# Item: 8

## Development and Infrastructure Committee: 8 June 2021.

## Hatston Pier – Proposed Extension and Reclamation.

## Report by Executive Director of Development and Infrastructure.

# 1. Purpose of Report

To consider a Stage 1 Capital Project Appraisal in respect of the proposal to provide a pier extension and reclamation to the existing Hatston Pier and area.

# 2. Recommendations

The Committee is invited to note:

### 2.1.

That, in April 2020, the Council approved the Orkney Harbours Masterplan Phase 1 as a Strategic Plan for the Statutory Harbour Authority.

### 2.2.

That one of the proposals contained within the Orkney Harbours Masterplan Phase 1 is to extend the existing Hatston Pier and carry out sea-bed reclamation to provide increased quay/storage areas.

### 2.3.

The Stage 1 Capital Project Appraisal in respect of the proposed extension of and seabed reclamation at Hatston Pier, attached as Appendix 8 to this report.

### 2.4.

That, should the project progress through the Capital Project Appraisal process, resources of up to £1,553,838 are required to produce the Stage 2 Capital Project Appraisal, which could be met from the Miscellaneous Piers and Harbours Fund.

### 2.5.

Options for the proposed extension of and seabed reclamation at Hatston Pier, as outlined in section 4 of this report, with the preferred option being to progress to a detailed Stage 2 Capital Project Appraisal.

### 2.6.

That, on 25 May 2021, the Harbour Authority Sub-committee recommended to the Development and Instructure Committee that the Executive Director of Development and Infrastructure should submit a report, to the Policy and Resources Committee, regarding funding required to develop the Stage 2 Capital Project Appraisal in respect of the proposed extension of and seabed reclamation of Hatston Pier.

**It is recommended:**

### 2.7.

That the Executive Director of Development and Infrastructure should submit a report, to the Policy and Resources Committee, regarding funding required to develop the Stage 2 Capital Project Appraisal in respect of the proposed extension of and seabed reclamation of Hatston Pier.

### 2.8.

That, subject to resources being secured, as an exception to the Capital Project Appraisal process, in order to ensure that progress with the proposed project is in line to meet the preferred developer announcement for the ScotWind off-shore leasing round due in early 2022, the Executive Director of Development and Infrastructure should submit, to the Policy and Resources Committee, a Stage 2 Capital Project Appraisal in respect of the proposed extension of and seabed reclamation at Hatston Pier.

## 3. Background

### 3.1.

On 17 March 2020, the Harbour Authority Sub-committee recommended that the Orkney Harbours Masterplan Phase 1 (OHMP1) be approved as a Strategic Plan. The Masterplan Phase 1 was subsequently approved by Council on 16 April 2020.

### 3.2.

One of the proposed projects contained within the OHMP1 is to extend the existing Hatston Pier and carry out sea-bed reclamation to provide increased quay/storage areas.

### 3.3.

Officers and consultants have worked on developing the proposal. Details regarding the proposed project are attached as Appendices 1 to 7 to this report.

### 3.4.

Due to the large-scale nature of this proposed project, it is proposed to report to the Development and Infrastructure Committee, as well as the Harbour Authority Sub-committee, to enable enhanced scrutiny.

### 3.5.

On 25 May 2021, the Harbour Authority Sub-committee recommended to the Development and Instructure Committee that the Executive Director of Development and Infrastructure should submit a report, to the Policy and Resources Committee, regarding funding required to develop the Stage 2 Capital Project Appraisal in respect of the proposed extension of and seabed reclamation at Hatston Pier.

## 4. Options Appraisal

The following options are available:

### 4.1.

Option 1 – do nothing.

#### 4.1.1.

The original construction of Hatston Pier and shore facilities was completed in 2002, with a pier extension added in 2012. Although as a pier it has proved popular, for general cargo work, oil and gas work and marine renewables, there has always been the limitation of no direct and quick access to quay areas. There are storage areas, but these are at least half a mile away from the main pier face – thus not being suitable for vessels that need or require quick turnarounds. Doing nothing will mean that these limitations will remain, and the overall use of the pier and surrounding area/s will be curtailed, leading to limited income and opportunity for the Harbour Authority to expand trade with a knock on effect to the Orkney economy and community.

### 4.2.

Option 2 – extend the existing pier and reclaim sea-bed to provide additional (close) quay/storage areas.

#### 4.2.1.

The OHMP1 and associated consultation document contain full details of the rationale behind the proposed works for this extension and reclamation project. The details contained in the Appendices to this report provide the engineering, environmental and economic results of in depth studies carried out over the last year.

#### 4.2.2.

The studies indicate that it should be possible to build an extended pier and reclaim approximately eight hectares of seabed at Hatston, noting that the reclamation is in relatively shallow areas.

- Environmental studies need to continue – at present there are no known serious problems, however, further studies will provide sufficient data and information which would form part of applications to Marine Scotland and the Council, in the event that the proposed project proceeds, in respect of planning permission, marine licencing and eventual construction. This is not, as such, part of the

Capital Project Appraisal process but as it requires a long-term data gathering exercise, it is worth noting at this stage.

- There is a good economic case in providing an extended pier and reclaimed areas.
- There are, in addition to the base details provided in Appendix 1a, a whole set of detailed technical drawings which further back-up the engineering feasibility study contained within Appendix 2. The proposed construction is for a sheet piled structure around the existing suspended deck pier. One of the important checks during the next proposed phase of this project is to check for any interaction between these two, ie wave and swell action, which has been allowed for in the estimated costs.

**4.2.3.**

The construction of the proposed extended pier and reclaimed land at Hatston would involve the importation (to site) of a large amount of suitable infill material. At present it is considered that there is sufficient capacity in Orkney to do this. One important piece of work during the next proposed phase of this project is to check that this is the case.

**4.2.4.**

The details and layout of the proposed extended pier and reclaimed areas at Hatston have been generated with close co-operation of many different industries and companies in order that it will be able to fulfil multiple types of use, including (but not limited to) a future proof ro-ro freight vessel berth, a boat lift-out facility, ex-pipe zero-carbon ship bunkering facility on the extended pier, an additional freight area ashore and further quay/storage areas close to the extended and existing pier in order to attract quick turnaround marine business. This in turn should lead to longer term storage operations on the existing land around Hatston and the real probability that hi-tech operation and maintenance offices and facilities for offshore wind being based at this site, linked to the ScotWind offshore wind leasing round announcement due in Q1 2022.

## 4.3.

The estimated cost of carrying out further studies, investigations and preparing all the necessary documentation for a Stage 2 Capital Project Appraisal is £1,553,838, as indicated in Appendix 7 to this report.

## 4.4.

Due to the positive overall economic effect, confirmation that the extended pier and reclaim areas should be able to be built, and the need to continue with environmental studies, it is proposed that Option 2 is the only viable proposal.

# 5. Links to Council Plan

## 5.1.

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

## 5.2.

The Orkney Harbours Masterplan Phase 1 relates directly to priority 4.4 – development of Scapa Flow and other Orkney Harbours for oil and gas activity and continue to diversify and grow all marine business activity, and to stimulate marine and non-marine employment.

# 6. 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 A Vibrant Economy.

# 7. Financial Implications

## 7.1.

The cost of developing the detailed Stage 2 Capital Project Appraisal has been quantified at a total cost of £1,553,838, to be incurred across financial years 2021/22 and 2022/23, comprising £750,000 for site investigation works in 2021/22, with the remaining split 50% between each of the two years, as indicated in the Appendices to this report. It is proposed that this is funded from Miscellaneous Piers and Harbours Account revenue budget utilising prior year accumulated reserves.

## 7.2.

As an exception to the Capital Project Appraisal process, in order to ensure that this proposed project remains in line with the expected announcement of preferred developers for the ScotWind offshore leasing round due in early 2022, consideration should now be given to submitting a Stage 2 Capital Project Appraisal to the Policy and Resources Committee.

## 7.3.

With a deficit budget of £404,800 approved for financial year 2021/22, reflecting the uncertainty that still exists around the impact of COVID-19 on the Miscellaneous Piers and Harbours Account in the year ahead, there is currently no capacity within the existing revenue budget to absorb this spending pressure.

## 7.4.

On the basis that the Miscellaneous Piers and Harbours Account carried an accumulated surplus balance position of £6,889,891 as at 31 March 2020, there is, however, scope to utilise prior year balances for this purpose. It is also notable that

while the approved budget for financial year 2020/21 was set to generate a surplus of £1,879,100 on the Miscellaneous Piers and Harbours trading account, the impact of COVID-19 has resulted in a significant shortfall in harbour dues income being realised for last financial year. In advance of the outturn position being finalised for financial year 2020/21, based on the Period 9 budget monitoring position which reported a shortfall of £3,047,300, a deficit of £1,168,200 is being forecast for the financial year end position. Taken together, this means that an accumulated balance position of approximately £5,316,891 is forecast as at 31 March 2021.

### 7.5.

In addition to the £1,553,838 required to develop the Hatston Pier project to the detailed Stage 2 Capital Project Appraisal level over financial years 2021/22 and 2022/23, a further £2,628,675 is also being sought in respect of a sister project at the Scapa Deep Water Quay. This can be summarised as follows:

| | 2021/22 | 2022/23 | Total |
|---|---|---|---|
| Scapa Deep Water Quay | £1,976,838 | £651,837 | £2,628,675 |
| Hatston Pier | £1,151,919 | £401,919 | £1,553,838 |
| Total | £3,128,757 | £1,053,756 | £4,182,513 |

#### 7.5.1.

It should be noted that these figures do not allow for the number of other Harbours related projects that are already in the Capital Project Appraisal pipeline and will require additional resources to be made available if they are to proceed.

### 7.6.

While uncertainty still exists around the actual level of harbour dues income that will be generated over the year ahead, overall, this still indicates that scope exists to use reserves to fund this spending, albeit the margins for risk will be significantly eroded. Beyond this, the underlying assumption remains that the Miscellaneous Piers and Harbours Account will return to a surplus trading position in financial year 2022/23 with a normal level of activity and associated harbour dues, but given the scale of these proposals, this does mean that the trading accounts ability to weather any storms in the years ahead and contribute financially to these or any other developments will be severely restricted.

### 7.7.

Any recommendation to vary the current approved revenue budget for the Miscellaneous Piers and Harbours Account in financial year 2021/22 in respect of this project will be as a spending recommendation to the Policy and Resources Committee.

## 8. Legal Aspects

There are no legal implications arising directly from the recommendations in this report.

## 9. Contact Officers

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## 10. Appendices

Appendix 1: Hatston Client Design Brief.

Appendix 1a: Orkney Harbours Masterplan Phase 1 – Hatston Location.

Appendix 2: Hatston Feasibility Study.

Appendix 3: Hatston High Level Costs and Phasing.

Appendix 4: Wintering Bird Survey Interim Report.

Appendix 5: Orkney Harbours Masterplan Phase 1 Economic Review.

Appendix 6: Tasks Completed and Milestones for Hatston.

Appendix 7: Stage 1 Capital Project Appraisal – Stage 2 Capital Project Appraisal Estimated Costs for Hatston.

Appendix 8: Stage 1 Capital Project Appraisal – Hatston Pier Extension and Reclamation.

# Hatston Pier and Reclamation

## Client Design Brief Report

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# Document Information

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| **Client Representative** | David Sawkins |
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# Table of Contents

# 1.0 Introduction

Following the adoption of the Orkney Islands Council Harbour Authorities (OICHA) Harbours Masterplan, Hatston Pier has been identified as a development which is to be progressed. The Hatston Pier development is for the design and construction of a further extension to the existing Hatston Pier, Kirkwall, Orkney, with significant reclamation behind the new and existing Pier. The new proposed extension shall have 350m of new berthing length at -10mCD and 10 hectares of land reclamation. Figure 1.1 identifies the proposed location.


*Figure 1.1 – Existing Hatston Pier Location*

The aim of this document is to provide the baseline agreement of the design information to be considered for the Hatston Pier development to allow for the design to be progressed through the feasibility stage. The feasibility stage design based on the agreed client requirements in this document shall also allow for an order of magnitude of cost for the whole project (and individual elements) to updated from the OICHA Masterplan, with any Optimism Bias (OB's) considered in this cost estimate.

The constraints and requirements to be considered during design and obtaining of consents shall also be outlined as well as an updated anticipated programme to completion.

This is a live document that will be updated as the design brief develops in conjunction with the client and stakeholders. This document may be updated following the conclusion of the feasibility design to inform further design development.

## 1.2 Design Development

No significant design change has been brought forward for the Hatston Pier development since the publishing of the OICHA Masterplan document. The Masterplan layout in presented below.

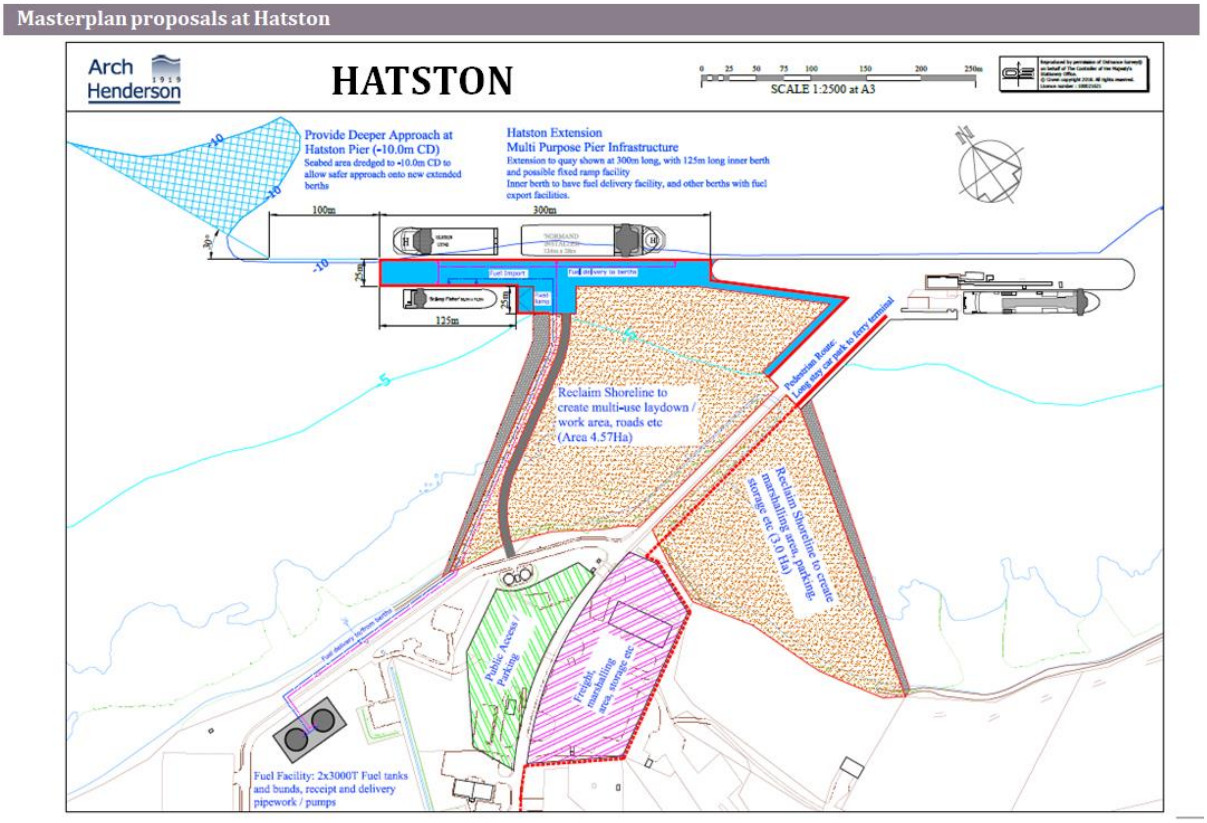



*Figure 1.2 – Proposed Hatston Pier Development*

One change out with the control of the project is the availability and cost of import material in Orkney to undertake land reclamation and quay infilling. The OIC quarry does not have the ability to supply material and has not had its licence to extend the current quarry approved. This may lead to prohibitive costs relating to infill material particularly for the reclamation areas identified at Hatston Pier. This shall be further scoped in the feasibility report.

# 2.0 Hatston Pier Outline Client Design Requirements

## 2.1 Design Vessels

The design vessels to be used for the feasibility study design and costing of the SDWP have been set out in the table below;

| Vessel Type (Name) | LOA(m) | Beam (m) | Draft (m) | Notes on Berthing |
|---|---|---|---|---|
| Service Operation Vessels<br><br>(Esvagt Njord) | 85.0m | 18.0m | 6.50m | |
| Supply Vessel<br><br>(Esvagt Server) | 72.0m | 16.50m | 6.30m | |
| Jack-up Barge (Thor) | 70.0m | 40.0m | 7.0m | May require top jack-up alongside |
| Cable Laying vessel<br><br>(Maersk Connector) | 139.0m | 27.45m | 6.25m | |

*Table 1. Design Vessels*

## 2.2 Tidal, Current, Wind and Wave Data

### 2.2.1 Tidal Data

The following tidal information has been derived from Admiralty Charts and has been utilised within the feasibility study design works. The worst case tidal data has been used.

All levels have been given to Chart Datum. At the Hatston Pier site, Chart Datum is 1.40m below Ordnance Datum at Kirkwall, Orkney.

| Tidal Data | Metres Chart Datum (mCD) |
|---|---|
| Highest Astronomical Tide (HAT) | +3.5mCD |
| Mean High Water Springs (MHWS) | +3.0 mCD |
| Mean Low Water Springs (MLWS) | +0.6 mCD |
| Lowest Astronomical Tide (LAT) | 0.0mCD |

*Table 2. Tidal Data*

### 2.2.2 Current Data

With reference to the Mott MacDonald report titled, 'Hydraulic Studies' dated June 2011, Section 2.2 highlights the current speed and direction data is reported in the 2001 Hydraulic

Study undertaken by HR Wallingford for the Hatston site. Within this document current speed is generally less than 0.1m/s with direction varying from east to west through south.

### 2.2.3 Wind Data

The Mott MacDonald report previously referenced uses site specific wind data collated at Hatston Pier over a 6-year period. From the report the wind rose highlights, 'strong dominance', of wind from the South both frequent and high magnitude winds occur from the West.

### 2.2.4 Wave Data

The HR Wallingford study referenced by the 2011 Mott MacDonald report highlights that the site is dominated by sort period waves generated through wind forcing across Wide Firth. The largest in magnitude and most frequent waves generally occur from 60 degrees either side of North. This is noted to correspond with the longest fetch.

Table 2.1: Extreme waves

| Wave | Return period (yr) | Hs (m) | Tz (s) | Tp (s) |
|---|---|---|---|---|
| Sea wave | 1 | 1.24 | 3.2 | 3.8 |
| | 50 | 1.63 | 3.5 | 4.2 |
| Swell | 1 | 0.43 | 10-15 | |
| | 50 | 0.96 | 10-15 | |

Source: 2001 hydraulic report

*Figure 2.1 Table of Extreme Waves. Source 2011 Mott MacDonald Report.*

A further wave study may be conducted by OIC, if appropriate to verify data above as it now dated in nature.

Dependant of the type of construction used at Hatston a further updated hydraulic study may require to be conducted prior to the commencement of construction.

**For more information relating to sections 2.2.2, 2.2.3 and 2.2.4, please refer to the Mott MacDonald report, 'Hydraulic Studies', Revision B, 2011.*

## 2.3 Water and Dredge Depths

The minimum quayside dredge depth is to be -10mCD on the main quay face. Dredging is not anticipated.

## 2.4 Quay/Berth Geometry

As noted in Section 1.2 the geometry and layout of the Hatston Pier development has not altered from the OICHA masterplan document.

### 2.4.1 Masterplan Location and Layout

The Masterplan layout for the Hatston Pier development is to extend the existing Hatston Pier by circa. 300m (with the option of a future 100m extension – timeframe not specified). This shall facilitate up to 300mm outer face berthing at -10mCD and 125m of berthing on the inner arm. Dredging to the west of proposed development is to be considered in order to facilitate safe navigational berthing approach.

The facility also included 7.5 hectares of additional land reclamation using imported fill and is presently based on rates from the local OIC quarry (see section 1.2). In order to undertake the reclamation as detailed, sheet piling is specified for the inner arm perimeter of the existing Hatston Pier to retain the material.

The Masterplan also considers a fixed ramp on the inner arm of the Pier extension and the possibility of providing a specialist boat lift. The boat lift is to have a minimum SWL of 800T with capacity to lift vessels of 40m LOA and 15m beam.

#### 2.4.3 Proposed Quay Deck Level

The proposed quay deck level is to match the existing Hatston Pier and is therefore to be +6.40mCD.

## 2.5 Navigation Risk Assessment

Navigational risk assessments do exist for the channel approaches into Hatston Pier. It is likely that a small update shall be required for the proposed Hatston Pier works and any new types of vessel likely to use the Pier as well as the dredging to west of proposed development is to be considered in order to facilitate safe navigational berthing approach.

## 2.6 Quay Deck Loading

#### 2.6.1 General Loading

For the main quay areas the deck universally distributed load (UDL) is to be 10T/$m^2$.

#### 2.6.2 Cranage / Specialist Loading Requirements

No abnormal loading or carnage loading is envisaged. The designer should account for standard mobile carnage and/or small static cranage.

## 2.7 Bollards

Bollards to be provided on the new proposed quay development are to match, as a minimum the existing Hatston Pier. It is understood that these are 80 tonne bollards.

## 2.8 Fenders

The fender line of the new pier is to align with the existing Hatston Pier. The fender system to be installed is to be similar to the existing and maintain the berthing line.

Fendering on the end face and inner arm may vary from outer face.

## 2.9 Quayside Services & Drainage

It is thought that much of the new services to the new quay and reclamation areas, as required shall come from existing network infrastructure however this shall require to be confirmed.

#### 2.9.1 Power

As a minimum 1Nr. shore power point (1000kVA) and a power supply for lighting requirements is to be provided.

Consideration to the existing sub-station capacity is required to be undertaken. The nearest exists at root of existing Hatston development next to Scottish Water storage tanks.

The existing power route is to be assessed and upgraded as required.

2.9.2 Lighting
Lighting options are to be assessed. OICHA would have a preference for lattice towers but high level lighting masts may be considered.

2.9.3 Water
100mm Water main is to be installed with an additional new water storage tank with a minimum capacity of 250 cubic metres.

2.9.4 Foul Water (Septic Tank)
To be confirmed.

2.9.5 Surface Water
Perimeter cut-off drains are to be allowed for in conjunction with standard SUDS systems for compliance with water management directives.

2.9.6 Surfacing and Water Collection
Concrete surfacing with quayside surface water drainage is required

In the rear yard area, hard-core surfacing and drainage is to be considered.

2.9.7 Gas Oil/ Fuels
Provision for a fuel berth is to be made on the arm of the Hatston development.

2.9.9 Local Service Network Information

## 2.10 Design Life

2.10.1 Quay Design Life
The design life of all quay structures is to be a minimum of 50 years.

2.10.2 Corrosion Allowance (Piling)
Additional corrosion protection systems may be considered however shall require to provide a minimum of 20 years design life until first maintenance.

## 2.11 Quay Laydown and Yard Areas

The following areas have been identified as potential reclaimed land yard areas for potential end-users of the SDWP development;

- Offshore Wind (Operation & Maintenance):
  Overall minimum requirements for an offshore wind Operation & Maintenance (O&M) base is 3,500 to 4,000m$^2$.
- Offshore Oil and Gas:
  A smaller area than that outlined for O&M for Offshore wind. Areas may be shared and/ or be multi-use.
- Aquaculture:
  To be moved away from the site utilising dolphins along coast. This is to be confirmed in conjunction with operators at a later date.
- Boatyard Facilities:

As per specification above.

- Warehousing and Offices:
  Warehousing shall be built within laydown areas, to be confirmed.

# 3.0 Design

## 3.1 Design Standards

All designs within the feasibility study and exemplar detailing are to be carried out to the latest applicable Eurocodes, associated National Annexes and relevant British Standards.

The design standards are to be maintained throughout the whole design process with any new codes and standards released in this design period to be considered by both the Client and Designer.

# 4.0 Consents

## 4.1 Environmental Consents

At the time of writing Envirocentre are currently completing an Environmental Screening and Scoping Document for Hatston Pier.

As a minimum it is anticipated that the following consent shall be required;

- Marine Scotland
- Crown Estates
- OIC Works Licence
- SEPA Discharge Consents
- No HRO is required under Orkney County Council Act (1974), Section 7. Orkney County Council Act 1974: section 7 of this Act provides that "*The Council may construct, place, maintain and operate in and over a harbour area such works as are required for or in connection with the exercise by them of any of their functions under this Act an may alter, renew or extend any works so constructed or placed.*"

## 4.2 Planning Permission

Planning Permission shall be required for the overall works.

# 5.0 Programme Requirements

## 5.1 Overall Project Programme

### 5.1.1 Masterplan Programme

No detailed programme was developed within the Masterplan. As part of the feasibility study it is anticipated that a programme shall be developed.

Orkney Islands Council Harbour Authority's main programme driver is that the development is operational by 2028. A draft of OICHA implementation plan for SDWP is included below, Figure 5.1.

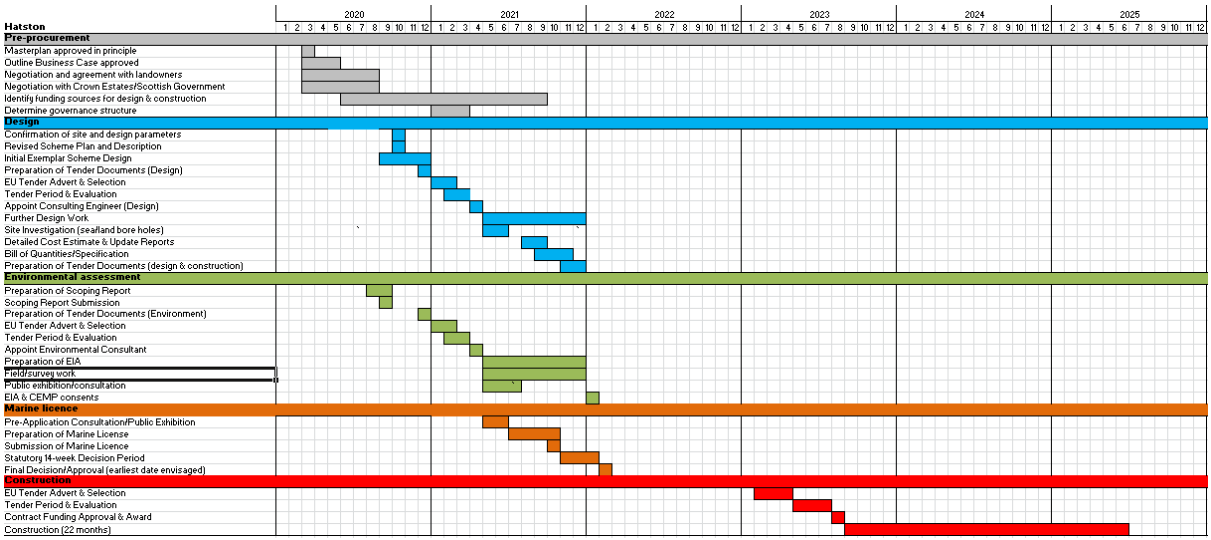



*Figure 5.1 OICHA Draft Implementation Programme for Hatston Pier Development*

### 5.1.2 Phasing

It is anticipated that works at Hatston on the reclamation(s), retaining elements and new pier shall be phased and this is to be set out in the Feasibility Study. To date, no phasing has been discussed but it anticipated that phasing shall ensure the most cost-effective design and construction is implemented.

# 6.0 Hatston Pier Project Budget

## 6.1 Masterplan Budget

### 6.1.1 Overall Budget

The overall project has not altered significantly between Masterplan and the start of feasibility reporting. At this stage the Masterplan cost remains valid. The Masterplan cost has been presented below in Figure 6.1

**Masterplan proposals at Hatston – high level cost estimate (£m)**

| Project component | Cost[1] | Contingency[2] | Fees[3] | Total (£m) |
|---|---|---|---|---|
| New deep water pier infrastructure (additional 250m quayside and water depth of -10m CD) including 4.75 hectares of reclamation | 33.850 | 3.385 | 2.465 | 39.701 |
| Additional reclamation of 3.0 hectares | 2.934 | 0.293 | 0.074 | 3.301 |
| Ex-pipe and fuel storage | 1.900 | 0.190 | 0.000 | 2.090 |
| Reconfiguration of freight marshalling, parking, pedestrian routes and public access | - | - | - | - |
| **Total (projects costed so far)** | **38.684** | **3.868** | **2.539** | **45.092** |
| Boatyard infrastructure (shiplift and facility) | *Cost will depend on what ground works are required and specification of shiplift and adjacent facility. Likely to be in region of £5m - £7m but cannot be estimated until a more detailed specification is provided* | | | |

- 1.Costs, as developed by Arch Henderson, are based on actual costs incurred on similar projects elsewhere. They are high level estimates and assume that each project is stand alone – should projects be grouped together then there may be savings through shared mobilisation and general item costs. Where a proposal is unlikely to be delivered by the Harbour Authority no cost estimate has been provided.
- 2. Contingency is assumed to be 10% construction risk and does not included Optimism Bias, which will still need to be assessed based on procurement routes finally chosen coupled with client knowledge of potential development constraints.
- 3. Consultant fees associated with design, feasibility and construction; excludes costs relating to HRO, legal aspects, EIA and VAT.

*Figure 6.1 Hatston Pier HLCE. Source: OIC Harbours Masterplan 2020.*

### 6.1.2 Optimism Bias

The above project cost does not account for capital cost optimism bias (OB), see figure 6.2. Within the Masterplan the OB for Hatston was set by the Engineering Consultants as 30%. The feasibility study, despite the sizable changes to the layout and design requirements shall aim to reduce the optimism bias.

**Summary results by proposal**

There are considerable uncertainties regarding the capital costs, particularly for Scapa Deep Water Quay. As the projects progress and more information from surveys and design work becomes available, these risks will be reduced as costs are refined. We have included Optimism Bias on the capital costs as shown below. **Even allowing for substantial escalation in capital costs, the proposals still return a positive economic NPV overall as summarised below**.

| Proposal (£000s) | Capital cost Base case | Optimism Bias | Capital cost (with Optimism Bias) | ENPV Base case | ENPV (with Optimism Bias) |
|---|---|---|---|---|---|
| Kirkwall Pier | 34,118 | 30% | 39,927 | £12.0m | £6.7m |
| Hatston | 45,092 | 30% | 52,828 | £68.0m | £61.1m |
| Scapa Pier | 12,988 | 30% | 15,187 | -£13.6m | -£15.7m |
| Scapa Deep Water Quay | 76,276 | 70% | 115,673 | £37.9m | £3.3m |
| All projects | 168,474 | | 223,615 | £106.9m | £58.1m |

The following page presents further details on the substantial positive impacts on GVA and employment.

*Figure 6.2 Hatston Pier HLCE with OBs. Source: OIC Harbours Masterplan 2019.*

# 7.0 Feasibility Study Deliverables

The Feasibility Study is the next phase of the project development to be undertaken in conjunction with the Outline Business Case (OBC). The feasibility study shall be presented in report form. The report shall be supplements with an exemplar design basis statement and exemplar design drawings. This document shall also sit in partnership of the feasibility study.

