Peterhead Port Authority

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Inner Harbour Deepening & New Fish Market Development, Environmental Statement

Peterhead Port Authority

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Environmental Statement

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Inner Harbour Deepening & New Fish Market Development Environmental Statement

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EXECUTIVE SUMMARY

The Proposed Scheme

Peterhead is situated in the north east of Scotland, just over 30 miles north of Aberdeen. With a population of about 18,500 it is the centre for the local Buchan economy within Aberdeenshire. The main focus for this activity is the port which is administered by the Peterhead Port Authority (PPA) as a trust port. The port has one of the busiest fish markets in Europe and also acts as a major logistics supply base for the offshore oil and gas industry in the North Sea.

PPA has identified a significant need to modernise the existing port provision in respect of fishing and has identified works to bring facilities in line with current and anticipated vessel and market standards and demands.

Essentially the objectives of the works which are planned are to:

- Maintain and enhance Peterhead's position as the top performing UK port for both demersal and pelagic fish, catering for future market demand.

- Enhance Peterhead's position as a major fishing port in Europe, particularly with regard to white fish.

The proposed works include the following:

- Deepening of the Port's north and south harbours and approaches to allow vessels non-tidal, easy access and berthing in safe, deep water, weather protected inner basins.

- Associated strengthening of quay walls where required, and removal of relatively small structures causing narrowing of access channels.

- Construction of a new larger modern fish market able to accommodate existing and future market demand, with a covered landing area for private sales.

- An extended reclamation area, using dredged material from the inner harbours, contiguous with the recently completed Smith Embankment

Figure 1 indicates the extent of the proposals.

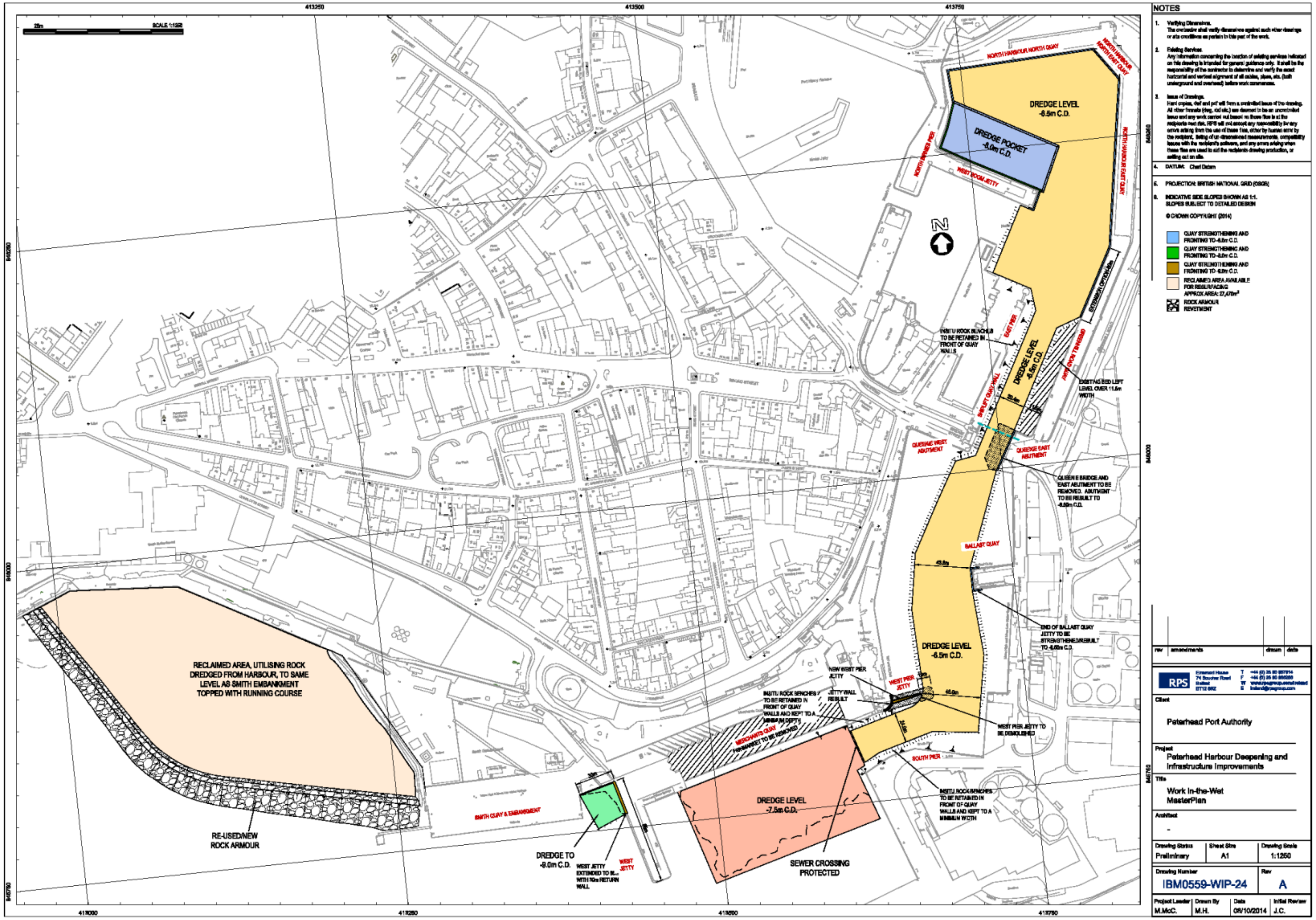


Figure 1 - Proposed development

PPA have appointed NIRAS Fraenkel Ltd to undertake an Environmental Impact Assessment of the scheme and prepare an Environmental Statement.

A Harbour Revision Order (HRO) will be required in order to obtain statutory consent for the proposed works. Accordingly, PPA are making an application to the Scottish Ministers for an HRO under Section 14 of the Harbours Act 1964 accompanied by this Environmental Statement (ES) in accordance with the requirements of that Act. This ES has been prepared in accordance with The Marine Works (Environmental Assessment) Regulations 2007, Statutory Instrument 2007 No1518 Environmental Protection, as amended by The Marine Works (Environmental Impact Assessment) (Amendment) Regulations 2011 for works below the mean low water mark. Those Regulations implement European Community EC Directive 85/337/EEC, as amended by Council Directives 97/11/EC and 2011/92/EC. This ES also complies with the requirements of paragraph 8 of Schedule 3 to the 1964 Act.

Method of assessment

The ES is based on information from a master plan recently developed by PPA, previous studies, recent specific investigations and studies including a geotechnical site investigation, together with consultation with statutory bodies, stakeholders and other integrated parties.

Statutory bodies which have been consulted and have provided feedback include Marine Scotland and Marine Scotland Science, Aberdeenshire Council Planning, Scottish Natural Heritage (SNH), Scottish Environmental Protection Agency (SEPA) and Transport Scotland who were managing the overall consultation process. Discussions and correspondence have also taken place with other interested parties. A total of twenty one organisations were consulted and seven responses were received.

Evaluation of the various elements of the proposed development for the purpose of the ES was undertaken by the in-house resources of NIRAS Fraenkel Ltd, with specialist ecological input provided by associated company NIRAS Consulting Ltd.

Existing environment

The sea bed within the bay consists of generally thin deposits of sands and gravels, underlain by varying depths of stiff boulder clay which in turn is underlain by granite or microgranite rock. In the Inner Harbour basins, thin sediments are directly underlain by granite rock. Although there are at times noticeable currents outside the port, currents within the port are low. Sediment movement due to currents is negligible within the Inner Harbour and what little movement there is emanates from the action of small locally generated waves.

While the main breakwaters give general protection to the bay, in storm conditions, with easterly and south easterly winds in particular, waves reaching the southern berths and in some cases the outer northern berths can be of concern. However, there is only local wave action in the Inner Harbour which is well protected from waves and swell.

Bathing waters within the port at Peterhead Lido have passed for over 10 years in a row appropriate bathing water quality standards as monitored by Scottish Environmental Protection Agency (SEPA). Air quality within the port is good. Maintenance dredging has now been completed in the Inner Harbour and the results of sediment sampling and testing for contamination will be provided prior to the start of the construction phase.

Peterhead is situated on the eastern edge of the North East Coastal Plain, where it meets the North Sea. In the areas surrounding the town the land forms an open, rolling landscape, which is intensively farmed with only small areas of woodland and semi-natural vegetation.

Peterhead town itself has many listed buildings, three conservation areas and one scheduled monument. In terms of local amenity and recreation the port plays an important role with the Lido, a caravan park, a marina, and a Maritime Heritage Centre complementing areas of open grassland, dunes and footpaths around the western fringes.

The key habitats in the area surrounding Peterhead are in the coastal zone. These include sea cliffs, extensive sand dunes, small estuaries, exposed rocky shores, and the sea itself. These habitats are generally in the UK Biodiversity Action Plan. No designated conservation sites exist within the immediate vicinity of the works.

Cetacean species are present in the waters of the North Sea off Peterhead, the most important of which are the bottle nosed dolphins from the Moray Firth SAC, but only common harbour seals have been observed within Peterhead port itself. There are several sites of importance to birds in the general area: south of Peterhead lies the Buchan Ness to Collieston SPA, as well as the Ythan Estuary SPA. Immediately to the north of Peterhead the Ugie Estuary and Craig Ewan are important areas for many species. Again, however, there are no bird colonies of significance within the port.

Peterhead is the largest town in Buchan with a population of around 18,500. It falls under the administration of Aberdeenshire Council. The foundations of the economy of the local area have traditionally been fish and agriculture. Since the 1970s the economic base has broadened with Peterhead acting as an administrative centre, and providing servicing facilities for the North Sea oil and gas industries. The local economy now is mainly dependent on two sectors: offshore services and fishing including related processing activities.

Impact assessment and mitigation

The most significant beneficial impact of the proposed development is the potential for expansion of the local, regional and national economy resulting from an increase in the availability of deep water sheltered (all-weather) berthing at the port, together with associated opportunities for local commercial and industrial diversification. During the construction period local businesses will also benefit from the influx of site personnel and local employment opportunities during this time will be created.

Adverse impacts are likely to be mainly transient in nature, relating from construction activities. An area of concern could be the potential impact of noise and vibration on protected bottle nosed dolphins from the Moray Firth SAC which are known to pass from time to time in the waters of the North Sea off Peterhead, although none have been reported in the bay itself. Noise and vibration will result from the blasting used to break up some of the hard granite rock prior to dredging. Specific mitigation measures are proposed in relation to these activities to minimise and negate any adverse impacts on cetaceans and the ecological, human, and physical environments.

Impacts on coastal processes are almost entirely confined to the port. Any effects outside will be negligible so that SPA's and SAC's will be unaffected. The new works will be constructed to the same quay level as the adjoining facilities and there will be no increased risk of flooding.

Inevitably dredging operations, placing of reclamation materials and associated maritime activities will result in suspended fines in the harbour waters and sedimentation during construction. Careful selection of dredging plant can mitigate adverse effects, and the suspended material will settle relatively quickly after operations are completed. Water at the Lido area may be temporarily discoloured but pollutant levels are very low in the seabed materials which would be disturbed.

During construction there will be increased traffic on roads, particularly south of Peterhead. Mitigation measures are proposed in relation to this, in relation to traffic to minimise disturbance, noise, vibration and fumes include route selection and timing of transport operations.

The sea bed area immediately under the proposed reclaimed area will be lost and any non-mobile species in the area will be eliminated. Recolonisation will occur in adjacent area once construction is complete.

Visual landscape will be affected with the demolition of the existing fish market, the removal of Queenie Bridge, the covering up of the historical quay wall and the construction of the new fish market. Mitigation measures are proposed ranging from undertaking a complete historical photo survey of the existing landscape and relocation of a small section of Queenie Bridge being used as a static display at the end of Bridge Street.

PPA will engage with the public, prior to and throughout the construction of the works to allay any concerns the community might have in relation to the works and the subsequent operation of the enhanced facilities in the port.

Recommendation

In order to ensure that the mitigation measures identified in the ES are carried through to the contract for the works, a draft Construction Environmental Management Plan will be developed and will be included as part of the contract documents for the development works. It will be based on the substance of the ES and will include both a set of specific requirements for the contractors undertaking the works and a set of requirements and obligations on the part of the PPA as client. Ongoing liaison with consultees, particularly Aberdeenshire Council, SNH and SEPA, will be maintained throughout the period of the works.

Adherence to the mitigation measures proposed will ensure that the project can be realised in an environmentally sensitive manner to the overall benefit of the local, regional and national communities.

1. INTRODUCTION

1.1. Scheme summary

The new development will consist of the deepening of the North and South Harbours, the demolition of Queenie Bridge, the demolition of buildings on Merchants Quay, land reclamation at Smith Embankment and the construction of a new expanded fish market on the north side of the North Harbours (Figure 2).

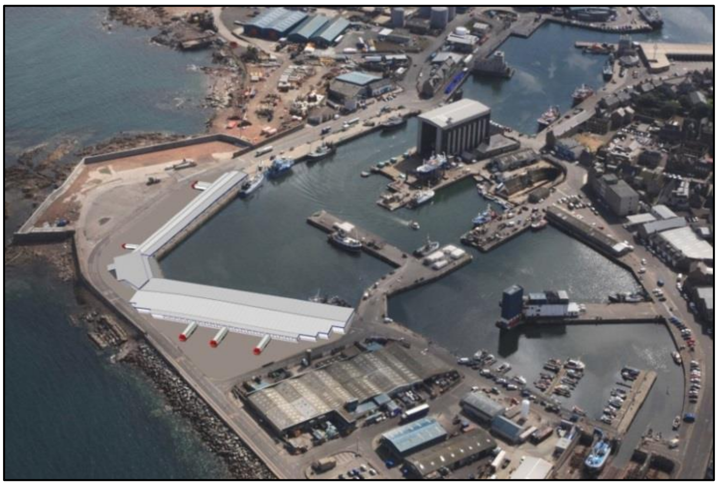


Figure 2 - 3D impression of the future fish market

1.2. Rationale for the project

1.2.1. Background

Peterhead is situated in the north-east of Scotland, just over 30 miles north of Aberdeen. With a population of about 18,500 it is the centre for the local Buchan economy within Aberdeenshire. The main focus for this activity is the port which is administered by the Peterhead Port Authority (PPA) as a trust port. The port has one of the busiest fish markets in Europe and also acts as a major logistics supply base for the offshore oil and gas industry in the North Sea.

Peterhead Port is an important economic driver within the Aberdeenshire economy. The fishing industry and the offshore oil and gas industry are the two most important income generating sectors for the port and for the wider regional economy. These industries in turn support a range of associated activities clustered around the port and its hinterland including fish processing, marine engineering, logistic support operations and vessel repair and maintenance.

The fish market is one of the busiest in Europe, and is the largest whitefish port in the UK. In 2010, the total value of fresh fish handled through Peterhead was at almost £150 million. Half of this value was in pelagic species, mainly herring and mackerel, and the other half was in whitefish, including cod, haddock, coley and monkfish, and also shellfish.

1.2.2. Rationale

Essentially the purpose of the proposed works at the Port of Peterhead is twofold:

- Maintain and enhance Peterhead's position as the top performing UK port for both demersal and pelagic fish, catering for future market demand.

- Enhance Peterhead's position as a major fishing port in Europe, particularly with regard to white fish.

1.3. Requirement for an EIA

A Harbour Revision Order (HRO) will be required in order to obtain statutory consent for the proposed works. Accordingly, PPA are making an application to the Scottish Ministers for an HRO under Section 14 of the Harbours Act 1964 accompanied by this Environmental Statement (ES) in accordance with the requirements of that Act. This ES has been prepared in accordance with The Marine Works (Environmental Assessment) Regulations 2007, Statutory Instrument 2007 No1518 Environmental Protection, as amended by The Marine Works (Environmental Impact Assessment) (Amendment) Regulations 2011 for works below the mean low water mark. Those Regulations implement European Community EC Directive 85/337/EEC, as amended by Council Directives 97/11/EC and 2011/92/EC. This ES also complies with the requirements of paragraph 8 of Schedule 3 to the 1964 Act.

The proposed development at Peterhead Port falls within Annex II to the above mentioned Directive. (Any change to or extension of development of a description listed in Annex I or II to the Directive. The development has the potential to give rise to adverse environmental impacts. Thus a formal Environmental Impact Assessment is required in accordance with the aforementioned regulations.

The Marine (Scotland) Act 2010 requires a works licence for the project as well as a dredging licence and these will form an essential part of the overall statutory process.

The impact of the UK Marine Policy Statement 2011 and the subsequent National Marine Plan (Scotland) also need to be considered in respect of the EIA.

1.4. Layout of the ES

The report is set laid out as follows:-

- Executive Summary

- Introduction.

- Project description.

- Environmental assessment process.

- Policy and need

- Baseline conditions, impact assessment and mitigation taking account of the comments on scoping report

  a) Coastal Processes (currents and sediments effect, weather)
  b) Water Quality
  c) Air quality
  d) Noise and vibration
  e) Contaminated land / geology and geomorphology
  f) Ecology
  g) Health and safety
  h) Socio-economic
  i) Navigation
  j) Traffic and transport
  k) Landscape and visual impact assessment (amenity and aesthetics / cultural and archaeological heritage)

- Interrelationships between environmental factors

1.5. Conventions

References to source material are marked with a superscript number e.g.[1]. A list of these references is included after Chapter 16. Figure numbers refer to maps and drawings. Tables are described in the text.

All maps based on the Ordnance Survey are reproduced with the permission of the Controller of Her Majesty's Stationery Office, Crown Copyright Reserved.

2. PROJECT DESCRIPTION

2.1. Introduction

2.2. The site and surroundings

Peterhead is situated in the north-east of Scotland, just over 30 miles north of Aberdeen at the most easterly point of mainland Scotland

The overall area under the control of Peterhead Harbour Trustees covers 48 hectares of which the redevelopment of the Inner Harbour and surrounding quays will cover 10 hectares.

The main roads leading to the site are from the south side at the junction of the A90 (T) and the A982.

Through the north of the town the A982 connects the A90 (T) with the North Breakwater via South Road, King Street, Ugie Street, Port Henry Road, Alexandra Parade and Greenhill Road. Alexandra Parade and Greenhill Road are under private ownership of the PPA. An alternative route via the Harbour Bascule Bridge (Queenie Bridge) is also under the PPA's ownership and is subject to weight restrictions.

There are no rail connections to Peterhead, with the nearest railway station being located in Aberdeen. The nearest airport is Dyce Airport located on the north-west side of the city of Aberdeen.

2.3. Development of Inner Harbour

2.3.1. Harbour deepening

The scope of the harbour works consists of a number of associated elements as indicated in Figure 1. Essentially these comprise:

- Deepening of the North and South Harbours to 6.5m throughout.
- Dredge channel to depth of 6.5m through the South Harbour.

- Strengthening and stabilisation of the dock walls adjacent to deepened areas.
- Deepening at the Merchant's Quay from existing to -7.5m, excavation varying from 0 to -1.5m.
- Removal of restrictions on the navigation route into the South Harbour i.e. the small jetty adjacent to the Port office will be replaced by a wave screen, 10m shorter than the existing jetty.
- Removal of the Queenie Bridge and widening of navigation channel from 10.5m to 20.5m.
- West quay to be retained with extension at its root to create 85m long berth on west side. Associated services/utilities diversions.
- Associated services/utilities diversions.

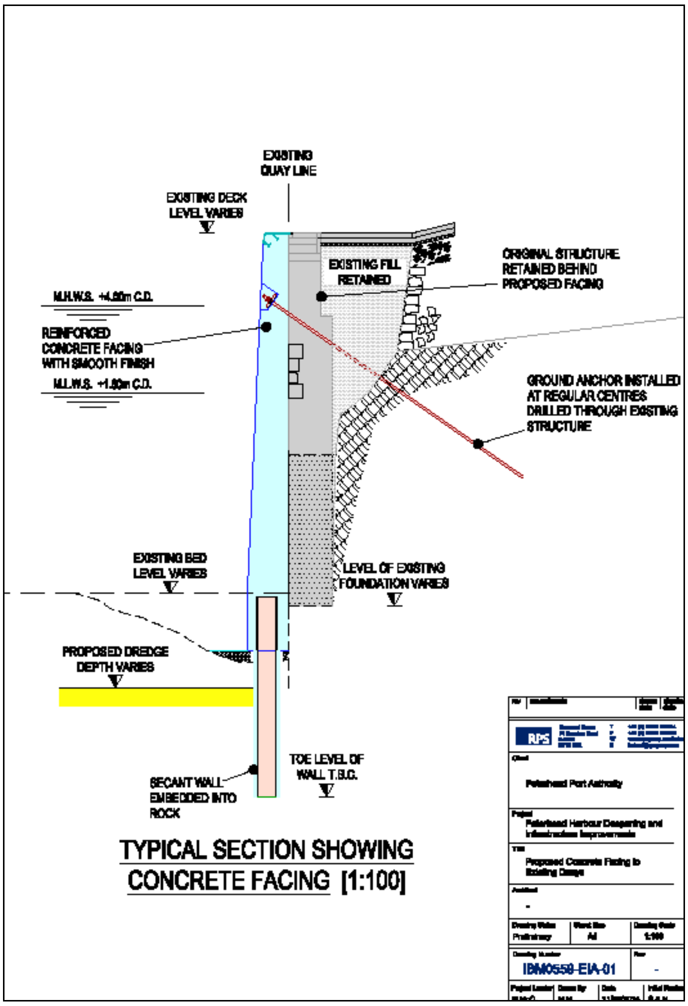
- Formation of reclamation of 30,000m^2 west of the Smith Embankment against the existing sea wall which will be used for general purpose laydown to supplement the existing Smith Quay facility.
- An allowance of potential over-dredged below the design level of 750mm has been included into the design.
- West pier jetty will be shortened by 10m to provide wider vessel access. The south elevation will be realigned as well as maintaining the RNLI pontoon adjacent to it.