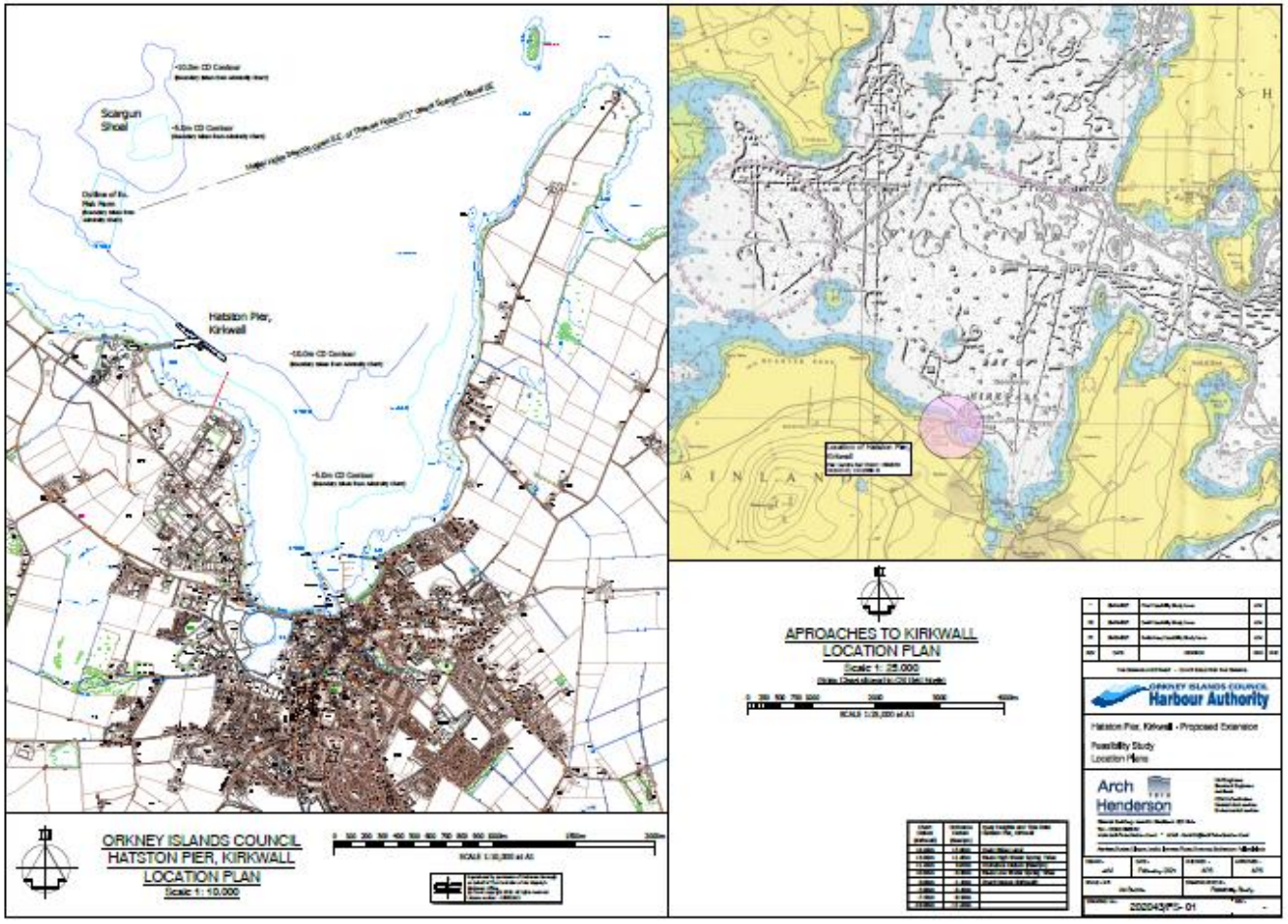
The key deliverables of the feasibility study are as follows;

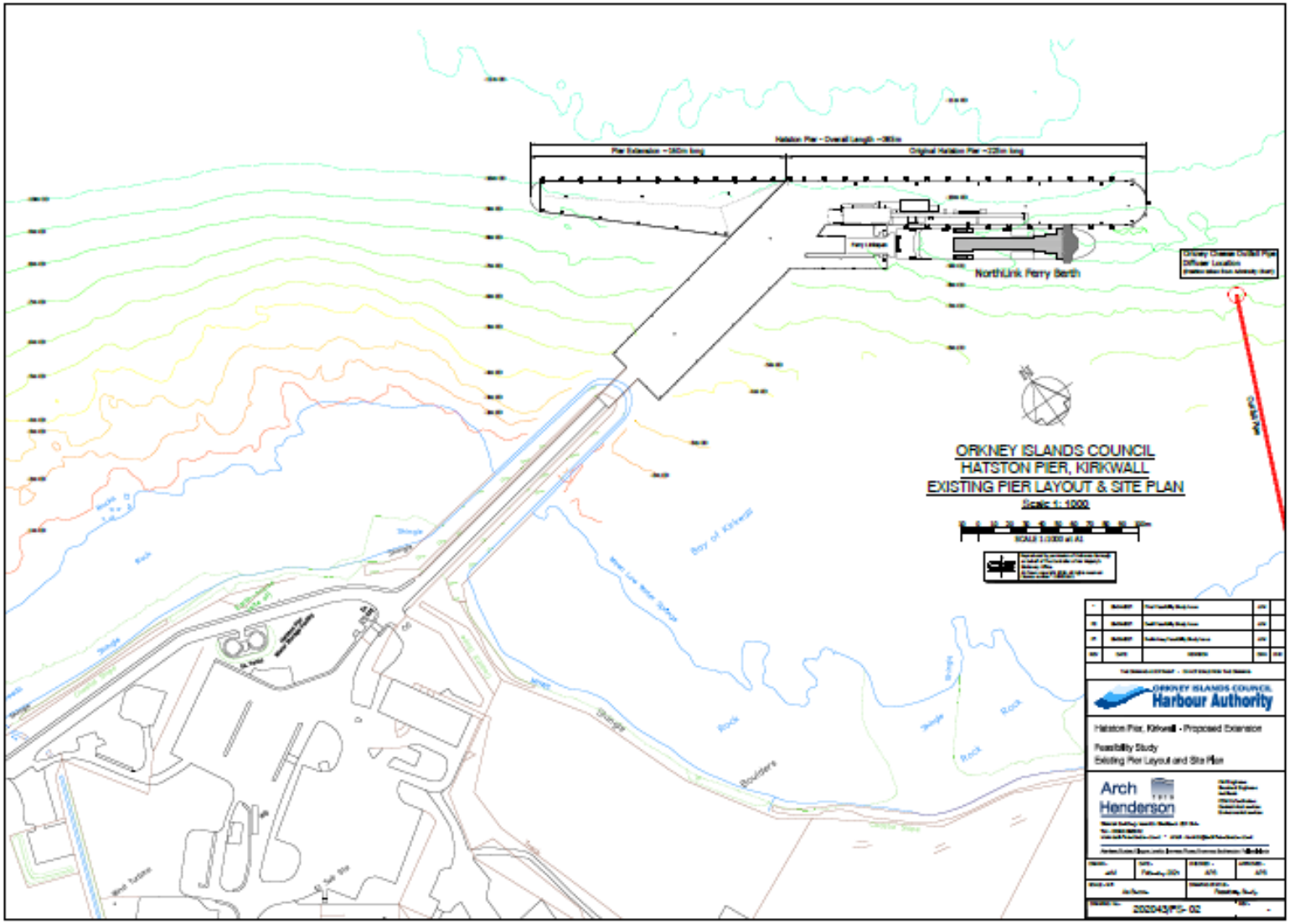
1. Provide an overall commentary on the Hatston Pier development for the consideration of OIC and OICHA.
2. Provide detail in the form of construction of the Hatston Pier development by undertaking exemplar design using the information available.
3. Provide an exemplar design.
4. Provide exemplar design drawings for the development
5. Provide detail on overall project budget, to aid Economic Assessment.
6. Provide an outline programme for procurement and the preferred procurement route.
7. All feasibility study details required for the outline business case to be supplied as required.
8. Based on the findings and outcomes of the feasibility study, provide recommendations on the potential project procurement routes and Contract Forms for construction.

# 8.0 Appendices

Appendices:

**Appendix 1a:** Orkney Harbours Masterplan Phase 1 – Hatston location plans



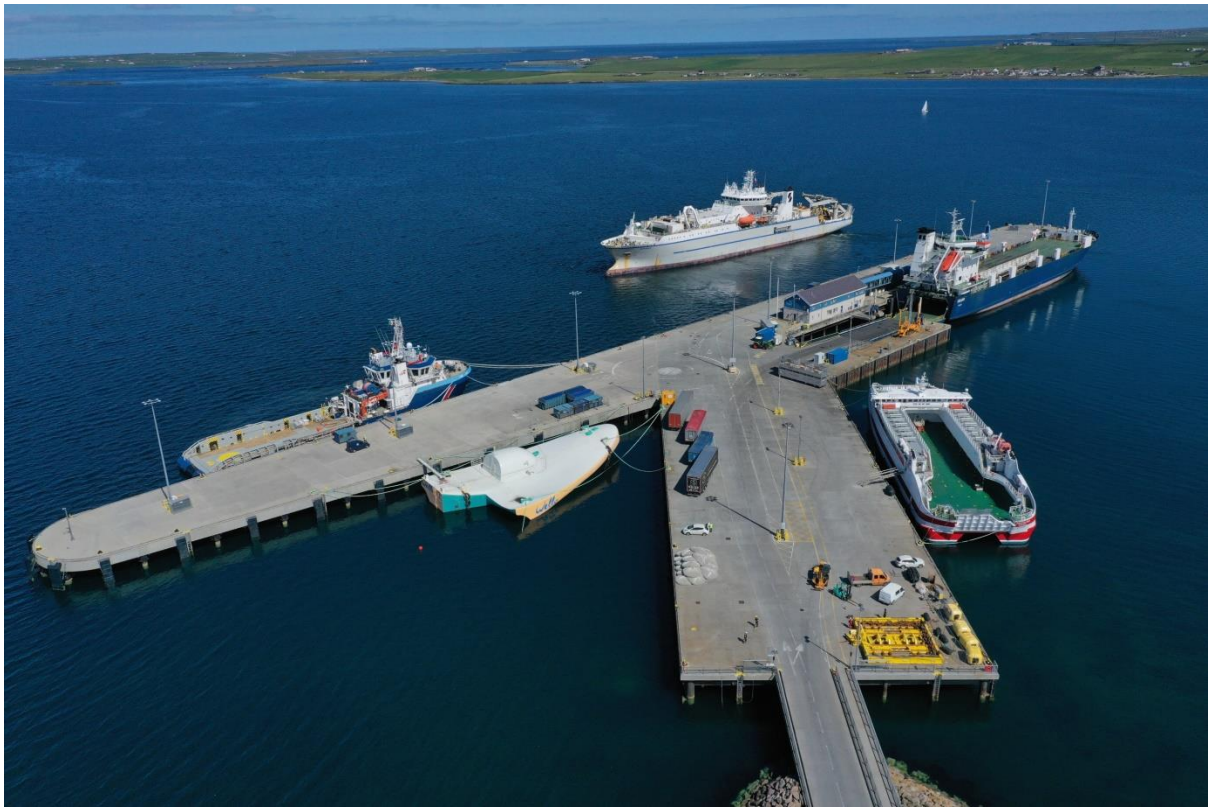



ORKNEY ISLANDS COUNCIL
HATSTON PIER, KIRKWALL
EXISTING PIER LAYOUT & SITE PLAN
Scale 1: 1000

# Hatston Pier and Reclamation

## Feasibility Study

## Report

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# Table of Contents

## List of Tables and Figures

# 1.0 Executive Summary

The Orkney Harbours Masterplan Phase 1 (Masterplan Ph1) identified that the existing Hatston Pier required further development in order to meet the changing requirements of the existing and potential marine operations in the surrounding Orkney area.

Within this Feasibility Study the extension of the existing Hatston Pier has been broken down into phased work packages that help to inform future procurement, programming options and funding revenue streams. This Feasibility Study sets out the required operating parameters, sets out and explains the exemplar project design engineering and cost and risks associated with the overall project. Finally, this Feasibility Study discusses procurement methods to reduce current engineering uncertainty and associated cost risks. This includes procuring full Site Investigation (SI) and Wave Studies to complement the Exemplar Design as a priority and before the Orkney Islands Council's (OIC's) requirement to commit to further Professional Services to undertake the next phases of design and procurement.

The Hatston development in its proposed layout delivers an additional 320m of new outer berthing, which extends the overall outer berth to a significant 671m in length, 125m of sheltered inner berthing, a fixed ramp and 800T boatlift. The Exemplar Design has been chosen and engineered to provide suitable deck load capacity of between 5 and 10 tonnes/$m^2$ but more importantly to provide an extensive laydown area required by current industry stakeholders.

Please refer to the appended drawing package prepared by Arch Henderson as part of the Feasibility Study which shall act as visual supplement to this report.

In addition to this document and supplementary information appended, all users should also refer to the Economic Assessment prepared by Fisher Associates and the Environmental Scoping Document and opinion(s) prepared by EnviroCentre.

# 2.0 Introduction

## 2.1 Overview

Following Orkney Islands Council (OIC) approval of the Orkney Harbours Masterplan Phase 1, Hatston Pier was identified as a development to be progressed. The Hatston Pier development involves the design and construction of a further extension to the existing Hatston Pier, Kirkwall, Orkney, with significant reclamation behind the new and existing Pier. The proposed extension will have 315m of new berthing length with water depth of 10m below Chart Datum (CD) and close to 8.5 hectares of land reclamation. Figure 1.1 identifies the proposed location.


*Figure 1.1 – Existing Hatston Pier Location*

The Feasibility Study is a holistic assessment of all aspects of the Hatston Pier capital works and aims to set out the most efficient and effective means of progressing the project. This report sets out the findings of the Feasibility Study and provides commentary on the works undertaken by Arch Henderson to complete the study and conclude.

# 3.0 Client Requirements and Design Criteria

The requirements of the Orkney Islands Council Harbour Authority (OICHA) as the client have been fully captured in the Client Design Brief document. This document shall act as a supplementary 'live' document to the Feasibility Study report. The Client Design Brief was collated at the start of the Feasibility Study to act as a baseline and inform the overall study in more detail when moving from the Masterplan Ph1 phase. Additionally, the document has been further revised throughout the Feasibility Study as the client requirements evolved and/or the study presented findings which fundamentally improved or altered the requirements of the overall scheme.

The client requirements document at the date of completion of this Feasibility Study has been captured within the study as far as reasonably possible. As the projects moves through the pre-construction procurement phases this document may evolve from the baseline requirements presented.

The Economic Assessment is being prepared in parallel with this Feasibility Study by Fisher Associates. The Economic Assessment report and information contained within this study should be read in conjunction.

# 4.0 Masterplan Phase 1 (Ph1) Engineering Development

Since the adoption of the OIC Harbour Masterplan Ph1, the overall concept and business case for Hatston Pier in the Economic Assessment presented in conjunction with this Feasibility Study has not altered considerably. The proposals presented in the Feasibility Study from the Masterplan Ph1 at Hatston are developments built on through on-going dialogue between Arch Henderson, OICHA, and wider project team and stakeholders.

The main project developments which have been further defined since the Masterplan Ph1 adoption and are considered in more detail within this feasibility study are listed as follows;

1. *Breakdown of the Works ('Works 1 to 3')*
   The overall project at Hatston has been broken down into three 'Works' sections. The phases and numbering provided to each should not be taken as a sequencing of work. The stages are to provide clarity on each area of works in design, costing and presentation with each offering a differing opportunity to OICHA. Each 'Works' package could be carried out independently of the other package(s) dependant on OICHA requirements, end-user interest / investment and budget.
2. *Solid Quay Construction v Suspended Deck*
   Solid sheet pile construction has been selected ahead of a potential suspended deck solution which is utilised at the existing Hatston Pier and Extension. The Steel pile design selection is in principle driven by the requirements to have extensive hardstanding immediately to the rear of the new development. Further commentary is provided in Section 6.0.
3. *Vessel types*
   The vessel types have not significantly varied since Masterplan Ph1 phase, with the exception to the inner berth Ro-Ro cargo vessel. The inner berth has been amended to accommodate the P-Series Ro-Ro vessel identified to potentially be used on the Aberdeen-Kirkwall-Lerwick route in the future.
4. *Boat Lift*
   The proposal of up to an 800T boatlift has been proposed by OICHA since the completion of the Masterplan Ph1 and has been included within the Feasibility Study.
5. *Marine Aquaculture Facility*
   During the Feasibility Study, OICHA has engaged with industry regarding the potential for a specified vessel berth to allow the Aquaculture industry to create a processing facility onshore via a pumping system at the designated berth. This option was partially developed as an integrated add-on to the Works 3 boatlift area but after further review OICHA has indicated that it is not feasible at this stage, and therefore not carried forward at present.

# 5.0 Site Selection and Locations

Since the publication of the Orkney Harbours Masterplan Ph1, despite the developments noted in Section 4.0, the site location has not altered from the original Masterplan Ph1.

Only one issue on location has been raised. This relates to the fish farm to the north of the site and its locality to the proposed extension / dredging. It is understood the fish farm is on a planning application / licence. Discussion with the site operators shall be required at some stage.

# 6.0 Exemplar Design and Commentary

## 6.1 Codes and Standards

The Exemplar Design elements undertaken at this Feasibility Study stage have been carried out in line with all up to date Eurocodes, British Standards and supplementary National Annexes and industry best practice.

Elements of the main quay wall design have been undertaken utilising Arcelor AMRetain and PLAXIS 2D finite element modelling software. Only the primary marine elements for the Feasibility Study have been considered in the design at this stage within the computational model.

## 6.2 Existing Hatston Site

The existing Hatston site and Pier is formed of a narrow causeway out to the main T-shaped quay. The existing pier and the extension are a suspended deck construction on tubular piling and a wave screen installed.

The existing structure at Hatston provides a single Ro-Ro berth for the Aberdeen-Kirkwall-Lerwick ferry service on the inner South-East arm. The main quay face has a berthing depth of circa -10mCD and provides infrastructure for larger supply vessels and cruise vessels. The inner North-West arm is utilised by smaller works vessels. It is understood that most of the quay is design for $10T/m^2$.

Services are provided to the existing quay infrastructure and they will be considered for extension, or inclusion on the new scheme as appropriate.

It is understood that one of the main issues with the existing quay infrastructure is the access and locality of required shore-side infrastructure to support the operations. As the quay has been constructed from a causeway to access the deeper water the shore-side infrastructure is located a significant distance from the quay and therefore vessels. This is one issue that the proposal in the Feasibility Study aims to remove.

## 6.3 Site Layout and Works Description

The proposed development being considered within this Feasibility Study is to the north and south of the existing causeway and root of the existing Hatston Pier. The proposed site layout and works aims to provide the following as a minimum;

1. Extension to the main outer quay face with a minimum design dredge depth of -10mCD and UDL deck load of $10T/m^2$ on the outer face.
2. Provide continuity between the existing and proposed developments.
3. Provide reclaimed land for shore-side support directly to the rear of the existing quay and proposed quay works.
4. Provide Improvements to the existing HGV parking for Ro-Ro operations.
5. Provision of a fixed ramp for upgrades in lifeline Ro-Ro vessels.
6. Provision for future fuels.
7. 800 Tonne capacity boat lift and laydown area.

The above list is not exhaustive and is flexible and adaptive dependant on the end-users / operators identified by OICHA at present and in the future.

The 'Works' phases highlighted below, as previously stated, should not be considered as consecutive phases of works. The works packages set out allow for the proposals to be broken down offering a flexible solution which can be adapted to suit the OICHA requirements, budget, programme and the like. Each phase could be carried out independently of the others but would offer advantages to the follow-on phases if planned and considered in a constructive manner.

6.3.1 Works 1

Works 1 is located to the South of the existing causeway and can be further understood in drawing AH202043FS-10 within the appendices.

'Works' 1 is predominately an earthworks reclamation project. The reclamation shall aim to provide a total of 3.0 Hectares of hard-core surfaced marshalling / storage area with primarily a rock armour revetment. Additionally, the reclamation shall provide a HGV Trailer Park for the Ro-Ro service. This area shall be reinforced concrete slab suitable for HGV Traffic. To allow extended access to the existing quay a sheet pile return is proposed to allow a retained interface to the suspended deck is to be created. It may be prudent to consider this steel pile return element in conjunction with the mobilisation of marine plant for Works 2, if possible.

6.3.2 Works 2

Works 2 is located to the north of the existing causeway and interfaces with the existing suspended deck. Works 2 is set out within the appendices, specifically AH202043FS-20.

The marine works is to include the following and details of the design are within Section 5.5 of this report. A steel sheet pile wall is to interface with the alignment of the existing suspended deck on the north-west inner faces. The steel sheet pile is then continued along the main outer face for circa. 300m with a 25m return and an inner berth to facilitate the proposed Ro-Ro berth and fixed ramp.

The reclamations are to be retained by the constructed steel sheet pile walls creating an estimated laydown are of circa. 8 Hectares. Rock armour will bound the reclaimed land to the west.

The main quay areas are to be designed for 10T/$m^2$, and the inner arm return for 5T/$m^2$. The main deck areas shall be reinforced concrete slabs. The remaining 3.71Hectares marked as storage shall be hard-core surfaced.

6.3.3 Works 3

Works 3 is located to the North-West of proposed 'Works 2' and is proposed to include a 1.5 Hectare reclamation area for yard / storage and an 800T boatlift.

The marine works shall be to extend from the Ro-Ro fixed ramp at the Works 2 interface and create 2Nr. pile lines to create access for an 800T boatlift and ancillary yard space to the rear which shall be reinforced concrete pads designed for the boatlift wheel-loads.

The reclamation for extra yard / storage shall be protected by armour stone to the existing foreshore. All details are shown on Arch Henderson Drawing AH20243FS-30.

6.4.3 New Roads and Re-Alignments

New access roads to each of the works phases and also re-alignment (roundabout suggested and shown at this stage) of the existing roads to accommodate the new access roads has been proposed. The access roads shall be developed as and when each of the works packages is progressed by OICHA. The re-alignment could be considered as enabling work with new junction heads formed to each works stage in advance. It is likely road access requirements and re-alignment(s) of the existing shall be progressed in conjunction with the OIC Roads Department at the next phase.

## 6.3 Rock Infill Material and Reclamation(s)

The Exemplar scheme presented within this Feasibility Study is based on the principle of reclaiming significant areas of the foreshore to creating hardstanding areas to provide access and support to the proposed quay extension.

The suitable infill material required to be placed in the sea requires to be imported from an external source. The Masterplan Ph1 and budget therein assumed the fill material would be provided by a combination of OIC-owned Cursiter Quarry and Orkney Aggregates Heddle Quarry which are 7.0km and 9.5km from the Hatston site, respectively. A potential further source could be from excavation of the area to the rear of the proposed Scapa Deep Water Pier Development and transported to Hatston. Discussion on this can be found in Section 10.0

Preliminary Volumes of infill material required for each Works phase is set out in the table below;

| | Works 1 | Works 2 | Works 3 |
|---|---|---|---|
| Infill Volume ($m^3$) | 197,800 | 440,500 | 101,000 |
| Hard-core Infill Area ($m^2$) | 29,830 | 33,775 | 19,850 |
| Rock Armour ($m^2$) | 5,238 | 2,603 | 3,450 (all armour recovered from Works 2) |
| Dredge Volume ($m^3$) | - | 6,650 | - |

*Table 1. Cut and Fill Volumes*

## 6.4 Main Quay Design

6.4.1 Overview

The quay is to be solid construction with the main outer berthing face positioned on, or as closely aligned to, the -10mCD contour. This quay alignment has been driven by the factors relating to the client and end-user requirements, namely;

- Maintain alignment with existing Hatston Pier;
- UDL of 10T/$m^2$ on outer and existing to proposed interface;
- 5T/$m^2$ UDL has been designed for on the inner, proposed Ro-Ro berth;
- The deep water quay at -10mCD to match existing;
- The quay's proximity to land / storage.

During this Feasibility Study phase, Arch Henderson has given much consideration to design efficiency and value engineering options to achieve the requirements of OICHA and is further presented in the Risk and Opportunity section of the report. In terms of the main quay structural elements the feasibility design considers the construction options (continuation of suspended quay or solid quay construction) and the 10T/$m^2$ UDL with a minimum dredge depth of -10mCD and budget costs associated.

The main design elements have been analysed using Arcelor AMRetain and checked on Plaxis 2D at a high level. The analytical models used existing SI information available from previous Hatston quay works in tandem with correlated engineering judgement / marine construction experience to fill the gaps in knowledge that existed in the SI.

6.4.2 Main Quay Structural Elements

The main construction elements of the Hatston Exemplar Design proposed the main quay walls and tie-in are constructed of AZ52-700 (X70) steel sheet piles with a upper level tie rod positioned just above mean low water springs. The main steel sheet pile (SSP) wall has been considered in three sections at this stage to fit with constraints and requirements of the proposed site layout; Tie-In SSP, the balanced anchorage SSP wall and SSP cofferdam finger. All works are design for a 10T/$m^2$ or 5T/$m^2$ UDL and a cope level has been taken as +7.0mCD.

1. Tie-in SSP
   The tie in steel sheet pile wall has been proposed to interface with the suspended deck cope and create a retaining element to allow fill to be placed at the rear. The tie in wall is to be AZ52-700 SSP with a M120/90 (ASDO 500) tie rod at +1.0mCD back to a rear anchor wall. The AZ52 pile has a 0.75m toe into the hard strata and is proposed to be supported at the head during construction from the existing Hatston Pier cope. Please refer to AH202043FS-23 & 24 for further information.
2. Balanced Anchorage
   The balanced anchorage wall shall be a similar in construction elements, AZ52-700, M120/90 at +1.0mCD to a rear anchor wall but no restraint is considered at the head as it is not available on the main quay wall. On the main quay wall, the Exemplar Design proposes to pre-treat the hard strata to fragment the rock and vibro-pile to achieve a minimum of 3m depth into the rock strata. The pre-treatment of the rock strata is discussed in the Risks and Opportunities section. Please refer to AH202043FS-23 & 24.
3. Tied Cofferdam
   A tied cofferdam is to be used to create the finger pier forming the remainder of the main outer quay and the inner proposed Ro-Ro berth to the fixed ramp. The tied cofferdam shall be constructed using the 3m pre-treated trench with AZ52-700 SSP

with a cross tied tie rod at +1.0mCD spanning from each quay face. Please refer to AH202043FS-23 & 24 for details.

A solid quay construction has been selected as it offers retained height support of fill material to construct a quay facility with large areas of reclamation immediately to the rear.

At future scheme design and value engineering stage then the tied cofferdam finger pier proposal may be considered as a tubular piled suspended deck if suitable configuration and alignment can be made more efficient than the current solid quay proposal.

An allowance for cathodic corrosion protection of steel piles is included in proposals.

Please refer to the Arch Henderson Exemplar drawing package produced for the proposed Hatston scheme within the appendices.

6.4.3 Dredging

To achieve the -10mCD depth at the quay face then some minor dredging has been specified at the berth and on the approach to the berth, as can be seen on AH Drawing AH202043FS-20. The dredge volumes have been identified in the table above, Table 1. These values and confidence in the dredging approach shall be further known when a marine site investigation is completed. At this stage it is assumed the dredge material shall be utilised within the development and no offshore dumping shall be required and therefore no waste created. If any dredge material is deemed unsuitable for reclamation works then OIC have designated licensed offshore disposal sites that would need to be utilised.

## 6.5 Ancillary Quay Equipment

5.5.1 Bollards

Bollards are generally shown as 80T bollards at 22.40m centres along the main quay faces to match the existing Hatston Pier.

6.5.2 Fendering

It has been agreed for the feasibility design that fender panels shall be used in order to maintain the berthing line between the proposed and existing Hatston Pier(s).

6.5.3 Lighting

The requirement for lighting across the facility is important but should not cause light pollution outwith the site or over the quay edge as far as possible. The lighting is to be similar to that already employed at Hatston.

## 6.6 Construction Method Statement

Arch Henderson has prepared a brief outline construction method statement of how the Hatston works could be constructed. Our method statement set out is based on our experience of works of a similar nature being successfully constructed in the Northern Isles.

6.8.1 Overall Site

The primary principal of creating development land (yard / storage areas) is to ensure the quays, existing and proposed, are supported by land immediately to the rear to improve the current layout of the Hatston Pier and industrial areas.

Initial construction could commence to upgrade the access road(s), however this could be constructed during any phase of the development to improve the traffic flow to-and-from the existing and proposed sites.

6.8.2 Works 1

Once sufficient and suitable material source is located, the Works 1 reclamation shall commence with inert fill material delivered to the site by road or sea and placed from the existing foreshore to the proposed rock armour revetment alignment.

The slope face would have geotextile placed as the bund is progressed in order to mitigate the migration of fines followed by the placement of secondary and primary rock armour on the final alignment. A silt boom would also be employed to minimise contamination.

The marine piling required to form the increased access opportunity to the existing Hatston Pier shall be carried out in the same manner as Works 2 (please refer to below). We would envisage the piling works to undertaken at the time of mobilising Works 2, if possible, to remove any large mobilisation costs related to marine plant and piling.

Suitable vibro-treatment of all fill material shall be undertaken to compact and reduce future consolidation and settlement (H-pile on vibro-hammer). This treatment is an important aspect and future contracts will need to programme and allow adequate resources to ensure and minimise future risk of differential settlement. In the area of the HGV trailer park the concrete deck shall be placed (generally no less than 6 months after fill takes place) with remaining reclamation and laydown area capped and compacted with graded hard-core surface with falls to V ditch and French drains. The vibro treatment and compaction of all reclamation and quay core fill material is a very important engineering requirement to minimise, as far as possible, future differential settlement and this aspect of construction contract planning must be well programmed and adequately resourced.

6.8.3 Works 2

Once sufficient and suitable material source is located, the works 2 reclamation bund shall commence with inert fill material delivered to the site by road or sea and placed and slope protected from the existing foreshore parallel along north side of existing approach mole to the rear of the existing Hatston spur to allow piling works to commence and act as a platform for working and access. Once this reclamation perimeter bund is formed then this shall provide the main land route to access the quay works construction site for labour, plant and construction materials.

It is envisaged that the interface steel sheet piling between the proposed works and the existing pier shall commence first, working seaward to the main berthing line wall. The interface piling is to AZ52-700 steel sheet piles with a balanced anchorage rear anchor wall tied with tie rods. Due to the proximity of the existing tubular piles, all steel sheet piles shall be vibro-driven to refusal into the hard strata. As the piling progressed the reclamation fill shall advance behind thus affording additional sea fetch protection together with added silt boom used to shore. This principal shall be used throughout the whole of works 2.

Once the main quay berth face is reached the method of installation of the sheet piles shall be via a pre-treated fragmented rock trench to a minimum of 3m and the piles vibro-piled within 24-48 hours of the fragmented rock trench being formed. The cofferdam phase of the works forming the arm and inner berth shall require both sheet pile walls to be advanced prior to any filling works.

Once suitable vibro-treatment of quay fill has been undertaken to compact and reduce future consolidation and settlement (H-pile on vibro-hammer) then concrete deck immediately behind quay face will be placed (generally no less than 6 months after fill takes place) with remaining reclamation and laydown area capped and compacted with graded hard-core surface with falls to V ditch and French drains. The vibro treatment and compaction of all reclamation and quay core fill material is a very important engineering requirement to minimise, as far as possible, future differential settlement and this aspect of construction contract planning must be well programmed and adequately resourced.

#### 6.8.4 Works 3

The proposed boatlift is proposed to be a tubular pile construction, and would be constructed from the reclamation areas created in Works 2. Circa. 1.0m tubular steel piles with steel pin toe for the boatlift walls are anticipated to require some pre-treatment to enable suitable pile axial load capacity and toe fixity below the seabed overburden. Tubular piles and sheet piles are expected to be vibro-hammered to the required depth. Impact hammers are anticipated for proving set on tubular piles. Piles will then be filled with tremie concrete, tie rods installed for lateral stability and secured between front face of boatlift dock and rear sheet pile wall and concrete cope formed.

The Works 3 reclamation would be formed as prescribed in Works 1 and Works 2 above.

## 6.7 Design Development and Information

In order to progress the design beyond Exemplar Design, the following investigation, studies and reports shall be require to be carried out as a minimum. The suggested informational requirements are not definitive or exhaustive.

#### 6.7.1 Site / Ground Investigation

Despite the existence of marine site investigation at Hatston, the data is not in the areas proposed for development and therefore a marine SI campaign shall be required.

To further inform the design and to proceed effectively with design development rock depth and quality information are required.

All design development to date within the exemplar detailing has used the existing SI correlated against our engineering knowledge having conducted the design works for the existing Hatston Pier, using other freely available information against previous Arch Henderson works and utilising our marine design experience.

#### 6.7.2 Wave Study / Hydraulic Modelling

Several hydraulic and physical modelling exercises have been conducted for the existing Hatston Pier by HR Wallingford and Mott MacDonald, respectively. The Mott Macdonald

study highlights a 1 in 1 year return wave height of 1.24m and a 1 in 50 year return wave height of 1.63m.

A more detailed wave study and desktop modelling should be conducted which considers the geometry of the proposed Hatston quay extension and in particular the effects of transitioning from a suspended quay to a solid quay. The study should consider elements of the proposed design such as quay shape, quay construction type, wave reflection etc.

### 6.7.3 Navigational Risk Assessment

It is our understanding at this stage that given the operations that currently take place in Hatston Pier that a navigational risk assessment (NRA) does exist for the wider area. It would be anticipated that this is extended to include the new proposed Hatston development and navigational approach for the specified vessels at an appropriate time.

The navigational risk assessment has not been looked at in any further detail at this stage apart from that it is a factor that shall require to be considered in the future development of the project.

### 6.7.4 Berthing and Mooring Study

A berthing and mooring study should be considered as part of the design development as the project progresses. Berthing and mooring was considered as part of the Hatston studies conducted by Mott MacDonald. Our anticipation would be that this study is extended and updated for the new development at an appropriate time. The study shall be linked to both the wave study and the NRA. Given the variation in size and operational requirements / loads of the vessels proposed at Hatston it would be prudent to ensure the quay and ancillary infrastructure design are suitable. The study would inform the loading placed on the infrastructure for inclusion at the detailed design phase as well as ancillary equipment design, such as bollards and fenders.

### 6.7.5 Detailed Design Development

The development of the detailed design for Hatston shall be dependent on the procurement route decided upon and the timeframes for procuring the above studies. The detailed design development shall aim to further detail the scheme and gain further certainty on budget and buildability.

# 7.0 Service Provision

This section aims to set out the availability for service provision to the extended Hatston Pier facility from the current Orkney network and the information gathered to provide provision to the facility during the Feasibility Study

7.1 Power

1Nr. shore power point (1000kVA) has been allocated along with quayside and storage area lighting. All positions are to be agreed on the quayside.

At the next phase(s) the capacity of the existing sub-station will need to be ascertained. The existing sub-station is located at the root the existing Hatston Pier entrance next to the water storage tanks owned by OICHA. If sufficient capacity is found the power cables will need to be upgraded and linked to the new development.

Arch Henderson has assumed at this stage that capacity does exist at Hatston.

7.2 Fresh Water

A 100mm water main has been included within the works from the existing OICHA storage tank positions. An additional 250 cubic metre tank is also to be located at the existing location to increase capacity.

7.3 British Telecom

BT is assumed to be located down the existing Hatston Pier. This is to be located. A new connection or extension to the existing can be investigated as required and at the appropriate stage.

7.4 Foul and Surface Water

Quay and yard area drainage has been indicted on the exemplar Arch Henderson drawing and included for within the budget cost plan, both appended to this report. All surface water shall require a level of treatment via a SUDS device and filtered to a new sea outfall.

No foul water sewage disposal has been included within Hatston development at this stage.

7.5 Future Fuel Provision (Hydro-carbon Provision)

Gas Oil and a fuel delivery facility has been included within Works 2 of the proposed Hatston Development and costs estimated.

The provision of a fuel facility future-proofs any opportunity presented by industry to OIC(HA) in providing a berth with vessel future fuels.

# 8.0 Programme

An updated programme has been prepared for the project in line with the feasibility works undertaken. The programme has been split into two; overall project and procurement programme which features the next works elements following completion of this phase.

Key dates have been highlighted in the table below. For a full breakdown please refer to Appendix 2.

| Project Milestone | Time to Complete (Months) | Planned Completion Date |
|---|---|---|
| Completion of Exemplar Design | 5 | Q2 2021 |
| Site Investigation | 9 | Q1 2022 |
| Appointment of Consultant | 7 | Q2 2022 |
| Detailed Design | 12 | Q2 2023 |
| Tender of Construction Works | 4 | Q3 2023 |
| Award of Contract | 3 | Award – Start Q1 2024<br>Site – End Q1 2024 |
| Construction Works | 30 +<br>(12 months float) | Q3 2026<br>(Float to Q3 2027)<br>*All Works Packages* |
| Environmental Assessments | 18 | August 2022 |
| Consents (e.g. Marine Licence) | 12 | December 2022 |

*Table 2. Key Project Dates*

With reference to the additional Site Investigation required, highlighted in the Programme above, Arch Henderson would recommend that this may be considered prior to tendering and appointing Lead Consultant Services. For more information please refer to Section 11 on Procurement Routes.

# 9.0 Updated Budget

An updated budget cost has been collated in line with the Feasibility Study work and the Exemplar Design. The budget provided is aligned to the drawings presented and is appended in Appendix 3. The budget presented with this report for proposed Hatston Pier project should not be compared to the original Masterplan Ph1 budget due to the developments and evolution of the project from the Masterplan Ph1 phase, as detailed.

Contingency sum allowance of 10% has been applied to all cost totals*.

** It is worth noting at this stage no allowance to costs have been made based on the Global COVID-19 Pandemic or the effects of Brexit. Both of which shall have some effect on overall project budgets but is not yet quantifiable.*

Optimism Bias percentage requires to be applied to all cost estimates depending on stage of procurement.

Risks and Opportunities are highlighted in Section 10 below. This section highlights areas which are foreseeable at this stage that may present cost savings or escalations relating to the project and any intrinsic effect this may have on programme and overall project.

As previously highlighted the Feasibility Study is being prepared in conjunction with the Economic Assessment, undertaken by Fisher Associates. The capital works project budget appended should be read in conjunction with the Economic Assessment report.

# 10.0 Risks and Opportunities

This section of the report shall set out the engineering risks and opportunities identified by Arch Henderson within this phase of work. The risks and opportunities to be discussed below shall likely have a, potentially significant, impact on Cost and Programme of the project.

## 10.1 'Works' Phasing

Arch Henderson has proposed the Hatston Development in 'Works' phases, primarily for the purpose of breaking the overall development into manageable packages. Phases have been identified to meet with project and client requirements and also 'type' of construction works required. The 'Works' numbering system should not be read as a natural order for works to be completed. Phasing also allows for budgeting, programming and interfaces of the overall project to be managed effectively, however does not stop several phases being undertaking concurrently as the project requires or allows.

Arch Henderson has set out Works 1 to 3 as a potential opportunity to OICHA and its Stakeholders as each of the packages could be carried out independently of each other as industry investment and budget allows. This in turn protects OICHA and stakeholders from speculative risk and spending on the whole development at one time, should this prove necessary.

The Works packages are clearly set out in AH Drawings 202043FS-10, 20 and 30, and in Section 5.4 above.

## 10.2 Form of Quay Construction

The Exemplar Design carried out has considered both solid quay construction and suspended deck construction to match with the existing Hatston. The main quay works sections have been detailed as solid forms of construction in the Exemplar Design supporting this Feasibility Study report. This construction type was selected as the most economical due to desired land reclamation to the immediate rear of the proposed quay, the industrial laydown / storage requirements and it is a form of construction which Arch Henderson has had success with in the Northern Isles.

## 10.3 Marine Piling Design Risks

As noted above, a solid sheet pile wall construction has been selected in the Feasibility Study as the preferred method of construction. During the Exemplar Design exercise which included running preliminary computational modelling of the proposed quay construction (balanced anchorage steel sheet pile wall and cofferdam), several key design risks were identified which could have a potential impact on cost, in particular. The high level specific design risks identified in the exemplar detailing have been highlighted below.

1. Site Investigation
   No Site Investigation or Ground Investigation exists at the proposed location of Hatston. Site investigation does exist at the original Hatston Pier, however only probing was completed for the extension which will not prove suitable for detailed design. A site investigation in the areas of the proposed development will be required to inform the

next phases of design. Ground / rock data was utilised from the limited sub-bottom profiling and use of the existing site investigation data correlated to the sub-bottom profiling. All design development has been based on the information provided within these studies. Also see section 10.4 below.

2. Interface of Existing and Proposed Quay(s)

   The quay loading has been prescribed as 10kN/m$^2$ across the quay interfaces and the main outer quay. The proposed solid quay sheet piling requires interfacing with the suspended deck due to land reclamation requirements. This has been selected as the preferred construction method as set out above, but does pose some risk when interfacing with a suspended deck including potential differential settlement, wave climate and no pre-treatment to create a fragmented rock trench for the toe of the wall due to the proximity of the tubular piles.

   Settlement will have to be considered carefully between the two concrete cope interfaces and detailed accordingly in the design and specification of the works to minimise any settlement issues. The wave climate and reflection from the solid quay construction may pose a challenge to the suspended deck structure and the climate created from the solid quay to berthing vessels. Please refer to section 10.5.

   As no rock pre-treatment can occur at the interface between the existing and proposed developments, the existing suspended cope has been considered to present an opportunity in design to negate low level tie-rods by being considered to act as a 'prop' to the installed sheet pile at the head during construction in particular. The existing cope may also be considered for temporary works during construction.

3. Pre-Treatment to Create Fragmented Rock Trench

   Arch Henderson, within the Exemplar Design of the solid sheet pile wall, has specified a construction method that has been successfully completed before in the Northern Isles. This is the installation of a sheet pile wall via pre-treatment to create a fragmented rock trench to achieve toe penetration. This is achieved by placing delayed charges over a suitable depth of drill hole to fragment the rock and allow penetration of the rock by the piling and create toe fixity. This method has proven to significantly reduce costs by elimination of low level tie rod anchorage that require expensive mobilisation of dive teams and associated construction safety risks.

   By pre-treating the hard strata in a small time-step ahead of the advancing sheet piling works allows for a smaller pile to be installed due to the larger toe restraint offered. In this instance it has saved the Exemplar Design (and budget) requiring to be a tubular (or similar) combi-wall solution, which is a heavy solution, or the need for low level tie-rods which are expensive to install due to the need for divers.

   The risk with pre-treating the hard strata is the type of rock likely to be encountered and its characteristics. If the limestone (present at Hatston) proves to have significant horizontal layering, it may lead to a 'slabbing' effect when pre-treating the rock strata.

This is where the pre-treatment breaks the rocks into horizontal fractures opposed to vertical fractures required for the vibro-piling installation and therefore toe fixity cannot be achieved. The site investigation will help inform this analysis. The alternative should fixity not be achieved is a low level tie-rod.

4. Low Level Tie Rods
   As described in the point above (point 3) low level tie-rods have not been considered in the Exemplar Design due to the use of a pre-treated fragmented rock trench. This is seen as a cost saving to the project and overall construction programme, from our experience. It should be noted that should the pre-treated fragmented rock trench option not be achievable the low level tie-rod option may need to be considered.

5. Volume and Timely Delivery of Suitable Fill Material
   Timely delivery of the quality and volume of material may be problematic to the overall success of the development at Hatston. The source of fill material is not clearly defined at this stage and therefore, is a project risk to many aspects of the project; namely, but not limited to, programme and cost. An affordable material source, offering a timely delivery to meet project requirements shall be of importance to the success of the project. Also See Section 10.7.

   A table on the requirements of the reclamation material supply was constructed for information previously and to aid other reports ongoing concurrently (including environmental scoping) to this feasibility and has been included, in part, below;

| Proposed Hatston Works | Area m2 | Type 1 (m3) | Crusher Run (m3) | General Fill (m3) | Est. Total (Tonnes) | Est. Duration (months) | HGV / day | HGV/hour/ 10 hour day |
|---|---|---|---|---|---|---|---|---|
| Works 1 South Reclamation | 29,600 | 8,800 | 30,000 | 159,000 | 394,000 | 10 months | 66 | 6 to 7 |
| Works 2 North Reclamation & Quay Works | 34,000 | 10,500 | 34,000 | 396,000 | 880,000 | 22 months | 67 | 6 to 7 |
| Works 3 Boat lift & storage area | 13,300 | 4,000 | 13,500 | 83,500 | 183,000 | 10 months | 31 | 3 to 4 |
| | **7.7 Hectares** | 23,300 m3 | 77,500 m3 | 638,500 m3 | **1.46M Tonnes** | | | |

*Table 3. Infill Material Requirements*

## 10.4 Site / Ground Investigation

The lack of marine site investigation is a risk to the overall project. As previously stated the site investigation and laboratory testing thereafter shall be required, and is of great importance to the design development of the overall scheme, and therefore directly linked to scheme confidence and the development of risk and cost certainty.

During the marine SI, Arch Henderson would also propose to undertake testing of the material to gain confidence in the rock blasting construction technique and its likelihood in being successful.

## 10.5 Wave Study / Hydraulic Modelling

Wave studies are available to assess the current climate at Hatston but require updating to account for the new development proposed. The reviewed wave regime, heights and climate are to be fully investigated and understood in relation to design to ensure a practical working harbour environment is procured and built. As previously highlighted particular attention is required to the formation of a solid quay and its interface with the existing suspended deck and wave screen.

Until the wave climate is modelled, analysed and understood this shall sit as a risk to the design.

## 10.6 Environmental Considerations

Environmental considerations to the best of our knowledge at this stage have been considered. At the time of this Feasibility Study, EnviroCentre is undertaking and completing a Scoping Opinion for submission to all Statutory Consultees. Until opinions are returned and understood further this remains a risk to the project design.

## 10.7 Quarry Provision

As previously highlighted the source of fill material required for the Hatston Development at this time is from OIC Cursiter Quarry and Orkney Aggregates Heddle Quarry, with an alternative option of extending the storage area at the proposed Scapa development to create further inert fill to service Hatston works.

At this stage no approach for fill material out with the Orkney Islands has been considered, but may be required further into the Procurement of this development to obtain value for money.

This is a significant risk to the overall project at this time until the available supply source is finally agreed and covered by appropriate licence approval.

## 10.8 Proposed Road Upgrades

An upgrade to the existing access road network to the existing Hatston Pier and the proposed development areas has been proposed in the overall development exemplar details. The road upgrade provides a suitable solution to the multiple junctions that occur from varying areas of the Hatston Industrial Site(s) to the existing and proposed developments.

The proposed upgrade(s) would likely require to be phased but could be carried out as part of the overall development works to offer significant traffic improvement and flow to the Hatston site(s).

# 11.0 Procurement Routes

This section shall define and provide an outline commentary on the procurement requirements to progress from this Feasibility Study stage. The procurement route outlined has been prescribed to ensure OICHA maintains the key dates as set out in Table 2.

If approved, Arch Henderson would propose the Site Investigation (SI) and wave study / hydraulic modelling for Hatston Pier is procured and completed on site in Orkney within 2021 and early 2022. The SI and desktop modelling could run in conjunction or prior to the appointment of Professional Services for the project. This is being recommended for a number of reasons, as set out below;

1. The overall project, and its success is at a 'medium risk' until the SI and wave modelling is undertaken. Refer to Section(s) 10.3, 10.4 and 10.5 of this report.
2. The project risk could be reduced and further cost certainty could be gained prior to OIC / OICHA committing further Capital Investment to the project. For example procuring Professional Services to an estimated tender value of between £2M and £3M (dependant on number of phases).
3. Procuring the SI at this time allows the Key Dates to be achieved; otherwise the dates shall be pushed for circa 9 to 12 months. For Hatston this would significantly reduce any Programme float allocated.

Professional Services would require to be procured towards the end of 2021 and in early 2022 to oversee the design and management of the overall project from Scheme Design to Project Completion.

Once the appointment of Professional Services has been made by OIC(HA) one of two procurement routes would require to be chosen; Traditional route (Designed by Professional Service Consultant and constructed by a Contractor), or Design and Build (Lead by a Contractor partnering with a Consultant Designer). This decision would be taken by OICHA in conjunction with the appointed Professional Services provider.

Dependant on how the works phases are scoped and let to Contractors is likely to dictate the preferred procurement route. For example if Phase 1 was let as a sole contract it is likely a traditional contract form is selected. However, if all 3 works package are let as a single lot a D&B form of contract may be the preferred selection to allow for the potential of value engineering on the overall scheme by the main Contractor.

# 12.0 Consents

As highlighted in the Client Brief document Statutory and Regulatory consenting shall be required to be undertaken for the SDWQ project. Many of the processes to close out consenting cannot be wholly completed and closed out at this stage.

To date, Envirocentre has been conducting the following, prior and during the Feasibility Study, and has confirmed;

- Screening under the Environmental Impact Assessment (EIA) Regulations has been undertaken and has confirmed that both developments are 'EIA Development'.
- Scoping requests have been submitted to Marine Scotland (MSLOT) and Orkney Islands Council (OIC) to confirm the surveys and assessments that are required for each site to support planning and marine licence applications.
- Once scoping responses are received assessments will be undertaken to feed into the EIA Reports for each site.

# 13.0 Conclusion and Outcomes

This Feasibility Study and report concludes the following:

1.0 The feasibility of extending existing Hatston Pier and foreshore has been researched, chosen and engineered with the primary client requirement for increased berthing space but more importantly, extensive laydown directly behind the quays.

2.0 Unlike the Scapa Deep Water Quay development, the above project requires significant imported inert stone for reclamation works that is not available to be won directly at the Hatston site and will rely on supply from existing Orkney Quarries or other sources.

3.0 The quay positioning has been chosen and engineered to allow an additional 320m of new outer berth which extends overall outer berth to a significant 671m in length.

4.0 A solid quay Exemplar Design has been chosen and engineered to provide suitable deck load capacity of between 5 and 10 tonnes/$m^2$ but more importantly to enable up to 7.5 Hectares of extensive laydown area required by current industry stakeholders.

5.0 The feasibility of extending Hatston Pier has been broken down into enabling and phased work packages that help to inform future procurement programming options and funding revenue streams.

6.0 This Feasibility Study explains and highlights current project engineering and cost risks. Finally, this Feasibility Study discusses procurement methods to reduce current engineering and cost risks including procuring full Site Investigation and Wave Studies to complement Exemplar Design before further scheme and detailed Professional Services are committed.

7.0 In conclusion, from an engineering viewpoint, the proposed project is considered to be feasible, both in terms of construction and timing, providing the associated project risks are investigated and mitigated. The estimated cost of the project is around £66m including 10% contingency, but excluding Optimism Bias, and therefore, the ultimate feasibility of the project also relies on the economic benefits being realised, as set out in the Economic Assessment report produced by Fisher Associates.

# Appendices

| | |
|---|---|
| Appendix 1 | OICHA Client Design Brief Document (Hatston Development) |
| Appendix 2 | Hatston Development Programme(s) |
| Appendix 3 | Hatston Development Cost Plan / Budget |
| Appendix 4 | Arch Henderson Exemplar Design Drawings |

# Hatston Development

## Feasibility Study

## Preliminary High Level Cost Estimates

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# Salient Cost Estimate Summary

| Works | Hatston WP01 | Phasing | Hatston WP02 | Phasing | Hatston WP03 | Phasing |
|---|---|---|---|---|---|---|
| **Dredging** | | | | | | |
| **SI & Consents** | | | £80,900 | | | |
| **Fees** | | | £25,000 | | | |
| **Dredging** | | | £814,650 | **4 months** | | |
| **Contingency 10%** | | | £81,465 | | | |
| **Total Dredging** | | | £1,002,015 | | | |
| **Quay & Access Construction** | Reclamation Infill volume 197,800m3, Concrete Freight Area 0.77 Hectares, Hardcore Reclamation | **12 Months** | Berthing Length 453m / Infill volume 232,000m3 (Quay&Fixed Ramp), 217,000m3 (Reclamation), / | **22 Months** | Reclamation Infill volume 91,585m3, 800 Tonne Boat Lift 15m wide x 56.5m length , Concrete Slab Area 0.23 | **14 Months** |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Area 2.21 Hectares, 70m Sheetpiling | | Pile Area 17,564m2 + 6,650m3 dredging + Services incl Gas Oil Fuel Facility | | Hectares, Hardcore Reclamation Area 1.46 Hectares | |
| **SI & Consents** | £20,000 | **6 months 2021/22** | £420,000 | **6 months 2021/22** | £110,000 | **6 months 2021/22** |
| **Fees** | £80,000 | **Over 36 months** | £1,100,000 | **Over 36 months** years | £225,000 | **Over 36 months** |
| **Quay Construction** | £6,861,696.00 | | £39,066,695 | | £11,469,995 | |
| **Contingency 10%** | £686,169.60 | | £3,906,669.50 | | £1,146,999.5 | |
| **Total Quay Construction** | £7,547,865.60 | | £44,493,364.50 | | £12,616,994.50 | |
| **Grand Total** | **£7,647,865.60** | | **£45,495,379.50** | | **£12,951,994.50** | |

Excludes Optimism Bias, HRO, EIA, Land Purchase, Legal, VAT cost etc.

## Orkney Islands Council

Hatston Development
Estimated High Level Cost Option - Works Phase 01

**Reclamation Infill volume 197,800m3, Concrete Freight Area 0.77 Hectares, Hardcore Reclamation Area 2.21 Hectares, 70m Sheetpiling**

| | Item Description | Unit | Quantity | Rate | Amount |
|---|---|---|---|---|---|
| **DREDGING** | | | | | |
| **Back Hoe & split hopper barges** | Mobilisation / Demob | | | | £0.00 |
| **Dredging** | Soft Dredge and Fill Structure | m3 | 0.0 | £21.00 | £0.00 |
| | Hard Dredge and Fill Structure | m3 | 0.0 | £46.00 | £0.00 |
| | Soft Dredge & Dump Offshore | m3 | | | £0.00 |
| | Hard Dredge & Dump Offshore | m3 | | | £0.00 |
| | Additional Contingency Allowance (10%) | | | | £0.00 |
| | **Total Dredge Cost Estimate** | | | | **£0.00** |
| **Statutory & Engineering Fees** | Crown Estates Dredge Royalty Charge (Incl. overdredge and bulking factor) | m3 | 0.0 | £0.16 | £0.00 |
| | Marine Scotland Consent Charges (Estimate) | Sum | | | £0.00 |
| | Site Investiagtion (combine with quay SI below) | Sum | | | £0.00 |
| | Dredging Engineering Fees (Estimate depending on final procurement method) | Sum | | | £0.00 |
| | **Total Dredge SI and Fees Cost Estimate** | | | | **£0.00** |
| | **DREDGING GRAND TOTAL** | | | | **£0.00** |
| **QUAY WORKS** | | | | | |
| **Contract Set Up** | Mob/ Demob/ General Items / Preliminaries / Risk / Insurances etc | Sum | | | £70,000.00 |
| **Core Fill From Shore** | Excavation from commercial quarry and fill - General | m3 | 159000.0 | £16.50 | £2,623,500.00 |
| | Excavation from commercial quarry and fill - Crusher Run | m3 | 30000.0 | £21.00 | £630,000.00 |
| | Excavation from commercial quarry and fill - Type 1 | m3 | 8800.0 | £21.00 | £184,800.00 |
| **Rock Armour** | Supply and place primary 2 to 3 T Armour in 2 layers to Outer Bund | m2 | 5238.0 | £190.00 | £995,220.00 |
| | Supply and place secondary 0.3 to 0.7 Armour 1m deep to Outer Bund | m2 | 5238.0 | £110.00 | £576,180.00 |
| | Supply and place geotextile to Outer Bund | m2 | 5238.0 | £17.00 | £89,046.00 |
| **Piling Temporary Works** | Jack up barge + ringer crane mob / demob (Red7 Marine quote) | Sum | | | £0.00 |
| | Jack up barge + ringer crane hire £14000 / day (6 months piling / drilling) | Nr | 0.0 | £14,000.00 | £0.00 |
| | Fabricate, place and remove temporary works | Sum | | | £35,000.00 |
| **Quay Work** | | | | | |
| | AZ52-700 driven area (including pre-treatment of hard strata) | m2 | 115.0 | £490.00 | £56,350.00 |
| | AZ52-700 area pile / linear metre wall | m2 | 495.0 | £430.00 | £212,850.00 |
| | Supply and place ASDO 500 M110/85 Tie Rods, L=30m @ +1.25m CD | Nr | 0.0 | £6,000.00 | £0.00 |
| | Supply and place ASDO 500 M110/85 Tie Rods, L=20m @ +1.25m CD | Nr | 15.0 | £5,500.00 | £82,500.00 |
| | Supply and place ASDO500 M110/85 Tie Rods, L= 5to 20m Varied@ +1.25m CD | Nr | 0.0 | £4,000.00 | £0.00 |
| | Supply and place ASDO 500 M72/64 Tie Rods, L=25m @ +1.35m CD | Nr | 0.0 | £3,500.00 | £0.00 |
| | Supply and place 2 x 305x305x198Kg/m waling assembly @ +1.35m CD tidal | m | 30.0 | £925.00 | £27,750.00 |
| | AZ18-700 anchor wall driven area | m2 | 60.0 | £150.00 | £9,000.00 |
| | AZ18-700 anchor wall area pile / linear metre wall - 6.0 m length | m2 | 25.0 | £300.00 | £7,500.00 |
| | Concrete Cope Supply and Place (50mx2mx2m) | m3 | 200.0 | £250.00 | £50,000.00 |
| | Concrete Cope Shuttering (50 x (2m + 0.5m)) | m2 | 125.0 | £90.00 | £11,250.00 |
| | Concrete Cope Ancillary | sum | | | £3,500.00 |
| | Deck Slab 400mm thick | m2 | 0.0 | £225.00 | £0.00 |
| | Deck Slab 250mm thick | m3 | 7730.0 | £125.00 | £966,250.00 |
| | Proprietory Panel Fenders including face plates | Nr | 0.0 | £7,500.00 | £0.00 |
| | Marine furniture (1 laddersx£2000 / 0 80T bollards x £1800, 50m cope railx£75) | sum | | | £5,750.00 |
| | Lighting 25m Columns on base | Nr | 1.0 | £35,000.00 | £35,000.00 |
| | Cathodic Protection | m | 50.0 | £1,000.00 | £50,000.00 |
| | Service trench + access pits | m | 30.0 | £175.00 | £5,250.00 |
| | Ancillary service works (water, power, drainage & fencing) | sum | | | £45,000.00 |
| | Site Access Road (roundabout include works pahse 2) | m | 50.0 | £1,800.00 | £90,000.00 |
| | Sub Total | | | | £6,861,696.00 |
| | Additional Contingency Allowance (10%) | | | | £686,169.60 |
| | **Total Quay Cost Estimate** | | | | £7,547,865.60 |
| | **Total Dredging Cost Estimate** | | | | £0.00 |
| | **Grand Total Capital Works 1 Estimate** | | | | **£7,547,865.60** |
| **Statutory, Engineering Fees&SI** | Marine Scotland Consent Charges (Estimate) | Sum | | | £20,000.00 |
| | Site Investigation including wave study (await quote) | Sum | | | £0.00 |
| | Quay Works Engineering Fees (Est. depending on final procurement method) | Sum | | | £80,000.00 |
| | Dredging Fees , SI, consents and Crown royalties from above | Sum | | | £0.00 |
| | **Total fees cost estimate** | | | | **£100,000.00** |
| | **GRAND TOTAL QUAY WORKS, DREDGING FEES AND 10% CONTINGENCY SUMS** | | | | **£7,647,865.60** |
| | Excludes Optimism Bias (say 10%), HRO, EIA, Legal, VAT cost etc. | | | | |
| **Current Programme & Anticipated Cashflow Forecast** | TBC | | | | |

## Orkney Islands Council

Hatston Development

Estimated High Level Cost Option - Works Phase 02

**Berthing Length 453m / Infill volume 232,000m3 (Quay&Fixed Ramp), 217,000m3 (Reclamation), / Pile Area 17,564m2 + 6,650m3 dredging + Services incl Gas Oil Fuel Facility**

| | Item Description | Unit | Quantity | Rate | Amount |
|---|---|---|---|---|---|
| **DREDGING** | | | | | |
| **Back Hoe & split hopper barges** | Mobilisation / Demob | | | | £650,000.00 |
| **Dredging** | Soft Dredge and Fill Structure | m3 | 5650.0 | £21.00 | £118,650.00 |
| | Hard Dredge and Fill Structure | m3 | 1000.0 | £46.00 | £46,000.00 |
| | Soft Dredge & Dump Offshore | m3 | | | £0.00 |
| | Hard Dredge & Dump Offshore | m3 | | | £0.00 |
| | Additional Contingency Allowance (10%) | | | | £81,465.00 |
| | **Total Dredge Cost Estimate** | | | | **£896,115.00** |
| **Statutory & Engineering Fees** | Crown Estates Dredge Royalty Charge (Incl. overdredge and bulking factor) | m3 | 20000.0 | £0.16 | £3,200.00 |
| | Marine Scotland Consent Charges (Estimate) | Sum | | | £2,700.00 |
| | Site Investiagtion (combine with quay SI below) | Sum | | | £75,000.00 |
| | Dredging Engineering Fees(Est depending on final procurement method) | Sum | | | £25,000.00 |
| | **Total Dredge SI and Fees Cost Estimate** | | | | **£105,900.00** |
| | **DREDGING GRAND TOTAL** | | | | **£1,002,015.00** |
| **QUAY WORKS** | | | | | |
| **Contract Set Up** | Mob/ Demob/ General Items / Preliminaries / Risk / Insurances etc | Sum | | | £4,500,000.00 |
| **Core Fill From Shore** | Excavation from commercial quarry and fill - General | m3 | 396000.0 | £16.50 | £6,534,000.00 |
| | Excavation from commercial quarry and fill - Crusher Run | m3 | 34000.0 | £21.00 | £714,000.00 |
| | Excavation from commercial quarry and fill - Type 1 | m3 | 10500.0 | £21.00 | £220,500.00 |
| **Rock Armour** | Supply and place primary 2 to 3 T Armour in 2 layers to Outer Bund | m2 | 5625.0 | £190.00 | £1,068,750.00 |
| | Supply and place secondary 0.3 to 0.7 Armour 1m deep to Outer Bund | m2 | 5625.0 | £110.00 | £618,750.00 |
| | Supply and place geotextile to Outer Bund | m2 | 5625.0 | £17.00 | £95,625.00 |
| **Piling Temporary Works** | Jack up barge + ringer crane mob / demob (Red7 Marine quote) | Sum | | | £200,000.00 |
| | Jack up barge + ringer crane hire £14000 / day (6 months piling / drilling) | Nr | 180.0 | £14,000.00 | £2,520,000.00 |
| | Fabricate, place and remove temporary works off jack up / bunds | Sum | | | £250,000.00 |
| **Quay Work** | | | | | |
| | AZ52-700 driven area (including pre-treatment of hard strata) | m2 | 2360.0 | £490.00 | £1,156,400.00 |
| | AZ52-700 area pile / linear metre wall | m2 | 17564.0 | £430.00 | £7,552,520.00 |
| | Supply and place ASDO 500 M110/85 Tie Rods, L=30m @ +1.25m CD | Nr | 80.0 | £6,000.00 | £480,000.00 |
| | Supply and place ASDO 500 M110/85 Tie Rods, L=20m @ +1.25m CD | Nr | 142.0 | £5,500.00 | £781,000.00 |
| | Supply and place ASDO500 M110/85 Tie Rods, L= 5to 20m Varied@ +1.25m CD | Nr | 15.0 | £4,000.00 | £60,000.00 |
| | Supply and place ASDO 500 M72/64 Tie Rods, L=25m @ +1.35m CD | Nr | 35.0 | £3,500.00 | £122,500.00 |
| | Supply and place 2 x 305x305x198Kg/m waling assembly @ +1.35m CD tidal | m | 1560.0 | £925.00 | £1,443,000.00 |
| | AZ18-700 anchor wall driven area | m2 | 900.0 | £150.00 | £135,000.00 |
| | AZ18-700 anchor wall area pile / linear metre wall - 6.0 m length | m2 | 1800.0 | £300.00 | £540,000.00 |
| | Concrete Cope Supply and Place (1075mx2mx2m) | m3 | 4300.0 | £250.00 | £1,075,000.00 |
| | Concrete Cope Shuttering (1075 x (2m + 0.5m)) | m2 | 2680.0 | £90.00 | £241,200.00 |
| | Concrete Cope Ancillary | sum | | | £75,000.00 |
| | Deck Slab 400mm thick | m2 | 11900.0 | £225.00 | £2,677,500.00 |
| | Deck Slab 250mm thick | m3 | 7000.0 | £125.00 | £875,000.00 |
| | Proprietory Panel Fenders including face plates (Ship2Shore quote) | Nr | 45.0 | £18,750.00 | £843,750.00 |
| | Marine furniture (24 laddersx£2000 / 26 80T bollards x £1800, 570m cope railx£75) | sum | | | £140,000.00 |
| | Lighting 25m Columns on base | Nr | 6.0 | £35,000.00 | £210,000.00 |
| | Cathodic Protection | m | 910.0 | £1,000.00 | £910,000.00 |
| | Service trench + access pits | m | 850.0 | £175.00 | £148,750.00 |
| | Ancillary service works (water, power, drainage & fencing) | sum | | | £125,000.00 |
| | Site Access Road & Roundabout | m | 280.0 | £1,600.00 | £448,000.00 |
| | Fuel Storage Facility (2No. 1,500m3 tanks civils +M&E) | sum | | | £1,900,000.00 |
| | Gas oil line supply & receipt, installation & NDT ( (740m + 850m) x £255) | sum | | | £405,450.00 |
| | Sub Total | | | | £39,066,695.00 |
| | Additional Contingency Allowance (10%) | | | | £3,906,669.50 |
| | **Total Quay Cost Estimate** | | | | £42,973,364.50 |
| | **Total Dredging Cost Estimate** | | | | £896,115.00 |
| | **Grand Total Capital Works 2 Estimate** | | | | **£43,869,479.50** |
| **Statutory, Engineering Fees&SI** | Marine Scotland Consent Charges (Estimate) | Sum | | | £70,000.00 |
| | Site Investigation including wave study (await quote) | Sum | | | £350,000.00 |
| | Quay Works Engineering Fees (Est. depending on final procurement method) | Sum | | | £1,100,000.00 |
| | Dredging Fees , SI, consents and Crown royalties from above | Sum | | | £105,900.00 |
| | **Total fees cost estimate** | | | | **£1,625,900.00** |
| | **GRAND TOTAL QUAY WORKS, DREDGING FEES AND 10% CONTINGENCY SUMS** | | | | **£45,495,379.50** |
| **Current Programme & Anticipated Cashflow Forecast** | TBC | | | | |
| | Excludes HRO, EIA, Legal, VAT cost etc. | | | | |