A separate maintenance dredging contract has now removed the soft silty material from the areas which are to be deepened allowing virtually all excavated/dredged material to be deposited in the reclamation area. PPA has applied directly to Marine Scotland for a dredging licence in respect of this, which will also include for dealing with any contamination issues and these advance works are not considered in the assessment.

Excavation for deepening will be almost entirely in fractured granite rock. Initial assessment of the total amount of material to be dredged is approximately 110,000m^3.

A typical cross section through the proposed works is shown in Figure 3.

Figure 3 - Typical cross section



2.3.2. New fish market

A new fish market building with supporting facilities and amenities will be built on the site of a former market shed to be demolished, with a shed on the east side being retained (Figures 4 and 5). The new structure will be joined on to this. The market building will be a single storey portal frame whilst the support accommodation will be located in a two storey steel frame. Materials are to be confirmed but at this stage, Fyfestone blockwork, Chinese granite (in feature areas), and 'plastisol' style coated profiled sheet wall and roof cladding are being considered by the architects.

The building will be designed at a minimum to meet Bronze Level Active of the Technical Standards which will include a highly insulated, air tight envelope exceeding the minimum U-Values and Air Permeability targets recommended. The orientation of the building will allow the inclusion of PV panels to be directly south facing to maximise the efficiency of these.

All procedures to protect the environment will be implemented and all work will be in accordance with the Environmental Protection Act 1990. In respect of this, the works are to be designed to minimise adverse environmental effects namely by using recycled or recyclable products where possible, bearing in mind cost and quality objectives.

Figure 4 - Proposed new fish market plan layout

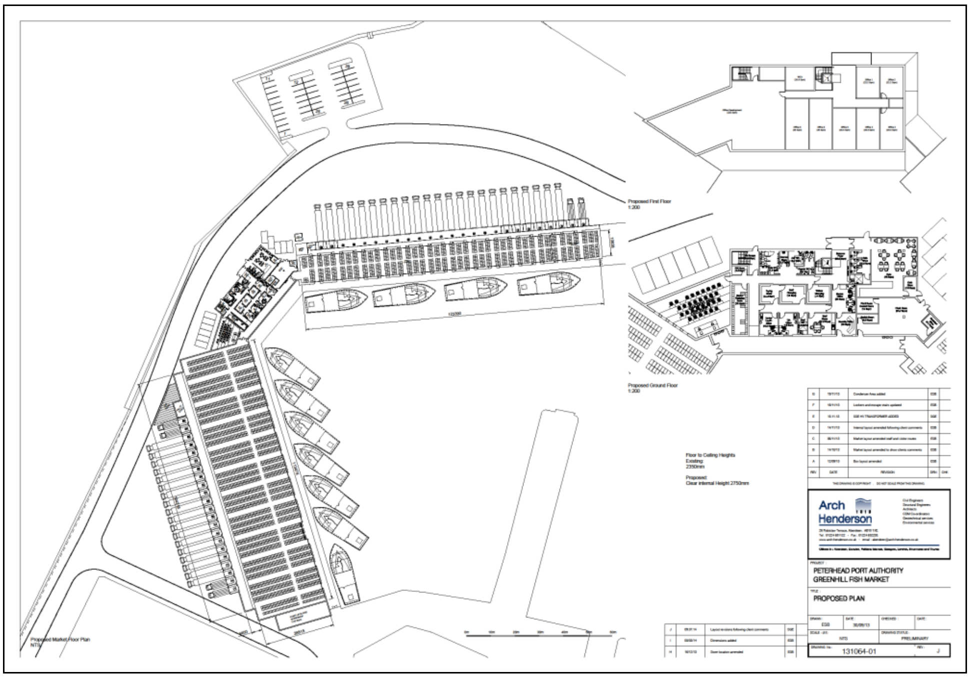
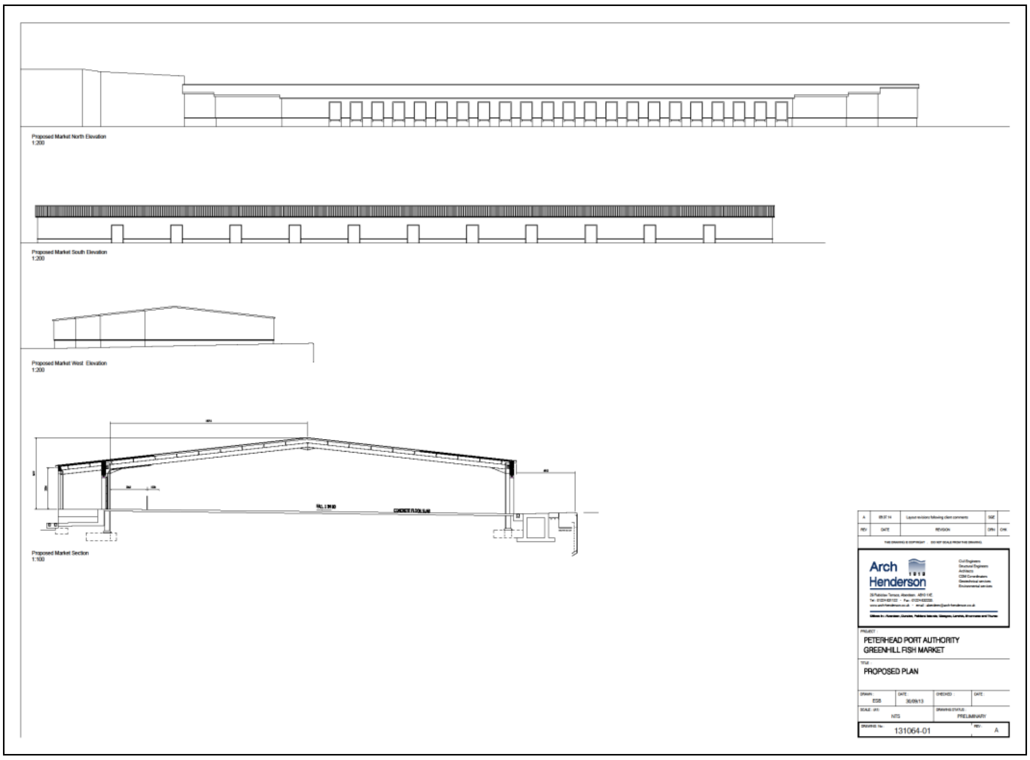


Figure 5 - New fish market proposed elevations



2.3.3. Options considered

<u>Overall development options</u>

An alternative option for provision of a larger, more efficient fish market with deep water access would be to create new berths with full wave protection elsewhere in or adjacent to the port. Within the Peterhead Bay area a fully protected area of sufficient extent is not available. A site with partial wave protection adjacent to the Smith Embankment could possibly be developed but significant imported fill would be required. This location would suffer significant downtime in adverse weather and was rejected by PPA at an early stage.

<u>Underpinning</u>

Various design options for maintaining the integrity of the quay walls have been considered, including simple underpinning with concrete which was PPA's original preferred option. However, bored pile secant walls, cut off at the bed level or extended to the existing cope to form a new berthing face are likely to be needed to stabilise the rock and existing quay walls during and after excavation.

The initial option for the deepening of the inner harbour to use an underpinning solution as 'hit and miss' pile option. Following further geotechnical investigation the underpinning solution was abandoned and a secant wall solution as shown on Figure 3 was adopted. The main reasons for the change are:

1. The ground conditions across the site are extremely complex and variable and in some areas the rock is completely weathered. Analysis has shown that generally, and specifically in areas of weathered rock there is insufficient factor of safety against a global failure of the soil/rock mass. This would be further exacerbated by the proposed deepening works.

2. Notwithstanding the overall stability issue, in areas of completely weathered rock there is a risk of local failure of the soil at the excavated face and thus it is considered that underpinning will be difficult to achieve practically and safely.

3. Trial pits have indicated that some of the masonry wall sections are of relatively slender construction and are not considered to be suitable for retention in the long term as the main earth retaining structure for the quay working areas. Many of these walls have already undergone underpinning in the past and further underpinning is not considered a suitable solution.

4. The variability in the quality of the rock, including sections of completely weathered material introduces a significant risk in terms of the practicality of dewatering the harbour to carry out underpinning works. Recent testing has indicated the groundwater behind the walls is closely linked to tidal variations and the presence of water pressure after dewatering could lead to local flow paths which would introduce a significant risk to both wall stability and maintaining a dry working environment. Given the nature of the rock on site and the need to closely monitor quality and safety, underpinning as originally proposed is not possible.

<u>Inner Harbour ‘wet’ or ‘dry’ construction</u>

As part of their remit the Consulting Engineer to Peterhead Port Authority carried out a review of existing site investigation information alongside proposed outline design options for the project. Having discounted the underpinning option the main options remaining are whether to excavate the North Harbour in the dry or in the wet. The former has advantages in enabling quay wall stabilisation to be carried out in the open. However to complete the works in the dry carries a high level of risk in the design, contractual (financial) and health and safety of the project.

Records of previous works identify various features which provide an indication of the soil and rock characteristics, the potential for groundwater flow into the dewatered harbour, the condition and need to support and underpin the walls as construction proceeded at the time. The progress photographs of the works help clarify that there are significant areas of rock beneath the walls which are comprised of a heavily fractured rock mass with numerous randomly orientated joints and fractures. Some show spalling failures immediately below the existing dock walls with temporary propping in place to support the walls. Dewatering of the dock at that time also resulted in a number of inflows into the excavations, especially toward the north eastern perimeter of the North Harbour. It appears that a sheet pile cofferdam was installed along a line behind the northern external sea wall to try to mitigate water ingress to the dry harbour in the course of the works.

The recent analysis identifies particular areas of primary concern regarding the potential for approaching the North Harbour works with the methodology of dewatering, excavation and under-pinning. These are the masonry walls at Greenhill Road Quay, Birnies Pier and West Boom jetty, the counterfort wall at the Northern Quay, and the potential impact of water ingress on a dewatered harbour.

From the assessment of the ground conditions and the stability analysis for the Greenhill Road Quay it is apparent that the in-situ weathered rock is relatively poor quality with pockets and zones of Completely Weathered Granite within the Highly to Moderately Weathered Granite in the vicinity. This results in potential stability issues during the temporary condition when the toe of the existing wall is excavated from the existing dredge level of -3.3m CD down to the proposed dredge level of -6.5m CD. There are similar concerns in relation to Northern Quay, North Birnies Pier and West Boom Jetty, particularly as the required dredge depth in these areas is -8.0m

A further area of concern is focussed on the northern end of the North Harbour relating to ground water conditions and rock quality assessment. It is considered that the variability of weathering along with joint and fracture discontinuities have the potential to result in high rock mass permeability producing substantial flow from the surrounding water bodies into the North Harbour Basin if dewatering to carry out the works takes place. There is also potential for significant hydraulic head to be induced in the excavated condition which could lead to erosion and piping failure of pockets of weathered and/or joint infill material. This has the potential for significant and un-manageable inflow to the de-watered harbour as well as localised blow-outs.

The conclusions of the consultant have therefore led to a solution that comprises strengthening the quay walls in the North Harbour prior to excavation/dredging to secure them against the forces identified, and then dredging "in-the wet". This methodology obviates the risks identified in terms of structural stability and uncontrollable water ingress in the course of the works.

<u>Reclaimed area</u>

Figure 6 shows the initial plan shape proposed for reclamation to the west of existing reclamation at the Smith Quay. A previous desk study into effects on waves showed it was likely that, under storms from the south-east, waves diffracting round the head of the extended Albert Quay Breakwater would be reflected off the south face of the reclamation in this location towards the ASCo South Base berths. Although some of the wave activity would be absorbed on the rock armour, some 50% would be reflected southwards.

The curved alignment of the eastern port of the reclamation now proposed as shown in Figure 1 should direct reflections towards the rocky foreshore north of the marina as described Chapter 5 – Coastal Process. The foreshore is exposed to south-east storms so the additional reflected waves should be hardly noticeable.

Fish Market

Alternative options considered have been confined to identifying building concepts and developing the most appropriate architectural and functional layout of the structure.

Revetment armouring

The material for the revetment armour will be either imported rock or concrete blocks. The anticipated volume of armouring for the revetment is 18,000m^3. The impact of both options has been considered in the environmental impact assessment.

2.4. Description of Proposed Inner Harbour deepening construction

It is proposed to construct continuous concrete walls in front of the existing quay walls extending from the current harbour bed level to a penetration into rock sufficient to support the cut face and prevent any movement. These walls would be of secant shape in plan formed by overlapping bored concrete piles. They would be surmounted by a reinforced concrete facing to cope level providing a flush berthing face for the full range of vessels to be accommodated in the harbour. This would be tied into rock by anchors in drilled holes passing through the existing masonry walls.

As an alternative to the full height facing, discrete concrete posts could provide a berthing line, leaving the existing walls unfaced between the posts. While this would partially preserve the original appearance of the walls, it would make for difficulties in berthing smaller vessels between the posts and leave the intervening portions of original wall open to long-term deterioration. The full facing option is therefore to be preferred.

The excavation in the North Harbour would be undertaken by dredging plant, dredged material would be transported by barge to Merchant’s Quay or the West Quay where it would be unloaded before being trucked to the reclamation area. Pre-treatment of the harder rock by blasting is expected to be necessary.

Deepening of the South Harbour and Merchant’s Quay would also be carried out in the wet, probably by back-hoe dredging following pre-treatment blasting as necessary. The spoil would be unloaded from barges at the Merchant’s Quay or West Quay then trucked to the reclamation area. The volume of material to be dredged from both harbours would be of the order of 110,000m^3.

2.5. Description of Fish Market construction

The proposed building works include:

- Demolition of the west section of the former Greenhill Fish market.
- Construction of a new fish market at Greenhill, together with refurbishment of the existing east section.
- Demolition of the existing fish market at Merchant’s Quay.
- Re-alignment of Greenhill Road adjacent to Gerries Yard.

2.6. Expected timeline of works

Based on the assumption that contractors will be appointed mid-2015, the following milestones could be expected for construction.

- Fish market works contract – Sept 2015
- North Harbour excavation/dredging Nov 15 – June 16
- North harbour quay wall strengthening July 15 – June 16
- Queenie Bridge Removal - Oct 15
- South harbour dredging Feb 16 – Aug 16
- Closure and demolition of existing fish market. Nov 16

2.7. Description of operations on completion

The current operation of the port will not change from its core business and neither will the number of vessel movements increase.

However, the new fish market will increase the efficiency for the existing fishing fleet. There is a recognised shortfall in capacity of the current fish market at Merchants' quay which results in sales from landings often being carried over until the next day.

Deepening the North Harbour will allow the fishing fleet to occupy its traditional location within the harbour and will better utilise existing underused facilities. In addition the proposed sequencing of the works will allow the new fish market to be built and commissioned without disruption to the current market operations.

Eventual demolition of the Merchants' Quay fish market will create valuable general purpose laydown area in the port.

The reclamation to the west of Smith Embankment will also create general purpose laydown area.

2.8. Decommissioning

The expected life of the proposed structures developed as part of the project will be in the order of 50 years, but the deepened harbour would be expected to function for the foreseeable future.

Based on current knowledge and the design approach to the different elements of the work, especially the building elements, the environmental impact of eventual decommissioning would be minimal, with the opportunity to recycle structural materials elsewhere.

3. METHOD OF ENVIRONMENTAL ASSESSMENT

3.1. Baseline data

Existing information on the site area and surroundings has been collated from readily available sources within PPA, feedback from a large number of consultations, appropriate desk top studies and site visits. Environmental Impact Assessment Reports for the recent Smith Quay development were also reviewed.

3.2. Scoping report

3.2.1. General

Schedule 4 of The Marine Works (Environmental Assessment) Regulations 2007 (as amended) sets out the items that need to accompany a request for a scoping opinion. The requirements of the scoping process are to describe the items in sufficient detail to allow appropriate authority to comment. For the purpose of this application, Transport Scotland coordinated responses from Marine Scotland and Aberdeenshire Council Planning as well as from other statutory consultees for the purpose of the scoping opinion process.

3.2.2. Scoping report summary

A scoping report was issued in February 2014 as part of the formal request for scoping opinion to statutory and non-statutory consultees. A list of impacts identified within the scoping report and the chapters in the ES where the impacts are considered is listed in Table 1.

Table 1 - Summary of scoping impacts included in EIA/ES

Impact	Chapter in ES
Physical Environment	
Geology and Geomorphology	Chapter: 9
Coastal Process	Chapter: 5
Sediment Effects	Chapter: 5
Water Quality	Chapter: 6
Air Quality	Chapter: 7
Noise and Vibration	Chapter: 8
Ecology	
Benthic Communities	Chapter: 10
Marine Mammals	Chapter: 10
Birds	Chapter: 10
Others	Chapter: 10
Human Environment	
Safety	Chapter: 11
Socio-Economic	Chapter: 12
Navigation	Chapter: 13
Traffic	Chapter: 14
Amenity and Recreation	Chapter: 15
Landscape and Aesthetics	Chapter: 15
Cultural and Archaeological Heritage	Chapter: 15
Planning and Development	Chapter: 4

A full copy of the scoping report can be found in Appendix I

3.2.3. Consultation process

In considering the likely environmental effects that could arise from undertaking the proposed scheme in the manner described, or by other options considered, a consultation document was sent to statutory consultees, stakeholders, and other concerned bodies. The aim of the consultation process was:

- To explain why the proposed scheme is considered to be necessary and what options may be available.

- To obtain an initial response from the consultees on the scheme particularly in relation to environmental concerns and issues they would wish to be addressed in the EIA.
- To identify any additional information held by the consultees relating to the natural and human environment.
- To help engender good public relations and an open approach with the local Peterhead community.

In relation to the last bullet point above an ‘open day’ was organised by PPA on 3 April 2014 and 29 August 2014 to describe the proposals to the local community.

3.2.4. *Scoping opinion responses*

Transport Scotland circulated the consultation document to the following statutory consultees for a formal opinion:-

- SNH
- SEPA
- Maritime and Coastguard Agency
- NLB
- Association of Salmon Fishing Boards
- Chamber of Shipping
- Crown Estate
- HSE
- Defence Infrastructure Organisation
- Historic Scotland
- Inshore Fishing Groups
- Local Planning Authority
- Marine Safety Forum
- Royal Yachting Association
- RSPB
- Scottish Fishermen’s Federation
- Scottish Fishermen’s Organisation
- Scottish Wildlife Trust
- Transport Scotland
- Whale and Dolphin Conservation Society

In total, the consultation document was issued to a total of 77 consultees, 21 statutory consultees and 56 non-statutory consultees in February 2014. Non statutory consultees included harbour users, other organisations representing their interests, and other interested parties. A list of the consultee organisations contacted is given in Appendix II.

The consultees were given a 7 week period in which to respond, but this had been extended to 23 weeks, by the time final responses were received.

3.3. Key issue arising from scoping opinion process

A total of 6 responses and comments from statutory consultees were received.

A summary of key issues identified by the various consultees is given in Table 2 below.

Among the non-statutory consultees who responded were: Peterhead fish salesmen's Association, Scottish white fish producers Association, Searoute port services Ltd, RSPB East Scotland. The complete list of response is attached in Appendix II

During the open day on the 3rd April 30 people signed in the attendees list and the main concern were

- Impact on the ice factory operations
- Accommodating displaced pleasure and fishing vessels during construction
- Loss of ship repair facility during construction
- Loss of historical access at Queenie bridge location
- Potential random traffic route to and from Alexandra Parade to main routes

The results of the consultation exercise have been taken into consideration when assessing the potential environmental impacts of the scheme and formulating mitigation measures.

Table 2 - Summary of key issue arising from scoping opinion

Organisation	Summary of key issue	Section of EIA/ES covering the issue
1 . Scottish Natural Heritage	1.1 - Construction Environmental Management Plan	Draft Construction Environmental Management Plan will be developed
	1.2 - Requirement for **Habitats Regulations Appraisal**	Refer to Appendix III - Habitat Regulation Appraisal As per meeting with SNH representative on 26/05/2014, it is noted that SNH did not consider that the development would have a likely significant effect on the SPAs listed in the response to the scoping interest, and therefore the comment could be scoped out.
	1.3 - Natura: European Protected Species consideration to determine if a European Protected Species licence is needed	An EPS license will be prepare and submitted in advance of the work commencing
	1.4 - Project details and method of construction	The methods of construction have been described in Chapter 2 – Project description
	1.5 - Southern Trench nature conservation Marine Protected Area (MPA) search location with potential impact on minch whales and white-beaked dolphin features	The potential impact on Southern Trench MPA proposal have been considered and have been recorded in Chapter 10 Ecology

1 . Scottish Natural Heritage (continued)	**1.6 - Benthic communities** • Confirmation is needed that the footprints of the reclamation area and the intertidal zone overlap and the entire area of the reclamation area is included in the Phase 1 surveys • Recommendation from SNH that Priority Marine Features list should be taken into account when analysing the results of the survey	The entire area of the reclamation area was included in the Phase 1 surveys Priority Marine Features list have been taken into account within the ecology impact assessment
	1.7 - Marine mammals: underwater noise • Requirement to assess all noise activities during construction and cumulative impact from the noisy activities in the region • Safe distance to be confirmed • Noise modelling may be requested • Full review of cetacean sightings in the area • Full assessment of seals • Robust mitigation and monitoring strategy in place to ensure no injury or disturbance occurs • Request Marine Mammal Mitigation Plan	An underwater noise impact calculation in respect of underwater blasting has been conducted. The conclusion can be found in Chapter 10 – ecology and the complete report in Appendix III Mitigation and monitoring strategy will be part of the CEMP Draft MMMP has been developed and is included in Appendix III
	1.8 - Marine mammals: corkscrew injuries and seals Full assessment of risk of death to seals as a result of corkscrew injuries	Currently any fishing vessels over 10m length have ducted or Kort propellers representing 65% of the fleet visiting the harbour Recommendation will be discussed and laid out in the CEMP for vessel which would not be fitted with ducted propeller
	Construction Environmental Management Plan	Draft CEMP will be prepared

2. Scottish Environmental Protection Agency	**2.1 - Water Framework Directive (WFD) and River Basin Management planning** Work to be considered within the River Basin Management context and impact assessed if impacts of the proposal are likely to lead to deterioration of the marine environment or present opportunities for improving the marine environment Water Framework Directive should be followed and complied with by water bodies and responsible authorities	Noted
	2.2 - Site layout and nature of construction • The ES should have enough technical information on the engineering work required, including construction methods • Provide demonstration that the project has no significant impact to the existing discharge located in the vicinity of the project • Consideration made in disturbance of contaminated sediments including consideration if radioactive substance may be present within the sediment	• Sediment issue has been scoped out as it is dealt with by a separate maintenance dredging application. • This is covered in the Chapter 5
2. Scottish Environmental Protection Agency (continued)	**2.3 - Marine ecological interest** • Advice on designated sites and European Protected Species should be sought from Scottish Natural Heritage. These would include Marine and transitional Special Areas of Conservation (SAC) and Special Protected Areas (SPA) and Marine Protected Areas (MPA)	Address within SNH comments above (comments 1.3)

	• Priority Marine Features list and approach to be considered • Consideration of potential impact from the project in introducing Marine Non-Native Species should be made including proposed risk management / mitigation	
	2.4 - Coastal processes Review potential risk of changes to the coastal and sediment transport processes	Refer to Chapter 5
	2.5 - Pollution prevention and environmental management • Advice to identify all aspects of site work that might impact upon the environment, pollution risks, prevention and mitigation • With regard to the presence of the designated Peterhead Lido Bathing Water within the bay, we would highlight that any application involving large scale beach replenishment and/or dredging works should be cross checked as to whether the proposals lie within or close to a designated bathing water or shellfish growing water	• The response to this statement should be found throughout this ES which covers all the identified impact including risk of pollution which are associated with the development of the new Inner Harbour at Peterhead • Refer to Chapter 5 – Coastal process
2. Scottish Environmental Protection Agency (continued)	**2.6 - Preparation of Construction Environmental Management Plan**	Construction Environmental Management Plan will be developed
	2.7 - Site Waste Management Plan Minimise waste with design and construction method	Construction method with the aim to minimise the waste material by reduced, re-sued, or recycled method is described in

	Specific site waste management plan	Chapter 2 – Project description We recommend that a specific site waste management plan should to be included as a condition to the consent for the contractors to develop and implement during the works
	2.8 - Flood risk	The proposal has been assess against flood risk and this can be found in Chapter 5 coastal process
	2.9 - Onshore water abstraction	The proposal do not require water abstraction, this comment and related guidance and requirement from SEPA have been scoped out of the ES
.	**2.10 - Air quality and noise** Recommendation that the local Environmental Health with in the local authority to be consulted regarding potential noise and odour issues	The local Environmental Health officer was consulted, his recommendation have been taken into consideration in the ES
2. Scottish Environmental Protection Agency (continued)	**2.11 - Regulatory advice for the applicant** Waste management licensing regulations compliance	We recommend that a specific site waste management plan should to be included as a condition to the consent for the contractors to develop and implement during the works

	Reuse of sediment and dredging spoil Current sluices connection the inner harbour to the sea to be re-instated New discharge from the redevelopment	Addressed in answer to SEPA comments (comments 2.2) The sluices connection are will be reinstated Scottish Water and SEPA have been consulted by the designer to agree on procedures for the new development discharge
3. Marine Scotland	**3.1 - Marine licence requested for:** 1. To deposit any substance or object within the Scottish marine area, either in the sea or on or under the seabed, from a vehicle, vessel, aircraft, marine structure or a container floating in the sea; 2. To construct, alter or improve any works within the Scottish marine area either in or over the sea, or on or under the seabed; 3. To use a vehicle, vessel, aircraft, marine structure or floating container to remove any substance or object from the seabed within the Scottish marine area, and; 4. To carry out any form of dredging within the Scottish marine area (whether or not involving the removal of any material from the sea or seabed).	A marine Licence will be submitted by PPA to cover bullet points 1, 2, 3 and 4 in relation to the anticipated construction work and capital dredging and disposal Licence Number: 05114/14/0 reference number: FKB/D478
3. Marine Scotland (continued)	**3.2 - Engagement with Marine Coastguard Agency** and if required provide Navigational Risk Assessment	The marine coastguard agency has been consulted as part of the EIA
	3.3 - Review of cumulative effect from potential other development within the area:	None of the noted projects are supported from Peterhead and there has been no increase in port traffic as a direct or indirect

	• Moray Offshore Renewables Ltd • Beatrice Offshore Windfarm Ltd • Inch Cape Offshore Limited • SeaGreen Firth of Forth Windfarm • Aberdeen Offshore Windfarm • Global Energy Nigg Berth Development • Cromarty Firth Port Authority Berth Development • Port of Ardersier Ltd N-RIP • Forth Replacement Crossing • Aberdeen Harbour Development • Port of Leith N-RIP • Port of Dundee N-RIP • Cockenzie Power Station • Kincardine Offshore Windfarm Ltd • Neart na Gaoithe Windfarm	consequence of these developments. In addition Chapter 16 covers any potential cumulative effect from other known plans and projects
	3.4 - Underwater noise Assessment should be made including recommendation on involvement of Marine Scotland Science	Refer to 1.7 answer to comments from SNH – Marine Scotland Science have been involved in the consultation
	3.5 - Habitat Regulations Assessment Screening	Refer to Appendix III - Habitat Regulation Appraisal
3. Marine Scotland (continued)	**3.6 - Pre-application consultation**	A pre-application consultation was undertaken on 3rd April 2014 – refer to Chapter 3.2.4 Consultation process for more details

	3.7 - Construction Environmental Management Plan	Draft Construction Environmental Management Plan will be developed
	3.8 - Tributyltin Contamination (TBT) Sample from capital dredging operation to be sent to Marine Scotland for review	Prior to the start of the capital dredging, the sample for TBT analysis will be sent to Marine Scotland in accordance with the maintenance dredging licence
4. Marine Scotland Science	**4.1 - Marine Mammals** Clarification on blasting and strengthening work required	The method of construction and options considered have been described in Chapter 2 – Project description. The impact on blasting to marine mammals is covered in Chapter 10 - Ecology
	4.2 - Benthic ecology MSS to review Phase 1 survey results	Phase 1 survey included in Chapter 10 – Ecology
	4.3 - Aquaculture MSS confirmed that no active aquaculture was suited within 15km of the proposed development	Noted and no further review necessary
	4.4 - Physical Environment Wave analysis should be described included baseline date within the ES	Wave analysis, impact and effects of the new development, specifically the reclaim area, are described in Chapter 5 – Coastal processes
4. Marine Scotland Science (continued)	**4.5 - Commercial fisheries and marine fish ecology** Contingency arrangement to be provided by PPA during construction phase and affected fishermen should be included in the ES	This is detailed in Chapter 13 – Vessel movement / navigation

	4.6 - Diadromous Fish Consideration should be made regarding migration time vs construction time including the possibility of cumulative effect from any other developments Salmon fishing Boards view to be reviewed Advice to consult Ugie District Salmon Fishery Board	The planning consideration of migration time vs construction will be included in the CEMP and will be considered prior to the approval of the construction programme by the contractor The Salmon fishing boards and Ugie District Salmon Fishery Board have been consulted
	4.7 - Socio-economics Clear impact on net employment and gross and net GVA impact to be presented in the ES	The executive summary of the economic impact assessment produced by BiGGAR specifically for this development is included in Chapter 12 – Socio-Economic and the full report can be found in Appendix IV
5. Aberdeenshire County Council	**5.1 - Built Heritage** • EIA to consider the harbour as a whole not just the walls on impact to built heritage • Confirmation of the purpose for infilling Birnie Pier and	For consideration of built heritage, specific answers to the list of comments from ACC, and wider consideration, refer to Chapter 15

	Scott's Pier • Dry dock work need clarification • More information regarding the new fish market and offices • Consideration on impact of the work in the wider historic environment Specifically what impact the proposal will have on the 3 • Conservation Areas (Peterhead Central, Buchanhaven and Roanheads) as well as any listed structures in the surrounding area • Confirm usage of reclaimed material west of Smith Quay	Landscape and visual impact assessment Regarding infilling Birnie Pier and Scott's Pier, these items have been removed from the works
	5.2 - Road • Effect from the development on Farme's Lane and Harbour Street • Review the consideration to use Lodge Walk and Harbour Street when new operation start • Potential spillage of material • Protection of public road from mud from haulage vehicles	Effects have been considered and are recorded in Chapter 14 – Traffic & Transport This will be covered in the CEMP and contract specification with the contractors
5. Aberdeenshire County Council (continued)	**5.3 - Contaminated land** Areas which require further information or site investigation: • Demolition of Greenhill fish market / new fish market • Refurbishment of east section of fish market building	Asbestos or other potentially dangerous materials may be present in the existing buildings and area where demolition will occur and a survey has been commissioned

	• Existing fish market removed • Existing jetty removed and pontoon relocated / Queenie bridge removed • Consult SEPA on reus • e of dredge material, reclamation area	by PPA in accordance with HSG 264; pre-demolition and major refurbishment (formerly known as Type 3 surveys) SPEA has been consulted and requirement have been included in the ES
	5.4 - Noise and vibration during construction EIA must identify all source of noise and vibration potential impact, residual impact and how to address potential claims/complaints arising from the construction activities	Chapter 8 – Noise and vibration covers the issues raised by ACC and the CEMP will include prevention and restriction to the contractors to reduce or alleviate the impact of noise and vibration to the local community
	5.6 - Air pollution EIA should address control of dust during construction and assess it during future operation	Chapter 7 – Air Quality covers this issue
	5.7 - Benthic ecology Recommendation for not scoping out the Benthic ecology out of the EIA	The benthic ecology has not been scoped out and from the EIA. Chapter 10 – Ecology deals with the matter

5. Aberdeenshire County Council (continued)	**5.8 - General advice** • Parking to be provided in sufficient manner. • Establish procedure for dealing with third party complaints • Marine mammals assessment to be included in the EIA	• Chapter 2 provides a full description of the proposed project – additional parking places have been included • PPA has set procedure for dealing with third party complaints as part of operation management • Marine Mammals assessment is included in the EIA
6. Transport Scotland	**6.1 - Site access** Confirmation if Abnormal Loads is required	No licence will be required
	6.2 - Assessment of environmental impacts Level of traffic for the construction and operation to be identified	The level of traffic during construction and during operation is stated in the Chapter 14 Traffic & Transportation, together with the potential impact to the trunk road
	6.3 - Noise and vibration Operational and construction traffic noise should be assessed	Operational and construction traffic noise have been assessed, refer to Chapter 8 – noise and vibration for more details
	6.4 - Air quality Identify and assess if the project will have a significant impact on the air quality	The impact on air quality regarding the increase of traffic has be assessed and is recorded in Chapter 7 – Air quality

3.4. Methodology for assessing significant impact

The assessment of the nature of environmental impacts was made by examination of the impacts relating to both the construction and operation of the new works. It examines each impact in terms of environmental components grouped under the three headings: Physical Environment, Ecology and Nature Conservation, and Human Environment.

Each potential impact was studied to determine whether the impact is likely to occur and if so, the size and nature of that impact. Figure 20 indicates a summary evaluation of the impacts of these proposals, with a more detailed analysis identified in the Impact Table in Figure 21.

3.4.1. Assessment method

Impacts are assessed as being adverse, negligible, beneficial or indeterminate. Impacts are defined as indeterminate either because it cannot be certain they will occur, or there is not enough information to assess the significance of the impact. In assessing the significance of each impact, the following factors are considered.

1. Type of impact: The impacts of the scheme are classified as adverse, negligible, beneficial or indeterminate.

2. Probability: The likelihood or risk of the impact occurring as a result of the work undertaken. This is judged to be low, medium or high. In most cases the classification is subjective except where analytical and physical modelling has been undertaken, for example in determining effects of waves on the proposed reclamation revetment.

3. Geographical importance: The area or population, which would be affected by the impact is defined as local (town/land adjacent to the bay), regional (county wide or of country importance), national or international. An impact is judged to have international significance when it is detrimental to a species or habitat protected by national or international legislation.

4. Contextual importance: The consequence of an event occurring is classified as low, medium or high. The contextual importance of an impact would be low where, for example, the habitat is poor or common or where there will be few long-term effects. It would be high where impacts affect protected habitats or spaces.

5. Nature: The nature of the impact is described in terms of timescale (short, medium or long term), reversibility (reversible/irreversible) and whether direct or indirect.

6. Mitigation measures: Are solutions to the problems available? Are they feasible or economical in the particular case?

7. Significance: As a result of appraising each impact in terms of the above factors and in light of mitigation measures available, a decision as to the size and importance of an impact has been made. The residual impacts of the scheme are classified as major, minor or negligible.

The decisions made are largely based on the experience of the impact assessors and the views of the consultees, as well as factual background knowledge and information: some are therefore qualitative and subjective, rather than based on quantitative information.

3.4.2. Assessment overview

Minor impacts are generally small-scale providing slight concern when adverse; in which case they are undesirable but acceptable. Major impacts are significant and pose greater concern. When adverse, major impacts would usually be unacceptable if considered out of the context of the scheme as a whole.

Major adverse impacts tend to be those which are difficult to mitigate against and, hence, the essence of the analysis involves weighing any such impacts against the benefits which the scheme will bring.

4. POLICY

Peterhead and the area surrounding it come under the administration of Aberdeenshire Council. The town lies within Buchan, which is one of six administration areas established by Aberdeenshire Council.

The Aberdeen City and Shire Strategic Plan was adopted March 2014[17] and runs until 2035

The vision of Strategic plan is

"Aberdeen City and Shire will be an even more attractive, prosperous and sustainable European city region and an excellent place to live visit and do business.

We will be recognised for:
- *our enterprise and inventiveness, particularly in the knowledge economy and in*
- *high-value markets;*
- *the unique qualities of our environment; and*
- *our high quality of life.*

With the aim to:
- *Provide a strong framework for investment decisions which help to grow and diversify the regional economy, supported by promoting the need to use resources more efficiently and effectively; and*
- *Take on the urgent challenges of sustainable development and climate change.*

To support these main aims, the plan also aims to:
- *make sure the area has enough people, homes and jobs to support the level of services and facilities needed to maintain and improve the quality of life;*
- *protect and improve our valued assets and resources, including the built and natural environment and our cultural heritage;*
- *help create sustainable mixed communities, and the associated infrastructure, which meet the highest standards of urban and rural design and cater for the needs of the whole population; and*
- *make the most efficient use of the transport network, reducing the need for people to travel and making sure that walking, cycling and public transport are attractive choices.*

The Aberdeenshire Local Plan[18] was adopted in 2012

Clauses of relevance to the proposed new works in relation to the local plan policy have been quoted below.

Policy 1 Business development

Aberdeenshire Council will support the development of business and sustainable economic growth in all areas by taking account of the economic benefits of proposed development when we make decisions in development management. We will also make sure we meet the many different needs and locational requirements of the different sectors and sizes of business by applying the following supplementary guidance.

- *SG Bus1: Development of business land*

Policy 8 Layout, siting and design of new development

Aberdeenshire Council will support new development on sites we have allocated within this plan, where they conform with a previously agreed development framework and/or master plan (whichever is appropriate) for the site. We will assess all development, whether on sites we have allocated or elsewhere, using a process that includes appropriate public consultation and appropriate standards for design, open space, accessibility, safety, sustainability, and the provision of associated services. The way we will do this is set out in the following supplementary guidance.

- *SG LSD1: Master planning*
- *SG LSD2: Layout, siting and design of new development*
- *SG LSD4: Infill development*
- *SG LSD5: Public open space*
- *SG LSD6: Public access*
- *SG LSD7: Community facilities*
- *SG LSD8: Flooding and erosion*
- *SG LSD9: Hazardous development*
- *SG LSD10: Contaminated land*
- *SG LSD11: Carbon neutrality in new development*

All new buildings are required to produce ever-lower proportions of greenhouse gases through their siting, layout and design, and the installation of appropriate technologies. Supplementary guidance will provide a standard to achieve the council's target of carbon neutrality by 2016; a process to enable savings to be demonstrated; a specified and rising proportion of greenhouse gases to be avoided through the installation and operation of low and zero-carbon generating technologies for all new buildings; and any exceptions. In furtherance of SG LSD1, we may produce additional design guidance or planning advice for specific sites, to provide a basis for putting the master plans into practice. We may also use section 75 obligations or conditions, as appropriate, to secure the results of applying this policy on a continuing basis.

Policy 11 Natural heritage

Aberdeenshire Council will improve and protect designated nature conservation sites and the wider biodiversity and geodiversity of the area. Where there is uncertainty over the impacts of a proposed development, we will adopt an approach based on the precautionary principle. We will also consider cumulative impacts of development on the natural environment and will only accept harm to the environment where there is an overriding public interest.
The way we will do this is set out in the following supplementary guidance:

SG Natural Environment 1: Protection of nature conservation sites
SG Natural Environment 2: Protection of the wider biodiversity and geodiversity

Policy 12 Landscape conservation

Aberdeenshire Council will plan for and promote the improvement and protection of all landscapes in Aberdeenshire by recognising and using landscape character areas. All the landscapes of Aberdeenshire are valuable assets and vulnerable resources, which are facing various pressures of change. We will use the Landscape Character Area framework as a basis for our future planning and management policy. We will also take into consideration particular opportunities, sensitivities and vulnerabilities of different landscapes, and make sure that the implications of development on these are managed in an appropriate and sensitive way.

The way we will do this is set out in the following supplementary guidance.

SG Landscape 1: Landscape character
SG Landscape 2: Valued views

Policy 13 Protecting, improving and conserving the historic environment

Aberdeenshire Council supports the protection, improvement and conservation of the historic environment. There will be a presumption against development that would have a negative effect on the quality of these historic assets. Different parts of the historic environment require to be subject to specific guidance and controls to make sure that we maintain and improve their value.