## Orkney Islands Council

Hatston Development

Estimated High Level Cost Option - Works Phase 03

**Reclamation Infill volume 91,585m3, Boat Lift 15m wide x 56.5m length , Concrete Slab Area 0.23 Hectares, Hardcore Reclamation Area 1.46 Hectares**

| | Item Description | Unit | Quantity | Rate | Amount |
|---|---|---|---|---|---|
| **DREDGING** | | | | | |
| **Back Hoe & split hopper barges** | Mobilisation / Demob | | | | £0.00 |
| **Dredging** | Soft Dredge and Fill Structure | m3 | 0.0 | £21.00 | £0.00 |
| | Hard Dredge and Fill Structure | m3 | 0.0 | £46.00 | £0.00 |
| | Soft Dredge & Dump Offshore | m3 | | | £0.00 |
| | Hard Dredge & Dump Offshore | m3 | | | £0.00 |
| | Additional Contingency Allowance (10%) | | | | £0.00 |
| | **Total Dredge Cost Estimate** | | | | **£0.00** |
| **Statutory & Engineering Fees** | Crown Estates Dredge Royalty Charge (Incl. overdredge and bulking factor) | m3 | 0.0 | £0.16 | £0.00 |
| | Marine Scotland Consent Charges (Estimate) | Sum | | | £0.00 |
| | Site Investiagtion (combine with quay SI below) | Sum | | | £0.00 |
| | Dredging Engineering Fees (Estimate depending on final procurement method) | Sum | | | £0.00 |
| | **Total Dredge SI and Fees Cost Estimate** | | | | **£0.00** |
| | **DREDGING GRAND TOTAL** | | | | **£0.00** |
| **QUAY WORKS** | | | | | |
| **Contract Set Up** | Mob/ Demob/ General Items / Preliminaries / Risk / Insurances etc | Sum | | | £400,000.00 |
| **Core Fill From Shore** | Excavation from commercial quarry and fill - General | m3 | 74000.0 | £16.50 | £1,221,000.00 |
| | Excavation from commercial quarry and fill - Crusher Run | m3 | 13500.0 | £21.00 | £283,500.00 |
| | Excavation from commercial quarry and fill - Type 1 | m3 | 4000.0 | £21.00 | £84,000.00 |
| **Rock Armour** (Incl. Works Phase 02 Recover) | Supply and place primary 2 to 3 T Armour in 2 layers to Outer Bund | m2 | 3685.0 | £190.00 | £700,150.00 |
| | Supply and place secondary 0.3 to 0.7 Armour 1m deep to Outer Bund | m2 | 3685.0 | £110.00 | £405,350.00 |
| | Supply and place geotextile to Outer Bund | m2 | 3685.0 | £17.00 | £62,645.00 |
| **Piling Temporary Works** | Jack up barge + ringer crane mob / demob (Red7 Marine quote) | Sum | | | £0.00 |
| | Jack up barge + ringer crane hire £14000 / day (6 months piling / drilling) | Nr | 0.0 | £14,000.00 | £0.00 |
| | Fabricate, place and remove temporary works | Sum | | | £150,000.00 |
| **Quay Work** | | | | | |
| **Boat Lift** | Combi 914 x 25mm tubes + AZ52-700 / grade X70 | | | | |
| | 914mm x 25mm tubes @ 16m long (Concrete Infill provisional ) | Nr | 62.0 | £76,000.00 | £4,712,000.00 |
| | Driven depth pre-drilled 1.8m dia. | m | 400.0 | £4,500.00 | £1,800,000.00 |
| | AZ52-700 driven area | m2 | 180.0 | £900.00 | £162,000.00 |
| | AZ26-700 area pile / linear metre wall less tubes - 12m length | m2 | 620.0 | £525.00 | £325,500.00 |
| | Supply and place ASDO 500 M110/85 Tie Rods, L=20m @ +1.25m CD | Nr | 15.0 | £5,500.00 | £82,500.00 |
| | Supply and place ASDO500 M110/85 Tie Rods, L= 5to 20m Varied@ +1.25m CD | Nr | 0.0 | £4,000.00 | £0.00 |
| | Supply and place ASDO 500 M72/64 Tie Rods, L=25m @ +1.35m CD | Nr | 0.0 | £3,500.00 | £0.00 |
| | Supply and place 2 x 305x305x198Kg/m waling assembly @ +1.35m CD tidal | m | 150.0 | £925.00 | £138,750.00 |
| | AZ18-700 anchor wall driven area | m2 | 40.0 | £150.00 | £6,000.00 |
| | AZ18-700 anchor wall area pile / linear metre wall - 6.0 m length | m2 | 300.0 | £300.00 | £90,000.00 |
| | Concrete Cope Supply and Place (135mx2mx2m) | m3 | 540.0 | £250.00 | £135,000.00 |
| | Concrete Cope Shuttering (135 x (2m + 0.5m)) | m2 | 90.0 | £90.00 | £8,100.00 |
| | Concrete Cope Ancillary | sum | | | £3,500.00 |
| | Deck Slab 400mm thick | m2 | 1150.0 | £225.00 | £258,750.00 |
| | Deck Slab 250mm thick | m3 | 1150.0 | £125.00 | £143,750.00 |
| | Proprietory D fenders to moon pool (provisional) | sum | | | £30,000.00 |
| | Marine furniture (3 laddersx£2000 / 4 80T bollards x £1800, 135m cope railx£75) | sum | | | £36,000.00 |
| | Lighting 25m Columns on base | Nr | 1.0 | £35,000.00 | £35,000.00 |
| | Cathodic Protection | m | 135.0 | £1,000.00 | £135,000.00 |
| | Drainage - french, aco and pits | m | 200.0 | £65.00 | £13,000.00 |
| | Service trench + access pits | m | 20.0 | £175.00 | £3,500.00 |
| | Ancillary service works (water, power, drainage & fencing) | sum | | | £45,000.00 |
| | Site Access Road & roundabout include works phase 2) | m | 0.0 | £1,800.00 | £0.00 |
| | Sub Total | | | | £11,469,995.00 |
| | Additional Contingency Allowance (10%) | | | | £1,146,999.50 |
| | **Total Quay Cost Estimate** | | | | £12,616,994.50 |
| | **Total Dredging Cost Estimate** | | | | £0.00 |
| | **Grand Total Capital Works 1 Estimate** | | | | **£12,616,994.50** |
| **Statutory, Engineering Fees&SI** | Marine Scotland Consent Charges (Estimate) | Sum | | | £10,000.00 |
| | Site Investigation including wave study | Sum | | | £100,000.00 |
| | Quay Works Engineering Fees (Est. depending on final procurement method) | Sum | | | £225,000.00 |
| | Dredging Fees , SI, consents and Crown royalties from above | Sum | | | £0.00 |
| | **Total fees cost estimate** | | | | **£335,000.00** |
| | **GRAND TOTAL QUAY WORKS, DREDGING FEES AND 10% CONTINGENCY SUMS** Excludes Optimism Bias , HRO, EIA, Legal, VAT cost etc. | | | | **£12,951,994.50** |
| **Current Programme & Anticipated Cashflow Forecast** | TBC | | | | |

David Sawkins
Orkney Islands Council Harbour Authority
Harbour Authority Building
Scapa
Orkney
KW15 1SD

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29 April 2021

Dear David

**OICHA Capital Projects**
**Wintering Bird Surveys – Interim Report**

Please find attached a brief, interim report on the findings of the wintering bird surveys across four Capital Projects sites.

If there are any questions regarding the attached please do not hesitate to contact the undersigned.

Yours sincerely
**for EnviroCentre Ltd**

(issued electronically)

**Emma Cormack**
**Principal Ornithologist**

**Matt Sullivan**
**Principal Consultant**

Enc: 2020-21 Wintering Bird Survey - Interim Report
Appendix A - Bird Records



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# 2020-21 WINTERING BIRD SURVEY – INTERIM REPORT

## Introduction

Orkney Islands Council Harbour Authority (OICHA) proposes to construct a number of capital harbour projects on Mainland Orkney. There is potential for these projects to impact bird species during the construction period and effect bird species over the longer-term once the projects are operational, especially the qualifying species of the proposed Special Protection Areas (pSPAs) of North Orkney and Scapa Flow.

This document details the methods used, the results and a brief discussion on the findings so far along with an interim summary.

## Survey Aims and Objectives

In summary, the main concerns raised by NatureScot (formerly Scottish National Heritage (SNH)) during early consultation on the proposed capital projects is in relation to the disturbance of qualifying species pertaining to the various European-designated sites (and proposed European-designated sites) around Orkney, especially within Scapa Flow. This disturbance may occur during the construction period and through the operational period of the proposed facilities, which may include displacement caused by increased vessel and vehicular movements.

These concerns are based on Eider, Long-tailed Duck, Goldeneye, Red-breasted Merganser, Black-throated Diver, Great Northern Diver, Slavonian Grebe and Shag which occur around the Orkney coastline during the winter months, and Red-throated Diver which breeds on the moorlands of Orkney and forages in the sea during the summer months.

Discussions were held with NatureScot to agree appropriate methods of surveying the development areas to ascertain the ornithological baseline conditions throughout the entire year. In accordance with best practice, two periods of surveys were agreed namely

- The Wintering Bird Survey covering the period between October and March; and
- The Summer Breeding Bird Survey covering the period between April and September.

The objective of these surveys was to count the numbers and species present, their favoured locations in relation to the proposed developments, and their behaviour.

The results of the ornithological surveys would then be used to address NatureScot's concerns through assessing if there is potential for protected bird species to be impacted by the proposed developments.

## 2020-21 Wintering Bird Survey Methodology

The aim of the wintering surveys was to monitor the overwintering species in the vicinity of the proposed capital harbour project sites and to carry out a range of surveys in areas where no previous data were available. The scope of the 2020-21 Wintering Bird Surveys is provided in Table 1 with the locations of each capital harbour development site shown in Drawing No 673702/001 Location Overview, Appendix B.

**Table 1: Orkney Winter Bird Survey Methods (Period October 2020 to March 2021)**

| Survey | Method |
|---|---|
| Upland Winter Bird Survey | • A winter walkover survey closely following the adapted B&S moorland breeding bird survey method, with fieldwork being undertaken three times during the period October to March; and<br>• This survey will be undertaken at the Scapa Deep Water Quay (SDWQ) site and around its proposed access track. |
| Vantage Points | • Vantage Point (VP) surveys to record the bird activity around the SDWQ site where the most construction activity will occur, and where the highest number of pSPA bird species are most likely to be observed;<br>• The VP surveys will be conducted in the centre of the proposed works area which offers an excellent panorama of the vicinity and water of Scapa Flow to both the north and south (Ordnance Survey Grid Reference (OSGR) HY 45283 04122);<br>• The VP surveys should provide a spread over the full daylight period available (from official local sunrise to sunset times) which will vary depending on the time of year, and watches should also be conducted through a range of tide heights and sea states. VPs should be spread across all calendar months when the species is present or likely to be so. The watches should be stratified according to the ecology of the target species present and should give a representative sample of site use;<br>• From the VP, the visible sea area within a 180º arc is divided into 12 sectors. This area is scanned for target species over a (maximum) 3 hour period, with all bird activity recorded. This includes birds on the water of Scapa Flow (with an indication of their general behaviour – foraging, resting, etc), and any flights across the survey area (noting approximate height and direction of flight);<br>• A hierarchy of importance for the VP data has been drawn up to obtain the most useful results:<br>i. A quantified measure of occurrence (i.e. average numbers & density) for each of the pSPA species in, and close to, the offshore development area, using repeated counts within the 12 sectors;<br>ii. A quantified or descriptive measure of the use of the area by a particular species – e.g. by focussed watching of a group of birds, mapping their position and detailing their behaviour every five minutes. Given that Black-throated Diver is the most important offshore species, any groups or individuals of this should always be selected; if all Black-throated Diver were followed, it would give quantified information of their time spent in the different sectors as well as what they were doing there. This method would also be used for Slavonian Grebe. Red-breasted Merganser are an inshore species, and will also be recorded using this method when present. Goldeneye numbers have declined in Scapa Flow, but if present, they will be recorded using this method. For the more abundant pSPA species, which can occur in several groups at once (Great Northern Diver, Long-tailed Duck, Eider and Shag), the larger groups present can be selected for following – this will not be comprehensive for any of these species and would therefore give only descriptive information of site usage;<br>iii. A descriptive measure of flight activity – Flights of diver, grebe, merganser, and the larger groups/flocks of Eider, Long-tailed Duck and Shag should be noted briefly – with a note of the time observed, height and a mapped flight path, but with no need to attempt to time their duration; and<br>iv. A count of the waders and other species along the shoreline.<br>• A minimum of three sector counts should be undertaken during 20 VP surveys throughout the 2020-21 winter bird survey period. |
| Low Tide Counts | • Low tide counts to be undertaken in line with the national Wetland Bird Survey (WeBS) programme. WeBS Core Counts are made using so-called 'look-see' methodology, whereby the observer, familiar with the species involved, surveys the whole of a predefined area. Counts are made at all wetland habitats, including lakes, lochs/loughs, ponds, reservoirs, gravel pits, rivers, freshwater marshes, canals, sections of open coast and estuaries. Numbers |

| Survey | Method |
|---|---|
| | of waterbird species, including divers, grebes, cormorants, herons, spoonbill, swans, geese, ducks, rails, cranes, waders and kingfisher are counted. Counts of gulls and terns are optional;<br>• For the Hatston, Kirkwall and Scapa Pier Capital Project sites, counts will be made once per month throughout the year, ideally eight days after the predetermined 'priority dates' defined in the WeBS guidance to cover the optimal low-tide period, rather than the high-tide that WeBS desires. The WeBS priority dates are pre-selected with a view to optimising tidal conditions for counters covering coastal sites at high tide on a Sunday, whereas all the Orkney sites will be conducted on the same day per month to coincide with a suitable low-tide time to ensure all foraging waders will be included in the counts. All areas will include potential intertidal areas to be lost during the proposed construction of the sites; and<br>• Any terrestrial species present (Rock Pipit, Pied Wagtail, corvids, etc) within the survey area should also be recorded to ensure all bird activity is included within the data. |

## Field Surveyor

Firth Ecology was commissioned by EnviroCentre (on behalf of OICHA) to undertake the Wintering Bird Survey field work during the months of October 2020 and March 2021 in line with Table 1. Andrew Upton of Firth Ecology is a highly experienced field surveyor, and has undertaken a wide scope of ornithological survey work and analysis on Orkney for renewable energy schemes and for NatureScot in order to determine the baseline levels of wildfowl ahead of the pSPA designations.

A QA/QS audit carried out by EnviroCentre in February 2021 considered the fieldwork to be excellent, with both highly impressive survey design and recording accuracy allowing the best possible data to be obtained from the surveys.

## 2020-21 Wintering Bird Survey Results

The 2020-21 wintering bird surveys have recorded a total of 56 species. All 56 species constituted birds resident on Orkney throughout the year or those which regularly overwinter on Orkney.

Species observed during each of the surveys are listed in alphabetical order in Appendix A.

A summary of the results for each of the specific survey methods are provided below.

### Upland Bird Survey (Site of Scapa Deep Water Quay)

The upland bird survey in the area of the proposed Scapa Deep Water Quay included both the standard survey method listed in Table 1 and *ad hoc* sightings during the journey to and from the Vantage Point location overlooking the Bay of Deepdale through the agricultural land.

Twenty-four species were observed, which included waders, raptors, passerines and wildfowl.

There was one female Hen Harrier present in the area throughout the winter period, one female Merlin on 8 January, and the occasional Peregrine hunting along the cliffs of Scapa Flow. There were no large aggregations of passerines (24 Skylark on 24th November 2020 being the largest). The largest flock of wildfowl present was a flock of 110 Greylag on 20th February 2021 (there was also a group of 90 in November 2020). Curlew numbers peaked on 20th February 2021 with a flock of 120 foraging birds in the fields adjacent to the proposed access road.

## Vantage Points (Site of Scapa Deep Water Quay)

The 2020-21 Wintering Bird Vantage Point (VP) survey was undertaken from a location overlooking the Bay of Deepdale. The watch point is located at a raised headland approximately halfway along the proposed quayside of the Deep Water Quay, and has a viewshed which stretches along the coastline and into the eastern section of Scapa Flow, enabling excellent viewing of at least 1 km in all directions.

As required by the VP methodology, the visible sea area within a 180º arc was divided into 12 sectors as shown in Figure 1, Appendix B. All birds observed were recorded by the surveyor, with birds observed in sectors 1-8 being the most likely to be disturbed by the proposed development.

Twenty-seven species were recorded within the 12 sectors throughout the survey period (i.e. within 1 km of the viewpoint), with Shag and Eider the most numerous of the pSPA species. Great Northern Diver numbers began to drop off after a period of high numbers in November, and Slavonian Grebe was not observed until December, after which a small group was present in a small area of the Flow. Black-throated Diver is arguably the most vulnerable species and commands most attention during the surveys, and there was a small group present sporadically throughout the winter.

Groups of qualifying species of the Scapa Flow pSPA (Black-throated Diver, Great Northern Diver, Slavonian Grebe, Eider, Long-tailed Duck, Goldeneye, Red-breasted Merganser, Shag) or other target species if none of the above are present, regularly have their behaviour recorded to ascertain behavioural traits and from this it is hoped to extrapolate the birds' preferred locations of foraging, lounging, swimming, roosting, moulting, etc.

Eider, Slavonian Grebe, Great Northern Diver, Black-throated Diver, Shag and Long-tailed Duck have all been recorded occasionally in the four sectors closest to the shoreline on both rising and falling tides and during various sea states, both foraging and swimming. This is the area most likely to be disturbed during the construction and operation of the proposed development.

For an unknown reason, but possibly due to depth of water or availability of prey items, the sectors to have had most bird activity recorded within them were scattered across the 180º view shed. Cliff-nesting birds are likely to increase from the early spring to the north of the Burn of Deepdale, it is probable most of these birds will be in the northern sectors over the summer months.

## Low Tide Counts (Hatston, Scapa Pier and Kirkwall)

At all sites, birds roost or forage in their preferred locations, and counts have been organised into small, manageable geographical areas to simplify analysis of the results. A total of 37 species was recorded across all four Low Tide Count Sites to the end of March 2021. Twenty-eight were recorded at Hatston, 22 at Scapa Pier, and 20 in Kirkwall.

Numbers of species were highest during October at Scapa Pier and Hatston. Accumulations of certain species were noted to have peaked at Hatston with 226 Golden Plover present in October 2020 and 275 Curlew in December 2020. The gull roost at Hatston increased as the winter period progressed, and included two Iceland Gulls in February 2021 (uncommon, but regular winter visitors from Greenland). Oystercatcher numbers also increased as winter progressed at Scapa Pier. Numbers of birds on the water (auks, grebes and ducks) peaked in January at Scapa Pier and Hatston.

Due to its more urban environment, Kirkwall has had a more limited diversity during the counts, although disturbance through human activity is highest at Scapa Pier, where the beach is a popular destination for family gatherings and dog walking.

## Discussion

Consistent data was obtained throughout the winter survey period. Bird activity occurred throughout the survey areas at each site, and some species were recorded in locations that may be impacted by the proposed developments.

The Upland Survey on the terrestrial sections of the proposed Scapa Deep Water Quay site showed the presence of species typical of moorland and agricultural land on Orkney over the winter months. Although some species recorded are afforded additional levels of legal protection, or are included on the national Amber or Red Lists of conservation concern, there is no species or location which will require specific additional surveys to be undertaken, or specific mitigation measures or design changes to the proposed development.

The data gathered from the Vantage Point watches have shown several interesting behavioural traits of species being mobile within the eastern section of Scapa Flow during each survey. It is unknown whether this is normal behaviour that will occur annually, or whether external factors (sea state, weather, temperature, food sources, etc) at the time of the surveys were partly, or wholly, responsible for such movements, but it does complicate assessing the potential for species to be impacted whilst present on the water.

The Low Tide Counts showed a diverse number of species being present through the winter, including some large accumulations of some species at Hatston Pier. At this stage, there appears to be no certain trend within the data at any site as many of the wintering birds had arrived prior to the start of the winter survey period, and shall remain into the spring. With the continuation of monthly visits to all sites, a broader picture of when bird numbers fluctuate and species' diversity deviate throughout the year can be obtained, and there will be data on the presence and numbers of pre-breeding and post-breeding roosts of breeding birds and summer visitors which have yet to be recorded during the surveys (e.g. terns).

The majority of qualifying species for both the Scapa Flow pSPA and the North Orkney pSPA are winter visitors to Orkney and are present from late-summer through to the following spring. Numbers and densities of some qualifying species are likely to be inflated in post-arrival (September) and pre-departure (April) accumulations around the coasts of Orkney. In order to record these potential build-ups of numbers and their locations, and thereby assess their importance to the area and any potential disturbance to their behavioural patterns, it is important to conduct surveys during these times as well so as to analyse the full winter season.

Red-throated Diver is a qualifying species of the pSPA due to its presence as a breeding bird on the moorlands of Orkney, and its presence through the summer months foraging in the waters around Mainland Orkney. This will also need to be addressed in order to discount the proposed developments being considered within their main foraging zones.

Similarly, little is known about moulting grounds of several pSPA qualifying species, and in order to show that the proposed developments are not being considered within areas where moulting wildfowl gather between mid-summer and autumn, it is important that these times are also surveyed.

In conclusion, the results of the winter surveys show the species, numbers and locations of birds within the vicinity of each capital project harbour site. These datasets will answer the majority of concerns of NatureScot regarding bird activity and the potential for the developments to impact on them.

One concern NatureScot has at Scapa Deep Water Quay (and potentially at all sites) appears to be disturbance to birds on the water in the vicinity of the shipping lanes through the increase in vessel movements associated with the development(s). It is unlikely that data from any bird surveys will address this concern as a result of the disparate locations of the birds in the vast expanse of Scapa Flow and there being very few vessel movements noted within the survey areas during the wintering bird survey season.

## Wintering Bird Summary

The current suite of surveys and data obtained so far has produced some interesting results regarding bird activity within eastern Scapa Flow. It has highlighted the importance of obtaining field data to better understand both bird activity in the area and thereby shape any forthcoming mitigation or management measures to enable the proposed developments to proceed.

The data so far will cover many of the questions raised by NatureScot and an additional breeding season of data will only improve the knowledge of the proposed sites, and lead to a better understanding of the behaviour of birds present. This, in turn, will allow an even more robust assessment of any effects on the birds in the vicinity of each development site, and a more appropriate level of mitigation or management measures to be implemented where required. However, it should be noted that concerns about bird disturbance within shipping lanes will need to be addressed through future dialogue with the relevant stakeholders.

## APPENDIX A: BIRD RECORDS

**Table 2: Summary of 2020/21 Wintering Bird Species Present**

| SPECIES | Upland Bird Survey | Vantage Point | Low Tide Counts | | | |
|---|---|---|---|---|---|---|
| | | | Scapa Deep Water Quay | Scapa Pier | Hatston Pier | Kirkwall Pier |
| Bar-tailed Godwit | | | | | | |
| Black Guillemot | | | | | | |
| Black-headed Gull | | | | | | |
| Black-throated Diver | | | | | | |
| Collared Dove | | | | | | |
| Common Gull | | | | | | |
| Common Scoter | | | | | | |
| Cormorant | | | | | | |
| Curlew | | | | | | |
| Eider | | | | | | |
| Gannet | | | | | | |
| Golden Plover | | | | | | |
| Goldeneye | | | | | | |
| Great Black-backed Gull | | | | | | |
| Great Northern Diver | | | | | | |
| Grey Heron | | | | | | |
| Greylag Goose | | | | | | |
| Guillemot | | | | | | |
| Hen Harrier | | | | | | |
| Herring Gull | | | | | | |
| Hooded Crow | | | | | | |
| House Sparrow | | | | | | |
| Iceland Gull | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Jackdaw | | | | | | |
| Kittiwake | | | | | | |
| Lapwing | | | | | | |
| Little Auk | | | | | | |
| Long-tailed Duck | | | | | | |
| Mallard | | | | | | |
| Merlin | | | | | | |
| Mute Swan | | | | | | |
| Oystercatcher | | | | | | |
| Peregrine | | | | | | |
| Pheasant | | | | | | |
| Pied Wagtail | | | | | | |
| Pink-footed Goose | | | | | | |
| Puffin | | | | | | |
| Raven | | | | | | |
| Razorbill | | | | | | |
| Red-breasted Merganser | | | | | | |
| Redshank | | | | | | |
| Red-throated Diver | | | | | | |
| Ringed Plover | | | | | | |
| Rock Dove / Feral Pigeon | | | | | | |
| Rock Pipit | | | | | | |
| Rook | | | | | | |
| Shag | | | | | | |
| Shelduck | | | | | | |
| Skylark | | | | | | |
| Slavonian Grebe | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Snipe | | | | | | | |
| Starling | | | | | | | |
| Turnstone | | | | | | | |
| Twite | | | | | | | |
| Wigeon | | | | | | | |
| Wren | | | | | | | |
| **TOTAL** | **56** | **24** | **27** | **10** | **22** | **28** | **20** |

## APPENDIX B: DRAWINGS AND FIGURES


**Legend**

Approximate Capital Project Location

Do not scale this map

**Client**
Orkney Islands Council Harbour Authority

**Project**
OICHA Capital Projects Screening Exercise

**Title**
Capital Project Locations

**Status**
FINAL

| Drawing No. | Revision | Date |
|---|---|---|
| 673702-001 | - | 28 May 2020 |
| **Drawn** | **Checked** | **Approved** |
| JP | CF | CF |

**Scale**
1:50,000 @A3
0 255 510 1,020 1,530 Metres

| Rev | Date | Amendment | Initials |
|---|---|---|---|
| - | - | - | - |

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**Figure 1: Vantage Point Survey Sectors at the site of the proposed Scapa Deep Water Quay Development**

# ORKNEY ISLANDS COUNCIL:
# ORKNEY HARBOUR AUTHORITY

# FINANCIAL AND ECONOMIC ASSESSMENT FOR ORKNEY PORT DEVELOPMENT PROJECTS

## FINAL REPORT: APRIL 2021

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# TABLES

# EXECUTIVE SUMMARY

This Report – 'Financial and Economic Assessment for Orkney Port Development Projects' – has been commissioned by Orkney Islands Council Harbour Authority to consider the financial and economic considerations and benefits associated with specific harbour development projects in Orkney.

This work follows on from the Orkney Harbours Masterplan Phase 1 and will feed into a more detailed Outline Business Case (OBC).

The infrastructure and facilities in question comprise:

- The construction of new deep water quayside facilities in Scapa Flow – the Scapa Deep Water Quay (SDWQ)
- Development of land and quay space at Hatston
- Improvements at Stromness and Lyness

These projects are underpinned by the following key drivers:

1. Climate change initiatives, in particular the commitment to **Net Zero** greenhouse gas (GHG) emissions.
2. The need to **develop new business activity** and **support current growth sectors** to secure the future economic wellbeing of Orkney and the Harbour Authority in the light of transition away from traditional oil and gas operations.
3. Enabling Orkney to capitalise on the **remaining opportunities** in the oil and gas sector.

## Offshore wind opportunity

Orkney is well-located for several offshore wind sites and agreements have been drawn up with several developers wanting to base the assembly/installation of wind turbines and their operations and maintenance (O&M) activities in Orkney.

Scapa Deep Water Quay will provide the necessary quay space, depth of water and laydown area to meet the developer's needs for the installation phase. Hatston is the preferred location for an O&M base and crew transfers. There is also a supporting role for Stromness and Lyness as a rapid response base and storage area respectively.

## Other opportunities

### Remaining opportunities in oil and gas

Orkney is ideally located to service oil and gas vessels supporting activities West of Shetland; there are opportunities for Orkney to become a successful **oil and gas supply base**. The harbour infrastructure to support this would be provided at Hatston.

Operators are also looking for alternative sites to carry out **large scale maintenance and modification programmes** for semi-submersible platforms and rigs. They need very deep water/ quay space and the new facility at SDWQ would allow them to come alongside.

## Boatyard

The development at Hatston will enable a boatyard and lift to be accommodated. This will enable Orkney to attract the larger vessels (e.g. windfarm, aquaculture) that would otherwise have to go overseas to be serviced, as well as serving the local community.

## Cruise and marine leisure

The proposed developments at Stromness will support the offshore wind sector, but also safeguard the cruise calls into Stromness by providing a pontoon for landing passengers. It will also remove conflicts with the marina users and enable additional marina berths to accommodate the growing demand for marine leisure facilities.

## Results

| | |
|---|---|
| Total cost of investment is substantial at **£248.2m** | Projects are expected to generate **£528m** of monetised benefits to Orkney (to 2051) |
| Projects have a strong justification with a **positive** ENPV<br><br>(excluding lease payments from windfarm developer anchor tenant) | **ENPV (to 2051)**<br><br>Base case: +£57.8m |
| The number of jobs created or safeguarded in Orkney and gross value added (GVA) will **benefit the local community** | Base Case (2030):<br><br>**150 jobs**<br><br>**£16.2m GVA** |

# 1 INTRODUCTION

## 1.1 Aim of this Report

This Report – 'Financial and Economic Assessment for Orkney Port Development Projects' – has been commissioned by Orkney Islands Council Harbour Authority to consider the financial and economic considerations and benefits associated with specific harbour development projects in Orkney.

This work follows on from the Orkney Harbours Masterplan Phase 1 (see 1.3) and will feed into a more detailed Outline Business Case (OBC) which will be developed according to HM Treasury "Green Book" and "Guide to Developing the Project Business Case" Five Case Model which is summarised below.

This financial and economic assessment is closely linked to the Economic and Financial Cases as per the Five Case Model.

Although this is an economic assessment, it is important to demonstrate that the project fits in with the delivery of strategic goals at a national, regional and local level.

**Stage 1: Scoping: Strategic Outline Case (SOC)**

- Orkney Harbours Masterplan Phase 1.

**Stage 2: Planning: Outline Business Case (OBC)**

- **Strategic case**: revisits earlier strategic assumptions and analyses. Makes the case for change at strategic level. Sets out background to proposal and explains the objectives to be achieved. Strategic policy context and the fit with wider public policy objectives, and any dependencies on other programmes.
- **Economic case**: identifies a preferred option which demonstrably optimises value for money. Assesses the economic costs and benefits of the proposal to society as a whole. Includes a cost-benefit analysis and takes account of uncertainty and risk, optimism bias, distributional impacts, and wider socio-economic impacts.
- **Commercial case**: prepares the potential deal and asks "can the proposed solution be effectively delivered through a workable commercial deal or deals?" Sets out procurement strategy, ownership of assets, key contractual issues.
- **Financial case**: affordability and funding requirements/ sources of the likely deal. Identifies and fills any funding gaps, contains provision for cost overruns, explains and estimates contingent liabilities.
- **Management case**: management arrangements and clear milestones for successful delivery.

**Stage 3: Procurement: Final Business Case (FBC)**

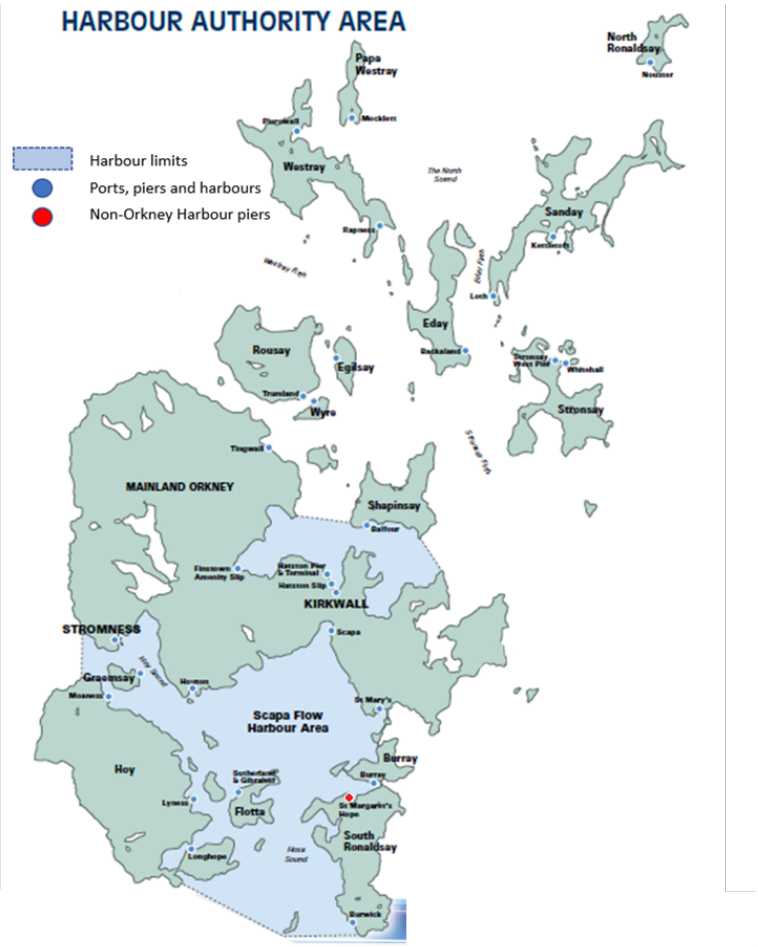
- Finalise commercial arrangements prior to project commenement

## 1.2 Orkney Harbours – a diverse and forward looking base

Orkney Islands Council (OIC) is the Statutory Harbour Authority responsible for the safe and efficient operation of the 29 piers and harbours located throughout the Orkney Islands.