The way we will do this is published separately in the following supplementary guidance:

SG Historic Environment 1: Listed buildings
SG Historic Environment 2: Conservation areas
SG Historic Environment 3: Historic gardens and designed landscapes
SG Historic Environment 4: Archaeological sites and monuments

Policy 14 Safeguarding of resources and areas of search

Aberdeenshire Council will not support developments that sterilise, degrade or otherwise make unavailable key strategic resources, including the water environment, important mineral deposits, prime agricultural land, trees and woodlands. Other key strategic resources include sites that may reasonably be required in the future for the delivery of transportation improvements, waste facilities or energy generation.

We have identified areas of search to help the development industry to locate major waste, minerals and energy-generating facilities in appropriate places, taking account of opportunities, constraints and the settlement strategy of the plan.

The way we will do this is set out in the following supplementary guidance.
SG Safeguarding 1: Protection and conservation of the water environment
SG Safeguarding 2: Protection and conservation of agricultural land
SG Safeguarding 3: Protection and conservation of trees and woodland
SG Safeguarding 4: Safeguarding transportation facilities
SG Safeguarding 5: Safeguarding employment land
SG Safeguarding 6: Safeguarding oil and gas sites
SG Safeguarding 7: Areas of search for minerals
SG Safeguarding 8: Areas of search for waste facilities

5. COASTAL PROCESSES

5.1. Introduction

This Chapter addresses the potential impacts of the proposed development on coastal processes including waves, tides, water levels, currents and sediment movements.

Peterhead town is on a headland at the north-eastern extremity of the Scottish mainland with a high exposure to weather conditions in the North Sea (Figure 7). Peterhead Port occupies the bay to the south of the headland. The River Ugie reaches the sea immediately north of the headland.

The Port comprises two harbour areas, the outer Bay Harbour with its entrance from the North Sea and the Inner Harbour entered from the Bay Harbour (Figure 7). The Bay Harbour is extensive, measuring some 1km by 1km and is protected by two land connected breakwaters, the North Breakwater and the South Breakwater. The Inner Harbour comprising several interconnected harbour basins is much smaller in scale and is protected by an internal breakwater, the Albert Quay Breakwater (Figure 1). Berths are provided in both harbour areas. Also within the Bay Harbour is a marina adjacent to the Lido bathing area.

The proposed development is mainly to take place in the Inner Harbour where improved access for larger vessels will be provided by widening and deepening some of the basins and their entrances. A reclamation is proposed in the Bay Harbour just outside the entrance to the Inner Harbour.

In the terms of impact on coastal processes, the main construction activities of the works are broadly similar to those completed in 2010 for the Smith Quay. Both schemes include dredging and reclamation in the vicinity of the Inner Harbour. Many of the coastal process studies for the Quay are relevant to the new works and are used extensively in this assessment. However, the impacts caused by the two sets of works differs in that the current scheme is largely confined to the Inner Harbour basins, with the exception of the new reclamation.

5.2. Assessment Methodology

5.2.1. Overview

Works in the tidal and wave environment at Peterhead could affect tidal propagation, tidal and other currents, waves and the effects of waves and currents on sediment movements. For this assessment, baseline data has been compiled from site measurements, published data, modelling, desk evaluation and experience.

The effects of the new works on the existing situation have been deduced and interpreted through modelling and desk studies. Where effects are considered adverse, they are set in context against the baseline information.

5.2.2. Field Studies

Currents in the approaches and in the entrance to the Bay Harbour were measured in 1998 and 2001[10,11]. These will not have changed noticeably since then. Seabed materials have been revealed by marine boreholes and geophysical surveys[10,19].

5.2.3. Desk Studies

Desk studies have derived tidal currents through the entrances to the Inner Harbour basins, both before and after the proposed works. The effects on sediment movements have been deduced as have the effects on tidal propagation. Outline wave tracking has examined the effects of waves reflected off structures in the Bay Harbour.

5.2.4. Modelling

A sequence of numerical wave models was undertaken by HR Wallingford for the Smith Quay development and earlier works using their ARTEMIS modelling software. The models transferred waves from offshore to the approaches of the Bay Harbour, then into the Bay Harbour and on to the Inner Harbour. The offshore wave climate was taken from the Met Office archive of wave and swell predicted by the Global Weather Forecasting model. Reflection coefficients for the various structures in the ARTEMIS numerical model of the port were calibrated against results from physical model studies.

In addition, and specifically for this project, a sequence of numerical wave models were undertaken to assess the impact of the deepening and reclamation and changes of wave climate at ASCo South Base[20].

5.3. Baseline Condition

5.3.1. Introduction

The baseline conditions below are described in the following order:

- Waves
- Vessel Downtime
- Tides
- Water Levels
- Currents
- Sediment Movements

5.3.2. Waves

The 200m wide 20m deep entrance to the Bay Harbour from the North Sea is good for navigation, but on occasions allows excessive wave activity to enter and cause downtime at berths in the Bay Harbour. The Inner Harbour, with additional protection behind the Albert Quay Breakwater, is much less affected. With the proposed widening and deepening in the Inner Harbour, larger vessels will be able to benefit from sheltered conditions. Waves are consequently an important consideration.

Waves outside Peterhead Harbour

Peterhead is at the most easterly point of mainland Scotland. Just to seaward, 1 km to the east of the Bay Harbour entrance, there is exposure to waves from NNW round through N, E and S to SSW. The land mass and coastline northwards provides shelter to the west of NNW and the coastline southwards provides shelter to the west of SSW. Further offshore, in 100m of water, 30 km to the east, waves are most frequent and highest from N and to a lesser extent from SE and S.

The wave climate offshore is given in Table 3. These offshore waves were transferred to the vicinity of the main harbour entrance through numerical modelling[4]. The high waves from N as they propagate across the shallowing sea bed are turned towards the coast and approach the harbour from NE and ENE. The high waves from S are also turned and approach from SSE and SE. As the waves are turned they tend to lose height.

Table 3 - Offshore Deep Water Wave climate (Hs against direction at 57.5ºN 1.27ºW. Data are in parts hundred thousand.

Significant wave height			Wave direction in degrees North											
			-15	15	45	75	105	135	165	195	225	255	285	315
H1	H2	P(H>H1)	15	45	75	105	135	165	195	225	255	285	315	345
0	0.5	0.98987	1423	1046	456	319	328	269	231	262	189	137	177	451
0.5	1	0.937	4423	4175	1555	1676	1631	1832	1558	1152	909	736	949	1709
1	1.5	0.71396	4192	2981	1069	1647	1862	2039	2018	1478	1015	838	1182	2384
1.5	2	0.4869	2908	1709	510	991	1135	1338	1813	1588	975	708	876	2495
2	2.5	0.31644	1883	845	220	562	824	989	1447	1555	630	484	574	1267
2.5	3	0.20364	1234	446	109	321	604	779	1275	1003	361	208	253	748
3	3.5	0.13024	883	203	85	333	576	592	852	566	208	78	132	467
3.5	4	0.08049	503	97	78	212	463	460	578	342	71	71	104	274
4	4.5	0.04796	363	50	50	168	191	276	470	205	50	42	19	135
4.5	5	0.02778	248	45	21	153	210	208	231	92	9	7	12	73
5	5.5	0.01468	137	12	17	71	139	130	127	12	12	2	7	26
5.5	6	0.00777	73	14	12	19	78	64	64	21	5	5	0	24
6	6.5	0.00399	54	7	0	7	35	38	28	7	0	2	2	9
6.5	7	0.00208	26	7	9	9	24	21	24	0	0	0	0	0
7	7.5	0.00087	14	0	0	7	9	5	9	0	0	0	0	7
7.5	8	0.00035	21	0	0	0	0	0	0	0	0	0	0	0
8	8.5	0.00014	5	0	0	0	0	0	0	0	0	0	0	0
8.5	9	0.00009	5	0	0	0	0	0	0	0	0	0	0	0
9	9.5	0.00005	0	0	0	0	0	0	0	0	0	0	0	0
9.5	10	0.00005	5	0	0	0	0	0	0	0	0	0	0	0
Parts per thousand in each direction			184	116	42	65	81	90	107	83	44	33	43	101

Waves from easterly directions are already directed towards the shore so are turned little as they approach Peterhead and lose less height. The harbour entrance has additional shelter from South Head on the north side of Peterhead Bay, and from the shallows out to The Skerry off Boddam to the south.

The consequence of the shallowing water and local shelter is that at the harbour entrance, the highest waves approach from directions between ENE and SE. Table 4 gives estimates of the heights and periods of the waves in storms of various return period severities[4].

Table 4 - Extreme waves at the Bay Harbour Entrance in storms of 12 hours duration

Storm Frequency	Direction from which waves approach	Significant wave height (m)	Mean wave period (s)
10 times a year	ESE	2.7	6.0
Once a year	ESE	4.5	7.8
Once in 10 years	ESE	6.0	9.1
Once in 50 years	ESE	7.1	9.8

Waves in the Bay Harbour

The configuration of the North and South Breakwaters makes the entrance to the Bay Harbour face SSE which is partially sheltered by The Skerry to the south. As the direction from which waves come swings northwards, the harbour entrance becomes progressively more closed and is shut to the direct entrance of waves from ENE. However, by diffraction, waves spread out and swing round the end of the North Breakwater and some wave activity comes into the harbour when waves outside are from ENE and from directions further to the north.

The effective width of the harbour entrance governs the amount of wave activity which enters the harbour. Diffraction spreads the wave activity around the harbour and wave activity falls the further the waves spread sideways. The net result of this is that the highest wave activity enters the harbour from SE. This is demonstrated in Figures 8 and 10 taken from the computer wave simulations[5] for the design of the Smith Quay. The wave heights shown by the colour code are for storms which occur once a year from E and from SE. The aquamarine coloured band for waves with significant heights between 2m and 3m is much more extensive in the SE storm than in the E storms. Although waves are generally lower under the E storm, they are higher than under SE storms in the southern part of the harbour as indicated by the less extensive dark blue area of waves from 0-1.0m. The figures show the effects of diffraction which spreads waves to all parts of the harbour with the highest waves continuing mainly in the direction of the waves approaching the harbour entrance and falling off to the side.

In the northern part of the Bay Harbour, where the entrance to the Inner Harbour is located, waves are a metre or so higher in the SE, once a year, storm than in the E storm.

The computer wave simulations concentrated on waves in storms from SE because of their greater penetration into the Bay Harbour and because they are directed towards the entrance to the Inner Harbour and the Smith Embankment wall.

Model output such as that in Figures 8 and 9 shows that the present Albert Quay breakwater provides some shelter to the Smith Embankment wall, where the reclamation is proposed, but the protection in SE storms falls off rapidly on moving westwards. Estimates of wave heights presently in this vicinity are indicated in Table 5.

Table 5 - Ranges of Extreme Waves at the Smith Embankment Reclamation site in 12 hour SE Storms

Storm Frequency	Significant wave height (m)	Mean wave period (s)
10 times a year	0.3 – 1.3	6.0
Once a year	0.5 - 2.0	7.8
Once in 10 years	0.9 - 2.5	9.1

Wave reflections within the Bay Harbour

The internal boundaries of the harbour act as mirrors for the waves which reach them. Vertical quays or breakwaters with vertical sides, like the Smith Embankment wall or ASCo South Base are good mirrors and waves reflect off them with little reduction in their intensity. Where the crest of a reflected wave meets the crest of an incoming wave the overall crest height is increased. Where the crest of a reflected wave meets the trough of an incoming wave they tend to cancel each other out. This interference between incoming and reflected waves produces alternating zones of high and low wave activity, as can be seen in Figures 8 and 9 adjacent to ASCo South Base and the Smith Embankment wall. Steep sloping rock boundaries are less good mirrors; they absorb some of the waves, but reflect the remainder. The rock armoured slope of the Albert Quay breakwater reflects some waves as can be seen from the alternating wave height zones in front of it. Gently sloping areas such as the beach along the western boundary of the harbour are good at absorbing waves and little if any wave activity is reflected off them.

Wave reflections generally increase the waves within the harbour and may direct waves towards other areas of the harbour which may be sheltered from the main waves coming from the harbour entrance. For example, some wave activity is reflected off the vertical faces of the Smith Embankment towards the vicinity of the marina, Princess Royal Jetty and ASCo South Base. Waves reflected towards the shore to the north of the marina may effect sand movements there.

The open piled structures, namely the Tanker Jetty and the Princess Royal Jetty, are transparent to waves and were omitted from the numerical simulations.

Waves in the Inner Harbour

Figure 10 shows that the Albert Quay Breakwater provides good shelter to the Inner Harbour in once a year storm from south east. Figure 10 shows the Inner Harbour areas in more detail. Note that the wave height scale is in 0.2m bands as opposed to the 1.0m bands in Figure 10. Significant wave heights approaching the Albert Quay Breakwater are 2.5m or more falling to less than a metre in the Albert Basin and less than 0.5m in the South Harbour. These simulations are of the harbour before the Smith Quay development and the extension of the Albert Quay Breakwater. Other modelling indicates that the extension further reduced waves in the Inner Harbour.

In more extreme storms, Figure 11 shows waves in the once in 10 year south-east storm. Waves in the Albert Basin reach just over a metre in places. The patches of high and low wave activity show that there are partial standing waves in the basins which could indicate a susceptibility to resonance which was curtailed in the design of the Smith Quay development.

Waves at the Marina

Figures 8 and 9 show that waves reaching the marina entrance are of the order of 1-2m in once a year storms from east and south east. Figure 13 shows that waves within the marina fall to less than 0.25m over the majority of the marina away from the immediate entrance and are less than 0.2m at the Lido Beach.

Global Warming and waves

There is increasing evidence that Global Warming is taking place. One of the consequences of warming is an increase in storm activity and there is some evidence that this also is taking place.

The wave conditions described above are based on statistics derived from the recent past. They are based on analyses of 15 years of data from the UK Met Office European wave model. With increasing storminess extreme conditions can be expected to worsen.

Vessel downtime

Peterhead Port benefits from its 200m wide 20m deep entrance which can allow a wide range of vessels to enter the Port. However, the wide deep entrance also allows waves of considerable height to come into the harbour. There are occasions in a year when no vessels can remain at open berths in the Bay Harbour because of the risk of breaking mooring lines or vessel damage. Physical modelling of waves and moored vessels[4] indicated that for supply vessels, wave heights much above 0.5m pose such a risk. Figures 8 and 9 show that waves at the South Base are higher than this threshold in the once a year storms. Thus mooring downtime is more frequent than once a year under storms from SE and more frequent than once a year under storms from east. The Peterhead Harbour Master reports that vessels leave the berths in the southern part of the Bay Harbour around 5 times, in a year of average wave severity.

Quays within the Inner Harbour are reported to be tenable in all storms up to and including the worst in 10 years. The wave height simulations have shown that wave heights reach a maximum significant height of 0.6m in the Albert Basin and at the Smith Quay in such a storm.

5.3.3. Tides

Tides at Peterhead Harbour are semi-diurnal, i.e. the water level rises and falls twice a day, with a time difference between successive high or low waters of between 12 and 13 hours.

The predicted astronomical tide levels, relative to Chart and Ordnance Datum, are shown in Table 6. These values are predicted levels based on the movement of the sun and moon, but do not take into account any variations due to changes in meteorological conditions which cause surges.

Table 6 - Predicted Tide Level, relative to Chart Datum and Ordnance Datum factors, for Peterhead Port

Tide level	Chart Datum(m)	Ordnance Datum(m)
Highest Astronomical Tide (HAT)	4.34	2.14
Mean High Water Spring Tide (MHWST)	3.80	1.60
Mean High Water Neap Tide (MHWNT)	3.10	0.90
Mean Tide Level (MTL)	2.23	0.02
Mean Low Water Neap Tide (MLWNT)	1.50	-0.70
Mean Low Water Spring Tide (MLWST)	0.5	-1.70
Lowest Astronomical Tide (LAT)	0.05	-2.15
Spring Tide Range	3.30	
Neap Tide Range	1.60	

The UK Hydrographic Office, Admiralty Tide Tables[6] shows that tides propagate down the North Sea from north to south. Because of this, High and Low Waters occur earlier at Peterhead than further south. They are ½hr to ¾hr earlier than at Aberdeen and more than an hour earlier than at Leith. The ranges of the tides also increase southwards. These effects influence the patterns of tidal currents off Peterhead. Around High Water at Peterhead the water is ebbing locally, but to seaward it is still flooding strongly southwards feeding the later and higher, High Waters to the south. The reverse occurs after Low Water. These tidal current effects are discussed further under *Currents*.

5.3.4. Water Levels

The other component of overall water level is surge, arising from meteorological effects. Surges are caused by changing barometric pressure and wind driven currents. Sea levels act as an inverted barometer rising under the low pressure of a depression and falling under a high. A northerly wind down the North Sea sets up a south going current which builds up water level. There are similar, but lesser effects with winds from east and south.

At Peterhead tidal effects predominate, but positive surges can lift high water levels and negative surges depress low water levels.

Extreme water levels at Peterhead from combinations of tide and surge have been assessed by HR Wallingford[7]. These with a correction to the datum level are given in Table 7.

Table 7 - Extreme Water Levels at Peterhead

Return Period	Extreme Water Level (m)	
	To Chart Datum	To Ordnance Datum
10 times a year	4.12	1.92
Once a year	4.38	2.18
Once in 10 years	4.54	2.34
Once in 50 years	4.66	2.44

Extreme combinations of waves and water levels

Extreme combinations of waves and water levels are of consequence to coastal defence and overtopping of breakwaters. HRW concludes that there is a weak correlation between high waves and positive surges[7]. The extreme combinations of wave and water level occur when high waves, positive surge and high tide levels all coincide. The most likely water levels to occur with extreme easterly storms are given in Table 8.

Table 8 - Maximum Water Levels accompanying Waves at the Harbour Entrance

Storm Frequency	Significant wave height from Table 5 (m)	Water Level (m) to Chart Datum
10 times a year	2.7	3.4
Once a year	4.5	3.5
Once in 10 years	6.0	3.7
Once in 50 years	7.1	3.8

The maximum water level in the worst storm from easterly directions in an average 50 years is 3.8m which happens to correspond with Mean High Water Spring Tides**.** Within the harbour the maximum water levels accompanying the storms are the same as those at the entrance, but waves are lower within the shelter of the breakwaters.

The reason for quoting extreme waves in Table 3 for storms of 12 hours duration is to ensure that each storm does occur over the high water of the semi diurnal tide.

Sea level rise

Sea levels are rising and there is evidence that the rate of rise may be accelerating because of Global Warming. Around NE Scotland the land mass is also rising, so that the rise of sea level relative to the land is less than in SE England where the land mass is falling. Advice from East Grampian Coastal Partnership is that over 50 years the rise could equate to 350mm. In relation to Table 6 this would combine to give a once in 50 year’s extreme water level of just over 5.0m above Chart Datum. This is significantly below the existing quay levels of 6.2m above CD, or 4.0m above Ordnance Datum. SEPA has advised a minimum level of 2.86m above OD plus a minimum of 0.60m, giving a level of 3.46m above OD or 5.66m above Chart Datum.

5.3.5. Currents

Circulation in the North Sea is driven by a combination of winds, tidal forcing and topographically steered inflows. The predominant regional current in the central North Sea originates from the vertically well-mixed coastal water and Atlantic Water inflow of the Fair Isle / Dooley Current, which flows around the north of Orkney, and into the North Sea. This current follows the 200 m depth contour to the north of Shetland, before passing southwards along the western edge of the Norwegian Trench (NSTF, 1993). Occasionally some of this inflowing water may pass southwards into the northern North Sea close to the eastern coast of Shetland. In addition, a smaller inflow of water, the Fair Isle Current, follows the 100m contour and enters the northern North Sea between Shetland and Orkney. The Norwegian Coastal Current, which flows predominantly along the Norwegian coast, constitutes the only outflow from the North Sea and balances the various inputs of water to the North Sea (OSPAR, 2000). Water circulation in the North Sea is anticlockwise, with an eddy forming over the Fladen Ground (DTI, 2001). Circulation in the North Sea is enhanced by south-westerly winds, thus circulation is normally stronger in winter than in summer. The generalised pattern of water movement in the North Sea may be strongly influenced by short-medium term weather conditions, resulting in considerable seasonal and inter-annual variability.

Seaward of Peterhead the background current is southerly or south-easterly, but is usually masked by the much stronger flood and ebb of the tides[8]. The main direction of the flood tide in the North Sea is southwards and the ebb northwards.

Information on tidal currents in the approaches to Peterhead has been taken from Admiralty charts [9] and two reports on measurements of currents [10,11].

As described under *Tides*, the timing of tides down the North Sea influences the patterns of tidal currents outside Peterhead Harbour. Offshore, 12 km east of Peterhead, the tidal currents on Mean Spring Tides start flooding southerly well after local Low Water at Peterhead (LW) at around mid-tide between 3 and 4 hours before the following High Water (HW). Flood currents rise to a maximum of 2.1 knots (1.1 m/s) a little before HW and continue southerly through HW to 2-3 hours after HW when they turn to ebb northerly.

Closer to Peterhead, 3.5 km to the east of the harbour entrance, the pattern is similar to that further out, but current speeds are a little lower and change and peak around ½ hour earlier. The currents at this distance from Peterhead are summarised in the last column of Table 9 with a maximum south going flood current of 1.8 knots and a north going ebb of 2.1 knots.

Moving closer to Peterhead, the patterns of currents are more complex. At some stages of the tide, the currents broadly follow the coastline, entering and swinging round the various embayments. At other stages, the currents sweep past the headlands, bypassing the bays and setting up gyres or circulations within the bays. In these gyres, currents may be in the opposite direction to those of the main flow outside.

Figure 13 shows the pattern of currents within 1 km of the harbour entrance at an hour before HW (HW-1). The main south going flood currents to seaward are sweeping past South Head and The Skerry and the Boddam peninsular. A clockwise gyre occupies the embayment between the headlands and currents within 500m of the harbour entrance are going northwards in the opposite direction to the main currents to seaward.

Figure 14 at LW (6½ hours before HW) shows the opposite pattern of an anticlockwise gyre with strong north going currents to seaward and southerly currents near the harbour entrance.

The gyres are initiated earlier in the tide in the area sheltered by the North Breakwater. The first column of Table 9 summarises current in this area. As the tide progresses the gyres expand and move seawards. The rotations of the gyres are shown by the up and down arrows in Table 9.

Table 9 - Currents eastwards from Harbour Entrance (Mean Spring Tides)

TIME (hrs) Referred to HW at Peterhead	LOCATION & DISTANCE FROM ENTRANCE						
	S of North Breakwater 0-100m	Near shore 100-500m	S of South Head 500m	Seaward 0.5-1 km	Off-Shore 1 km	Off-Shore 1-3.5 km	Off-Shore 3.5 km
HW-3	-	SW	SW	SW-S	S	S	S
HW-2	↑N↓	↑W↓	SW	SW-S	**<u>S</u>**	S	S
HW-1	↑NE↓	↑NE↓	↑E↓	↑E-S↓	S	S	**<u>S</u>**
HW	-	↑NE↓	↑E↓	↑E-S↓	S	S	S
HW+1	-	NE	↑NE↓	↑NE↓	↑E↓	↑E-S↓	S
HW+2	**<u>NE</u>**	**<u>NE</u>**	NE	NE	↑NE↓	↑ ↓	-
HW+3	-	N	N	N	N	N	N
HW+4	↓ ↑	NE	**<u>N</u>**	N	**<u>N</u>**	N	N
HW+5	↓SW↑	↓NE↑	N	N	N	N	**<u>N</u>**
HW+6	↓SW↑	↓W↑	↓N↑	↓N↑	N	N	N
LW							
HW-6	↓SW↑	↓SW↑	↓W↑	↓NW↑	↓N↑	N	N
HW-5	**<u>SW</u>**	**<u>SW</u>**	↓W↑	↓NW↑	↓NW↑	↓NW-N↑	N
HW-4	SW	SW	**<u>SW</u>**	SW	SW	↓ ↑	-
Maximum Speeds (Knots)	SW 0.7 NE 0.5	SW 0.9 NE 1.2	SW 0.8 NE 1.3		S 1.8 N 1.5		S 1.8 N 2.1
	Time of Maximums shown in bold and underlined						

S Southerly currents

E/W East/West currents

N Northerly currents

↓ ↑ Influenced by Anticlockwise Gyre

↑ ↓ Influenced by Clockwise Gyre

Table 11 summarises how currents change with time along a line running eastwards from the harbour entrance. The changing patterns are more easily described by starting at the time when the whole of the area is flooding in a south or south-westerly direction. This is at 3 hours before local HW at Peterhead (HW-3) which is the top line of the Table. Almost everywhere the currents are flooding southwards, with the exception inshore, around the harbour entrance, (column 1 of the Table) which is sheltered from the flooding flows by the North Breakwater.

An hour later at HW-2 the slack inshore area (column 1) has started to form a clockwise gyre and this is influencing the nearshore area of column 2. The Table shows how this gyre grows in extent and moves eastwards with consistent northerly currents inshore of the gyre and southerly offshore. This continues over HW until 3 hours after HW (HW+3) when almost all the area is ebbing northwards. An anticlockwise gyre then develops, expands and moves east continuing over Low Water, until HW-3 when almost everywhere is flooding southwards again.

The times of maximum currents, shown in bold, are much earlier inshore than those offshore, but currents are generally weaker inshore than offshore. Exceptions to this are at around 2 hours after HW (HW+2) and 2 hours after LW (HW-5) when currents offshore are low and currents across the harbour entrance are at their maximum.

Currents through the Bay Harbour entrance

The entrance to Peterhead Port is wide and deep, 200m wide with depths down to 20m. Because of this the tidal currents required to fill and empty the tidal volume within the port between high and low water are low. Theoretically if currents were evenly distributed over the whole of the entrance, they would reach a maximum on spring tides of 0.2 knots (0.1 m/s).

In a previous study[10], it was shown on a traverse across the entrance that currents are seldom consistently distributed. They may be out round the head of one breakwater and simultaneously in round the other. The maximum current, measured on spring tides, was 0.4 knots (0.2 m/s).

During the first half of the flood tide, from LW to HW-3, when there were south going currents down the outside of the North Breakwater (see Table 9), a small clockwise gyre was formed at and inside the head of the North Breakwater, by currents swinging round to enter the harbour. In this case the flow into the harbour was close to the head of the South Breakwater. During the latter half of the flood, HW-3 to HW, with north going currents, flows into the harbour were more evenly distributed over the entrance, entering from the SW, directed by the alignment of the South Breakwater, as indicated for HW-1 on Figure 13.

During the ebb tide with north going currents across the entrance, the main current out of the entrance was round the head of the North Breakwater.

Away from the vicinity of the heads of the North and South Breakwaters the currents in and out of the harbour had no noticeable effect on the general patterns of currents outside the harbour. It was the pattern of currents outside that influenced the patterns through the entrance.

Neap tides

The intensive measurement programme over spring tides in the Outer Breakwater Survey[10] was not repeated for neaps. However, both neap and spring tides were covered in another report[11]. The indications are that the neap currents follow similar patterns, but with reduced speeds.

Currents within the Bay Harbour

Currents within the harbour have not been measured. They can be expected to be low with a slow drift towards the entrance on the ebb and a slow drift away from the entrance on the flood. During the flood the main flow just within the entrance is northwards, either in the reverse flow of the clockwise gyre at the North Breakwater or from north going current along the South Breakwater. This could set up a general slow anticlockwise circulation within the Bay Harbour, between the entrance and the Albert Quay Breakwater. However, wind induced currents and circulations are likely to be more dominant, than the low speed tidal movements. It should also be noted that no natural watercourses run into the harbour and so there is no contributory effect from such sources.

Destinations of water ebbing out of the Bay Harbour entrance

Although currents through the entrance are low the volume of water leaving the harbour, as the tide falls from HW to LW on Mean Spring Tides, is nearly 4 million m^3. This water joins the nearshore currents which are summarised in columns 1 and 2 of Table 9.

For the first half of the ebb, from the time of HW to mid ebb tide at HW+3, the water from the harbour joins that running NE past South Head. Float tracking[11] which passed close to the harbour, showed that on spring tides, flows heading northwards past South Head, joined the main ebb flow of the North Sea. After passing Rattray Head, on the turn of the tide, the floats returned southwards on a course further seaward, passing Peterhead 2-3 km offshore. None of the floats entered shallow coastal areas. The destinations of water from the harbour travelling northward is likely to be the same, it will stay clear of coastal areas and return to seaward. The neap tide float tracks gave a similar picture, but not travelling as far northwards as Rattray Head.

Over the second half of the ebb tide, HW+4 to LW, flow from the entrance joins the anticlockwise gyre and is carried southwards. Some continues in the gyre to join the north going main ebb currents, but some may drift into Sandford Bay. The water going northwards, as before, stays clear of coastal areas and returns to seaward. However, the water reaching Sandford Bay, where currents are low, may be carried towards the coast as the tide turns to flood in towards the coast. Some may be flushed out southwards past Boddam Harbour and Buchan Ness as the flood tide intensifies at 5 hours before the next HW (HW-5). The float tracks in one study showed that some of the floats carried past Buchan Ness, ran into the shore up to 3 km south of Buchan Ness, but the majority migrated seaward[11].

Overall, most of the water leaving the harbour ends up to seaward. However, some may reach the shore of Sandford Bay and the shore southwards from Buchan Ness.

Currents in the Inner Harbour

No measurements of currents in the various parts of the Inner Harbour are available. However, currents averaged over the widths and depths have been calculated from consideration of the continuity of tidal flows. The highest average currents are developed where the flows are constricted as in the entrances and in the channels between the various basins. Currents have been derived at six locations which are starting from the entrance to the Inner Harbour, as follows:

- **Inner Harbour Entrance**, between the head of the Albert Quay Breakwater and the Smith Quay.
- **West Quay**, between the head of the West Quay and the Albert Quay.
- **South Harbour Entrance**, between South Quay and Merchants Quay.
- **North Harbour Entrance**, at Queenie Bridge.
- **Alexandra Basin Entrance**, between West Basin Jetty and East Pier.
- **Port Henry Harbour Entrance**, between the heads of Birnies and North Birnies Piers.

The maximum currents on Mean Spring Tides, averaged over the widths and depths at each of the locations, are in the Table 10 below.

Table 10 - Maximum Average Spring Tidal Currents in the Inner Harbour

Location	Speed cm/s
Inner Harbour Entrance	1.7
West Quay	2.2
South Harbour Entrance	9.2
North Harbour Entrance	21.6
Alexandra Basin Entrance	1.0
Port Henry Harbour Entrance	7.9

Because of the angularity of the channels and basins, currents are highly unlikely to be evenly distributed. There could be variations of up to twice and down to half of the average maximum values in the Table at each location. The speeds are generally low other than at Queenie Bridge where they are up to half a knot.

Currents away from mid tide and on Neaps are lower. On extreme Spring Tides maximum currents are higher.

Harbour Sluices

There is some flushing of the dead end basins, Port Henry Harbour and Alexandra Basin provided by a pair of 1.8m diameter sluice pipes, connecting to open sea to the NE (Figure 15). It is understood that the sluices are normally kept open to allow water exchange with open sea, improving oxygen levels and water quality. Since the tide is slightly earlier to the north, there must be a little flow through the pipes northwards from the basins to the sea on ebbing tides and a little southward on flooding tides. The flow volumes are too small to affect the speeds in Table 10.

Currents to the North of Peterhead

The patterns of currents along the north side of the Peterhead promontory have not been measured, but can be deduced from the patterns recorded to the south which were described earlier. The currents broadly followed the coastline early in the flood and ebb. Later currents tended to break away at headlands leaving gyres in their shelter. A clockwise gyre formed in the shelter of the Peterhead promontory over the latter part of the flood tide and an anticlockwise gyre during the later ebb tide behind the Boddam headland.

On the north side of Peterhead there is no major headland to the north so a clockwise gyre on the flood tide is unlikely to develop. However, it is highly likely that there is an anti-clockwise gyre on the ebb tides.

Offshore the currents throughout the tide are the same as those in the last column of Table 9. Inshore, from three hours after HW, through LW to four hours before the next HW, currents are similar to those in Table 9 with the anticlockwise gyre developing on the north side of the promontory. Over the remainder of the tide, with south going currents the clockwise gyre is absent.
The directions of tidal currents along the north side of the promontory are summarised in Table 11.

Table 11 - Tidal Current Directions along the N Coast of Peterhead

Tidal Time	Current Directions
Early Flood	SE along coast, River Ugie to Peterhead
Late Flood	SE along coast, River Ugie to Peterhead
Early Ebb	NW along coast, Peterhead to River Ugie
Late Ebb	SE in gyre, River Ugie to Peterhead

Interchange of Water between Peterhead Port and River Ugie

Both the River Ugie and the Port sluice pipes exchange water with the sea. As they are only 2km apart water from one could be drawn in by the other. In Table 10 the currents run from NW to SE for most of the time, preventing water from the sluices reaching the river. During the early ebb water is issuing from the sluice pipes and the current takes it towards the river. However, the water ebbing from the river prevents its entry. It is thus highly unlikely that water from the Port can enter the river system directly.

Water from the river cannot enter the sluice pipes during the ebb tide as water is discharging from the pipes. On the flood tide the current runs from the river to the pipes and the pipes are drawing in water, however, the river is also drawing in water so none reaches the pipes directly. There is a possibility that at the turn of the tide from ebb to flood, water which has already ebbed out of the river over slack water is drawn into the pipes as the flood starts. This is more likely if there are high river flows.

On neap tides, occasionally when tidal currents are low, and if there are strong winds from E or NE, wind induced currents could carry water from the sluices towards the river. It could then be drawn in on the early flood tide.

Summarising, it is only occasionally that water sluiced from the Port enter the River Ugie directly. Water from the river can enter the port during the early flood.

5.3.6. Navigation

The changing directions and speeds of the currents as vessels approach the Bay Harbour are challenging for navigation, particularly as currents approaching the head of the North Breakwater are almost always across the entrance. However, the wide entrance leaves considerable room for manoeuvre.

Within the Bay Harbour currents are low. There is an extensive turning area in which a turning circle with a maximum diameter of 400m can be fitted. Vessels making for Inner Harbour, after entering the Bay Harbour heading NW, have to make a turn to starboard to clear the head of the Albert Quay Breakwater and enter the Albert Basin. The least depth around the head of the breakwater is 10m. When there are high waves from easterly directions vessels are beam on to the waves as they turn.

The draft of vessels using the Inner Harbour basins is limited by the depths. No tugs are held at Peterhead, as tugs for large vessels are ordered in advance from Aberdeen. Deep water down to 15m is available for berthing on the inside of the North Breakwater, but these berths are untenable in storms due to high waves.

5.3.7. Sediment Effects

Sea Bed Sediment

Materials on the sea bed in the vicinity of Peterhead are shown on Admiralty Charts to be fine to coarse sand with some shell and stones[9]. Marine boreholes and subsurface marine geophysical soundings over the area within 500m of the harbour entrance, show thin layers of mobile sand, overlying boulder clay on top of granite[10]. The surface layer is absent in places exposing the boulder clay. Towards and at the coast, the granite rock is exposed.

Within the inner Harbour a site investigation was undertaken as part of the design work for this project. The general theme of the ground conditions determined by the boreholes is that there are varying depths of sandy organic silt (0 to 0.5m) heavily weathered granite (0.15 to 4.5m), underlain by varying depths of medium to strong granite (up to 15.0m). It is expected that a proportion of the hard granite encountered in the area to be dredged will require to be loosened by explosive charges to facilitate removal. The maintenance dredge has now been completed and sandy organic silt layer with some overburden has now been removed. A total of 15,000 cubic metres of material has been dredged and dumped off-shore. A post dredge survey has been carried out to confirm the extent of the works and the quantities.

Along the western shore of the harbour there are granite outcrops which contain patches of sand, gravel and stones. There is a sand beach at the Lido within the marina. Some silty material is reported to be deposited in the enclosed basins of the Northern Harbour.

The shoreline along the western edge of the harbour comprises low grassed sand dunes.

There are sand beaches to the north of the Peterhead promontory, north of the estuary of the River Ugie.

Sediment Movements

In the approaches to the harbour, where currents are low (Table 11), little or no sediment movement is expected to be caused by currents alone. However, the relatively high wave environment in easterly storms is likely to mobilise the sandy materials so that they can be distributed by the currents. Side scan sonar has shown some small sand ripples with their shape indicating that there had been some movement towards the west[10]. This would be consistent with wave induced movement towards the harbour.

Other than through the sluice pipes to the north side of Peterhead (Figure 15), the only connection between the harbours and the open sea is through the entrance to the Bay between its North and South Breakwater. Some sand and fines are carried into the Bay by the combined action of high waves and flooding tides. There are no rivers, streams or water courses which flow into the Bay and Inner Harbours other than urban run-off. Sediments entering the Bay from seaward are deposited in areas sheltered from waves. Some sediments mobilised by waves will leave the Bay Harbour on ebbing tides.

Sequential surveys show some limited deposition in the southern area of the Bay, and possibly some deposition behind the Albert Quay Breakwater and in the Inner Harbour. Navigable depths are restored from time to time by maintenance dredging.

Since building the marina on the western seaboard by the Bay Harbour in the 1990s there has been a build-up of sand in the corner between the marina’s northern breakwater and the shore. It is not immediately clear why this has happened. Currents are too slow to mobilise sand and waves from the Bay Harbour entrance approach the shore head on. In easterly storms the waves can certainly mobilise the sand, but they do not have the direction to produce a south going littoral current to carry sand towards the corner. A possible explanation is that waves, impinging on parts of the Smith Embankment wall, are reflected south-westwards and that they provide the south going along-shore current which transports the sand.

Some of the deposited sand may have been eroded from the sand dunes along the western margin of the harbour. Erosion of the low dunes has been controlled to some extent in the past with buried stone filled gabions.

During the construction of the Smith Quay there was additional deposition along the inside of the South Breakwater. Some of this was eroded in a storm in December 2012 when there was severe overtopping of the breakwater.

At the entrance of the Inner Harbour, sediments suspended by waves are carried in on flooding tides and are deposited in areas sheltered from waves and currents. The maximum currents in Table 10, throughout the harbour, are too low to erode any material which is deposited but in places are high enough to discourage deposition. Deposition is consequently much less likely at Queenie Bridge at the entrance of the North Harbour than in Alexandra Basin.

Port Henry Harbour and Alexandra Basin in the Inner Harbour are connected to the sea on the N side of Peterhead by two 1.8m diameter sluice pipes some 2km E of the Ugie Estuary (Figure 15).

When waves are high enough to the N of Peterhead to mobilise seabed sediment, sediment is carried into the estuary on flooding tides and via the pipes into the harbour and deposited in the calm areas of the basin.

Sediments on the beds of the basins are highly unlikely to be carried by currents and ebb through the sluices because the bottoms of the sluice pipes are 2m or more above the beds and because waves in the basins are too low to disturb bed material. Other than in the pipes currents are also too low.

The tidal currents to the north of Peterhead make it very unlikely that the suspended sediments from the harbour issuing from the sluices can enter the Ugie estuary. Only if wind induced currents from E are strong enough to counter tidal currents could this be a possibility. Suspended sediments from the estuary can be drawn into the harbour especially if there are high river flows. An exception to this would be when sediments in the harbour basins are disturbed by dredging or manoeuvring vessels.

The beaches to the N of the Ugie are even less likely to receive any material discharged from the harbour sluices.

5.4. Prediction and evaluation of likely significant effects

5.4.1. Introduction

The proposed works, which are shown in Figure 1, comprise: deepening and widening various parts of the Inner Harbour, a reclamation in the Bay west of the Smith Quay.

The works are all within the confines of the existing harbour. The harbour is separated from the general run of the coastal processes by the main North and South Breakwaters so that effects on processes outside the harbour are expected to be minimal.

The deepening and widening will reduce the tidal currents. The reclamations change tidal volumes which could change tidal propagation and tidal and other currents. The reclamations may also modify wave activity. The changes in waves and currents may affect sedimentation and conditions at berths. The various aspects of how the physical processes will change when the works are completed are discussed first followed by effects during construction. The processes are addressed in the same order as set out in 6.3.1 for the baseline studies, starting with waves.

5.4.2. Effects when the works are completed

Waves in the Bay Harbour

The reclamation in the Bay is proposed to be in front of the vertical wall along the Smith Embankment. The seaward boundary of the reclamation is to be a rock armoured slope. The present vertical wall reflects waves impinging on it towards other areas of the Bay. Replacing this with the armoured slope will absorb up to 50% of the waves reaching it, to the benefit of the harbour as a whole. Waves at the west end of the reclamation may be up to 2m high in once a year storms, a 50% reflection will send waves which are initially 1m high towards other areas. The plan shape and orientation of the south face of the reclamation will change the directions of the reflected waves. Although the majority of areas will benefit because of the reduced heights of the waves, some areas may be adversely affected because directions have changed. In detailed design, the boundary will therefore be configured to avoid sending more wave reflections towards sheltered or vulnerable areas such as the marina, Lido beach and berths. Waves approaching the entrance to the Inner Harbour will not be affected.

Modelling of the new project[20] has indicated that the wave energy reflected from the new reclamation towards the ASCo South Base will reduce significantly. The changes in wave climate affecting the ASCo South Base will result in the same or slightly reduced wave heights along the south Base quay during storms. Figure 16 shows an output from the model.