The range of ports and harbours is diverse, in terms of structure, size and nature of operational activity.

The major port facilities of Hatston, Kirkwall and Stromness accommodate a range of operational activity across many sectors – aquaculture, cargo, cruise, ferries, fishing, marine leisure and renewables, in particular offshore wind.



Source: Orkney Harbour Authority.

The strategically located Oil Port of Scapa Flow, with its unique deep water sheltered anchorage, hosts multiple ship to ship (STS) transfer operations of crude oil, liquefied natural gas (LNG) and liquefied petroleum gas (LPG) as well as serving the Flotta Oil Terminal. It now also accommodates semi-submersible rigs and accommodation platforms at anchor for maintenance and stand-down.

There are many smaller piers and harbours throughout the North and South Isles as well as across the Orkney Mainland: many of these accommodate lifeline island ferry services, aquaculture, fishing and marine leisure activities. Many of these piers are critical in ensuring the future viability of island or remote communities.

**ORKNEY HARBOURS HAS A DIVERSE BUSINESS BASE AND PLAYS A FUNDAMENTAL ROLE IN SUPPORTING MANY KEY SECTORS IN THE ORKNEY ECONOMY AND ACROSS ISLAND COMMUNITIES. IT HAS AN AMBITIOUS INFRASTRUCTURE VISION THAT WOULD "PLACE ORKNEY AT THE FOREFRONT OF THE DRIVE FOR A CLEANER, GREENER FUTURE".**

## 1.3 Developing Orkney's harbour infrastructure

### 1.3.1 Orkney Harbours Masterplan Phase 1 – a summary

The Orkney Harbours Masterplan Phase 1 was published in November 2019, a culmination of almost two years' analyses and consultation.

Following an iterative and detailed process of optioneering and assessment, the masterplan presented several projects that would enable the Harbour Authority to address challenges within existing markets, develop new business and safeguard its crucial role in supporting the economy of Orkney.

The objectives underpinning the Orkney Harbours Masterplan Phase 1 are shown opposite.

**Commercial**

- Establish a strategic framework and vision that will guide future infrastructure investment decisions towards a coordinated and sustainable future.

**Financial**

- To safeguard and enhance the financial sustainability of the harbour business within the context of a competitive business environment.

**Socio-economic**

- To support and enhance the socio-economic prosperity and social well-being of local communities.

**Environment**

- To safeguard and support the long-term productivity of the coastal and marine environment through best practice and strong environmental stewardship.

The masterplan proposals were defined as follows:

| | |
|---|---|
| **Kirkwall Pier**<br>• Multi-purpose quayside infrastructure<br>• Waterfront development<br>• Marina expansion<br>• Improvements to traffic management and facilities on the quayside | **Stromness & Copland's Dock**<br>• Improvements to Copland's Dock<br>• Reclamation of land for development<br>• Marina expansion<br>• Cruise tender pontoon<br>• Improvements to traffic management and facilities on the quayside |
| **Scapa Pier**<br>• Pier extension and dredging<br>• Increase in laydown and operational area and marine leisure facilities | **Lyness**<br>• Creation of new hardstanding area behind pier |
| **Scapa Deep Water Quay**<br>• Creation of a new Deep Water Port Facility in Orkney<br>• 300m quayside with water depth of -20m CD<br>• 5+ hectares laydown area | **Hatston Terminal & Pier**<br>• New deep water quayside infrastructure<br>• Reclamation of land for development<br>• Ex-pipe and fuel storage<br>• Reconfiguration of freight marshalling, parking and public access<br>• New passenger terminal |

### 1.3.2 Project development – an update

Since the publication of the Orkney Harbours Masterplan Phase 1 there has been a considerable amount of work undertaken to guide the prioritisation and timing of masterplan proposal development.

Over the last two years the offshore wind sector has been galvanised and advanced considerably with the ScotWind proposals brought to market in Scotland. The Orkney Harbours Masterplan Phase 1 is a strategic framework that has provided the basis for Orkney to respond to these market opportunities. There has been continuous and increasing interest from offshore wind developers seeking a base in Orkney for construction / assembly and O&M.

In practical terms, this has resulted in the reimagining of the proposals for Scapa Deep Water Quay into a more substantial facility that is better focused on serving this market, whilst also accommodating the previously foreseen uses.

Potential roles for other harbours in Orkney have also been identified through dialogue with the offshore wind market, particularly Hatston, Stromness and Lyness although there is no requirement for significant physical changes at the latter two.

The expanded Scapa Deep Water Quay project, and the complementary ability to service offshore wind at other harbour locations, now form the basis for modified proposals and use of facilities, which have now been analysed in this assessment.

**Scapa Deep Water Quay** and **Hatston** proposals should be prioritised to enable Orkney to attract and benefit from offshore wind opportunities, which will provide a long-term stream of economic activity for Orkney.

There may be funding available in the short term to support marina development and a cruise pontoon in **Stromness** along with the placing of additional fenders at **Copland's Dock**. Stromness has been identified as an ideal location for crew transfer vessels (CTVs) for servicing offshore wind farm sites during operational phases. To this end, the economic assessment considers Stromness.

Whilst creating hardcore standing at **Lyness** was not deemed a major priority within the masterplan, it is now the case that the offshore wind sector are keen to use Lyness as a storage site for larger items. Again, Lyness is included in the economic assessment in this regard.

The **Scapa Pier** proposals may not be required – as and when the fuel tanks at Scapa reach the end of their life there is an option to build a new fuel tank farm at Hatston – thus avoiding the need for Scapa Pier to accommodate larger fuel carriers. It is proposed that tugs and pilot boats be relocated to Scapa Deep Water Quay. This will free up space on the existing Scapa Pier and the original intention of using it for more marine-related activities can still be achieved but without spending £12m.

**Kirkwall** Pier proposals will come later, but within ten years.

## 1.4 Structure of this Report

This Report is structured as shown opposite.

Section 2 (Strategic Context) describes the rationale for projects; presents a summary of key market sectors; and demonstrates how the projects fit with national, regional and local policies.

Section 3 presents a detailed overview of the projects, namely Scapa Deep Water Quay and proposals to develop Hatston Pier and Terminal.

Sections 4 comprises an overview of project costs and analysis of economic benefits and impacts.

Section 5 summarises the Harbour costs and revenues.

Section 6 presents our conclusions.

Appendix A describes the strategic policies in more detail.

# 2 STRATEGIC CONTEXT

## 2.1 Why is this project needed?

The masterplan proposals were developed against a set of outline requirements derived from identified issues, constraints and opportunities at the time.

The Scapa Deep Water Quay and Hatston projects are underpinned by the following key drivers:

4. Climate change initiatives, in particular the commitment to **Net Zero** greenhouse gas (GHG) emissions.
5. The need to **develop new business activity** and **support current growth sectors** to secure the future economic wellbeing of Orkney and the Harbour Authority in the light of transition away from traditional oil and gas operations.
6. Enabling Orkney to capitalise on the **remaining opportunities** in the oil and gas sector.

The Harbour Authority must look to the future and invest in facilities and infrastructure that will both safeguard and enable growth in existing markets and enable diversification into new markets and revenue streams.

Orkney has an opportunity to develop new and grow existing markets in the oil and gas sector, but it is dependent on the right infrastructure, which it currently lacks.

Investing in new infrastructure will enable Orkney to become a hub for offshore wind and other activities through transition to decarbonisation.

### 2.1.1 Net Zero greenhouse gas emissions – harnessing offshore wind

The Scottish Government has set itself the ambitious and legally binding target to reach Net Zero by 2045[1]. The UK Government has, within the wider Climate Change initiatives, also committed to reach this target by 2050. To achieve these targets, zero carbon technologies and fuels need to be developed as soon as possible and these projects play a pivotal role in delivering these policies.

Scotland has extensive offshore wind resources with potential to increase its contribution to the UK energy needs, and it has the commitment to be a global leader in offshore wind. The current leasing round, ScotWind, includes several deep water sites in proximity to Orkney and site operators will require access from and to suitable ports.

[1] Climate Change (Emissions Reduction Targets) (Scotland) Act 2019

Crown Estate Scotland[2] highlighted that it is essential that Scotland's ports are "ideally equipped and ready to support the rapid expansion of offshore wind" and there is "a significant risk that existing port capacity will be insufficient". Orkney is well-located and will have the physical attributes to meet this need: the interest from offshore wind developers is unprecedented. Scapa Deep Water Quay has been identified as the optimal construction / assembly point, with Hatston the Operations & Maintenance base and Lyness and Stromness identified as suitable for laydown and additional O&M support.

Investing in new infrastructure will enable Orkney to harness the opportunity for offshore wind and create long term economic and social benefit for the region.

### 2.1.2 Net Zero greenhouse gas emissions – hub for future marine fuels

There is a potential opportunity to develop a storage and distribution hub for low and zero carbon fuels: this could be developed at Scapa Deep Water Quay where there is scope for up to 18 hectares of laydown area. The hub would initially provide storage and bunkering facilities for vessels in the region and regional terrestrial users. In the longer term the facility would extend service to the shipping sector in Scotland and the UK. This component of the project would only be taken forward if there was sufficient interest and investment from the private sector.

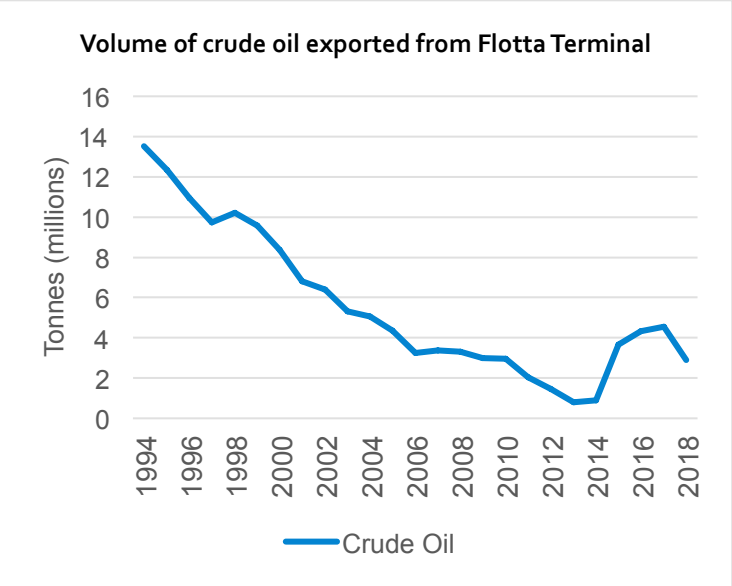
There is an opportunity for Orkney to play a key role not only in harnessing opportunities from decarbonisation but in enabling and even expediting the transition process, through the provision of appropriate infrastructure and facilities – coupled with Orkney's unparalleled expertise, research and commercialisation of renewable energy and zero carbon fuel technologies.

[2] Ports for offshore wind, Crown Estate Scotland, Arup, Sept 2020

### 2.1.3 Facilitate new harbour business and growth in existing markets

#### 2.1.3.1 Flotta Terminal

The Flotta Terminal operation is at the centre of the Scapa Oil Port and has been a key source of revenue for the Harbour Authority for the last 40 years. There has, however, been a long-standing decline in the volume of crude oil exported from the Flotta Terminal. Although volumes of oil exported have picked up since 2013, growth is not expected in the future, as operations at the Flotta Terminal are envisaged to wind down and cease at some point during the next 20 years.




#### 2.1.3.2 New and growth activities

The opportunity to support the forthcoming **offshore wind sector** developments has been mentioned above and is described in more detail in section 3.1. This is a major new activity stretching into the long term if Orkney has the infrastructure to support it.

In addition, there are potential opportunities in the following areas:

- **Boat repair and maintenance**: there is an opportunity to grow activity in this sector within Orkney, through providing the necessary infrastructure and equipment (e.g. at Hatston). Through the development of the masterplan it became clear that there could be potential demand for such a facility; a substantial number of aquaculture vessels currently travel to the North East of Scotland for repairs and maintenance, as do larger fishing boats, smaller ferries, tugs, pilot boats and work boats. The ability to handle them within Orkney would cut costs and increase efficiencies across a number of sectors.
- **Aquaculture**: strong growth is expected in salmon farming and Orkney is well-placed to support this and its supply chain, but it requires space and better facilities.
- **Marina**: Orkney is an attractive and strategic destination for visiting boats, in a market that is growing in popularity. The resident berths are full, however, and they cannot meet the demand from larger visiting boats.
- **Cruise**: cruise is already a key component of the Harbours' business base; but can constrain other activities at Hatston in busy periods.

The Harbour Authority must look to the future and invest in facilities and infrastructure that will both safeguard and enable growth in existing markets and enable diversification into new markets and revenue streams.

### 2.1.4 Remaining opportunities in the oil and gas sector

Orkney is ideally located to service oil and gas vessels supporting activities West of Shetland. According to recent analysis undertaken by EY[3], there are opportunities for Orkney to become a successful **oil and gas supply base**; however, there is not adequate harbour infrastructure in terms of water depth, available berthing space all year round and other essential services and supplies.

Operators are also looking for alternative sites to carry out **large scale maintenance and modification programmes** for semi-submersible platforms and rigs. They can only be accommodated with the right infrastructure in place – e.g. very deep water to attract rigs and platforms alongside. There is an opportunity for Orkney to target this market through creating a new deep-water facility in Scapa Flow.

### 2.1.5 Policy fit

The project proposals contribute to a range of policies and plans at national, regional and local level. The level of fit with policy aims and objectives is pertinent in that this can influence the availability of funding and deliverability.

Many of the policies are focussed on economic growth and competitiveness: Programme for Government, Scotland's Economic Strategy and HIE's Strategy; the National Planning Framework 4 aims to identify major developments and planning priorities at the national level.

The Climate Change Plan is focussed on decarbonisation.

The National Islands Plan focuses on Scotland's island communities across a range of sectors;

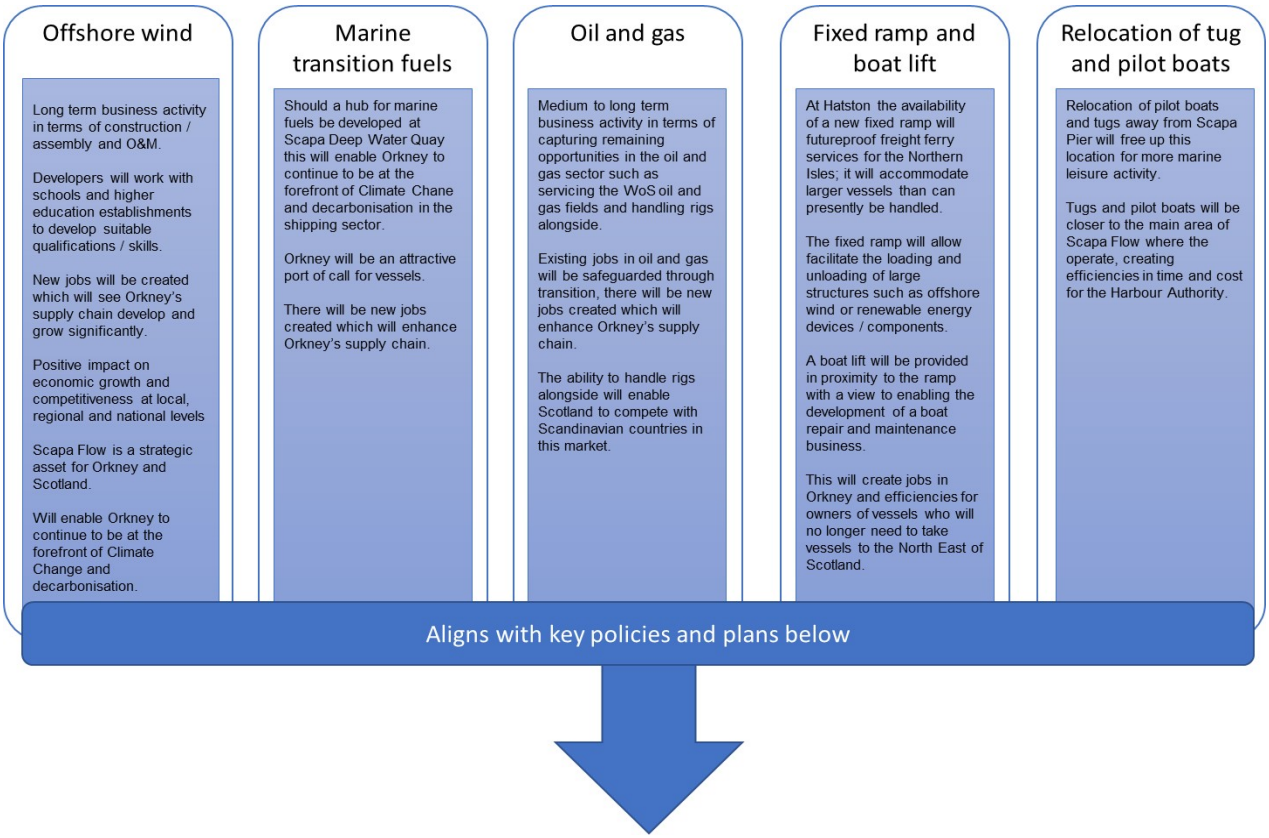
There are several policies relating to marine-related aspects (Giant Strides, Crown Estate policy and planning around island and ferry transport (Ferries Plan / Island Connectivity Plan).

Locally Orkney has several plans in place that focus on improving the economy, society and generally making Orkney a good place to live, work and visit.


[3] *Assessment of Potential Oil & Gas Revenues through Orkney Islands Harbour Infrastructure, EY, 2019*

A summary of these policies is presented at Appendix A.

In terms of fit with these policies, the projects at Scapa Deep Water Quay and Hatston go some way to delivering policy objectives at local, regional and national levels. The figure below presents a summary of project components and rationale and which policies these fit most with.



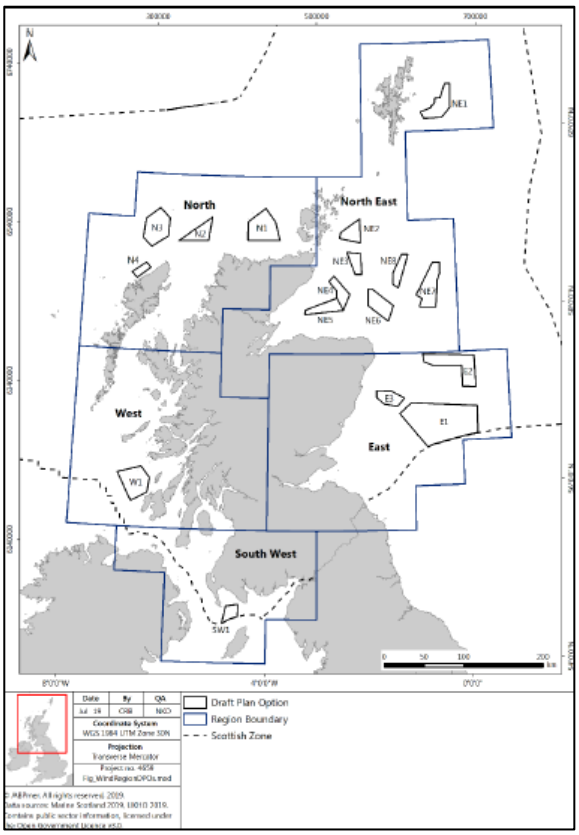

| Policies and plans | Offshore wind | Marine fuels | Oil and gas | Fixed ramp and boat lift | Relocation of tugs / pilot boats |
|---|---|---|---|---|---|
| Programme for Govt | ✓✓✓ | ✓ | ✓✓✓ | ✓✓ | ✓ |
| Scotland's Economic Strategy | ✓✓✓ | ✓ | ✓✓✓ | ✓✓ | ✓ |
| Climate Change Plan | ✓✓✓ | ✓✓✓ | | ✓ | ✓ |
| CES | ✓✓✓ | ✓ | ✓ | ✓ | ✓ |
| NPF4 | ✓✓✓ | ✓✓ | ✓✓ | | |
| National Islands Plan | ✓✓✓ | ✓✓✓ | ✓✓✓ | ✓✓✓ | ✓✓ |
| Giant Strides | | | | | ✓ |
| Ferries Plan | | ✓ | | ✓✓✓ | |
| HIE's Economic Strategy | ✓✓✓ | ✓ | ✓✓✓ | ✓✓ | ✓ |
| Local Development Plan | ✓✓✓ | ✓ | ✓✓ | ✓✓ | ✓ |
| Council Plan | ✓✓✓ | ✓ | ✓✓ | ✓✓ | ✓ |
| Community Plan | ✓✓✓ | ✓ | ✓✓ | ✓✓ | ✓ |

# 3 MARKET OVERVIEW

In this section, we provide an overview of the markets that this project will address; the reasons why the investment is needed to meet the market needs; and the beneficiaries of the investment.

## 3.1 Offshore wind

There is already a substantial volume of offshore wind energy activity off the coastline of Scotland, with six sites in operation and eight having received consent (2019). Crown Estate Scotland is in the process of running a further leasing round for commercial scale offshore wind energy projects in Scottish Waters, known as the Scotwind Leasing. A revised Draft Sectoral Marine Plan for Offshore Wind was published in 2019, which identified 17 sites or Draft Plan Options across five regions. These sites could deliver between 8 and 10 GW of power and, if delivered, these developments could assist in delivering the Scottish Offshore Wind Energy Council's goal to produce at least 8 GW of offshore wind in Scottish Waters by 2030.




There are several proposed sites in close proximity to Orkney (particularly N1, N2 and NE3 but also several others), making this the optimal location for the construction, operation and maintenance activities associated with offshore windfarm development: having a base in Orkney would significantly reduce time at sea, with shorter journey distances between harbour and offshore windfarm locations; there is safe anchorage within Scapa Flow; and Orkney has a track record in building resilient and capable supply chains and workforces to meet the demands of transitioning economies, from oil and gas to renewables and zero carbon fuels.

Orkney Harbour Authority is in discussion with upwards of 12 developers and has signed Non-Disclosure Agreements with ten of those who are looking to acquire one of the leases. Preferred developers will be announced in Autumn 2021; it is envisaged that consent for development could be given by 2025 and that construction could, for some sites, commence in 2028.

It should be noted that whilst the sites look relatively small on paper, they are fairly sizeable in terms of how many turbines could be installed – at least 100 turbines within each site initially.

As part of the Orkney Harbours Masterplan Phase 1, offshore wind was identified as a key opportunity for Orkney; there has been significant interest from potential windfarm developers, with some seeking exclusivity agreements already.

There needs to be specific investment in harbour infrastructure and facilities in order to accommodate construction, operation and maintenance activities. This would also need to be implemented fairly quickly in order that potential offshore windfarm developers could incorporate Orkney as a key port within their plans.

## 3.2 Oil and gas

Oil and gas operations in Orkney are in decline, which means there is a clear need to develop new business activity as well as capitalising on the remaining opportunities arising in the sector to secure the future economic wellbeing of Orkney and the Harbour Authority.

The West of Shetland oil and gas basin (WoS) is regarded as one of the UK's final opportunities with regard to oil and gas production. Whilst the area is relatively under-explored and under-developed compared with the rest of the UK Continental Shelf (UKCS) there are forecasts which suggest that it will yield a large proportion of UKCS output. There is a real opportunity for Orkney to become a supply base for vessels and crew servicing WoS oil and gas operations, given Orkney's proximity to the site – Hatston is significantly closer than Aberdeen or Peterhead (where vessels are currently operating from); as well as Lerwick and Scrabster which could be seen as competing ports. With unrestricted access to berths, sufficient depth of water, laydown area and fuel provision Hatston will be an optimal location for this activity.

Semi-submersible rigs and platforms require ongoing maintenance; there is limited capacity within Scottish ports to do this as there are very few facilities with sufficient water depth – it is the case that many structures travel to Scandinavia. Scapa Deep Water Quay will have -20m of water depth below Chart Datum and will be able to accommodate such structures, as well as other deep drafted structures and vessels.

At Flotta Oil Terminal there is a scheduled decrease in the flow of oil, with the facility currently due to close around 2035. This will result in the loss of around 200 jobs, a reduction in income to the Council as the Harbour Authority and the loss of an

otherwise world class energy facility. This constitutes a significantly negative outcome for Orkney's residents and businesses: Flotta Oil Terminal played a pivotal role in the UK oil and gas industry with around 10% of the UK's oil output handled through this terminal; the Terminal has been a prominent employer in Orkney over the last few decades – it is one of only several companies employing more than 50 people and its workforce makes up around 3% of all jobs in Orkney.[4]

Thus, there is a real and credible opportunity for Orkney to harness remaining opportunities in the oil and gas sector.

## 3.3 **Boat repair and maintenance**

The main facilities for boat repair and maintenance are based in the North East of Scotland. Macduff Shipyards is the largest company operating in the sector, with facilities at Macduff, Fraserburgh and Buckie. There are other boat repair companies operating out of Peterhead, Fraserburgh and Arbroath, plus there are boatyard facilities in Shetland and on the west coast of Scotland.

For major maintenance or refits many vessel owners in Orkney use facilities in the North East of Scotland: aquaculture workboats, the inter-isle ferry fleet, tugs, pilot boats and larger fishing boats, for example.

For basic maintenance, painting and out-of-water inspections, many vessels use the boatshed at St Margaret's Hope, which is undercover – this is the only such facility in Orkney at present and vessel owners also carry out maintenance and painting on the quay at various locations throughout Orkney, though this is weather dependent. The facility is restricted in terms of the weight and length of vessel it can accommodate.

There is a boatyard at Burray, which the owner intends to develop into a commercial business.

There is a real opportunity for Orkney to attract a new business sector to the region through commercial tendering of the boatlift and its operation. With the right operator in place, it would be possible to accommodate a wide range of vessels for repair and maintenance activities. The vessel owners would benefit from a substantial increase in efficiency.

- There are around 130 registered fishing vessels in Orkney (2018 Scottish Sea Fisheries Statistics), as well as a large number of residential sailing boats and dive boats based in Orkney (e.g. likely to be in excess of 150).
- Orkney Harbour Authority operates three pilot boats, three tugs and the inter-isle ferry fleet.
- There are at least 30 aquaculture boats servicing various fish farm sites around Orkney, plus other supporting workboats and barges.

[4] In 2018 total number of jobs in Orkney was estimated at 11,000, of which 5,000 were part-time (Orkney Islands Economic Review 2020, Fraser of Allender Institute).

## 3.4 Cruise

- Orkney's cruise market has grown very strongly since 2010. This reflects strength of visitor product, marketing to cruise lines and extension of Hatston berth in 2014.
- Passenger numbers in 2017 (115,000) were more than four times those in 2010, with the number of calls (135) almost doubling in that period.
- The average size of vessel has increased – passengers per vessel and GRT have both doubled since 2010.
- The number of calls in Orkney has grown at a slightly lower rate than in Scotland as a whole. However, Orkney passenger numbers have grown much faster than the national trend.

Despite the impact of Covid it is envisaged that Orkney's cruise business will return over the next several years and underlying growth in demand will continue.

Improvements in infrastructure will support Orkney's attractiveness to cruise companies.

Increasing the number of smaller cruise liner visits to the Isles would take some pressure off Kirkwall Pier, and fit with growing demand for more specialist/exclusive experiences as part of expedition cruises. This would need buy-in from Isles' communities to ensure they can meet the needs of the vessels and their passengers.

## 3.5 Marine leisure

In 2018 there were 653 visitor boats, with the majority of these between June and August. These boats spent just over 5,800 nights in Orkney, with an average of six nights per boat during the peak period. The total number of crew was 1,565.

Kirkwall and Stromness have similar volumes with regard to visitor boat nights, whilst there are more visitor boats and crew calling at Kirkwall.

Overall there has been a gradual increase in the number of visiting boats over the last few years despite some volatility in 2012/2013 – and the more recent impact of Covid-19. Nonetheless it should be noted that visitor boats to Orkney have grown at a faster rate than in Scotland as a whole. This is attributable to increased digital marketing by Orkney Marinas, growing general visitor awareness of Orkney as a destination and an increasing number of repeat visits.

There is the opportunity to attract more visitor boats to Orkney as underlying demand for leisure sailing grows – assuming that markets will return to normal a year after Covid-19. This would be strengthened by investment in onshore facilities and continued marketing efforts. The latter could possibly encompass Orkney being part of a marketed itinerary – akin to the *Cool Route* that has been developed for Ireland-Northern Ireland-western Scotland-Faroe-western Norway sailing.

The provision of more and larger berths would help meet demand from the growing numbers of boats of more than 20m LOA – including superyachts.

Provision of additional berths would also help meet growing demand from Orkney residents.

There is growth potential in the small day boat tour market, including provision of bookable/walk up tours as well as private charters. This will require raising awareness of the business opportunities by bodies like OIC and HIE.  There is likely be strong visitor interest in boat tours of Scapa Flow. However, potential conflicts with other harbour users would need to be addressed.

# 4 MASTERPLAN PROJECTS

## 4.1 Introduction

This section provides a detailed overview of the two projects that are the primary subject matter of this Economic and Financial Assessment – Scapa Deep Water Quay and proposals to develop Hatston Pier and Terminal.

## 4.2 Scapa Deep Water Quay

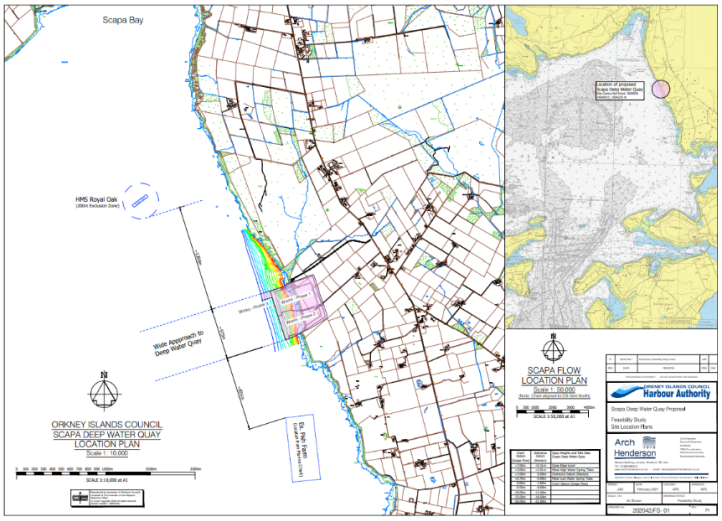
During the last 18 months the nature and scope of Scapa Deep Water Quay has transformed in some respects, as a result of various factors, such as site investigation, engineering feasibility and market requirements, particularly relating to the offshore wind sector which has seen significant development over the last year.

- Dialogue with more than 10 offshore wind developers to discuss requirements (e.g. water depth, quayside, laydown area, etc.).
- Preliminary site investigations (land and sea)
- Preliminary environmental surveys and analysis (wintering birds, otters, landscape, archaeological, etc.)
- Ongoing dialogue with key stakeholders (landowners, SEPA, Scottish Water, SSEN, SNH, HES)
- Further engineering feasibility to reach Exemplary Design stage

For Scapa Deep Water Quay, the site location proposed in the masterplan (to the north of the North of Deepdale) was discounted after assessment of access constraints and poor suitability of existing topography relative to minimum laydown extent now required.

As the ScotWind leasing round for offshore wind farm sites got underway, there was much greater clarity in terms of what potential developers will require in order to construct, operate and maintain offshore wind farms in proximity to Orkney. A key factor now known is that the laydown area required is much greater than 5 hectares; rather a minimum of 12 hectares is required; and that at least 15 metres of water depth would be required – more in the case of some specific developers and their proposed methods. It was concluded that an area in close proximity to the original site could be utilised as it was possible to create a much larger laydown area.

There is no deep water pier infrastructure in Scapa Flow located on the Orkney mainland coast. During the masterplanning process, a number of locations were identified and appraised; the preferred site is located south of the Burn of Deepdale, which is located within a rural area comprising mainly pastureland between Kirkwall and Holm, approximately four kilometres south of the existing Scapa Pier.




The Scapa Deep Water Quay proposals comprise the design and construction of a new harbour facility which has 575m of quayside with water depth of -15 CD; a 110m x 75m extension with water depth of -20m CD; and 18 hectares of laydown area (excluding quay areas). There will also be an access road from the A961 to the site.