The Inner Harbour

Wave activity entering the Inner Harbour will not change. The geometry of the entrance to the Inner Harbour between the head of the Albert Quay Breakwater and Smith Quay is unaltered and the waves approaching the breakwater are unchanged. The distribution of waves within the Inner Harbour itself may change a little. The increased widths and depths, will allow more wave energy to leave the southern basins and enter the northern basins. Since waves are low the changes will have little impact on operations or navigation.

Modelling for the Smith Quay development found that there was a tendency for wave resonance to occur (Figure 12). It was curtailed by the arrangement of the works at the entrance to the Inner Harbour which reduced the wave activity entering the harbours. The changes to widths and depths may change the susceptibility to resonance. This is highly unlikely but will be checked. Again numerical modelling will ensure that adverse effects if any are engineered out.

Global Warming and Waves

Increasing storminess may increase wave induced downtime at berths in the bay. However, the development as described above will not aggravate the situation.

Vessel Downtime

Downtime will not increase and at some berths it will be reduced. The changes to the Inner Harbour will allow larger vessels to benefit from protection afforded in the Inner Harbour. In the Bay Harbour the reduced wave reflections from the area of the Smith Embankment will reduce waves in the southern part of the harbour which will reduce downtime there. The reduction of downtime may be cancelled out by global warming effect as stated above.

Tides and Water Levels

The reclamation will reduce the tidal volumes within the harbours. The reclamation, in the bay outside the Inner Harbour, will reduce the tidal volume by 3%.

Extensive reclamations can affect the propagation of tidal levels and surges. However, the proposed reclamations are too small to have any noticeable effects on tide or surge levels in Peterhead Port. They are also much too small to influence tides outside the harbour.

Flooding

The existing quay levels and top of the Smith Embankment wall are at 6m or more above chart datum, more than a metre above the extreme water levels in Table 7 including an allowance for sea level rise and above the 5.66m advised by SEPA. The existing wall and the quays will remain in place other than where the West Quay is removed and the Queenie Bridge narrows widened. At these two locations the new quay walls will have the same level as the other quays. The new reclamation will have similar upper levels.

With the existing flood defences retained there will be no increased risk of flooding from the sea compared with present conditions. The rock armoured revetment along the main reclamation will reduce any overtopping of waves.

To avoid any increased risk of flooding from landward all existing storm water outfalls will be maintained or rerouted including the outfall at the Smith Embankment (Figure 15).

Currents

The existing currents in the harbours are low. Within the Bay Harbour tidal current speeds will fall by 3% or less. The current measurements[10] indicated that currents in and out of the harbour had no noticeable effect on the general patterns of currents outside the harbour. It is the pattern of currents outside that influence the pattern through the entrance. With reduced current speeds the effects outside the harbour will be even less.

In the Inner Harbour current speeds will be reduced a little by the small reclamation and more because of the widening and deepening of the basins and their entrances. The maximum currents, averaged over the widths and depths of the entrances to the various basins have been calculated in the same way as those for the baseline conditions. The resulting speeds are listed in Table 8 together with the baseline speeds from Table 6 for comparison.

Table 12 - Maximum Average Spring Tidal Currents in the Inner Harbour, before and after development

Location	Baseline Speed cm/s	Resulting Speed cm/s
Inner Harbour Entrance	1.7	1.6
West Quay	2.2	2.1
South Harbour Entrance	9.2	5.4
North Harbour Entrance	21.6	5.1
Alexandra Basin Entrance	1.0	0.6
Port Henry Harbour Entrance	7.9	7.9

The most striking change is at the entrance to the North Harbour when the Queenie Bridge is removed. Here speeds will be down to a quarter of those now. Speeds of around half a knot fall to a tenth of a knot. The average maximum speeds will all be low with the highest speed 7.9 cm/s at the entrance to Port Henry Harbour.

The generally lower speeds of the currents may reduce the initial dilution of existing discharges into the Inner Harbour, but the dispersion will hardly change as the tidal volume exchange with the Bay Harbour changes by only 3%.

Navigation

In the approaches to the Bay there will be negligible change to the challenging patterns of current speeds and directions.

Within the Bay the marginal reductions in the speeds of the low currents may be marginally beneficial.

The reduction in reflected wave activity towards berths in the southern part of the Bay will make a small improvement in berthing conditions there.

Waves at the head of the Albert Quay Breakwater will be unchanged as reflections off the new reclamation are directed away towards the north-west. Vessels will still have to turn beam onto waves from east as they enter the Inner Harbour.

Within the Inner Harbour the developments will allow larger vessels to benefit from the wave protection there. Overall current and wave conditions which affect navigation will be no worse than now and there are some benefits.

Sediment Movements

Sediment movements are driven by waves and currents, so where these are changed by the new works there may be changes to sediment movements.

There will be no discernible changes to tides, currents or waves outside the Bay Harbour. Thus there will be no changes to sediment movements outside when the development is completed.

Within the Bay there may be a little increase in wave activity along the northern half of the western foreshore as waves reflected from the reclamation are directed away from the Marina. The increases will be of the order of a few centimetres in the 2m high waves of a one in 10 year ESE storm. The northern half of the western foreshore comprises low granite outcrops with patches of sand, gravel and stones within the hollows. There may be a little redistribution of the mobile material due to the small changes in wave activity. There may also be a slightly increased tendency for erosion of the low, grassed, sand dune fringing the shoreline. In 1995/6, erosion were curtailed by buried stone filled gabions.

The Marina and the Lido beach inside are well sheltered from waves by the marina breakwaters. Modifications to the southern boundary of the new reclamation will ensure that waves approaching the Marina will not increase and may decrease. Waves reaching the beach are too low to remove sand from the beach.

The 3% reduction in the speed of the currents through the entrance to the Bay Harbour will marginally reduce the quantity of sediment carried into the harbour by the combination of waves and currents. The reduced currents within the harbour may marginally change the pattern of deposition. There may be a little more deposition towards the entrance and less towards the margins, but this is unlikely to be discernible.

Currents through the entrance to the Inner Harbour fall by 3% so marginally less of the sediment mobilised by waves in the Bay Harbour will enter the Inner Harbour and could be deposited a little closer to the entrance. The changes to current speeds between the basins shown in Table 12 will change patterns of where deposition takes place. For example, the present higher speeds at Queenie Bridge discourage deposition. After the changes when speeds are reduced deposition may increase there.

Vessel manoeuvring and maintenance dredging in Port Henry Harbour or North Harbour may bring material from the beds of the harbour into suspension. The suspended material could then be discharged through the sluice pipes onto the foreshore to the north of Peterhead. The bottoms of the pipes are presently over 2 metres above the beds of the basins which discourages some of the bed material from entering the pipes. When the bed of the North Harbour has been excavated to its new depth, the increased step between the bed and the pipe will further discourage the discharge of harbour sediment onto the foreshore north of Peterhead and in the approaches to the Ugie estuary. It will also encourage deposition in the harbour of any material, disturbed by waves, which are drawn in. Closing the sluices when there are high waves could reduce the need for maintenance dredging. Port Henry Harbour is not to be deepened so there will be no change at the sluice pipe to that basin.

5.4.3. Effects during construction

Introduction

The construction process will involve the following:

- The removal of soft material from the sea bed throughout the Inner Harbour by dredging under a separate licenced maintenance dredging contract.
- It may be assumed that small residual soft material from the maintenance dredging could remain.
- The excavation and dredging of 110,000m^3 of granite from the Inner Harbour including blasting.
- Excavation reclamation will be formed in front of the Smith Embankment wall.

The main effects will arise from the following:

- Movement of sediment released by dredging and probably blasting.
- Movement of sediment from materials forming the reclamation.

The effects will be as follows:

Waves

The majority of the works take place in the shelter of the Inner Harbour where waves are low. The Works will have little or no effect on the current wave climate inside the inner harbour.

The reclamation at the Smith Embankment will have no worse effect than that described for the finished works, providing the alignment of its seaward face follows a similar shape to that evaluated in modelling during detailed design. The effects on waves in the Bay Harbour will therefore be minimal.

Tides and Water Levels

The main effects will be on tidal currents which are described below.

Flooding

Providing a flood defence level of 6m or more above chart datum is maintained where the West Pier Quay and Queenie Bridge works are removed, the risk of flooding from the sea will be unchanged.

Storm water outfalls will be maintained or re-routed to avoid flooding from land.

Currents

There will be no significant effect during construction on currents.

Sediment Movements

During construction, seabed material will be disturbed by blasting and dredging. This will bring some silt and clay into suspension to be dispersed in the low currents. Fines can also be released from the placement of dredged and excavated material in the reclamation and from rocks forming its seaward boundary. Suspended sediment could be dispersed around the harbours and deposited in the marina at the Lido Beach and at berths, reducing working depths. The sediment will certainly discolour the water in parts of both the Bay and Inner Harbours because concentration of as little as 10 parts per million of suspended sediment are noticeable.

In respect of sediment movement effects, the works are of a broadly similar nature to those completed in 2010 for the Smith Quay, comprising rock excavation, reclamation and rock handling and placement. Many of the marine physical environment studies which were carried out for the Smith Quay are therefore relevant to the proposed new works and information from those studies have been drawn on as necessary. The main difference from the Smith Quay works, affecting sedimentation, is that the silt and clay on the rock bed of the Inner Harbour will have been removed prior to the execution of the new works. Also the new works do not include any breakwater construction.

Sediment Released by Dredging

As the North Harbour and Alexandra Basin excavation takes place, sedimentation will occur and is described below for the South Harbour and Albert Basin.

The dredging in the South Harbour and Albert Basin is likely to be carried out using a back-hoe dredger, with the dredged material being deposited into an anchored barge. Site investigation boreholes have generally indicated top layers of heavily weathered granite with varying degrees of strength and fracturing of granite below. Although a lot of the rock may be frangible enough to be removed by the back-hoe, it is expected that pre-treatment blasts will be required to break up some of the harder rock material.

It is anticipated that approximately 110,000m³ of rock material will be removed during dredging operations in order to achieve the required depths. During back-hoe dredging sediment may be released as described in[12] during the following phases of operation:

- Impact of the back-hoe on the seabed.
- Disturbance of the bed during closing and initial removal from the bed.
- Material spilled during hoisting.
- Material washed from the outside of the back-hoe during hoisting.
- Leakage and dripping during slewing.
- Wash off during re-entry and lowering.

Measurements of losses from back-hoe dredging indicate the mass of material lost per cubic metre dredged varies widely from 2-25kg/m³. The higher values are associated with dredging of loose silts with small capacity back-hoes. The smaller values are associated with the dredging of granular materials which is the case here. The lost material, if in suspension, may be dispersed by the currents.

The currents in the Inner Harbour are low (Table 12) and other than at Queenie Bridge, at the entrance to the North Harbour, the maximum currents listed in Table 10 are too slow to transport material larger than medium sand. Most of the time, currents are slower and often unable to transport medium silt. The higher speeds at the entrance to North Harbour, before it is widened, are capable of transporting coarse sand, but only at times of maximum currents.

Most of fine material on the bed of the Inner Harbour have been removed by the earlier maintenance dredging campaign. Material missed by dredging adhering to the rock, contained in fissures or produced by abrasion may be available for suspension.

The main concentrations of suspended sediment will remain generally in the vicinity of the dredging because there is little current to disperse it. In calm conditions it will settle onto the seabed.

The Inner Harbour is well sheltered from waves. It is likely that most of the suspended material will be deposited within the harbour, away from the entrances to the basins where the higher currents of Tables 12.

A small amount of suspended material may spread into the Bay Harbour where wave activity will prevent it settling permanently in areas other than those sheltered from waves such as the marina. Sequential surveys showed that there was some deposition along the inside of the South Breakwater from the construction of the Smith Quay. There may be additional deposition there.

Sediment Released from the Reclamation

The proposed reclamation which is adjacent to the Smith Quay reclamation is more than twice as extensive as for that quay. However, the material forming the reclamation will contain less fine material, because fines have been removed by the maintenance dredging.

Some fine material will be washed off the fill when it is tipped into the water and may spread into the Bay.

Another source of fine material will be the rock forming the revetment. It is expected that most of the dust and fines in the core material will be screened out in the quarry. However, some will remain in the primary and secondary armour and the filter layers. When the rock is tipped or placed onto the structures, the dust and fines will be released into the surrounding water. Because of the screening the quantity of material released will be small in comparison to that released by dredging. The material will be mainly rock particles and consequently will be mostly deposited in the vicinity of the works. Depths of deposition will be insignificant.

The release of materials in suspension from the reclamation is expected to be no worse than was the case with the Smith Quay and associated. The new reclamation is more extensive but no rubble mound breakwater is included.

The reclamation is exposed to waves especially towards its western end. Adequate wave protection and properly designed filters will be provided to avoid losses and release of fines.

Quantities and Destinations of Suspended Sediment

The volumes of suspended sediment released by the Smith Quay development were derived. Using the same methods the quantity of sediment which is expected to be released into suspension in the present scheme is 200m^3. This is much less than the 500m^3 for the Smith Quay. As described above most of the suspended material will be retained in the Inner Harbour.

The remainder, which spreads into the Bay Harbour, will be distributed to areas such as the Marina, the inside of the South Breakwater and to seaward through the main entrance.

The Marina has a relatively narrow entrance between its breakwater arms so that water ebbing out on the falling tide, will prevent entry during half the tide. During the flood tide some material may enter.

Some material will spread to the main harbour entrance and be fed into the passing currents. It is estimated that the lost material will be distributed as follows:

Inner Harbour	60%
Bay Harbour	25%
Marina	5%
Seaward	10%

If the 60% released to the Inner Harbour were evenly spread over the basins, the depth of deposited material would be 1-2mm. However, it will not be evenly distributed with possibly up to 5cm in some areas and none in others.

The 25% in the sheltered deep of the Bay Harbour will be hardly noticeable and 5% in the Marina, if evenly spread would have a depth of much less than 1mm. Most deposition is likely to be in the deep area sheltered by the main marina breakwater on its eastern side. The limited amount of wave activity entering the marina is likely to discourage deposition on the shallowing area of the Lido Beach.

The 10% leaving the harbour to seaward will be diluted by the much greater volumes of water passing the harbour entrance and be carried away by the tidal movements. Most of the diluted sediment carrying water will go seaward, but a small amount may reach the shore of Sandford Bay and the shore southwards from Buchan Ness. Because of dilution, concentrations of material reaching the shore will be negligible.

The sluice pipes to the north will be closed to avoid discharging sediment into the approaches of the River Ugie.
Experience from the Smith Quay Construction

Enquiries about sedimentation to the Port Authority and the Engineers who supervised the Smith Quay works have provided the following information.

Deposition in operating areas resulting from the quay works was not sampled or measured. However, nowhere in the Bay and Inner Harbour were operators aware of loss of depth, other than from natural causes such as storms.

Over time there has been some natural deposition of silt and sand in the Marina. Whether or not the quay works contributed to this is unknown.

Sequential surveys around the South Breakwater showed some deposition along the inside of the breakwater which may have taken place during the quay works.

As a precaution, turbidity was monitored during the bathing season. The readings never exceeded the guidance levels. There was consequently no disruption to the planned configuration works from to this cause.

No complaints regarding sedimentation or turbidity were received.

The main differences between the Smith Quay construction and the works for the Inner Harbour is that less material is to be dredged for the Inner Harbour and the dredging will take place inside the Inner Harbour rather than outside in the Bay Harbour. No breakwater construction is included. Estimates of the values of deposition with the two schemes are shown in Table 13.

Table 13 -Estimated Volumes of Deposition from the Smith Quay and Inner Harbour Schemes (m^3)

Location	**Smith Quay Total 500m³**		**Inner Harbour Total 200m³**	
Inner Harbour	40%	200m^3	60%	120m^3
Bay Harbour	30%	150m^3	25%	50m^3
Marina	10%	50m^3	5%	10m^3

Seaward	20%	$100m^3$	10%	$20m^3$

The table indicates that deposition will be less during the development of the Inner Harbour in all areas of the Port and particularly so outside the Inner Harbour. In conclusion, deposition from the Smith Quay works was hardly noticeable. What little deposition there was will be less with the Inner Harbour works.

5.5. Mitigation of Adverse Effects

5.5.1. Adverse Effects when the works are completed

i. There is a possibility that waves which are reflected off the southern boundary of the reclamation could be directed towards critical areas such as the Marina. This will be mitigated during detailed design by adjustments to the plan shape of the seaward boundary of the reclamation.

ii. Directing waves away from the Marina may slightly increase wave activity along the shore to the north of the Marina. This area is already exposed to high waves from the harbour entrance and changes there will hardly be noticeable. Mitigation will be through adjustments to the plan shape of the reclamation which will reduce and possibly eliminate the increase.

iii. The changes to the geometry of the Inner Harbour might encourage wave resonance. Although very unlikely, this will be checked and, if unacceptable, ameliorated through adjustments to the configuration during detailed design.

iv. The western end of the reclamation is subject to high waves. Wave damage will be engineered out during detailed design of the revetment and its armour rocks.

v. The speeds of currents in the Inner Harbour will have been reduced. This will marginally change where deposition takes place. The initial dilution of any discharges into the Inner Harbour may change but not their dispersion into the Bay Harbour. No mitigation is therefore necessary.

5.5.2. Adverse effects during construction

i. Dredging and reclamation will release fine material into suspension which will be deposited in areas sheltered from waves. The impact of this will be significantly less than occurred during the Smith Quay Development in 2009/2010. Then no significant deposition was experienced over and above that occurring naturally in storms. Mitigation will be through periodic maintenance dredging.

ii. Turbid water from sediment disturbed by dredging could reach the Marina and Lido Beach. Turbidity was monitored during the Smith Quay development, and found not to exceed bathing water standards. Turbidity is expected to be less from the Inner Harbour works but as a precaution turbidity should be monitored during the bathing season and dredging operations controlled to reduce turbidity as necessary.

iii. Increased flooding from land could occur if existing outfalls are obscured. This will be mitigated by ensuring that all existing outfalls are maintained or rerouted.

iv. The use of silt curtains was considered for the Smith Quay works, but the waves and swell in the Bay Harbour would have made this impractical. The dredging in the bay took place without curtains and had no serious consequences. The impacts from dredging in the Inner Harbour are expected to be less so silt curtains are not necessary. As for the Smith Quay works, there should be a careful pragmatic selection and operation of dredging and other plant.

5.6. Residual Effects

The main residual effects of the permanent works will be improved access for larger vessels into the sheltered Inner Harbour. Wave conditions in the Bay Harbour, under storms from south easterly directions, will generally be calmed a little, although there may be a slight increase on the western shoreline north of the Marina. There will be no discernable effects on coastal processes outside the Bay Harbour, including the estuary of River Ugie. The low speed currents in the Bay and Inner Harbours will be marginally reduced, this is possibly of slight benefit to navigation.

On completion of construction of the works there may have been some deposition of material disturbed by dredging and other activities. This will be removed as necessary during routine maintenance dredging, so no residual effect on coastal processes will remain.

5.7. Summary of significant effects

Other than residual effects mentioned in 5.6 above there will be no significant effects on coastal processes within the port, outside the port or in the estuary of the River Ugie.

6. WATER QUALITY

6.1. Introduction

This Chapter of the ES addresses the potential impact of the proposed development on water quality.

6.2. Assessment criteria

A reference case for the water quality assessment is the construction of the Smith Quay in 2009-2010 in the outer harbour.

The construction activities likely to affect the water quality were very similar to those in the new project and include pre-treatment blasting of rock, dredging and land reclamation.

During the construction phase for the Smith Quay, turbidity tests were carried out and no results of these tests were above the guidance levels. In addition, there were no complaints recorded from the users of the Marina or the public using the Lido beach regarding water quality issues.

The assessment criteria for water quality have therefore been carried over from the Smith Quay for the Inner Harbour development, including proposed construction restrictions and monitoring.

6.3. Baseline conditions

6.3.1. Discharges

There are no natural streams discharging into the bay, however, information from Scottish Water has indicated a number of discharge pipes. Details of these are indicated in Table 14 below:

Table 14 -Known bay discharge pipes

Ref No.	Location	Grid Ref	Size (mm)	Discharge Details
1	West Road Outfall	412889E 845839N	1800	Concrete pipe. Surface water/unscreened storm sewage. Outfall for extensive surface water system, 4 CSO's and Pumping station no.3 storm tank. Outfall discharges at approx. MLWS.
2	Surface water previously serving Pumping Station no. 3	412757E 845902N	400	Surface water. Abandoned
3	Lido Beach Outfall	412850E 845348N	1050	Concrete pipe. Surface water/unscreened storm sewage. Outfall for School road CSO and surface water system. Has primary screened treatment and discharges infrequently.

Other discharges may exist which do not pertain to Scottish Water, e.g. from Aberdeenshire Council roads, but no records of these are available.

6.3.2. Bathing Water Standards

Peterhead Lido is located within the outer harbour as shown in Figure 7. This bathing area attracts a diverse range of water-sports enthusiasts, with dinghy sailing in the sheltered water of the bay particularly popular. In accordance with the EU Bathing Directive, as monitored by SEPA, Peterhead Lido has passed for over 10 years in a row the bathing water quality standard[13].

The Directive sets standards for concentrations of microbial organisms in bathing waters which are naturally present in the guts of humans and all other warm blooded animals. The presence of indicators of faecal contamination in excess of the limiting values in the Directive indicates that waters may have received discharges of sewage which have not been given adequate treatment or dilution. Large concentrations of seabirds or livestock slurries and manure also give rise to these microbial indicators in bathing waters as can run-off from agricultural land or food processing. The bacteria and viruses present in sewage and animal excreta may cause illness, especially as result of ingestion or infection through open wounds or cuts.

Article 5 of the Directive specifies how the results of faecal coliform and faecal streptococci monitoring are to be interpreted. These are summarised in Table 15 (below).

Table 15 - Interpretation of microbial values for bathing waters where 20 samples have been taken

Level of pass	SEPA Assessment	Interpretations	Total colforms	Faecal coliforms	Faecal streptococci
Pass - Guideline	E (Excellent)	Directive states:	80% of samples should not exceed 500 total coliforms per 100ml.	80% of samples should not exceed 100 faecal coliforms per 100ml.	90% of samples should not exceed 100 faecal streptococci per 100 ml.
		Based on 20 samples:	Must have at least 16 samples with less than, or equal to, 500 total coliforms per 100 ml.	Must have at least 16 samples with less than, or equal to, 100 faecal coliforms per 100 ml.	Must have at least 18 samples with less than, or equal to, 100 faecal streptococci per 100 ml.
Pass - Mandatory	G (Good)	Directive states	95% of samples should not exceed 10,000 total coliforms per 100 ml.	95% of samples should not exceed 2,000 faecal coliforms per 100 ml.	The directive contains no mandatory standard for faecal streptococci.
		Based on 20 samples:	Can only have 1 sample with greater than 10,000 total coliforms per 100 ml.	Can only have 1 sample with greater than 2,000 faecal coliforms per 100 ml.	The Directive contains no mandatory standard for faecal streptococci.

6.4. Prediction and evaluation of likely significant effects

6.4.1. Impact during construction

These are likely to be from two potential activities in respect of water quality:

- Dredging, filling and stone placing operations which are likely to result in suspension of silt and clay particles.

- The use of plant and machinery adjacent to and within the works which could result in accidental contamination from oil or diesel leaks, or from runoff from temporary storage areas. Oil/diesel and potentially some sediment are identified as the risks.

6.4.2. Impacts in Operation

These are likely to be from two potential activities in respect of water quality:

- Changes in nature of vessels using the port.
- Direct surface water runoff from the new reclamation.

6.5. Mitigation of adverse effects

6.5.1. Mitigation during construction

The sluice located in the north harbour will be closed during any dredging of the North Harbour to avoid sediment travelling into the sluice and within the approaches of the mouth of river Ugie.

In terms of oil, diesel or other pollutants from the construction activities the contractors for the works will be required, under the contract, to comply with all statutory legislation requirements including the Pollution Prevention and Coastal (Scotland) Regulations 2000.

In addition the contractors will be required to comply with the PPA emergency procedures in respect of prevention of oil pollution and to comply with the Port Marine Safety Plan, Security Plan, and Port Waste Management Plan. Specifically the contactors will be required to submit for approval to PPA and SEPA their proposals and method statement related to storage of any oil or diesel on site together with detailed emergency procedures.

As part of the above the contractors will be required to comply with SEPA's guidance note PP62 'Above Ground Oil Storage Tanks' with particular attention to location, planning and secondary containment, ancillary equipment, maintenance, refilling and security.

Adherence to SEPA's PPG5: Works In, Near or Liable to affect Watercourses will also be required and the contractors will need to demonstrate that they have taken appropriate general precautions, have planned their activities to minimise siltation and sedimentation, are adequately keeping their plant and equipment clean, adequately planning their concreting activities and complying with oil storage requirements. In general terms compliance with SEPA's PPG6: Working at Construction and Demolition Sites will also be a requirement and this additionally embraces site storm drainage, with special attention to deliveries of materials and waste minimization, storage and removal.

In respect of welfare arrangement on site all foul sewer waste materials will be self-contained and removed from site on a regular basis.

Other relevant construction period restrictions will include:

- A requirement that no chemicals stored on site.
- Use of existing routes to the site, no temporary roads are required.

6.5.2. Mitigation during Operation

Potentially there could be a risk of pollution and deterioration of water quality if more vessels use the port. However, although the proposals will result in a small increase in quay size which will allow larger vessels within the inner harbour, it is not expected that numbers of vessels using the harbour will increase. In any case, all vessels are required to comply with current statutory requirements in respect of pollution and also to comply with PPA procedures in the event of any incidents. These procedures include the Port Emergency Plan, Port Marine Safety Plan, Port Waste Management Plan, PPA Oil Contingency Plan etc.

The new buildings for the fish market will be designed and operated with appropriate pollution control systems.

With regard to surface water runoff from the reclaimed area it is proposed to utilise a system of oil interceptors and silt traps which will effectively cut off any detrimental spillage from reaching the harbour water. Details of this will be arranged to the approval of SEPA.

6.6. Residual effects

Based on the assumption that the contractors will adhere to the CEMP and general good working practice for the construction phase, there should be no residual effects on water quality from construction of this project.

Similarly, during the operation, there should be no residual effects on water quality if the operation procedures from PPA are adhered by operators, users and stakeholders of the Port and regular maintenance on pollution control systems is carried out.

7. AIR QUALITY

7.1. Introduction

This chapter of the ES addresses the potential impact of the proposed development on air quality.

7.2. Assessment criteria

Air quality effects have been assessed in accordance with current legislation regarding the air quality monitoring and limits for pollutants:

- The Environment Act 1995
- National Air Quality Strategy 1997 changed to Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2000
- Air quality updating and screening assessment 2012
- Air quality management progress report for 2013
- Development Control: Planning for Air Quality - Environmental Protection UK which set the criteria for air quality assessment based due to traffic increase

7.3. Baseline conditions

The Environment Act 1995 requires local authorities to undertake air quality reviews. These reviews are required to assess the concentrations of the following pollutants:

- Benzene, 1,3
- Butadiene
- Carbon monoxide
- Lead
- Nitrogen dioxide
- Particles (PM^3) (gravimetric)
- Sulphur dioxide.

Local authorities are required to establish Air Quality Management Areas in places where the measurements of the above pollutant are likely to be above the allowable limits in the act, and implement action plans to improve air quality. In September 2012 Aberdeenshire Council published an Air Quality Updating and Screening Assessment[14]. The conclusions of this assessment (as for those previously issued) indicated that the authority did not need to undertake detailed assessments for any pollutant.

Legislation requires that Annual Air Quality Progress Reports are produced between subsequent rounds of review and assessment. Aberdeenshire Council's Local Air Quality Management Progress Report for 2013 includes details of monitoring of nitrogen dioxide at 4 locations within Peterhead[15]. All of these indicated both current and future predicted annual mean concentrations below the limits given in the legislation.

Sulphur dioxide was historically also monitored by Aberdeenshire in respect of the power station located south of Peterhead Bay. In 1997 these levels were well below the EU directive threshold, and since then the station has been converted to burn gas (low in sulphur) as well as oil.

7.4. Prediction and evaluation of likely significant effects

7.4.1. Impact of Construction

Air quality deterioration could occur along access routes to the works sites due to vehicular exhaust emissions. Exhaust fumes from plant and machinery working on the site will also cause some local deterioration in air quality in the harbour area. The precise impact of these emissions is dependent on the proportion of material to be used in the works and removed from them to be transported by road compared to that transported by sea.

A key consideration with air quality is the quality of the receiving environment. Ambient air quality in Peterhead, is currently very good and it is unlikely that the exhaust emissions form site plant or delivery vehicles will reduce air quality to the extent that statutory limits will be exceeded. It is not considered necessary at this stage to undertake detailed air quality modelling, as the potential for air quality standards to be exceeded is minimal. In addition any impacts are likely to be localised and will only occur sporadically during the construction process.

Increased atmospheric dust may result from the transportation of construction and waste material and from storage piles of fill material, rock armour and other material. Dust generation could occur at the site working areas, quarries and, along access routes if materials are dry and uncovered and during storage or placement of materials on site. Any deterioration of air quality will be confined to these local areas and will be a temporary impact. Dust can cause a nuisance to local residents and workers and can also impact on plants by reducing photosynthetic activity. The measures identified below will usually reduce the impacts of dust to an acceptable level.

7.4.2. Impact of Operation

The anticipated increase of traffic, as stated in Chapter 14, will be below the 5% increase of the AADT for the Trunk Road, the potential increase of traffic in ADDT would therefore fall below the threshold of 10% increase that would have triggered a significant traffic change and additional air quality assessment

It is therefore not envisaged that the activities at the new inner harbour will generate any air quality issues that are different from those arising from current port activities.

7.5. Mitigation of adverse effects

7.5.1. Mitigation during Construction

The routes used by vehicles and plant to the site(s) have been carefully identified to avoid residential areas where possible and no temporary haul roads will be needed. All plant and machinery used during construction will fully comply with the Road Vehicles (construction and use) Regulations 1986 (as amended). During the work the plant will be maintained to ensure efficiency and minimise emissions.

Control measures will be implemented, to reduce impacts resulting from dust. Measures will include spraying stored materials with water to keep the surface layers damp. A bowser of clean water will be kept on site at all times to allow the dampening of dust sources. In addition, materials will be covered during transport or damped down to reduce dust generation along transport routes. Any complaints received relating to dust will be assessed and addressed as soon as possible.

7.5.2. Mitigation in Operation

Electric supply sockets will be provided at the quays, to supply power to the vessels. This will enable them to switch off their diesel engines. This was not available at the existing quays and therefore both air quality and noise should be improved.

Depending on the market response to the newly developed Inner Harbour, subsequent assessment of air quality with appropriate mitigation measures could take place should the air quality be considered to have deteriorated.

7.6. Residual effects

Post construction, there should be no residual effect regarding air quality. The potential small increase of sea and road traffic should not create residual effect on air quality.

8. NOISE AND VIBRATION

8.1. Introduction

This Chapter of the ES addresses the potential impact of noise and vibration from the proposed development.

8.2. Assessment criteria

The assessment criteria for effects during construction will be related primarily to the effects of blasting and dredging on sea mammals. Criteria have been taken from the following:

- The protection of marine European protected species from injury and disturbance, guidance for Scottish inshore waters – Marine Scotland
- BS738 Part 2 for maximum peak particle velocity allowed for human and structure protection
- BS 5228 Noise and vibration control on construction and open sites

8.3. Baseline conditions

Peterhead Port currently operates 24 hours a day and 7 days a weeks with existing noise mitigation measures during evenings and at weekends such as isolation of reversing ‘bleepers’ in trucks.

Noise and vibration effects are not regularly monitored by the local authority. In the vicinity of the harbour and Peterhead Bay most noise is probably generated by passing traffic, port operations, vessel generators and vessel movements.

8.4. Prediction and evaluation of likely significant effects

8.4.1. Impact of Construction

Noise during construction will emanate from the following sources:-

- Traffic to and from the site.

- Construction traffic within the site.

- Construction activities including pre-treatment blasting of rock, dredging, filling, quay wall strengthening by coring and anchoring, concreting, demolition and general building construction activities.

The underwater blasting will have little effect on the human population as the procedure will take place underwater, muffling a majority of the sound created. However, the blasting operations plus coring activity in the North Harbour have the potential to affect mammal populations. These issues are addressed separately in Chapter 10.

In terms of construction noise it is important to note that this impact will be very transitory and the local levels in the vicinity of the works will depend also on weather conditions particularly wind strength and direction.

8.4.2. Impact of Operation

It is not envisaged that the activities at the new inner harbour will generate any significant noise or vibration issues that are different from current port activities. Movement of the fish market to the new location at Greenhill will in fact result in the noise from the market activities being transferred from the current position to arguably a location further away from residential properties. Traffic routes are also reverting to where they were previously before the current market was established and will be along recognised harbour access thoroughfares.

8.5. Mitigation of adverse effects

8.5.1. Mitigation during Construction

A pragmatic, enforceable, approach will be adopted during the construction period and will include:-

- Generally all plant and machinery will be carefully selected to minimise noise generation and will be properly maintained, regularly serviced and operated to modern noise suppression standards. Hired plant and equipment will be acoustically screened and maintained. All body panels and other sound attenuating measures will be properly fitted.

- Routes for construction traffic will be carefully selected to avoid, as far as possible, residential areas and to access the port areas along recognised harbour access routes. Chapter 14 refers.

- Permitted construction hours in general will be specified to avoid anti-social times and it is proposed that work would be limited to 07.00 to 21.00 weekdays, and 08.00 to 16.00 at weekends. The exception to this would be the dredging activities. Dredging plant costs are such that projects are only viable if dredging plant is able to operate on a 24 hour basis. The proposals for this project would therefore be that for the dredging plant operates on a 24 hour basis with unloading at the West Quay on to trucks which then deliver to the reclamation area. Procedures would be put in place to silence reversing vehicle ‘bleepers’ with banksmen on duty - this procedure was successfully employed on the Smith’s Quay and embankment project a few years ago. The overall dredging exercise is expected to last 4 to 6 months.

- Underwater blasting will be carried out in capped drill holes and for humans, noise effects will be barely perceptible in the immediate area.

With regard to vibration aspects rock blasting has become a relatively sophisticated discipline, with the size, position, capping, depth and firing of explosive charges designed to reduce adverse noise and vibration effects to acceptable levels while at the same time achieving the excavation objective.

Specific mitigation measures will include:-

- Pre survey of adjacent properties, harbour facilities and nearby buildings including photographs and video survey.

- Compliance with all current mandatory and statutory codes and with current British Standards.

- Use of electronic detonators with multi-second delays to trigger charges in sequence.

- Design of the explosive pattern to reduce the peak particle velocity to not more than 15mm / sec (BS 7385 Pt 2, threshold for houses). More stringent restriction will apply in specific area (i.e. nearby the refrigerated area or adjacent to the quay wall), as will be included within the works contract specifications.

- Noise and vibration effects in relation to mammals are considered in Chapter 10.

8.5.2. Mitigation in Operation

The type of port activity will not change from the existing one and therefore it is not envisage that the redevelopment of the inner harbour will require any mitigation to its new operation compared to the existing operation.

Depending on the market response to the availability of the Merchant's Quay after project completion, which could involve various near activities, assessment of noise and vibration with appropriate mitigation measures will take place in due course.

8.6. Residual effects

Post construction, there should be no residual effect regarding noise and vibration effects.

9. CONTAMINATED LAND / GEOLOGY AND GEOMORPHOLOGY

9.1. Introduction

This Chapter of the ES addresses the impact of the proposed development as a potential source of contaminants on the existing geology and geomorphology.

9.2. Assessment criteria

The assessment criteria have been set to ensure suitability of the material which will be dredged, removed from demolished building or to enable foundation works for the new building

Desk studies, geotechnical investigations and laboratory testing have and will be carried out to ensure that no contaminant will be released into the environment to present a health hazard to humans, sea mammals or fish.

9.3. Baseline conditions

9.3.1. Contaminated land

The main source of contaminated land which could be affected by the work is the upper layer of sandy organic silt present in the inner harbour. However, this is not considered in this ES, as it is dealt with separate maintenance dredging licence which has now been carried out.

Other sources of contaminants could be found either within the buildings to be demolished or within the foundation area of the new fish market building.

However, the geotechnical investigations carried out in advance of the design phase have revealed no contaminants within the strata to be dredged or where new foundations are to be constructed.

9.3.2. Geology and Geomorphology

The length of the coastal fringe from just south of St Fergus, extending southwards to the southern end of Cruden Bay, is founded on non-metamorphosed, post tectonic granite associated with the Caledonian Orogeny (Figure 17).

In the vicinity of Peterhead Harbour granite outcrops on the foreshore north of Peterhead Bay across Keith Inch, North Head and northwards across Roanheads. Within the bay itself rock outcrops within the intertidal zone across the Lido beach frontage and to the south across Salthouse Head and Furrah Head to the north and south of Sandford Bay respectively (Figure 17).

Where the rock is not exposed, the overlying drift of the Peterhead area comprises red clayey till on greenish grey sandy till interbedded with silt and fine sand to the north and red coastal series deposits overlying flint/quartzite rich till to the south. A small pocket of blown sand deposits occurs close to the shoreline at Kirktown, adjacent to the old Crosse and Blackwell factory, at the head of Peterhead Bay (Figure 17).

Specifically the records of the British Geological Survey indicate that the site is underlain by late Weichselian to early Holocene marine, glaciomarine and fluviomarine deposits (Forth Formation) which are in turn underlain by coarse grained Granite (Caledonian Granites) which has east to west fine grained acidic intrusions cutting through it.

To help facilitate the works and to obtain information for design of the works a site investigation has been undertaken.

Ground conditions determined by boreholes sunk in the Inner Harbour indicate their depths within the inner harbour of sandy organic silt (0 to 0.5m) heavily weathered granite (0.15 to 4.5m), underlain by varying depths of medium to strong granite (up to 15.0m). It is expected that a proportion of the hard granite encountered in the area to be dredged will require to be loosened by explosive charges to facilitate removal.

9.4. Prediction and evaluation of likely significant effects

Potential for release of contaminants will be as follows:

- During the dredging of the bed materials
- During the demolition of the existing buildings
- During the construction of the foundations of the new building

9.5. Mitigation of adverse effects

Dredged material

To prevent any contaminants which may still be present within the lower level of the dredged material, TBT tests in accordance with Marine Scotland requirements will be undertaken prior to the dredged material being transported to the area to be reclaimed. Should the tests indicate TBT levels be above the threshold, the material will be dealt with the appropriate manner in accordance with Marine Scotland guidance.

Material from building demolition

Asbestos or other potentially dangerous materials may be present in the existing buildings and area where demolition will occur and a survey has been carried out in accordance with HSG 264; pre-demolition and major refurbishment (formerly known as Type 3 surveys).

Buildings surveyed were as follows:

- Greenhill Fish Market with associated offices (2 storey) to be demolished.
- Greenhill Fish Market single storey element to be refurbished.
- Industrial units to the north of Greenhill Market to be demolished.
- Queenie Bridge Control Room and Switchgear.

- Former harbour entrance 'lighthouse' (to be relocated).

The requirements for dealing with any contaminants found during the surveys will be included in the contract specification.

Material to be removed for foundations

A ground contamination survey prior to the excavation of the material for the pads and strips foundation will be carried out and any material found to be contaminated will be dealt with accordingly.

9.6. Residual effects

No residual effects are predicted with regards to contaminated material from any of the sources identified above.

10. ECOLOGY

10.1. Introduction

This Chapter addresses the potential impact of the proposed development on the surrounding ecology.

The focus of the assessment is on birds, intertidal and benthic ecology, fish and marine mammals which may be affected by the proposed development

A separate report has been produced which provides a detailed ecology impact assessment and this is provided in Appendix III of this ES together with annexes of that report:

- Underwater noise calculation report
- Draft Marine Mammal Mitigation Plan

The broad conclusions of the detailed ecology impact assessment are given below.

10.2. Conclusion and recommendation from Ecology Impact Assessment

A total of 18 Valued Ecological Receptors (VERs), including one intertidal biotope, six bird species, six marine mammals and five fish species were identified through desk study and as part of the Phase 1 intertidal habitat survey and extended surveys undertaken within Peterhead Harbour and Peterhead Bay. No significant impacts, in terms of EIA, are predicted for these VERs with impacts considered to be of negligible or minor significance. An exception to this, is the effect of underwater noise associated with blasting activity on marine mammals, for which a potential impact of major significance was identified. Through the implementation of adequate mitigation and monitoring measures (see para. 8.4.11 of Appendix III and Marine Mammals Mitigation Plan) a residual impact of minor significance, which is not significant in EIA terms, is however predicted.

The HRA assessment considered the potential effects of the project on three Special Area of Conservation (SPAs) and their ornithological qualifying features and seven Special Protection Area (SACs) five in relation to marine mammal species and two in relation to diadromous migratory fish and freshwater pearl mussel.

For five of the sites (all the SPAs and two SACs where harbour seal is the relevant qualifying feature), it was concluded that there was no potential connectivity with the proposed development and therefore no further assessment in relation to these sites and features was carried out.