The development is designed to be built in three phases although the ordering of Phases 2 and 3 will be dependent on the economic need for these facilities. It is most likely that Phases 1 and 2 or Phases 1, 2 and 3 would be built simultaneously.

| | |
|---|---|
| Phase 1 | • New quay: 300m x 46m (450m berthing)<br>• -15m CD water depth (via dredging)<br>• 12 hectares laydown area<br>• Access road |
| Phase 2 | • Quay extension: 275m x 46m to south<br>• -15 CD water depth (via dredging)<br>• Six hectares laydown area |
| Phase 3 | • Quay extension: 110m x 75m to north<br>• -20m CD water depth (via dredging) |

The main purpose of this facility would be to undertake any/multiple industry activity that requires both deep-water berthing and large laydown area. There are specific market opportunities in the offshore wind and oil and gas sectors. This is also a potential location for the development of a future fuel storage and supply hub. The location has also been identified as a hub for harbour pilot boats and tugs.

With regard to offshore wind, there are several lease areas earmarked for development around Orkney, with Orkney the preferred location as a hub for

construction assembly and O&M – Scapa Deep Water Quay is the optimal site for the delivery and assembly of components as part of the construction phase.

*'It is essential that purpose-built staging port facilities, such as the Scapa Deep Water Quay, are available to maximise the weather window for offshore construction. A new, purpose-built deep-water quay in the natural shelter of Scapa Flow would service the growing offshore wind market in the North of Scotland and, in doing so, become a great asset to Orkney's economy.'*

*Source: offshore windfarm developer*

## 4.3 Hatston Pier

Hatston Pier and Terminal is located on the coast to the northwest of Kirkwall. It is Orkney's primary commercial terminal and link south to Aberdeen and north to Shetland. The longest berth is 385m in length, offering 10.5 metre draft. The original pier was built in 2002 and a 160m extension was completed in 2013.

This multi-purpose infrastructure has been hugely successful in accommodating a range of operational activities including the largest cruise ships, renewable energy, ferries, oil and gas and cargo/ livestock.

The proposal for enhancing Hatston Pier has not changed dramatically since the publication of the Orkney Harbours Masterplan Phase 1, rather it has been developed into a more detailed plan, again through various activities over the last 18 months or so.

Dialogue with offshore wind developers has led to Hatston being identified as a key location for offshore wind Operations & Maintenance (O&M)

Preliminary environmental surveys and analysis

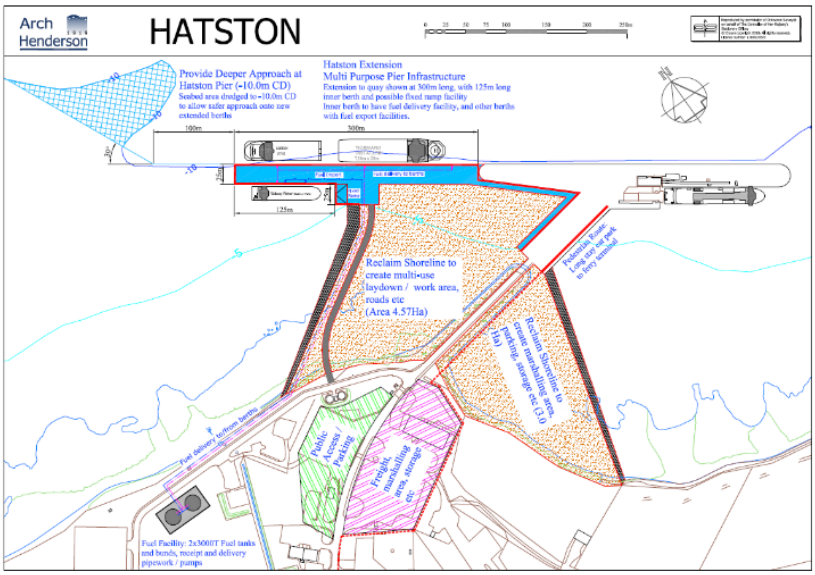
Ongoing dialogue with key stakeholders (existing harbour users, SEPA, Scottish Water, SSEN, SNH, HES)

Further engineering feasibility to reach Exemplary Design stage

The plan for Hatston is focussed on:

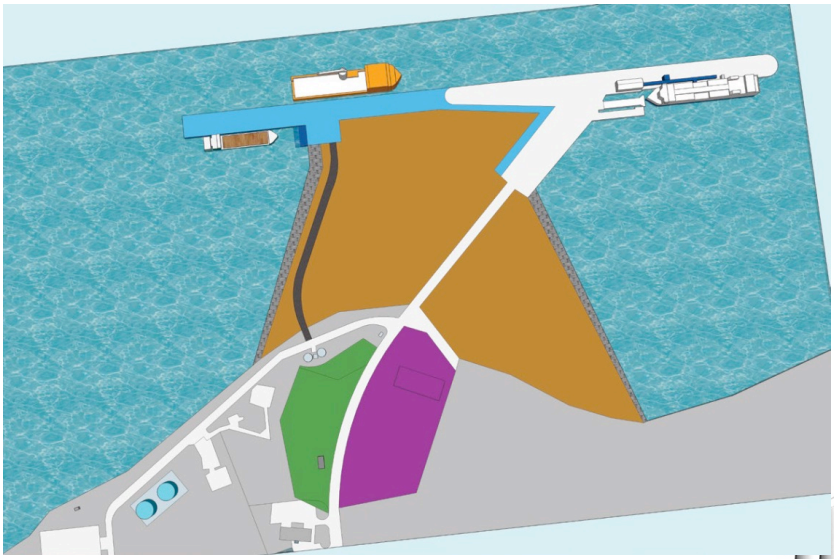
- Reducing conflicts between users and operational activity.
- Resolving the seasonal lack of availability of berths due to cruise, which imposes year-round constraints on other vessels using the quay.
- Providing capacity for offshore wind O&M and crew transfers.
- It will be possible to handle freight and traffic more efficiently and effectively and thereby enable growth across a range of economic sectors.


Hatston has been identified as an optimal base for Service Operation Vessels (SOVs), such as the Esvagt Froude, which would handle O&M, supplies and crew. A typical SOV has length over 80m and draft of 6.5m. Crew may also be transported on Crew Transfer Vessels (CTVs) which are generally smaller vessels with an LOA of between 20m and 40m and a relatively shallow draft. For any one offshore farm site, there could be several SOVs based at port. Different developers would also be likely to want their own facilities.




Core proposals comprise a significant extension to the existing pier and expansion of landside area through reclamation. This will futureproof harbour operations.

The existing outer quay will be extended by 300m (with water depth of -10m CD) and there will be a 125m inner berth. There will be substantially more quayside available both for the existing pier and the extension.



A fixed ramp will be located on the inner berth as well as a specialist boat lift which will have a maximum safe working load of 800 tonnes

able to lift vessels of 40m LOA and 15m beam.

Circa 7.5 hectares of additional land would be made available for harbour-related operations through reclamation.

There will also be an ex-pipe fuel supply and fuel storage facility close to the pier. The design of new infrastructure here will be futureproofed so as to accommodate future provision and storage of alternative (less polluting/carbon-free) fuels and provision of shore power where viable. The development is designed to be built in three phases if required.

| | |
|---|---|
| Phase 1 | • Reclaim shoreline to create 2.96 hectares of laydown / area for marshalling, parking and storage. |
| Phase 2 | • Extend current quay by circa 300m.<br>• Create 1.73 hectares of additional concrete deck area.<br>• Dredging to -10m CD to allow safer approach on to new extended quay. |
| Phase 3 | • Reclaim shoreline to create additional 1.47 hectares of laydown area.<br>• Create inner berth with ramp and boat lift. |

There is also potential for the reconfigured pedestrian access within the harbour area to connect to the proposed coastal path identified within the Kirkwall Urban Design Framework (KUDF).

Options to promote sustainable transport will be explored at the feasibility stage, such as the provision of electric vehicle charging points, electric bicycles, electric vehicles as part of car-pooling schemes and linkages with existing and future walking and cycling networks.

In the future there may also be a need to refurbish and/or extend the existing passenger reception facility that caters for both ferry and cruise passengers on the quayside.

## 4.4 Stromness and Lyness

The opportunity relating to offshore wind activity has extended to Stromness and Lyness; discussions with several offshore wind developers have led to consideration of these locations for specific uses.

**Stromness** has been identified as an optimal base for rapid response vessels used for quick site visits to westerly offshore wind farm sites when required. Typically they would use a catamaran such as a Seacat with LOA of 24m. At this stage, it is not clear

if an alternative location would be better suited for easterly windfarm sites.

**Lyness** has been identified as a preferential location for storing equipment such as cables, chains, anchors, etc.

# 5 ECONOMIC ANALYSIS

## 5.1 Introduction

In this section we examine whether the preferred option, which has been selected from a shortlist of technical proposals, demonstrably optimises value for money and meets the project objectives. It assesses the economic costs and benefits to society as a whole and takes into consideration risk and uncertainty, optimism bias, distributional impacts and wider socio-economic impacts.

In carrying out this analysis, we have followed the guidance in HM Treasury Green Book[5] which sets out good practice in project development to ensure that a project delivers value for money. All assumptions and data underlying the cost estimates, revenue projections, market outlook and wider economic impacts are documented.

The economic assessment looks at the impact of the project (the 'With project' case) against what would have happened without the project (the 'Reference case' or 'Do nothing'). The results are presented using the metrics:

- **Economic Net Present Value (ENPV)** - a measure of the value of an investment, taking account of all the costs associated with it, the revenue streams it generates and the benefits to the economy over time. A positive (or zero) ENPV indicates that the project is 'worthwhile'.
- **Economic Rate of Return (ERR)** – the discount rate at which the costs and benefits of the project, discounted over its life, are equal.

In the 'With project' case, for each project, we have set out the results for the Base case, which is based on realistic assumptions about what could happen in each of the markets. In future analysis we will also look at Low and High cases to reflect the upper and lower bounds of the expected returns.

We also carry out sensitivity tests to see how sensitive the outcomes are to changes in the assumptions, particularly allowing for optimism bias.

## 5.2 Contents of this section

The remainder of this section covers the following elements:

- General assumptions
- Capital expenditure
- Operating costs
- Assumptions, summary market outlook and results for each case

An overview of the markets is provided in Section 3 and in this section we summarise the assumptions pertaining to the economic analysis.

[5] https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-governent

We also look at the impact on employment and Gross Value Added (GVA) created or safeguarded, and fiscal receipts.

The benefits for each of the proposals has been identified and we have quantified those that have a monetary value in the economic evaluation. Not all benefits could be quantified, but they are still important to the justification of the proposals and should not be overlooked.

Although the results have been presented under each of the locations, it should be noted that, for the offshore wind in particular, a holistic approach needs to be taken: the different locations can offer different elements of the overall offering to developers, and there are dependencies and spin-offs to other activities.

## 5.3 General assumptions

| | |
|---|---|
| Time horizon | The analysis is annual from 2021 to 2051<br>(this can be extended to 50 years in line with Green Book guidance on very long-lived assets, if the scenarios can be well-defined that far into the future). |
| Prices | Costs and revenues are in 2021 real prices (i.e. no inflation). |
| Discount rate | 3.5% |
| Taxation | VAT is 11% (based on total UK VAT receipts divided by total UK annual household consumption to capture the fact that not all expenditure is on VAT-rated goods and services).<br>Average income tax, National Insurance contributions and Council Tax is 18.5%.<br>It is assumed that, through fiscal devolution, the Scottish Government receives taxation revenue either directly, or passed on by HM Treasury. |
| Dues and charges | Orkney Harbour Authority and OIC revenues are based on the 2021-21 Schedule of Charges, supplemented by Aberdeen 2021 charges for oil and gas cargoes. |

**Average wages and employment**

Average wages have been taken from the Scottish Government Financial Scrutiny Unit publication for 2019, inflated to 2021. Where an activity spans more than one sector classification for wages, an average of the wages in relevant sectors has been used.
Employment for cruise and marina activities has been estimated from visitor spend per job (from Highland Council, 'Sustainable Tourism Profile').

| Average wages (£/FTE/pa) | |
|---|---|
| Tourism | £21,612 |
| Fish processing | £29,678 |
| Wholesale/retail trade | £21,672 |
| Offshore | £51,483 |

**Gross value added**

Depending on data available, GVA has either been determined from:

- Scotland's Marine Economic Statistics 2018
- The ratio of turnover to GVA (from Scottish Annual Business Survey and from Cebr "The Economic Contribution of the UK Ports Industry" figures for Scotland, 2017).
- GVA per worker from 'Scotland's Marine Economic Statistics, Sept 2018' inflated to 2021 prices.
- Inputs from other research

| Ratio of turnover to GVA | |
|---|---|
| Cruise pax/crew spend | 39.8% |
| Marine leisure | 62.7% |
| Aquaculture | 24.4% |
| Harbour | 34.9% |
| Oil and gas / offshore wind | 44.9% |
| Boat repair | 23.3% |

| GVA | Per worker | Ratio FTE:worker | Per FTE |
|---|---|---|---|
| Offshore wind construction | | | £73,069 |
| Offshore wind operations | | | £106,417 |
| Oil and gas | £104,064 | 85.2% | £122,141 |
| Boat repair | | | £40,676 |

**Economic multipliers**

Indirect and induced impacts have been derived using employment multipliers and GVA multipliers from the Scottish Government 2015 Input-Output tables.
Where an activity spans more than one sector, an average of the multipliers in relevant sectors has been used.

These multipliers have been adjusted downwards to make them more applicable to Orkney.

Composite adjusted multipliers are shown below:

| Activity | Employment | GVA | Output |
|---|---|---|---|
| Renewables / Boatyard | 1.302 | 1.315 | 1.273 |
| Oil and gas | 1.367 | 1.379 | 1.262 |
| Rig maintenance | 1.308 | 1.330 | 1.276 |
| Marina/cruise | 1.150 | 1.261 | 1.265 |
| Harbour operations | 1.419 | 1.243 | 1.234 |
| Construction | 1.377 | 1.430 | 1.338 |

## 5.4 Implementation timescale and activities

The tables below summarise key project milestones for the Scapa Deep Water Quay and Hatston projects.

### Table 1 Project milestones - Scapa Deep Water Quay

| Scapa Deep Water Quay Project Milestone: | Time to Complete (months) | Planned Completion Date |
|---|---|---|
| Completion of Exemplar Design | 5 | Q2 2021 |
| Management & Completion of Site Investigation | 9 | Q1 2022 |
| Appointment of Lead Consultant | 7 | Q2 2022 |
| Detailed Design | 12 | Q2 2023 (Enabling works design captured in this date) |
| Tender for Enabling Works<br>Tender of Main Construction Works | 4<br>4 | Start of Q4 2022<br>End of Q3 2023 |
| Award of Contract:<br>Enabling Works Contract<br><br>Main Contract | <br>3<br><br>3 | Award – Start Q1 2023<br>Site - End of Q1 2023<br><br>Award – Start Q1 2024<br>Site – End of Q1 2024 |
| Enabling Works Access Road and Construction Jetty | 12 | Q1 2024 |
| Quay Construction Works | 24 Months + (6 months float) | End Stop Date: Q1 2026 (Float until Q3 2026) *For Phases 1 & 2* |
| Environmental Assessments | 18 | Q3 2022 |
| Marine Licence | 12 | Q4 2022 |

**Table 2 Project milestones - Hatston**

| Hatston Project Milestone: | Time to Complete (months) | Planned Completion Date |
|---|---|---|
| Completion of Exemplar Design | 5 | Q2 2021 |
| Site Investigation | 9 | Q1 2022 |
| Appointment of Consultant | 7 | Q2 2022 |
| Detailed Design | 12 | Q2 2023 |
| Tender of Construction Works | 4 | Q3 2023 |
| Award of Contract | 3 | Award – Start Q1 2024<br>Site – End Q1 2024 |
| Construction Works | 30 +<br>(12 months float) | Q3 2026<br>(Float to Q3 2027)<br>*All Works Packages* |
| Environmental Assessments | 18 | Q3 2022 |
| Marine Licence | 12 | Q4 2022 |

## 5.5 Capital expenditure: summary

Table 3 presents a summary of capital expenditure. The subsequent tables present a detailed breakdown of capital costs for each proposal /location.

- High level capital costs include consultant fees associated with design, feasibility and construction.
- Costs exclude those relating to Harbour Revision Orders (HRO), legal aspects, Environmental Impact Assessment (EIA) and Value Added Tax (VAT).
- A contingency of 10% has been applied to all the costs except the engineering fees and the site investigations and consents. This is construction risk to reflect typical variations in prices and does not include Optimism Bias, which is modelled separately.
- Costs assume that the construction element of each project phase is standalone. Should phases be carried out at the same time, it is expected that savings could be made through shared mobilisation, better access to site and general item costs. The dredging costs, however, are based on all the dredging being carried out at the same time. If it is not, there would be additional costs of getting the dredgers over.
- Phasing includes the additional float period to allow for delays.

## Table 3 Capital expenditure summary

| Location (£'000) | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | Total |
|---|---|---|---|---|---|---|---|---|
| Scapa DWQ | 2,371 | 12,015 | 39,633 | 46,928 | 46,928 | 31,285 | 0 | **179,160** |
| Hatston | 922 | 670 | 288 | 20,402 | 20,221 | 20,221 | 3,370 | **66,095** |
| Stromness | 750 | 0 | 0 | 0 | 0 | 0 | 0 | **750** |
| Lyness | 1,667 | 533 | 0 | 0 | 0 | 0 | 0 | **2,200** |
| **Total** | **5,710** | **13,218** | **39,921** | **67,330** | **67,150** | **51,507** | **3,370** | **248,206** |

## Table 4 Capital expenditure - Scapa Deep Water Quay

| Project component (£'000) | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | Total |
|---|---|---|---|---|---|---|---|---|
| Main road | 0 | 2,200 | 0 | 0 | 0 | 0 | 0 | 2,200 |
| Land purchase | 0 | 8,000 | 0 | 0 | 0 | 0 | 0 | 8,000 |
| **Phase 1** | | | | | | | | |
| Investigations, design, consents | 1,584 | 1,038 | 414 | 214 | 214 | 142 | 0 | 3,606 |
| Dredging | 0 | 0 | 425 | 510 | 510 | 340 | 0 | 1,784 |
| Quay | 0 | 0 | 16,302 | 19,562 | 19,562 | 13,041 | 0 | 68,467 |
| Contingency | 0 | 0 | 1,673 | 2,007 | 2,007 | 1,338 | 0 | 7,025 |
| **Total** | **1,584** | **1,038** | **18,813** | **22,293** | **22,293** | **14,862** | **0** | **80,882** |
| **Phase 2** | | | | | | | | |
| Investigations, design, consents | 462 | 459 | 301 | 155 | 155 | 103 | 0 | 1,636 |
| Dredging | 0 | 0 | 442 | 530 | 530 | 353 | 0 | 1,855 |
| Quay | 0 | 0 | 12,656 | 15,188 | 15,188 | 10,125 | 0 | 53,156 |
| Contingency | 0 | 0 | 1,310 | 1,572 | 1,572 | 1,048 | 0 | 5,501 |
| **Total** | **462** | **459** | **14,709** | **17,444** | **17,444** | **11,630** | **0** | **62,148** |
| **Phase 3** | | | | | | | | |
| Investigations, design, consents | 324 | 318 | 207 | 107 | 107 | 71 | 0 | 1,135 |
| Dredging | 0 | 0 | 281 | 337 | 337 | 225 | 0 | 1,180 |
| Quay | 0 | 0 | 5,086 | 6,103 | 6,103 | 4,069 | 0 | 21,361 |
| Contingency | 0 | 0 | 537 | 644 | 644 | 429 | 0 | 2,254 |
| **Total** | **324** | **318** | **6,111** | **7,191** | **7,191** | **4,794** | **0** | **25,930** |
| **Total** | **2,371** | **12,015** | **39,633** | **46,928** | **46,928** | **31,285** | **0** | **179,160** |

## Table 5 Capital expenditure - Hatston

| Project component (£'000) | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | Total |
|---|---|---|---|---|---|---|---|---|
| **Phase 1** | | | | | | | | |
| Investigations, design, consents | 41 | 33 | 16 | 10 | 0 | 0 | 0 | 100 |
| Reclamation and road access | 0 | 0 | 0 | 2,167 | 2,167 | 2,167 | 361 | 6,862 |
| Contingency | 0 | 0 | 0 | 217 | 217 | 217 | 36 | 686 |
| **Total** | **41** | **33** | **16** | **2,394** | **2,384** | **2,384** | **397** | **7,648** |
| **Phase 2** | | | | | | | | |
| Investigations, design, consents | 729 | 528 | 227 | 142 | 0 | 0 | 0 | 1,626 |
| Dredging | 0 | 0 | 0 | 257 | 257 | 257 | 43 | 815 |
| Quay | 0 | 0 | 0 | 12,337 | 12,337 | 12,337 | 2,056 | 39,067 |
| Contingency | 0 | 0 | 0 | 1,259 | 1,259 | 1,259 | 210 | 3,988 |
| **Total** | **729** | **528** | **227** | **13,996** | **13,854** | **13,854** | **2,309** | **45,495** |
| **Phase 3** | | | | | | | | |
| Investigations, design, consents | 153 | 109 | 45 | 28 | 0 | 0 | 0 | 335 |
| Quay | 0 | 0 | 0 | 3,622 | 3,622 | 3,622 | 604 | 11,470 |
| Contingency | 0 | 0 | 0 | 362 | 362 | 362 | 60 | 1,147 |
| **Total** | **153** | **109** | **45** | **4,013** | **3,984** | **3,984** | **664** | **12,952** |
| **Total** | **922** | **670** | **288** | **20,402** | **20,221** | **20,221** | **3,370** | **66,095** |

## Table 6 Capital expenditure – Stromness and Copland's Dock

| Project component (£'000) | 2021 | 2022 | 2023 | 2024 | 2025 | Total |
|---|---|---|---|---|---|---|
| **Fenders** | | | | | | |
| Investigations, design, consents | 10 | 0 | 0 | 0 | 0 | 10 |
| Fenders | 200 | 0 | 0 | 0 | 0 | 200 |
| Contingency | 20 | 0 | 0 | 0 | 0 | 20 |
| **Total** | **230** | **0** | **0** | **0** | **0** | **230** |
| **Marina expansion** | | | | | | |
| Investigations, design, consents | 30 | 0 | 0 | 0 | 0 | 30 |
| Marina | 250 | 0 | 0 | 0 | 0 | 250 |
| Contingency | 25 | 0 | 0 | 0 | 0 | 25 |
| **Total** | **305** | **0** | **0** | **0** | **0** | **305** |
| **Cruise pontoon** | | | | | | |
| Investigations, design, consents | 5 | 0 | 0 | 0 | 0 | 5 |
| Cruise pontoon | 195 | 0 | 0 | 0 | 0 | 195 |
| Contingency | 15 | 0 | 0 | 0 | 0 | 15 |
| **Total** | **215** | **0** | **0** | **0** | **0** | **215** |
| **Total** | **750** | **0** | **0** | **0** | **0** | **750** |

### Table 7 Capital expenditure – Lyness

| Project component (£'000) | 2021 | 2022 | 2023 | 2024 | 2025 | Total |
|---|---|---|---|---|---|---|
| **Surfacing** | | | | | | |
| Investigations, design, consents | 0 | 0 | 0 | 0 | 0 | 0 |
| Surfacing | 1,667 | 333 | 0 | 0 | 0 | 2,000 |
| Contingency/ optimism bias | 0 | 200 | 0 | 0 | 0 | 200 |
| **Total** | **1,667** | **533** | **0** | **0** | **0** | **2,200** |

### 5.5.1 Optimism bias

Optimism bias (OB) takes into account our demonstrated, systematic tendency to underestimate costs and overestimate benefits. The Green Book recommends that an explicit adjustment be made to the costs, benefits and phasing preferably based on outcomes of comparable projects against budget or using its generic OB percentages if there is no other evidence.

We start with an upper bound of OB and, as more information becomes available, for example from site investigations, and risks are mitigated, the level of OB will reduce towards a lower bound (or the initial contingency).

For this analysis we have used applied OB of 70% for Scapa Deep Water Quay and 30% for the other projects. The generic recommended adjustment ranges from the Green Book Supplementary Guidance are from 66% (upper) to 6% (lower) for non-standard civil engineering projects.

### Table 8 Capital expenditure with optimism bias

| Project location (£'000) | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | Total |
|---|---|---|---|---|---|---|---|
| Scapa DWQ | 2,371 | 12,215 | 64,267 | 76,489 | 76,489 | 50,993 | **282,823** |
| Hatston | 922 | 670 | 288 | 25,917 | 25,736 | 25,736 | **83,559** |
| Stromness | 750 | 0 | 0 | 0 | 0 | 0 | **750** |
| Lyness | 1,667 | 533 | 0 | 0 | 0 | 0 | **2,200** |
| **Total** | **5,710** | **13,418** | **64,555** | **102,406** | **102,225** | **76,729** | **369,332** |

## 5.6 Operating costs

It is assumed that the operating and maintenance costs in the reference case are already covered in the Harbour Authority's current budget and are not expected to increase as a result of not implementing these projects.

The costs below are additional costs resulting from the investment. The figures result from discussions with the Harbour Authority and the engineers, and can be refined in the future as the projects progress. They are in 2021 prices.

| | |
|---|---|
| Staff numbers | • Scapa Deep Water Quay: 1 full-time, 1 part-time pier worker<br>• Hatston: 1 full-time, 2 part-time pier workers.<br>• Stromness: no additional employment<br>• Lyness: no additional employment<br>As the level of activity increases, the requirements for additional manpower may increase. |
| Average employment costs | Wages = £30,028 (for a pier worker)<br>On-costs = 27.89%.<br>(Source: Orkney Harbour Authority, inflated to 2021 prices) |
| Maintenance costs | • Hatston = £158k per annum based on 50% of the current maintenance cost for Hatston.<br>• Scapa Deep Water Quay = assumed annual maintenance cost of 0.5% of the base case capital cost. Major refurbishment of the quay will fall outside the timeframe of this evaluation.<br>• Cruise pontoon = £5,000 per annum.<br>• Stromness marina expansion = maintenance cost will be borne by Orkney Marinas Ltd (OML).<br>• Lyness = 0.5% of the base case capital cost |
| Crown Estate | • Hatston = £9,875 pa based on 50% of the current cost.<br>• Scapa Deep Water Quay = £13,750 per annum based on the current cost for Hatston.<br>• Stromness marina = £5,940 (assumed to be same cost as Kirkwall: Orkney Harbour Authority).<br>• Lyness = no cost |
| Insurance | • Insurance costs are not expected to change as they are not based on area. |

In the following sections we set out the assumptions for each location and market sector.

## 5.7 Scapa Deep Water Quay

### 5.7.1 Reference case

There is no facility in the reference case, and hence no suitable harbour infrastructure for supporting the offshore wind sector installation phase, nor handling offshore structures (e.g. rigs and platforms) alongside, or maintaining oil tankers and vessels associated with the offshore sector.

### 5.7.2 With project

The new Deep Water Quay will enable the following specific activities, but there are expected to be additional market opportunities that have not been identified or quantified at this stage. Notably the windfarms will require decommissioning/ replacing in around 25-30 years' time, but we have not included this at this stage.

**Offshore wind**

- The project would provide berth and laydown area for the assembly and installation phase of offshore wind farms.

**Offshore structures maintenance**

- The facilities in Phase 3 would enable structures (e.g. platforms and rigs - in particular, the 6th generation oil rigs which cannot be accommodated elsewhere because they need very deep water) to be serviced alongside.

**Passing vessels**

- 8,000 vessels a year currently sail past Orkney without stopping. It is very likely that some will call at Scapa Deep Water Quay for emergency repairs or chandlery, for example. They can be accommodated in Phase 3.

**Harbour craft**

- Harbour tugs and other vessels can be relocated here from Scapa Pier. This will save costs and time, and mean that craft do not have to be moved when the fuel tanker is on Scapa Pier, or when the weather is bad.

**MTF hub (separate project)**

- There is an opportunity for Scapa Deep Water Quay to be the optimal location for the development of a hub for Marine Transitional Fuels. This has not been included in this assessment.

#### 5.7.2.1 Offshore wind

Orkney lies close to several offshore windfarm sites, giving it an advantage over mainland Scotland ports for the assembly/installation phase as well as ongoing operations and maintenance (O&M). It is expected that construction of the windfarms could commence in 2028. Two of these sites, N1 and N2, are expected to have around 170 turbines each (1GW is planned per site).

Discussions have been held with one developer and the profile of installation and vessel movements has been based on their plans and on the assumption that the two nearest sites, N1 and N2, are developed and served from Orkney. It is possible that additional sites could also be served from Orkney, particularly once it has established a track record, although it will face increasing competition from other ports the further out the sites are.

We have assumed that the windfarms could go ahead with Phases 1 and 2 or just Phase 1 of the investment. We understand that the developers have indicated that they would like both phases. If there is more than one developer, then there could be issues with them both fitting in with Phase 1 only, hence we have modelled them sequentially.

There would be some involvement by local services, but not as much as in the O&M phase as the components are largely being brought in and then shipped out to site.

**Key assumptions:**

| | |
|---|---|
| Turbine | • Nacelle: 560 tonnes<br>• Tower sections: 750 tonnes<br>• Blades: 55 tonnes x 3 per turbine<br>• Monopoles: 1,000 tonnes<br>• Jackets: 625 tonnes |
| Vessels | Examples of delivery vessels to bring the components into port:<br>• mv FAIRPARTNER:15,022GT / capacity for 10 piles<br>• mv OSPREY: 38,722GT / capacity for 10 jackets<br>• mv BOLDWIND: 8,604GT / capacity for 6 turbines<br><br>A jack-up vessel would be used to take the component out to the windfarm site:<br>• mv VOLTAIRE: 23,641GT / capacity for 30 piles or 10 jackets or 5 turbines per call |
| Laydown area | • Phase 1: 10.3 hectares, phase 2: 8.3 hectares (assumed to be taken for 12 months of the year even though activity may not be throughout the year)<br>• Charge: £54,000 per hectare per annum |
| Schedule | Components will be delivered and installed following a proposed schedule from the developer between:<br>• Site 1 – from 2028 to 2032<br>• Site 2 – from 2031 to 2035 (assumed a 2nd site will follow on from the first). |
| Local services | Assumed spend per turbine of £50,374 based on the findings from 'Socio-economic impact study of offshore wind' July 2020, QBIS, Denmark. |

### 5.7.2.2 Maintenance of offshore structures and passing vessels

Deepwater oil and gas structures have to return to shore for repair and refurbishment, but the number of ports that have enough depth of water to accommodate these very large structures is limited – most of those in northern waters have to go to Norway.

Platforms and rigs come to Scapa Flow during down times of if they require servicing/maintenance, though not all maintenance can be done at anchor. The local supply chain needs strengthening, but it is developing.

The key risk is competition from other harbours with deep water (e.g. Kishorn, Lerwick, Cromarty), so Orkney would have to ensure its rates are competitive.

These structures could only be accommodated at Scapa Deep Water Quay if Phase 3 of the project including the dredging is carried out. One offshore structure could be serviced alongside at any one time, and still leave space for other users. On average a structure would be alongside for 50 days.

In addition, Phase 3 will allow tankers and other smaller passing vessels to call in for maintenance.

**Key assumptions:**

| | |
|---|---|
| Offshore structures | • Six structures per year come for maintenance alongside (berth occupied for about 300 days).<br>• Direct spending on goods and services such as engineering, scaffolding, diving, welding, food and hotels = £300k per month. |
| Passing vessels | • 10 tankers (55,000 GT) per annum call in.<br>• 1 vessel (10,000 GT) per week calls in.<br>• Average length of stay: eight days for tankers; four days for passing vessels. |

#### 5.7.2.3 Harbour craft cost savings

There is a lack of berthing space at Scapa Pier which results in harbour vessels (e.g. tugs) having to move out to Stromness on when the fuel tankers are in port, or in bad weather, which costs money and time. Relocating them to Scapa Deep Water Quay will improve efficiency and save costs.

**Key assumptions:**

| | |
|---|---|
| Cost savings | • 250 harbour craft movements per year benefit<br>• Average cost saving of £1,000 per movement |

### 5.7.3 Results

The economic results for Scapa Deep Water Quay are shown in Table 9 below. These reflect the outcome if the Harbour only charges the offshore wind developer ship dues, cargo dues and lease of laydown area. It does not include any concession payment for being an anchor tenant.

We have, however, looked at four different cases of financial arrangement with the windfarm developer and compare the results in section 7. These are:

- Case A: The windfarm anchor tenant pays an annual lease only, no dues and charges, over 25 years. The Harbour receives no income from other users of SDWQ - clearly this is unlikely but reflects the outcome if OH can transfer all the risk to the windfarm developer.
- Case B: the anchor tenant pays a reduced annual lease as well as the normal dues and charges. The Harbour also receives income from other users.
- Case C: as per case B, but with lower lease payments.
- Case D: Only Harbour income, no anchor tenant concession agreement.

The results show that even without a concession payment from the anchor tenant, the ENPV is very positive at +£77.6m, which indicates that the project is worthwhile on economic grounds.

## Table 9 Scapa Deep Water Quay: Economic impact - Base case

| SDWQ (£'000) | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2041 | 2051 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Costs** | | | | | | | | | | | | | | |
| Capital expenditure | 2,371 | 12,015 | 39,633 | 46,928 | 46,928 | 31,285 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **179,160** |
| Operating costs | 0 | 0 | 11 | 11 | 11 | 82 | 927 | 927 | 927 | 927 | 927 | 927 | 927 | **23,294** |
| **Total costs** | **2,371** | **12,015** | **39,644** | **46,939** | **46,939** | **31,368** | **927** | **927** | **927** | **927** | **927** | **927** | **927** | **202,454** |
| | | | | | | | | | | | | | | |
| **Benefits** | | | | | | | | | | | | | | |
| **Offshore wind** | | | | | | | | | | | | | | |
| Harbour revenue Case D | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12,573 | 12,883 | 12,679 | 13,449 | 0 | 0 | **203,815** |
| Local direct spend | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,511 | 1,511 | 2,519 | 4,534 | 0 | 0 | **17,127** |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14,084 | 14,394 | 15,198 | 17,983 | 0 | 0 | **220,942** |
| **Structure/vessel service** | | | | | | | | | | | | | | |
| Harbour revenue | 0 | 0 | 0 | 0 | 0 | 406 | 1,281 | 1,281 | 1,281 | 1,281 | 1,281 | 1,281 | 1,281 | **32,428** |
| Local direct spend | 0 | 0 | 0 | 0 | 0 | 1,217 | 3,650 | 3,650 | 3,650 | 3,650 | 3,650 | 3,650 | 3,650 | **92,454** |
| Total | 0 | 0 | 0 | 0 | 0 | 1,622 | 4,930 | 4,930 | 4,930 | 4,930 | 4,930 | 4,930 | 4,930 | **124,882** |
| **Passsing ship traffic** | | | | | | | | | | | | | | |
| Harbour revenue | 0 | 0 | 0 | 0 | 0 | 0 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | **7,462** |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 298 | 298 | 298 | 298 | 298 | 298 | 298 | **7,462** |
| **Harbour craft cost savings** | | | | | | | | | | | | | | |
| Harbour cost saving | 0 | 0 | 0 | 0 | 0 | 83 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | **6,333** |
| **Total direct benefit** | **0** | **0** | **0** | **0** | **0** | **1,705** | **5,479** | **19,563** | **19,873** | **20,676** | **23,462** | **5,479** | **5,479** | **359,619** |
| | | | | | | | | | | | | | | |
| **Indirect and induced benefits** | | | | | | | | | | | | | | |
| Offshore wind | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,357 | 3,429 | 3,657 | 4,387 | 0 | 0 | **52,404** |
| Rig service | 0 | 0 | 0 | 0 | 0 | 431 | 1,309 | 1,309 | 1,309 | 1,309 | 1,309 | 1,309 | 1,309 | **33,151** |
| Passing traffic | 0 | 0 | 0 | 0 | 0 | 0 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | **1,747** |
| Harbour craft cost savings | 0 | 0 | 0 | 0 | 0 | 19 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | **1,483** |
| **Total indirect and induced** | **0** | **0** | **0** | **0** | **0** | **451** | **1,437** | **4,794** | **4,867** | **5,094** | **5,824** | **1,437** | **1,437** | **88,785** |
| **Total benefits** | **0** | **0** | **0** | **0** | **0** | **2,156** | **6,916** | **24,357** | **24,740** | **25,770** | **29,286** | **6,916** | **6,916** | **448,404** |
| | | | | | | | | | | | | | | |
| **Net benefits** | **-2,371** | **-12,015** | **-39,644** | **-46,939** | **-46,939** | **-29,212** | **5,989** | **23,430** | **23,813** | **24,843** | **28,359** | **5,989** | **5,989** | **245,950** |
| **NPV at 3.5% (£m)** | **£77.6m** | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| **Financial** | | | | | | | | | | | | | | |
| Costs | 2,371 | 12,015 | 39,644 | 46,939 | 46,939 | 31,368 | 927 | 927 | 927 | 927 | 927 | 927 | 927 | **202,454** |
| Harbour income | 0 | 0 | 0 | 0 | 0 | 489 | 1,829 | 14,402 | 14,712 | 14,508 | 15,278 | 1,829 | 1,829 | **250,038** |
| **Net revenue** | **-2,371** | **-12,015** | **-39,644** | **-46,939** | **-46,939** | **-30,879** | **902** | **13,475** | **13,785** | **13,581** | **14,351** | **902** | **902** | **47,584** |
| | | | | | | | | | | | | | | |
| **Financial IRR** | **2%** | | | | | | | | | | | | | |

## Table 10 Scapa Deep Water Quay: Gross Value Added - Base case

| Scapa DWQ (£'000) | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2041 | 2051 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Direct GVA** | | | | | | | | | | | | | |
| **Offshore wind** | | | | | | | | | | | | | |
| Harbour | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £4,388 | £4,496 | £4,425 | £4,694 | £0 | £0 |
| Local businesses | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £256 | £256 | £256 | £256 | £0 | £0 |
| Total | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £4,644 | £4,752 | £4,681 | £4,949 | £0 | £0 |
| **Structure/vessel service** | | | | | | | | | | | | | |
| Harbour | £0 | £0 | £0 | £0 | £0 | £142 | £447 | £447 | £447 | £447 | £447 | £447 | £447 |
| Local businesses | £0 | £0 | £0 | £0 | £0 | £449 | £1,347 | £1,347 | £1,347 | £1,347 | £1,347 | £1,347 | £1,347 |
| Total | £0 | £0 | £0 | £0 | £0 | £591 | £1,794 | £1,794 | £1,794 | £1,794 | £1,794 | £1,794 | £1,794 |
| **Passsing ship traffic** | | | | | | | | | | | | | |
| Harbour revenue | £0 | £0 | £0 | £0 | £0 | £0 | £104 | £104 | £104 | £104 | £104 | £104 | £104 |
| **Harbour craft** | | | | | | | | | | | | | |
| Cost saving | £0 | £0 | £0 | £0 | £0 | £29 | £87 | £87 | £87 | £87 | £87 | £87 | £87 |
| **Total direct GVA** | **£0** | **£0** | **£0** | **£0** | **£0** | **£620** | **£1,985** | **£6,629** | **£6,737** | **£6,666** | **£6,935** | **£1,985** | **£1,985** |
| | | | | | | | | | | | | | |
| **Indirect and induced GVA** | | | | | | | | | | | | | |
| Offshore wind | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £1,146 | £1,172 | £1,155 | £1,220 | £0 | £0 |
| Structure/vessel service | £0 | £0 | £0 | £0 | £0 | £182 | £552 | £552 | £552 | £552 | £552 | £552 | £552 |
| Passing ship traffic | £0 | £0 | £0 | £0 | £0 | £0 | £25 | £25 | £25 | £25 | £25 | £25 | £25 |
| Harbour craft | £0 | £0 | £0 | £0 | £0 | £7 | £21 | £21 | £21 | £21 | £21 | £21 | £21 |
| **Total indirect and induce** | **£0** | **£0** | **£0** | **£0** | **£0** | **£189** | **£599** | **£1,744** | **£1,771** | **£1,753** | **£1,819** | **£599** | **£599** |
| | | | | | | | | | | | | | |
| **Total GVA** | **£0** | **£0** | **£0** | **£0** | **£0** | **£809** | **£2,584** | **£8,373** | **£8,508** | **£8,419** | **£8,753** | **£2,584** | **£2,584** |

## Table 11 Scapa Deep Water Quay: Employment - Base case

| Scapa DWQ (FTE) | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2041 | 2051 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Direct employment** | | | | | | | | | | | | | |
| Harbour Authority | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| **Local businesses:** | | | | | | | | | | | | | |
| Offshore wind | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 4 | 4 | 0 | 0 |
| Structure/vessel service | 0 | 0 | 0 | 0 | 0 | 4 | 13 | 13 | 13 | 13 | 13 | 13 | 13 |
| **Total** | **0** | **0** | **0** | **0** | **0** | **6** | **14** | **18** | **18** | **18** | **18** | **14** | **14** |
| | | | | | | | | | | | | | |
| **Indirect and induced employment** | | | | | | | | | | | | | |
| Harbour Authority | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **Local businesses:** | | | | | | | | | | | | | |
| Offshore wind | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 |
| Structure/vessel service | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| **Total** | **0** | **0** | **0** | **0** | **0** | **2** | **5** | **6** | **6** | **6** | **6** | **5** | **5** |
| | | | | | | | | | | | | | |
| **Total** | **0** | **0** | **0** | **0** | **0** | **8** | **19** | **23** | **23** | **23** | **23** | **19** | **19** |

## Table 12 Scapa Deep Water Quay: Fiscal contribution - Base case

| Scapa DWQ (£'000) | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2041 | 2051 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Direct | 0 | 0 | 0 | 0 | 0 | 49 | 130 | 164 | 164 | 164 | 164 | 130 | 130 |
| Indirect | 0 | 0 | 0 | 0 | 0 | 16 | 41 | 51 | 51 | 51 | 51 | 41 | 41 |
| **Total** | **0** | **0** | **0** | **0** | **0** | **65** | **171** | **215** | **215** | **215** | **215** | **171** | **171** |

## 5.8 Hatston

### 5.8.1 Reference case

Without the masterplan proposals, there would be no change in current activity at Hatston.

### 5.8.2 With project

There are three main activities that are enabled by the investment in Hatston.

**Offshore wind**

- The project would provide quay access and landside development /laydown area for the operations and maintenance (O&M) phase of offshore wind farms.

**Oil and gas**

- New infrastructure and ex-pipe fuelling at Hatston would enable Orkney to better service the oil and gas market in the form of an operations/supply base for the sector, served by platform supply vessels (PSVs) and Safety Stand-by Vessels (SSVs) and other offshore vessels.
- Cargo is also imported into Orkney and transferred to oil and gas fields and vice versa, The Harbour Authority could charge cargo dues each time, as happens in Aberdeen; the analysis assumes this is the case.

**Boat repair**

- It will enable a boat repair business to locate at Hatston with a slipway and boat lift.

#### 5.8.2.1 Offshore wind

The developers of offshore wind sites have already shown interest in setting up an O&M base in Hatston.

**Key assumptions:**

| | |
|---|---|
| Vessels | Typical vessel for O&M, supply and crew changes:<br>• ESVAGT SOV: 5,230GT |
| Laydown area | • Phase 1: 3 hectares would be available. We have assumed that the developer takes all 3 hectares. If this is not the case, then the area could be let to other users.<br>• Charge: £74,132 per hectare per annum (£30,000 per acre) |
| Schedule | • 12 supply calls per annum and 24 O&M calls per windfarm (x2) (ramped up over initial years of operation) |
| Local services | • Assumed local turnover of £940k based on 'Socio-economic impact study of offshore wind' July 2020, QBIS, Denmark. |

#### 5.8.2.2 Oil and gas

Orkney is in close proximity to the West of Shetland oil assets, and Hatston is the closest deep water port to key developments which should be coming on-stream in the next decade. We have assumed that further exploration begins and there is some development after 2027, which means there is the opportunity to grow the existing customer base and for Hatston to become a hub for oil and gas supply operations.

It is very difficult to estimate the potential traffic given that this is a new area of development. We have, therefore, taken the operations using Aberdeen (3,353 PSVs and 939 SSVs/other vessels in 2017) as a starting point and assumed traffic in Orkney is a small percentage of that activity (2% rising to 5% over 10 years).

There will also be benefits to local services. The supply chain for oil and gas is well-established and initially a large proportion of supplies will be imported from elsewhere in Scotland or from rest of UK/world, but we have, in the absence of information, put in a nominal amount to reflect the strengthening of the local capabilities.

| | |
|---|---|
| Vessels | Typical cargo vessel for delivery to Orkney:<br>• Avonburgh = 2,100GT<br>• Carrying capacity of 10,000 tonnes (we assume ferries are not used for this cargo)<br>• PSV = 3,104GT<br>• SSV and other vessels = 1,343GT |
| Carrying capacity | • Avonburgh: 10,000 tonnes (we assume ferries are not used for this cargo)<br>• PSV per trip: Water: 100 tonnes; fuel: 95 tonnes; drilling muds/slurry: 55 tonnes; equipment including pipe: 45 tonnes; other including food: 165 tonnes; and scrap: 40 tonnes. |
| Schedule | • 12 supply calls per annum and 24 O&M calls per windfarm (x2) (ramped up over initial years of operation) |
| Local services | • £100,000 turnover pa |

#### 5.8.2.3 Boatyard

The overall market outlook for boat repair looks good. Offshore wind will create new demand for maintenance of vessels, and there is also demand locally from aquaculture vessels, harbour craft and others. Some of these vessels will currently be going to other boatyards in Scotland, so we would need to take account of

displacement of activity, but larger ones in particular may have to go overseas which imposes additional costs and time on operators.

**Key assumptions:**

| | |
|---|---|
| Revenue to Harbour | • £45,000 per year lease |
| Wider benefits | • Boatyard turnover building up to £1m per year |

### 5.8.3 Results

The economic results for Hatston are shown in Table 13 below. As with SDWQ, these reflect the outcome if the Harbour only charges the offshore wind developer ship dues and lease of land. Hatston would remain a common user facility, so would not have an anchor tenant, but it would not be unreasonable to expect the windfarm operator to contribute towards the cost of providing the infrastructure.

We have, therefore also looked at four different cases of financial arrangement with the windfarm developer and compare the results in section 7. These are:

- Case A: The windfarm operator pays an annual lease only, paid annually once O&M commences, and this covers the costs of developing Hatston.
- Case B: the windfarm operator pays a reduced annual lease as well as the normal dues and charges. The Harbour also receives income from other business enabled by the development.
- Case C: as per case B, but with lower lease payments.
- Case D: Only Harbour income.

Without a contribution from the windfarm operator, the ENPV of Hatston is -£21.1m.

## Table 13 Hatston: Economic impact - Base case

| Hatston (£'000) | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2041 | 2051 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Costs** | | | | | | | | | | | | | | |
| Capital expenditure | 922 | 670 | 288 | 20,402 | 20,221 | 20,221 | 3,370 | 0 | 0 | 0 | 0 | 0 | 0 | **66,095** |
| Operating costs | 0 | 0 | 0 | 0 | 0 | 0 | 87 | 245 | 245 | 245 | 245 | 245 | 245 | **5,959** |
| **Total costs** | **922** | **670** | **288** | **20,402** | **20,221** | **20,221** | **3,457** | **245** | **245** | **245** | **245** | **245** | **245** | **72,054** |
| | | | | | | | | | | | | | | |
| **Benefits** | | | | | | | | | | | | | | |
| **Offshore wind** | | | | | | | | | | | | | | |
| Harbour revenue Case D | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 332 | 346 | 346 | 456 | 470 | 470 | **10,878** |
| Local services | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 940 | 940 | 940 | 940 | 940 | 940 | **22,560** |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,272 | 1,286 | 1,286 | 1,396 | 1,410 | 1,410 | **33,438** |
| **Boatyard** | | | | | | | | | | | | | | |
| Harbour revenue | 0 | 0 | 0 | 0 | 0 | 0 | 38 | 45 | 45 | 45 | 45 | 45 | 45 | **1,118** |
| Boatyard benefit | 0 | 0 | 0 | 0 | 0 | 0 | 135 | 189 | 216 | 243 | 270 | 270 | 270 | **6,453** |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 173 | 234 | 261 | 288 | 315 | 315 | 315 | **7,571** |
| **Oil and gas supply vessels** | | | | | | | | | | | | | | |
| Harbour revenue | 0 | 0 | 0 | 0 | 0 | 0 | 222 | 265 | 265 | 400 | 400 | 665 | 665 | **14,189** |
| Local services | 0 | 0 | 0 | 0 | 0 | 0 | 83 | 100 | 100 | 100 | 100 | 100 | 100 | **2,483** |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 305 | 365 | 365 | 500 | 500 | 765 | 765 | **16,672** |
| **Total direct benefit** | **0** | **0** | **0** | **0** | **0** | **0** | **478** | **1,872** | **1,913** | **2,074** | **2,211** | **2,490** | **2,490** | **57,681** |
| | | | | | | | | | | | | | | |
| **Indirect and induced benefits** | | | | | | | | | | | | | | |
| Offshore wind | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 334 | 338 | 338 | 363 | 367 | 367 | **8,705** |
| Boatyard | 0 | 0 | 0 | 0 | 0 | 0 | 46 | 62 | 69 | 77 | 84 | 84 | 84 | **2,023** |
| Oil and gas supply vessels | 0 | 0 | 0 | 0 | 0 | 0 | 74 | 88 | 88 | 120 | 120 | 182 | 182 | **3,974** |
| **Total indirect and induced** | **0** | **0** | **0** | **0** | **0** | **0** | **119** | **485** | **496** | **534** | **567** | **633** | **633** | **14,702** |
| **Total benefits** | **0** | **0** | **0** | **0** | **0** | **0** | **597** | **2,357** | **2,408** | **2,608** | **2,778** | **3,123** | **3,123** | **72,382** |
| | | | | | | | | | | | | | | |
| **Net benefits** | **-922** | **-670** | **-288** | **-20,402** | **-20,221** | **-20,221** | **-2,860** | **2,112** | **2,163** | **2,363** | **2,534** | **2,878** | **2,878** | **328** |
| **NPV at 3.5% (£m)** | **-£21.2m** | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| **Financial** | | | | | | | | | | | | | | |
| Costs | 922 | 670 | 288 | 20,402 | 20,221 | 20,221 | 3,457 | 245 | 245 | 245 | 245 | 245 | 245 | |
| Harbour income | 0 | 0 | 0 | 0 | 0 | 0 | 222 | 265 | 265 | 400 | 400 | 665 | 665 | **14,189** |
| **Net revenue** | **-922** | **-670** | **-288** | **-20,402** | **-20,221** | **-20,221** | **-3,235** | **21** | **21** | **155** | **155** | **421** | **421** | **-57,865** |
| | | | | | | | | | | | | | | |
| **Financial IRR** | **-11%** | | | | | | | | | | | | | |

## Table 14 Hatston: Gross Value Added - Base case

| Hatston (£'000) | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2041 | 2051 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Direct GVA** | | | | | | | | | | | | | |
| **Offshore wind** | | | | | | | | | | | | | |
| Harbour | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £116 | £121 | £121 | £159 | £164 | £164 |
| Local businesses | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £5,321 | £5,321 | £5,321 | £5,321 | £5,321 | £5,321 |
| Total | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £5,437 | £5,442 | £5,442 | £5,480 | £5,485 | £5,485 |
| **Boatyard** | | | | | | | | | | | | | |
| Harbour | £0 | £0 | £0 | £0 | £0 | £0 | £13 | £16 | £16 | £16 | £16 | £16 | £16 |
| Local businesses | £0 | £0 | £0 | £0 | £0 | £0 | £117 | £163 | £186 | £210 | £233 | £233 | £233 |
| Total | £0 | £0 | £0 | £0 | £0 | £0 | £130 | £179 | £202 | £225 | £249 | £249 | £249 |
| **Oil and gas supply vessels** | | | | | | | | | | | | | |
| Harbour | £0 | £0 | £0 | £0 | £0 | £0 | £77 | £93 | £93 | £140 | £140 | £232 | £232 |
| Local services | £0 | £0 | £0 | £0 | £0 | £0 | £37 | £45 | £45 | £45 | £45 | £45 | £45 |
| Total | £0 | £0 | £0 | £0 | £0 | £0 | £115 | £138 | £138 | £184 | £184 | £277 | £277 |
| **Aquaculture** | | | | | | | | | | | | | |
| Harbour | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 |
| Local businesses | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 |
| Total | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 |
| **Total direct GVA** | **£0** | **£0** | **£0** | **£0** | **£0** | **£0** | **£244** | **£5,753** | **£5,781** | **£5,851** | **£5,913** | **£6,011** | **£6,011** |
| | | | | | | | | | | | | | |
| **Indirect and induced GVA** | | | | | | | | | | | | | |
| Offshore wind | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £1,707 | £1,708 | 1,708 | 1,717 | 1,718 | £1,718 |
| Boatyard | £0 | £0 | £0 | £0 | £0 | £0 | £31 | £37 | £37 | 48 | 48 | 71 | £71 |
| Oil and gas supply vessel | £0 | £0 | £0 | £0 | £0 | £0 | £33 | £40 | £40 | £51 | £51 | £73 | £73 |
| Aquaculture | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 |
| **Total indirect and induce** | £0 | £0 | £0 | £0 | £0 | £0 | £64 | £1,783 | £1,784 | £1,807 | £1,816 | £1,862 | £1,862 |
| | | | | | | | | | | | | | |
| **Total GVA** | **£0** | **£0** | **£0** | **£0** | **£0** | **£0** | **£308** | **£7,536** | **£7,565** | **£7,658** | **£7,729** | **£7,873** | **£7,873** |

## Table 15 Hatston: Employment – Base case

| Hatston (FTE) | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2041 | 2051 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Direct employment** | | | | | | | | | | | | | |
| Harbour Authority | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| **Local businesses:** | | | | | | | | | | | | | |
| Offshore wind | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 50 | 50 | 50 | 50 | 50 | 50 |
| Boatyard | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 4 | 5 | 5 | 6 | 6 | 6 |
| Oil and gas supply vessels | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Aquaculture (safeguarded | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **0** | **0** | **0** | **0** | **0** | **0** | **5** | **56** | **57** | **58** | **58** | **58** | **58** |
| | | | | | | | | | | | | | |
| **Indirect and induced employment** | | | | | | | | | | | | | |
| Harbour Authority | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **Local businesses:** | | | | | | | | | | | | | |
| Offshore wind | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 15 | 15 | 15 | 15 | 15 |
| Boatyard | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 2 | 2 | 2 |
| Oil and gas supply vessels | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Aquaculture (safeguarded | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **0** | **0** | **0** | **0** | **0** | **0** | **2** | **17** | **17** | **18** | **18** | **18** | **18** |
| | | | | | | | | | | | | | |
| **Total** | **0** | **0** | **0** | **0** | **0** | **0** | **7** | **74** | **74** | **75** | **76** | **76** | **76** |

## Table 16 Hatston: Fiscal contribution - Base case

| Hatston (£'000) | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2041 | 2051 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Direct | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 15 | 15 | 15 | 15 | 15 | 15 |
| Indirect | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| **Total** | **0** | **0** | **0** | **0** | **0** | **0** | **19** | **20** | **20** | **20** | **20** | **20** | **20** |

## 5.9 Stromness

Stromness has been identified by windfarm developers as a suitable location for rapid response vessels, at least for the westerly windfarm site.

There is an existing marina in Stromness which is operating near or at capacity. There are also conflicts and security issues between the marina and cruise liners; the latter come alongside in Stromness and several tender their passengers ashore through the marina facility. This setup does not encourage the cruise liners.

### 5.9.1 Reference case

There would be no change in current activities and, without the pontoon, it would not be acceptable to have offshore wind catamarans also using the marina facilities.

### 5.9.2 With project

Benefits of developing Stromness will be delivered for the following activities:

- **Offshore wind**
  - Stromness is closer to the west windfarm site than Hatston, which will reduce access time and therefore be preferable for rapid response.
- **Marina expansion**
  - The marina will be expanded with 12 new berths and there will be increased activity arising from this.
- **Cruise**
  - With a cruise pontoon located in Stromness, tendering will be safer and easier, thus safeguarding the current number of visiting cruise liners and encouraging more.
- **Marine leisure tours**
  - The presence of a cruise pontoon may be attractive to providers of marine tours and dive boats, providing safe access and egress for boat passengers.

#### 5.9.2.1 Offshore wind

**Key assumptions:**

| | |
|---|---|
| Vessel | • Seacat type catamaran 78GT |
| Frequency | • 24 trips per annum |

#### 5.9.2.2 Marine leisure

Sailing tourism is a growth area; a recent report estimates that sailing tourism in Scotland could grow by up to 28% by 2023 (EKOS 'Sailing Tourism in Scotland', 2016). The Scottish Government also envisages Scotland being a marine tourism destination of first choice. Orkney has good potential for growing its marine tourism:

- It provides much needed shelter for boats crossing the Pentland Firth.
- Larger boats are currently being turned away because they cannot be accommodated.
- There is a waiting list for resident berths (although this underestimates demand as people know the marina is full).

**Key assumptions:**

| | |
|---|---|
| Berths | • 12 additional berths for visitors |
| Vessel | • Leisure boat average length = 11.4m (source OHA) |
| Usage | • Visitor boat-nights per visitor berth are assumed to start at 40 in year 1, gradually increasing to 72 by year 5, then remaining constant. |
| Spending | • Average visitor boat spend (including berth fees): £153 (source: EKOS, in 2021 prices) |
| Charge | • Visitor rate for boats over 10m: £21.00 fixed charge plus £1.75 per metre over 10m. Average charge per visiting yacht call is therefore £24.50 including VAT (source: OML). |

#### 5.9.2.3 Cruise

There were 52 cruise calls to Stromness in 2018 and 2019. Of these 49 came alongside and three tendered their passengers into the town, using the marina as a landing area. The ships that tendered in were the smaller expedition cruises.

Given the safety and security concerns of this arrangement, the presence of a cruise pontoon will safeguard existing tendered calls and potentially attract several more each year.

**Key assumptions:**

| | |
|---|---|
| Vessel | Small to medium cruise ship (based on analysis of OH data):<br>• 12,000GT<br>• 207 passengers (max)<br>• 125 crew (max)<br>• Average occupancy = 89% |
| Visits | • 4 additional cruise calls<br>• 97% of passengers and crew coming ashore |

| | |
|---|---|
| Spending | • Average spend per passenger: £57.09 (2021 prices), including mark-up on tours by cruise company (assumed 15%); local spend: £48.52.<br>• Average spend per crew: £9.91 |

### 5.9.3 Results

The outcomes for Stromness are shown in Table 17. The ENPV is positive at £2.5m indicating that this is worthwhile.

## Table 17 Stromness: Economic impact - base case

| Stromness (£'000) | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2041 | 2051 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Costs** | | | | | | | | | | | | | |
| Capital expenditure | 750 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Operating costs | 6 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| **Total costs** | **756** | **10** | **10** | **10** | **10** | **10** | **10** | **10** | **10** | **10** | **10** | **10** | **10** |
| | | | | | | | | | | | | | |
| **Benefits** | | | | | | | | | | | | | |
| **Offshore wind** | | | | | | | | | | | | | |
| Harbour revenue | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 12 | 12 |
| **Total** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **6** | **12** | **12** |
| **Marina** (excl VAT) | | | | | | | | | | | | | |
| OML revenue less OHA % | 0 | 0 | 9 | 9 | 11 | 13 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| OHA revenue | 0 | 0 | 3 | 3 | 3 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 |
| Local direct spend | 0 | 0 | 55 | 55 | 68 | 82 | 96 | 99 | 99 | 99 | 99 | 99 | 99 |
| **Total** | **0** | **0** | **57** | **57** | **72** | **86** | **100** | **103** | **103** | **103** | **103** | **103** | **103** |
| **Cruise** | | | | | | | | | | | | | |
| Harbour revenue | 0 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 |
| Local direct spend | 0 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 |
| **Total** | **0** | **53** | **53** | **53** | **53** | **53** | **53** | **53** | **53** | **53** | **53** | **53** | **53** |
| **Total direct benefit** | **0** | **53** | **110** | **110** | **125** | **139** | **153** | **156** | **156** | **156** | **162** | **168** | **168** |
| | | | | | | | | | | | | | |
| **Indirect and induced benefits** | | | | | | | | | | | | | |
| Offshore wind | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 3 |
| Marina | 0 | 0 | 17 | 17 | 21 | 26 | 30 | 31 | 31 | 31 | 31 | 31 | 31 |
| Cruise | 0 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 |
| **Total indirect and induced** | **0** | **13** | **31** | **31** | **35** | **39** | **44** | **44** | **44** | **44** | **46** | **47** | **47** |
| **Total benefits** | **0** | **66** | **141** | **141** | **160** | **178** | **197** | **200** | **200** | **200** | **208** | **215** | **215** |
| | | | | | | | | | | | | | |
| **Net benefits** | **-756** | **57** | **131** | **131** | **150** | **168** | **187** | **191** | **191** | **191** | **198** | **205** | **205** |
| **NPV at 3.5% (£m)** | **£2.5m** | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| **Financial** | | | | | | | | | | | | | |
| Costs | 756 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Harbour income | 0 | 18 | 20 | 20 | 21 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 |
| **Net revenue** | **-756** | **8** | **11** | **11** | **11** | **12** | **13** | **13** | **13** | **13** | **13** | **13** | **13** |
| | | | | | | | | | | | | | |
| **Financial IRR** | **-4%** | | | | | | | | | | | | |

## Table 18 Stromness: Gross Value Added – Base case

| Stromness (£'000) | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2041 | 2051 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Direct GVA** | | | | | | | | | | | | | |
| **Offshore wind** | | | | | | | | | | | | | |
| Harbour | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 |
| **Marina** | | | | | | | | | | | | | |
| Harbour | £0 | £0 | £3 | £3 | £3 | £4 | £4 | £5 | £5 | £5 | £5 | £5 | £5 |
| Local businesses | £0 | £0 | £34 | £34 | £43 | £51 | £60 | £62 | £62 | £62 | £62 | £62 | £62 |
| Total | £0 | £0 | £37 | £37 | £46 | £55 | £64 | £66 | £66 | £66 | £66 | £66 | £66 |
| **Cruise** | | | | | | | | | | | | | |
| Harbour | £0 | £6 | £6 | £6 | £6 | £6 | £6 | £6 | £6 | £6 | £6 | £6 | £6 |
| Local businesses | £0 | £14 | £14 | £14 | £14 | £14 | £14 | £14 | £14 | £14 | £14 | £14 | £14 |
| Total | £0 | £20 | £20 | £20 | £20 | £20 | £20 | £20 | £20 | £20 | £20 | £20 | £20 |
| **Total direct GVA** | **£0** | **£20** | **£57** | **£57** | **£66** | **£75** | **£85** | **£87** | **£87** | **£87** | **£87** | **£87** | **£87** |
| | | | | | | | | | | | | | |
| **Indirect and induced GVA** | | | | | | | | | | | | | |
| Offshore wind | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | £0 | 0 | 0 | 0 | £0 |
| Marina | £0 | £0 | £10 | £10 | £12 | £14 | £17 | £17 | £17 | £17 | £17 | £17 | £17 |
| Cruise | £0 | £5 | £5 | £5 | £5 | £5 | £5 | £5 | £5 | £5 | £5 | £5 | £5 |
| **Total indirect and induce** | **£0** | **£5** | **£15** | **£15** | **£17** | **£20** | **£22** | **£22** | **£22** | **£22** | **£22** | **£22** | **£22** |
| | | | | | | | | | | | | | |
| **Total GVA** | **£0** | **£25** | **£72** | **£72** | **£83** | **£95** | **£107** | **£109** | **£109** | **£109** | **£109** | **£109** | **£109** |

## Table 19 Stromness: Employment – Base case

| Stromness (£'000) | 2,021 | 2,022 | 2,023 | 2,024 | 2,025 | 2,026 | 2,027 | 2,028 | 2,029 | 2,030 | 2,031 | 2,041 | 2,051 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Direct employment** | | | | | | | | | | | | | |
| Harbour Authority | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **Local businesses:** | | | | | | | | | | | | | |
| Offshore wind | O&M under Hatston | | | | | | | | | | | | |
| Marina | 0 | 0 | 2 | 2 | 2 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 |
| Cruise | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| **Total** | **0** | **2** | **4** | **4** | **5** | **5** | **6** | **6** | **6** | **6** | **6** | **6** | **6** |
| | | | | | | | | | | | | | |
| **Indirect and induced employment** | | | | | | | | | | | | | |
| Harbour Authority | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Local businesses:** | | | | | | | | | | | | | |
| Offshore wind | O&M under Hatston | | | | | | | | | | | | |
| Marina | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Cruise | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **0** | **0** | **0** | **0** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** | **1** |
| | | | | | | | | | | | | | |
| **Total** | **0** | **2** | **5** | **5** | **5** | **6** | **6** | **6** | **6** | **6** | **6** | **6** | **6** |

## Table 20 Stromness: Fiscal contribution - Base case

| Stromness (£'000) | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2041 | 2051 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Direct | 0 | 11 | 19 | 19 | 21 | 23 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| Indirect | 0 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| **Total** | **0** | **11** | **21** | **21** | **23** | **25** | **27** | **28** | **28** | **28** | **28** | **28** | **28** |

## 5.10 Lyness

Lyness has been identified as a suitable location for the storage of anchors and chains etc for the offshore wind farms. The original masterplan project was principally the remediation of the southern section of Harbour land towards the ferry linkspan. This will take some time and would not be required for offshore wind. We have therefore only included resurfacing the already surfaced northerly section in the compound.

**Key assumptions:**

| | |
|---|---|
| Land available | • 2 hectares |
| Charge | • £54,000 per hectare pa for the duration of the delivery and installation activities |

### 5.10.1 Results

The results for Lyness are shown in Table 21. The project shows a small negative ENPV, but this is not surprising given that the Harbour is only receiving income for 8 years. It would be expected that other uses would be found for the site in the future.

There is no additional employment and hence fiscal contribution associated with Lyness.

## Table 21 Lyness: Economic impact - base case

| Lyness ('000) | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2041 | 2051 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Costs** | | | | | | | | | | | | | | |
| Capital expenditure | 1,667 | 533 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **2,200** |
| Operating costs | 0 | 0 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | **319** |
| **Total costs** | **1,667** | **533** | **11** | **11** | **11** | **11** | **11** | **11** | **11** | **11** | **11** | **11** | **11** | **2,519** |
| | | | | | | | | | | | | | | |
| **Benefits** | | | | | | | | | | | | | | |
| **Offshore wind** | | | | | | | | | | | | | | |
| Harbour revenue | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 108 | 108 | 108 | 108 | 0 | 0 | **1,728** |
| **Total direct benefits** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **108** | **108** | **108** | **108** | **0** | **0** | **1,728** |
| | | | | | | | | | | | | | | |
| **Indirect and induced benefits** | | | | | | | | | | | | | | |
| Offshore wind | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 25 | 25 | 25 | 25 | 0 | 0 | **405** |
| **Total indirect & induced** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **25** | **25** | **25** | **25** | **0** | **0** | **405** |
| **Total benefits** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **133** | **133** | **133** | **133** | **0** | **0** | **2,133** |
| | | | | | | | | | | | | | | |
| **Net benefits** | **-1,667** | **-533** | **-11** | **-11** | **-11** | **-11** | **-11** | **122** | **122** | **122** | **122** | **-11** | **-11** | **-386** |
| **NPV at 3.5% (£m)** | **-£1.1m** | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| **Financial** | | | | | | | | | | | | | | |
| Harbour costs | 1,667 | 533 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | **2,519** |
| Harbour benefits | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 108 | 108 | 108 | 108 | 0 | 0 | **1,728** |
| **Net revenue** | **-1,667** | **-533** | **-11** | **-11** | **-11** | **-11** | **-11** | **97** | **97** | **97** | **97** | **-11** | **-11** | **-791** |
| | | | | | | | | | | | | | | |
| **Financial IRR** | **-2%** | | | | | | | | | | | | | |

### 5.10.2 Combined results

The projects collectively return an ENPV of £57.8m in the base case if the windfarm developer does not make a contribution over and above the usual charges.

If SDWQ phase 2 is not constructed, the ENPV rises slightly to £58.3m.

### 5.10.3 Sensitivity tests and optimism bias

There are considerable uncertainties regarding the capital costs, particularly for Scapa Deep Water Quay. As the projects progress and more information from surveys and design work becomes available, these risks will be reduced as costs are refined. In the table below, we show the impact on the ENPVs of including high level optimism bias.

**Table 22 Sensitivity of results to optimism bias**

| Project | Capital cost ('000) Base case | OB | Capital cost ('000) (with OB) | ENPV Base case | ENPV (with OB) |
|---|---|---|---|---|---|
| SDWQ | 179,160 | 70% | 282,823 | £77.6m | -£18.4m |
| Hatston | 66,095 | 30% | 83,559 | -£21.2m | -£35.8m |
| Stromness | 750 | 30% | 938 | £2.5m | £2.3m |
| Lyness | 2,200 | 30% | 2,800 | -£1.1m | -£1.8m |
| **All projects** | **248,206** | | **370,120** | **£57.8m** | **-£53.7m** |

### 5.10.4 Construction phase impacts

The construction of these infrastructure projects will create/support jobs and GVA in the construction sector. The advice of Scottish Enterprise Economic Impact Guidance is to report the impact on the construction sector, but to keep it separate from the overall impact of the projects themselves.

The reasons for this are that the construction impacts are essentially a by-product of the intervention, they are temporary, and it would be misleading to include them. In addition, deadweight may be high as there may be leakages out of the Scottish economy. This is considered to be particularly relevant to works at Scapa Deep Water Quay because they are likely to require specialist contractors from overseas, and may have limited domestic impact.

This will be examined in more detail in the business case.

# 6 FINANCIAL ASSESSMENT

The Financial analysis is closely related to the Economic analysis but focuses on the affordability of the scheme and excludes the wider economic impacts.

This section summarises forecast financial costs (capital expenditure and operating costs) and revenues to Orkney Harbour Authority. Detailed funding options will be developed in the business case when we have a better idea of the funding gap depending on whether the windfarm developer is expected to contribute to the project or not.

## Table 23 Summary of Orkney Harbours costs – Base case

| (£'000) | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2041 | 2051 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Capital expenditure** | | | | | | | | | | | | | |
| Scapa Deep Water Quay | 2,371 | 12,015 | 39,633 | 46,928 | 46,928 | 31,285 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hatston | 922 | 670 | 288 | 20,402 | 20,221 | 20,221 | 3,370 | 0 | 0 | 0 | 0 | 0 | 0 |
| Stromness | 744 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lyness | 1,667 | 533 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **5,704** | **13,218** | **39,921** | **67,330** | **67,150** | **51,507** | **3,370** | **0** | **0** | **0** | **0** | **0** | **0** |
| **Operating costs** | | | | | | | | | | | | | |
| Scapa Deep Water Quay | 0 | 0 | 11 | 11 | 11 | 82 | 927 | 927 | 927 | 927 | 927 | 927 | 927 |
| Hatston | 0 | 0 | 0 | 0 | 0 | 0 | 87 | 245 | 245 | 245 | 245 | 245 | 245 |
| Stromness | 6 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Lyness | 0 | 0 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| **Total** | **6** | **10** | **32** | **32** | **32** | **103** | **1,034** | **1,192** | **1,192** | **1,192** | **1,192** | **1,192** | **1,192** |
| **Total costs** | | | | | | | | | | | | | |
| Scapa Deep Water Quay | 2,371 | 12,015 | 39,644 | 46,939 | 46,939 | 31,368 | 927 | 927 | 17,863 | 39 | 39 | 39 | 927 |
| Hatston | 922 | 670 | 288 | 20,402 | 20,221 | 20,221 | 3,457 | 245 | 232 | 232 | 232 | 232 | 245 |
| Stromness | 750 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 53 | 53 | 53 | 53 | 10 |
| Lyness | 1,667 | 533 | 11 | 11 | 11 | 11 | 11 | 11 | 10 | 10 | 10 | 10 | 11 |
| **Total** | **5,710** | **13,228** | **39,953** | **67,362** | **67,181** | **51,610** | **4,405** | **1,192** | **18,158** | **334** | **334** | **334** | **1,192** |

## Table 24 Summary of Orkney Harbour Authority revenues – base case

| Project location (£'000) | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2031 | 2041 | 2051 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Scapa Deep Water Quay** | | | | | | | | | | | | |
| Harbour revenue Case D | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12,573 | 12,883 | 13,449 | 0 | 0 |
| Structure/vessel service | 0 | 0 | 0 | 0 | 0 | 406 | 1,281 | 1,281 | 1,281 | 1,281 | 1,281 | 1,281 |
| Passing vessels | 0 | 0 | 0 | 0 | 0 | 0 | 298 | 298 | 298 | 298 | 298 | 298 |
| Harbour craft cost savings | 0 | 0 | 0 | 0 | 0 | 83 | 250 | 250 | 250 | 250 | 250 | 250 |
| **Total** | **0** | **0** | **0** | **0** | **0** | **489** | **1,829** | **14,402** | **14,712** | **15,278** | **1,829** | **1,829** |
| | | | | | | | | | | | | |
| **Hatston** | | | | | | | | | | | | |
| Offshore windfarms Case D | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 332 | 346 | 456 | 470 | 470 |
| Boatyard | 0 | 0 | 0 | 0 | 0 | 0 | 38 | 45 | 45 | 45 | 45 | 45 |
| Oil and gas support | 0 | 0 | 0 | 0 | 0 | 0 | 222 | 265 | 265 | 400 | 665 | 665 |
| Aquaculture | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **0** | **0** | **0** | **0** | **0** | **0** | **259** | **643** | **657** | **901** | **1,180** | **1,180** |
| | | | | | | | | | | | | |
| **Stromness** | | | | | | | | | | | | |
| Offshore wind response | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 12 | 12 |
| Marina | 0 | 0 | 3 | 3 | 3 | 4 | 4 | 5 | 5 | 5 | 5 | 5 |
| Cruise | 0 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 |
| **Total** | **0** | **18** | **20** | **20** | **21** | **22** | **22** | **22** | **22** | **28** | **34** | **34** |
| | | | | | | | | | | | | |
| **Lyness** | | | | | | | | | | | | |
| Offshore wind storage | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 108 | 108 | 108 | 0 | 0 |
| | | | | | | | | | | | | |
| **Total** | **0** | **18** | **20** | **20** | **21** | **511** | **2,111** | **15,175** | **15,499** | **16,315** | **3,043** | **3,043** |

## Table 25 Summary of costs and revenues

| Base case (£'000) | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2031 | 2041 | 2051 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total cost | 5,710 | 13,228 | 39,953 | 67,362 | 67,181 | 51,610 | 4,405 | 1,192 | 1,192 | 1,192 | 1,192 | 1,192 |
| Total revenue | 0 | 18 | 20 | 20 | 21 | 511 | 2,111 | 15,067 | 15,391 | 16,207 | 3,043 | 3,043 |
| **Revenue – Cost** | **-5,710** | **-13,210** | **-39,932** | **-67,342** | **-67,160** | **-51,099** | **-2,294** | **13,875** | **14,199** | **15,015** | **1,851** | **1,851** |
| Cumulative | -5,710 | -18,920 | -58,852 | -126,193 | -193,354 | -244,453 | -246,747 | -232,872 | -218,673 | -189,529 | -120,247 | -949 |

The above comparison of costs and revenues for all proposals shows that the additional operating costs will be significant in relation to the additional revenue, but that the Harbour Authority will be able to meet them.

# 7 SUMMARY AND CONCLUSIONS

## 7.1 Summary

This analysis is based upon the discounted cash flow technique. This permits valuations, or assessment of outcomes, based upon calculating the Net Present Value of a project. If the NPV of a project is zero or above, it is viable, at the cost of capital ("discount rate") which is used (in our analysis 3.5%). Where the NPV is above zero, and there are alternatives, then the highest NPV may indicate a preferred project.

Project viability is considered at two levels:

- **Financially viable** means that the investment yields income to Orkney Harbours sufficient for a project to make an acceptable financial return on investment.
- **Economically viable** means that the investment yields income to Orkney Harbours plus economic benefits to Orkney and further afield, sufficient for a project to make an acceptable economic return on investment.

Results are presented in a continuum based upon the level of risk transferred from OIC to a wind farm developer/operator:

- **Case A – Financially viable project (min risk to Orkney Harbours):** All the revenue risk is transferred. This is arguably the goal for negotiations.
- **Case B – Financially viable project (higher risk to Orkney Harbours):** OIC retains risk from variable income (dues). This is perhaps the fallback position.
- **Case C – Economically viable project** (*if relevant*[6]): OIC retains risk from variable income, but the lease payments are too low for financial viability. This is the worst acceptable case.
- **Case D – The outcome** of the project with no lease payments.

Thus the first three cases (A, B, C) essentially use the analysis to generate valuations to achieve an objective, whereas the last case (D) is an outcome.

The results are presented in the table overleaf for two options for both SDWQ and Hatston:

- SDWQ: All phases (1, 2, 3) constructed.
- SDWQ: Only phases 1 and 3 constructed.
- Hatston: All phases (1, 2, 3) constructed.
- Hatston: Only phases 1 and 2 constructed.

[6] This is only relevant if the project would not be economically viable under Case D.

The table shows the Financial Net Present Value (FNPV), and the Economic Net Present Value (ENPV).

For SDWQ, the results show the valuation based on lease payment made over 25 years.

| SDWQ | Fin NPV | ENPV | Annual lease (25 years) | Total contribution |
|---|---|---|---|---|
| **All 3 phases** | | | | |
| Case A (lease only) | **£0.0m** | **£119.5m** | **£12.3m** | **£308.7m** |
| Case B | **£0.0m** | **£115.2m** | **£2.3m** | **£56.8m** |
| Case C | Not Applicable | | | |
| Case D | **-£30.5m** | **£77.6m** | **£0.0m** | **£0.0m** |
| **Phases 1 and 3** | | | | |
| Case A (lease only) | **£0.0m** | **£105.9m** | **£8.0m** | **£201.1m** |
| Case B | **£0.0m** | **£101.7m** | **£1.4m** | **£35.7m** |
| Case C | Not applicable | | | |
| Case D | **-£19.2m** | **£78.1m** | **£0.0m** | **£0.0m** |

For Hatston, the results show the valuation based on lease payments made annually from the start of O&M over the whole remaining period for analysis (23 years).

| Hatston | Fin NPV | ENPV | Annual lease (O&M ops) |
|---|---|---|---|
| **All 3 phases** | | | |
| Case A (lease only) | **£0.0m** | **£34.9m** | **£4.7m** |
| Case B | **£0.0m** | **£34.9m** | **£3.6m** |
| Case C | **-£28.3m** | **£0.0m** | **£1.4m** |
| Case D | **-£45.4m** | **-£21.2m** | **£0.0m** |
| **Phases 1 and 2** | | | |
| Case A (lease only) | **£0.0m** | **£27.9m** | **£3.8m** |
| Case B | **£0.0m** | **£27.9m** | **£2.7m** |
| Case C | **-£22.6m** | **£0.0m** | **£0.9m** |
| Case D | **-£34.6m** | **-£14.8m** | **£0.0m** |

## 7.2 Conclusions

### 7.2.1 SDWQ (All phases)

**Case A:** Taking the view that this project is primarily driven by ORE, and the Developer should pay for it, the lease payment required is £12.3m pa over 25 years. This rolls up all dues (from the Developer) and variable income into this payment. (In practice any non-developer users will still be paying dues.)

**Case B:** If Orkney Harbours was to still rely on income from variable dues from the Developer (and therefore take the risk on what level of income it actually receives), then the lease payment would be £23m pa over 25 years.[7]

**Case C**: not relevant.

**Case D:** Even if the Developer were to pay no lease fees, the project yields a positive ENPV of £77.6m. This is a viable project, all things being equal, however one looks at it.

### 7.2.2 SDWQ (Phases 1 and 3 only)

Under this option, the lease payments the Developer would have to make are obviously lower in Cases A and B, because the capital cost is lower.

Under Case D, it is important to note there is a higher ENPV for only Phases 1 and 3 (£78.1m), in comparison to all phases (£77.6m). This means that, from Orkney Harbours' perspective, it may have a preference for only Phases 1 and 3.

However, the analysis assumes that a Developer can achieve the same outcomes without Phase 2. There isn't enough knowledge at this stage to understand exactly what infrastructure is required to accomplish what. This will depend on the Developer's methods, and their timescales. It is important to retain the discipline of only planning what is needed, and so Developers will need to be challenged on their requirements.

### 7.2.3 Hatston (All phases)

**Case A:** The lease payment required is £4.7m pa over the period of the analysis. This includes all variable payments from the Developer, and in practice dues from other users would be received in addition.

**Case B:** The reduced lease payment is £3.6m pa.

[7] In practice Orkney Harbours would also attempt to negotiate an "minimum take" agreement on dues, such that its income from these would have a floor in the event that the Developer failed to bring business through Orkney.

**Case C:** If for whatever reason, the developer cannot or will not pay the lease fee in Case B, then the minimum lease fee that would still result in an economically viable project from Orkney Harbours' perspective is £1.4m.

**Case D:** in this event, the project yields a negative ENPV of -£21.2m.

### 7.2.4 Hatston (Phases 1 and 2)

Phase 3 of the Hatston development is primarily aimed at having a boatyard, so it is reasonable to determine any lease payments from a windfarm operator based on Phases 1 and 2 only.

**Case A:** The lease payment required is £3.8m pa over the period of the analysis. This includes all variable payments from the Developer, and in practice dues from other users would be received in addition.

**Case B:** The reduced lease payment is £2.7m pa.

**Case C:** If for whatever reason, the developer cannot or will not pay the lease fee in Case B, then the minimum lease fee that would still result in an economically viable project from Orkney Harbours' perspective is £0.9m.

**Case D:** in this event, the project yields a negative ENPV of -£14.8m.

### 7.2.5 Stromness

The Stromness project is economically viable without any lease contribution from the windfarm developer; with a relatively low level of traffic and Harbour income from the windfarm rapid response vessels, the main benefits come from marine leisure and cruise.

It makes a slightly negative financial NPV of -£0.4m, but given that the facilities are used by cruise and marine leisure as well as windfarm operations, it could be argued that the latter should not be made to make up the shortfall alone.

### 7.2.6 Lyness

The negative ENPV and NPV for Lyness reflects the relatively short period over which the windfarm developer is likely to use it for storing anchors and chains etc during the initial construction period (8 years). It is expected that alternative uses could be found in the future if the windfarm operators/developers no longer require it.

# APPENDIX A – STRATEGIC POLICIES

The project proposals have been developed in cognisance of key national, regional and local policies and plans. The table below provides a summary of each policy or plan.

| | |
|---|---|
| Scottish Programme for Government | The clear priority for this period through to the end of this Parliament in May is dealing with the economic, health, and social crisis that the coronavirus has brought.<br>Central to that recovery is a new national mission to help create new jobs, good jobs and green jobs. |
| Scottish Economic Strategy | A strong, vibrant and diverse economy is essential to our national prosperity and in creating the wealth to support high quality public services.<br>In order that everyone in Scotland can enjoy the opportunities that economic growth provides, it is vital to boost the competitiveness of the Scottish economy. Over the long term, increased levels of productivity are essential to support the economic growth needed to ensure rising living standards. |
| National Planning Framework (NPF) 3 (4) | Reword: |
| Climate Change Plan | The Scottish Government published a Climate Change Plan in December 2020 with the following actions:<br>• reducing greenhouse gas emissions through a Just Transition to a net-zero economy and society<br>• driving Scotland's adaptation to climate change<br>• supporting decarbonisation in the public sector<br>• engaging with business and industry on decarbonisation<br>• engaging the public and encouraging individuals to move towards low carbon living<br>• leading international action on climate change<br>• supporting communities to tackle climate change through the Climate Challenge Fund<br>• supporting developing countries to tackle climate change through the Climate Justice Fund<br>• preparing to participate in a UK Emissions Trading Scheme (UK ETS) after leaving the EU ETS at the end of the EU Exit Transition Period<br>• establishing a national Nitrogen Balance Sheet to keep track of how efficiently nitrogen is being used.<br>This project is primarily aimed at ensuring there is suitable and sufficient port infrastructure to support the offshore wind sector; there may be a distribution and storage hub for low or zero carbon fuels developed at Scapa Deep Water Quay in the future also. Hence the project is fully aligned with the Scottish Government's strategy to reach Net Zero by 2045. |
| Scottish Ferries Plan and Island Connectivity Plan | The Ferries Plan is currently being updated and provides the foundation for developing ferry services in Scotland. A new Island Connectivity Plan is also being developed. |

| | |
|---|---|
| Crown Estate Corporate Plan | The Corporate Strategy presents the overall objectives and proposes how these will be delivered. Crown Estate Scotland manages assets – seabed, coastline, rural estates and more – that stretch the length and breadth of Scotland. The strategic purpose is investing in property, natural resources and people to generate lasting value for Scotland. Five strategic objectives align with the National Performance Framework (NPF) and the UN's Sustainable Development Goals (SDGs), namely:<br>• Support the sustainable expansion of Scotland's blue economy, focussing on marine and coastal development<br>• Develop built environment that strengthens communities and benefits businesses<br>• Invest in innovation and work with tenants to enable sustainable natural resource use<br>• Build partnerships for people and the planet<br>• Develop and deploy our people's expertise to deliver value and success |
| Giant Strides A Marine Tourism Strategy supporting communities, the environment and economic growth around Scotland's coasts, lochs and waterways | Vision for Scotland to be a World leader in 21st century sustainable marine tourism<br>Marine tourism underpins rural and island economies, supports remote and fragile communities, invests in nature and provides a host of health and wellbeing benefits.<br>Why support and invest in marine tourism:<br>• Manage risk and drive returns. Marine tourism is one of many sectors that are all competing for support and investment. The strategy provides a clear framework to de-risk any potential investment, to assure alignment to national priorities and outcomes and to improve the return on investment by unlocking second and third order impacts and driving greater levels of community buy in.<br>• Multiple impacts in hard to reach communities. Marine tourism is also one of the very few sectors that reaches the most remote and fragile communities in Scotland. It drives the economy but can also drive health, community and environmental impacts of equal consequence and impact. |
| National Islands Plan | The Plan encompasses 13 strategic objectives that are focussed on making the islands better places to work, live and visit.<br>The project will realise new jobs; opportunities for the local supply chain to develop new skills and social and economic benefits for Orkney. The project supports many of the Plan's objectives, namely: *population retention/growth (1), sustainable economic development (2), housing (4), fuel poverty (5), health and well-being (7), empowering communities (10), climate change (11) and education (12*). |
| HIE Strategy 2019 – 2022 | HIE's Strategy encompasses three priorities:<br>• Successful, productive and resilient businesses<br>• Conditions for growth<br>• Strong, capable and resourceful communities.<br>The project supports these priorities, as well as HIE's commitment to |

| | |
|---|---|
| | 'build on the region's international reputation for excellence in energy and low carbon, and to forging collaborative partnerships to further strengthen the industry and HIE's position in it'. |
| Orkney Council Plan 2018 – 2023 | The Council Plan sets out the key priorities of Orkney Islands Council and details the projects and activities through which these priorities are to be implemented, within agreed budget.<br>The Plan's mission is focused on 'working together for a better Orkney'. There are five strategic priorities and a number of key priorities and aspirations which the masterplan proposals could potentially deliver against:<br>Connected Communities: invest in marine infrastructure and business development.<br>Caring Communities: address workforce development to make sure we have the right people in the right place at the right time.<br>Thriving Communities: the Orkney Community is able to access work, learning and leisure through a modern, robust infrastructure which supports all our communities and meets the requirements of 21st century life.<br>Enterprising Communities: continue to develop strategic projects, particularly to capitalize on the renewables sector.<br>• Progress the Islands Deal to deliver innovative, enterprising and transformational projects.<br>Continue to encourage and support economic opportunities which maximise islands' opportunity and influence.<br>Quality of Life: Orkney has a flourishing population with people of all ages choosing to stay, return or relocate here for a better quality of life. |
| Orkney Local Development Plan | OIC adopted a new Local Development Plan (LDP) for Orkney in April 2017. It sets out a vision and spatial strategy for the development of land in Orkney over the next 10 to 20 years.<br>The plan sets out 15 policies for each type of development. All of the policies in the Plan are afforded equal weight in the determination of planning applications; if a proposal is contrary to any single policy then it does not accord with the Plan.<br>There are several supplementary guidance documents for specific planning issues and sectors.<br>The Plan's vision incorporates the following:<br>• To ensure that effective planning policies are in place to strengthen and support Orkney's communities by enabling those developments which will have a positive and sustainable socio-economic impact, and utilise locally-available resources, whilst striving to preserve and enhance the rich natural and cultural heritage assets upon which Orkney's economy and society depends.<br>• Orkney's settlements will act as a focus for growth in order to support existing facilities and services such as shops, schools and public transport links. Facilitating active travel will be an integral part of development planning across the county with a commitment to include well-integrated footpaths and cycleways within new developments and to connect any fragmented sections of the existing network to encourage active and healthy living.<br>• The Plan supports Orkney's strong maritime links and guides relevant developments to key land around ports and |

| | |
|---|---|
| | harbours. |
| Orkney Community Plan | The Orkney Community Plan incorporates Orkney's Local Outcomes Improvement Plan (LOIP) and describes what the Orkney Partnership (this is a partnership between OIC and other stakeholder organisations) aims to achieve, setting out its strategic priorities for action. There are three strategic priorities:<br>• Positive ageing – independent living; positive and valued participation in the community; long-term health and wellbeing.<br>• A vibrant economic environment – opportunities for young people; Orkney innovation zone; community-based enterprise and employment.<br>• Healthy and sustainable communities – healthy lifestyles; inclusiveness and equality; access; a sustainable health and care workforce. |

**Appendix 6:** CPA1 Requirements, Completed Tasks & Future Milestones for Proposed Hatston Project

## OIC CPA1 Requirements

| Requirements | |
|---|---|
| Strategic fit with OIC Strategic Plan, risk assessment | ✓ |
| Existing / forecast service capacity constraints / project rationale | ✓ |
| Estimate of benefits to local business, employment & Orkney | ✓ |
| Fully developed specification | ✓ |
| Appraisal of options | ✓ |
| Land purchase requirements | ✓ |
| Estimated capital & revenue costs / contingency | ✓ |
| Planned project timeline | ✓ |
| Estimate of cost for CPA2 preparation | ✓ |
| Accountable Head of Service for CPA1 | ✓ |

# Where We Are Now:
# Scapa Deep Water Quay and Hatston

| Tasks completed |
| --- |
| Orkney Harbours Masterplan Phase 1 |
| Exemplar Design |
| Feasibility Study |
| Economic Assessment |
| Environmental Scoping Opinion |
| Environmental Surveys |
| Discussions with Statutory Authorities |
| Discussion with Land-Owners |

# Hatston: Milestones

| Key milestones going forward | Completed by: |
|---|---|
| Outline Appraisal Harbour Authority Sub Committee (CPA1) | May 2021 |
| Site Investigation | Feb 2022 |
| Wave Study | Aug 2021 |
| Outline Business Case | Nov 2021 |
| Project Approval (CPA2) | Nov 2021 |
| Appointment of Consultants | May 2022 |
| Detailed Design | May 2023 |
| Environmental Impact Assessment | Aug 2022 |
| Consents (e.g. Marine License, Planning Permission) | Dec 2022 |
| Tender of Construction Works | Aug 2023 |
| Award of Construction Contract (subject to consents) | Mar 2024 |
| Construction completion | 2027 / 2028 |

(Note: in “milestone” order not chronological order)

**Appendix 7:** Orkney Harbours Masterplan Phase 1 - CPA1 to CPA2 costs

| | | Scapa Deep Water Quay - Estimated Costs | Hatston - Estimated Costs |
|---|---|---|---|
| **1: Feasibility - Completed** | | | |
| **2a: Tender/Appointment of Consulting Engineer** | Outline Scheme Design | £250,000 | £139,000 |
| | Site Investigation organisation & management | £75,000 | £50,000 |
| | Detailed Design & Consent Management | £300,000 | £150,000 |
| | Tender Doc Preparation and Report on Tenders (0.5 for CPA2) | £250,000 | £139,000 |
| | Construction Production Information | £55,000 | £75,000 |
| | Construction Management | £375,000 | £208,500 |
| | Subtotal | **£1,305,000** | **£761,500** |
| **2b: Site Investigation (third party)** | Site Investigation (land/seabed boreholes) | £1,325,000 | £750,000 |
| | Subtotal | **£1,325,000** | **£750,000** |
| **3: Environmental Impact, Consents & Planning** | Environmental Impact Assessment | £130,000 | £90,000 |
| | Marine Scotland consents/Crown Estate Charges | £140,000 | £74,000 |
| | Other Planning Costs | £25,000 | £25,000 |
| | Sub Total | **£295,000** | **£189,000** |
| **4: Tender/Appointment of Contractor - Design & Build** | Detailed Design & Consent Management | £575,000 | £336,500 |
| | Construction Production Information | £320,000 | £133,500 |
| | Construction | TBC | TBC |
| | Sub Total | **£895,000** | **£470,000** |
| **5: OIC Costs** | Procurement Officer - 1FTE for 3 years (see below) | £97,350 | £48,675 |
| | Finance Officer - 1FTE for 3 years (see below) | £97,350 | £48,675 |
| | OIC Engineering - main road (A961) diversion, detail design | £60,000 | |
| | Other Apportioned Costs - Legal etc | £65,000 | £30,000 |
| | Sub Total | **£319,700** | **£127,350** |
| **6: Project Management** | General back up for project management and the generation of an outline business case | £30,000 | £30,000 |
| | Sub Total | **£30,000** | **£30,000** |
| | Total For Whole Proposed Project - post May 2021 | **£4,139,700** | **£2,297,850** |
| | CPA1 - CPA2 Costs - Sections 2a, 3 & one quarter of Section 5 for procurement and finance, all other OIC costs as stated in full | £1,303,675 | £803,838 |
| | CPA1 - CPA2 Costs - Site Investigation Costs - section | £1,325,000 | £750,000 |
| | Total for CPA1 - CPA2 per project | £2,628,675 | £1,553,838 |
| | **Total for Both Projects: CPA1 - CPA2** | **£4,182,513** | |

Note:
1: Parts not shaded are not CPA1-CPA2 costs, shown for indication of possible future costs and to be confirmed at CPA2.

Appendix 8:

# Stage 1 CPA

Capital Programme: Non-General Fund – Harbour Authority
Client Service: Development and Infrastructure – Marine Services
Project Name: Proposed Hatston Pier Extension and Reclamation.

## 1. Background

To extend an pier and reclaim sea-bed to form additional land at the Hatston Pier facility in Kirkwall. This would provide an addition 300m quay / berth with a water depth of between 10m below chart datum, on top of the existing 385m quay. It would have a quay and land area in the region of 8 Ha. The agreed client specification is in included as Appendix 1 of this report. Delivery models being considered vary from an early engagement of main contractor contract format (similar to that used by the British Antarctic Survey over the last five years), a contract where the client carries out all of the design works with the contractor building through to a design and build contract based on very good base information being supplied by the client. All options will be considered with a preferred method / contract arrangement being specified in the CPA2 report / documentation.

## 2. Financial Implications

| | **Total** | **2021/22** | **2022/23** | **2023/24** | **2024/25** | **2025/26** |
|---|---|---|---|---|---|---|
| | **£000k** | **£000k** | **£000k** | **£000k** | **£000k** | **£000k** |
| Capital Expenditure | 81,000 | | | 27,000 | 27,000 | 27,000 |
| **Less**: Anticipated Grants or Other Contributions | 9,000 | | | 3,000 | 3,000 | 3,000 |
| | | | | | | |
| **Net Capital Expenditure** | 72,000 | 0 | 0 | 24,000 | 24,000 | 24,000 |
| | | | | | | |
| Revenue Implications | 0 | 0 | 0 | 0 | 0 | 0 |
| Financing/Loan Charges | 8,231 | 0 | 0 | 1,136 | 2,851 | 4,244 |
| Post CPA2 | 744 | 0 | 0 | 248 | 248 | 248 |
| Estimated cost of detailed Stage 2 CPA | 1,554 | 1,152 | 402 | | | |

The cost of preparing documents, reports etc for CPA2 to be funded from Miscellaneous Piers and Harbours Reserves.

Estimated Stage 2 Costs from appendix 7 to this report.

Capital estimated within Appendices within this report and will be confirmed at CPA2, along with loan charges. This is due to a variety of finance packages that may be used to fund this project, which are known at this time but without a firm discussion on exactly which one would be best suited.

## 3. Policy Aspects

With reference to The Council Plan 2018-23, Part 1 Strategic Priority – Enterprising Communities, which in turn leads to The Council Delivery Plan 2018-23 Priority 4.4 which references development of Scapa Flow and other Harbours, especially to capitalise on the renewable sector – this project fits perfectly into these plans and aspects.

## 4. Statutory Responsibility

The Council, as the Statutory Harbour Authority, has the responsibility of operating and providing the relevant / necessary facilities in order to operate the Harbour in a safe and efficient manner – all as per Orkney County Council Act 1974, Harbours Act 1964 and Harbours, Docks and Pier Clauses Act 1847.

The Statutory Harbour Authority will be required to engage with all relevant Statutory bodies which in this case will be Crown Estate Scotland, Marine Scotland, OIC Planning Authority, NatureScot, Scottish Environment Protection Agency and Historic Environment Scotland as a minimum.

## 5. Land Purchase Requirement

There are no land purchase requirements involved in this proposed project. Sea-bed leases with Crown Estate Scotland will be required, as is normal with the majority of pier extension / reclamation projects in Scotland.

## 6. Impact on Local Business, Employment and the Economy

As indicated in the Economic Review, Appendix 5 of this report the impact on the Orkney economy and community is estimated £31m for direct income and £35m as indirect income and induced income, generating 76 jobs and having an overall Gross Value Added of £233m.

## 7. Risk Assessment

The main risk associated with this proposed project is that baseline conditions are not known sufficiently early to be included in the overall design and project plan. It is very important that as much base information (Engineering, Environment & Economic) information is gathered at an early stage, and work together, in order that final designs, construction methods etc are based on real data and information. With this main risk being reduced to a minimum many, if not all, other risks will be reduced to an absolute minimum.

## 8. Accountable Officer

Jim Buck, Head of Marine Services, Transportation and Harbour Master.