For the remaining sites (two grey seal SACs, one bottlenose dolphin SAC and two Atlantic salmon and freshwater pearl mussel SACs) the potential for connectivity with the proposed development could not be excluded. As such, those sites and qualifying features were taken forward for assessment of potential effects on site integrity. In all cases it was concluded that the proposed development, either alone or in combination with other plans and projects, would not result in adverse effects on the integrity of the SACs.

To further minimise the impacts associated with development activity upon the VERs and other ecological receptors within the harbour the following good practice measures are proposed:

(1) Control measures associated with dredging and filling activities including the use of grab or back-hoe bucket type dredging plant instead of cutter suction to reduce seabed disturbance and suspension of sediment within the water column;

(2) A soft-start approach is recommended with regard to any necessary blasting activities to minimise potential impacts on marine mammals and fish;

(3) Should demolition of the fish market at Merchant's Quay be carried out during the breeding season for birds, a Breeding Bird Survey may be required in order to prevent potential disturbance or destruction of nesting attempts by birds (e.g. starling) and to comply with the Wildlife and Countryside Act 1981 (as amended). Demolition of this building outside of the breeding season would not adversely affect breeding birds.

(4) In addition to the good practice measures proposed above, a Draft Marine Mammal Mitigation Plan (MMMP) (see Appendix III: Marine Mammals Mitigation Plan) has been included and a Draft Construction Environmental Management Plan (CEMP) will been designed and will be implemented to further minimise environmental effects potentially arising from the proposed development.

11. HEALTH AND SAFETY

11.1. Introduction

This Chapter of the ES addresses the potential impact of the proposed development on the health and safety with the main focus on the construction phase.

11.2. Assessment criteria

The assessment criteria during the construction phase relate mainly to human health and safety protection and have been derived from the Health and Safety at Work Act 1974.

11.3. Baseline conditions

The major health and safety issues within the study area arise from port associated activities. Ports can be potentially risky environments due to the nature of the activities which are fundamental to their existence.

Peterhead Port Authority has several safety and management contingency plans amongst which the Port Emergency Plan[16] details a call-out procedure which must be adopted in the event of an emergency such as fire, stranding, collision, explosion and any other occurrence which is likely to affect the safety of persons and property.

The plan is designed to control incidents, safeguard employees and anyone nearby who may be affected and to minimise damage to property and the environment.

There are other more general safety measures at the port, including barriers to limit public access, provision of lifebelts, quay ladders, etc.

Specific measures also apply to the use and storage of explosives, under the auspices of the Health and Safety Executive Explosives Inspectorate. Currently there are two explosives licences for Peterhead, one for the mainly offshore oil industry support vessel berths in the south of the port and the other for small amounts of explosives at the Albert Quay. The latter would probably be suspended for the duration of the construction works. It is expected that the use of explosive charges will be required during the works for rock removal, and specific measures would have to be put in place by the dredging contractor in conjunction with HSE EI. The Inspectorate have indicated that the type of construction envisaged does not require a safeguarding distance in relation to explosives handling operations and they therefore have no objection to the proposed development. PPA, at this time, do not intend that the new berths themselves will be licensed for explosives.

Peterhead Bay provides a safe refuge for sea going vessels. However in certain storm conditions, vessels need to leave some of their berths and move to others, as the wave conditions can reach levels that would make it dangerous to remain moored.

There is a Designated Bathing Beach at the Lido in Peterhead Bay. Routine water quality testing has confirmed that the water achieves the required quality for its designation as bathing water and poses no health risk to bathers. (Chapter 6.3.2 refers).

11.4. Prediction and evaluation of likely significant effects

11.4.1. Impact of Construction

Construction of the Works will result in health and safety issues affecting the construction contractors personnel, port users, and the general public including local residents. These issues include but will not be limited to:-

- Increase in traffic and number of heavy goods vehicles (HGVs).
- Maritime construction activity.
- Noise.
- Vessel movement and port operations near the works.
- Handling and use of materials including heavy rock armour, and explosive charges.

11.4.2. Impact of Operations

- At present no new processes are envisaged as part of the permanent works as the main features relate to lengths of berth and consequential operational advantages for larger vessels.

11.5. Mitigation of adverse effects

11.5.1. Mitigation during Construction

Mitigation measures which will be adopted by the contractor and PPA will include:

- Compliance with the mandatory CDM Regulations which embrace all aspects of the construction activities, including client and contractors responsibilities. A key element of these is the early identification of health and safety risks. PPA has already appointed a Project Coordinator under the regulations.
- Compliance with the PPA Port Emergency Plan.
- Appropriate safety issues as related to navigation, Chapter 13 refers.
- Adherence to the issues described in Chapter 6 in relation to water quality.
- Adherence to the issues related to traffic routes to the site as described in Chapter 14
- Adherence to the issues related to use of explosive charges as described in Chapter 8.
- Adherence to the Construction Environmental Management Plan
- Contractors will be advised to adhere to the Considerate Constructors Scheme

In addition the contractors will be required to submit risk assessments (RA) and method statements (MS) for approval prior to commencement each site activity.

11.5.2. Mitigation

As it is the current practice all port users are required to comply with PPA regulations which are continually reviewed.

11.6. Residual effects

Based on the assumption that the contractor and the operators will adhere to regulations, best practice and internal procedures, no residual effect to the health and safety of human should be anticipated from the construction and operation of the redevelopment of Peterhead Inner Harbour.

12. SOCIO-ECONOMIC

The socio-economic impact has been dealt with in an economic impact assessment for this project by BIGGAR Economics in March 2014.

For completeness of this EIA, the conclusions of the economic impact report have been summarised below and the complete report by BIGGAR Economics can be found as Appendix IV.

12.1. Conclusion from the economic impact assessment

The key finding of the report is that by 2032 the project could help to deliver £203 million net additional Gross Value Added (GVA) for the Scottish economy and support around 2,525 net additional jobs.

12.2. Baseline condition

It was estimated that in 2012 Peterhead Port contributed £800 million GVA to the Scottish economy and supported more than 9,400 jobs. This includes:

- £54 million GVA and 620 jobs from port operations.
- £103 million GVA and 980 fishing related jobs.
- £181 million GVA and 4,320 fish processing related jobs.
- £476 million GVA and 3,460 jobs in the oil and gas sector.
- £2 million GVA and 35 jobs from the transportation of agricultural products.

12.3. Future Impact by 2032

The economic impact and job supported by Peterhead Port depending on the project going ahead or not would be as follows:

Table 16 - Economic impact by 2032 with and without the project

	Without the project implemented	With the project implemented
GVA	£ 628 million	£ 831 million
Jobs supported by PPA	7,920	10,450

This represents a net additional benefit of £203 million GVA and 2,525 jobs compared to the reference case under which the project does not go ahead. This impact is a combination of effects on different areas of activity currently undertaken at the Port.

The project is expected to enable the Port to safeguard £29 million GVA per year for the Scottish economy and around 333 jobs.

By 2032, should the project proceed, it is expected

- To create or safeguard £24 million GVA per year for the Scottish economy and around 150 jobs in the Scottish fishing industry

- To contribute an additional £59 million GVA per year to the Scottish economy and support the creation of around 1,420 jobs in the Scottish fish processing industry.

- To safeguard £90 million GVA per year for the Scottish economy and around 620 jobs in the oil and gas industry

- To support around 7 additional Scottish jobs by 2032 and contribute a small amount of additional GVA for the agricultural products.

12.4. Conclusions from the Economic Impact Assessment

It is expected that the investment proposed by the PPA would generate a substantial net additional benefit for the Scottish economy in terms of jobs and GVA. The main beneficial GVA impact is expected to arise as a result of new oil and gas related activity that the new deep-water berths freed-up would enable the Port to attract and this activity would be safeguarded as a result of investing in the new facilities. Most of the employment impact is however expected to be as a result of an increase in the volume of fish that could be landed at the new fish market and the knock-on effect that this would have on the local fish-processing sector. By enabling fish processors to substitute fresh fish for frozen imports, this is also expected to have a positive impact on Scotland's balance of trade with the rest of the world. The PPA investment is also expected to lead to improvements in the quality of fish landed and processed in Scotland, which should help to support the development of the Scottish food and drink sector.

13. VESSEL MOVEMENT / NAVIGATION

13.1. Introduction

This Chapter of the ES addresses the potential impact of the proposed development on the navigation.

13.2. Assessment criteria

The assessment criteria for the vessel movement and navigation is primarily based on the review of the current situation compared to potential increases in movements and sizes of vessels from the new development.

13.3. Baseline conditions

Peterhead Bay lies between Keith Inch to the north and Salthouse Head to the south. It is protected by the North Breakwater, extending 400m SSW from Keith Inch and by the South Breakwater extending 750m NE from Salthouse Head. The entrance between the breakwaters faces SSE and is 200m wide. Lights are located at the head of the breakwaters. Entry between the breakwaters should be made with Kirktown leading lights in line, bearing 314 degrees. The line of leading lights is picked up around 250m off the entrance with winds from the north-east, and up to 2km offshore when winds are from the SE.

The leading lights are located on framework columns, painted reflective orange, each having an orange triangular top mark, the front one pointing up, and the rear pointing down. Conspicuous objects assisting navigation include: The Town Hall spire, identifiable by its illuminated clock; Reform Tower, standing on Meethill; and the Power Station chimney[2]. The Admiralty Chart reproduced in Figure 7 indicates the navigation features.

The harbour has per annum circa 3,000 commercial vessel arrivals; 2800 fish landings and 500 other movements. These figures are arrivals into the Outer Harbour. Vessels going on into the Inner Harbour represent about 1500 of these.

13.4. Prediction and evaluation of likely significant effects

13.4.1. Impact of construction

The main impact on navigation during construction is that areas of the Inner Harbour will be temporarily closed for short periods of time during the deepening and strengthening of the quays.

Works to the North and South Harbours will not affect the fish market which is located in Merchants' Quay Basin, therefore 75% of the works will have no impact at all on fish landings.

There may be some disruption to berthing of fishing vessels post-landing, however, this will be managed by the Harbour Master to ensure adequate berths are available. This may mean berthing vessels 2 abreast or berthing stern on or similar depending on weather conditions and volumes of traffic.

Dredging in Merchant's Basin will be managed locally to ensure that access to a significant proportion of quayside will be available at all times.

Some imported material and dredged material may be delivered by sea increasing vessel movements periodically.

In addition some construction activities will also have an impact on the current navigation during the construction, such as:

- Dredging operations with the use of dredging plant and split hopper barges.
- Import and placing of revetment rocks along the edge of the new reclamation.

13.4.2. Impact during operation

Vessel traffic is not expected to increase over the current situation as the aim of the proposed development is mainly to increase the efficiency of the port rather than increase total volume of vessel traffic. There should be no significant effect compared to the current operation and therefore no significant effect to any other elements reviewed under this ES which are linked to the vessel movements

13.5. Mitigation of adverse effects

Within the inner harbour, the Harbour Master has agreed to manage the temporary access restriction, the inner harbour has been divided into six areas and only one of the six areas will be affected at any one time during the construction.

A detailed navigation plan including waiting area will be developed by PPA to cater for the landing delays during the construction. This will also minimise any effect caused by the development on recreational or other businesses movements within the port.

A dedicated section of the construction specification will be included for the operation of vessels and plant within the harbour during construction with specific measure to be followed by the Inner Harbour contractors to regulate and minimise impact on the navigation:

- When operating vessel and floating plant, the contractors will only operate upon order and directions given by the Harbour Master
- Masters of vessels used by the contractor will be required to hold qualifications appropriate to the class of vessel under their command.

13.6. Residual effects

Post construction and during operation there should be no residual effects.

14. TRAFFIC & TRANSPORT

14.1. Introduction

This Chapter of the ES addresses the potential impact of the proposed development on the traffic and transport.

14.2. Assessment criteria

The criteria for the assessment of the traffic and transport impacts are:

- The current traffic over Queenie Bridge compared with post development traffic.
- Development Control: Planning for Air Quality - Environmental Protection UK which sets the criteria for air quality assessment resulting from traffic increase.
- Design Manual for Road and Bridges, changes of road alignment, ADDT, daily average speed or peak hour speed.
- Effects on the public roads network.

14.3. Baseline conditions

There are currently no rail connections to Peterhead, with the nearest railway station located in Aberdeen. Historically there was a mainline rail link from Peterhead to Fraserburgh and Aberdeen, which was closed many years ago. The old railway formation is currently used as a public right of way.

The main road to Peterhead from the south is the A90 (T) from Aberdeen, much of which has been recently upgraded although most of the road remains a simple carriageway. The road turns westwards to the south of Peterhead and runs around the landward edge of the town (the Peterhead Ring Road) before heading to the north. The A982 takes traffic into the centre of Peterhead. At the junction with the A90 (T) and the A982 there is an industrial road which takes traffic to the south of the bay, including the prison, the South Base and the South Breakwater.

There is a designated heavy goods vehicle route to the Harbour through the north of the town (A982) which connects with the A90 (T) via South Road, King Street, Ugie Street, Port Henry Road, Alexandra Parade and Greenhill Road. Alexandra Parade and Greenhill Road are under private ownership of the PPA. An alternative route via the Harbour (Queenie) Bridge is also under the PPA’s ownership and is subject to weight restrictions.

Roads in and around Peterhead are rarely congested, although significant traffic can be generated in and around the port area at certain times during the day.

The nearest airport is Dyce Airport located on the north-west side of the city of Aberdeen.

Queenie Bridge survey

A survey of vehicles crossing Queenie Bridge during the hours when it is open to traffic was undertaken over 5 separate days during 30 minute periods between 6.45am and 1.15pm.

Table 17 below show the total number of vehicles counted during these 5 days.

Table 17 -Vehicle Counts at Queenie Bridge

	HGVs		Small lorry / Van		Car		Total	
	East-bound	West-bound	East-bound	West-bound	East-bound	West-bound	East-bound	West-bound
Wed 18.06.2014	11	12	31	36	33	32	**75**	**80**
Thu 19.06.2014	6	14	21	34	38	35	**65**	**83**
Fri. 20.06.2014	7	9	34	29	41	32	**82**	**70**
Mon 23.06.2014	3	9	18	23	37	32	**58**	**64**
Tue 24.06.2014	11	12	23	22	22	35	**56**	**69**
Average vehicles over 5 half day counts							**67**	**73**

14.4. Prediction and evaluation of likely significant effects

14.4.1. Impact of Construction

Additional traffic arising from the construction of the new works is expected to constitute the following:

- Cars and general site vehicles travelling to and from the main works compound.
- HGVs for the delivery of materials for the construction of the new fish market.
- Trucks delivering concrete for quay wall strengthening and stabilization.

It is expected that the bulk of the construction material delivered for the project will come from the construction of the new fish market.

Increased traffic movements have been assessed as follows:

Inner Harbour Deepening

- The deepening would likely be carried out by back-hoe dredging with material then transported by barge to Merchant's Quay or West Quay where it would be unloaded and then trucked to the reclamation area, all within PPA land. Volume to be dredged from these areas and deposited in the reclamation zone is of the order of 110,000m^3. Using 40T trucks at a frequency of 5 per hour would result in a time operation of approximately 1400 hours. No extra traffic movements would arise on public roads.

  Revetment armouring for the new reclamation is estimated to require 18,000m^3 of rock armour. This material would come from quarries to the south of Peterhead along the A90, onto the A982, and then east at Kirkton roundabout, and along Bath Street to the site. Approximately 1850 HGV trips would be required. Based on a 6 hour day and 5 trucks an hour, the operation would take approximately 60 days. The contractor may choose to import such material by sea, in which case no extra traffic would result.

Demolition and Construction of New Greenhill Fish Market

- Materials and goods delivery would run over an a 8 month period, 8 hours a day, with an average of one HGV an hour:

- Routing for this material will be on the designated HGV route from the A90 (T) to the North Breakwater via South Road, King Street, Ugie Street, Port Henry Road, Alexandra Parade and Greenhill Road

Removal of Queenie Bridge

- This operation will require some heavy lifting and transport equipment. The removal will require a permanent 'stopping-up' at the west abutment of the Junction Canal before works can continue. The work is expected to be carried out in a fairly short timescale with a limited impact on traffic especially if done at weekends. It is envisaged that removal of this bridge will take place early in the contract, prior to North Harbour excavation commencing.

14.4.2. Impact of Operation

Removal of Queenie Bridge

Traffic crossing Queenie Bridge runs mainly traffic to and from the eastern parts of the Port and is not through traffic. With the removal of Queenie Bridge, the daily traffic (counted as an average of 67 and 73 vehicles during the operation time) will be redirected via Alexandra Parade.

The minor increase of traffic on Seagate and Alexandra after Queenie Bridge removal is deemed to be negligible, and is not considered as an adverse impact caused by the development.

Increase of traffic

The economic assessment of the project has indicated a projection of 303 jobs to be created within Peterhead by Year 20. As Peterhead Port operates 24 hours a day activities a spread in traffic flows resulting from the increased economic activity is expected. This should not give a significant impact over and above the existing traffic in Peterhead. The traffic to the new Fish Market, instead of running along Charlotte Street and part of Bath Street, will now revert to the previous route to the Greenhill Market location where in former years traffic flows were much higher. Routing for this will be via Ugie Street, Port Henry Road and then into Alexandra Parade, as previously.

Similarly the threshold for increase of traffic on the A90 Trunk road required further assessment is an increase of 10% of the ADDT traffic. Increases from the development will be well below this threshold.

14.5. Mitigation of adverse effects

14.5.1. Mitigation during Construction

Mitigation measures would include:

- Delivering material by sea as far as is practicable.
- Limiting bulk deliveries to the new Greenhill fish market and Inner Harbour site to certain hours to avoid morning and evening peaks and busy school times.
- Method statements and risk assessments provided by the contractors for approval of PPA and Aberdeenshire Council.
- In accordance with good practice the contractor will be required to keep all roads clean and to utilise plant and equipment to this effect. Properly maintained and serviced vehicles with well-sealed flaps will also be a requirement.
- The use of Lodge Walk and Harbour Street as haul routes will be restricted to after 8am each day.

14.5.2. Mitigation during operation

In terms of traffic flows in the short to medium term it is envisaged that the existing road infrastructure will be more than adequate to accommodate the additional traffic generated. However Aberdeenshire Council may wish to review the current traffic priority at the North East Street junction with the slight dog-leg Port Henry Road/Alexandra Parade where currently North East Street is the through road.

14.6. Residual effects

Queenie Bridge will be removed and traffic permanently diverted to Seagate and Alexandra Parade. Fish Market traffic will now journey mainly via Ugie Street, Port Henry Road and Alexandra Parade.

As part of the new Fish Market development at Greenhill, adequate manoeuvring space will be provided for commercial vehicles utilising accessing the premises and additional car parking for market staff and associated visitors will be provided.

The modest change in traffic patterns and slight volume changes over time are not considered to be significant in terms of road capacity, and any potential increase in vehicular emissions will be well within statutory limits.

15. LANDSCAPE AND VISUAL IMPACT ASSESSMENT

15.1. Introduction

This Chapter of the ES addresses the potential impact of the proposed development on the landscape and visual impact.

15.2. Assessment criteria

The assessment criteria for the landscape and visual impact assessment are:

- The baseline conditions
- Local designated landscape affected by the development
- Listed buildings affected by the development

15.3. Baseline conditions

15.3.1. Amenity and Recreation

There is a wide range of services available in Peterhead including five primary schools located close to the residential areas; Peterhead Academy, a sports and community centre which includes a theatre and swimming pool, a library and museum, and two hospitals. Figure 18 indicates the main town, highlighting the main features noted below.

In terms of leisure facilities the Bay plays an important role in Peterhead. Although the primary use of the Harbour and the Bay of Refuge remains industrial, the Bay of Refuge in particular has a particular recreational value to the town, which Aberdeenshire Council considers should be safeguarded and encouraged.

Peterhead has an attractive waterfront providing an important visual and recreational focus of the town (Photograph 1). The waterfront is a popular amenity area, the dune area and beach by the Lido is valued locally as a recreational resource and has potential for increased usage.

At the southern extent of the beach, the Peterhead Marina is owned and operated by Peterhead Port Authority. The marina has approximately 75 boats permanently moored with a further 300 visiting boats per year, each spending about 3-4 nights in the town. The Port also receives cruise liners. There is a sailing school based at the marina, which has permanent premises on shore at the Lido.

Peterhead Maritime Heritage Centre and car park look directly onto the marina and waterfront. There is also a caravan site at this location.

The Maritime Heritage Centre is an excellent state of the art facility, describing all aspects of Peterhead’s relationship with the sea including historical and contemporary industries, sea related professionals, maritime technology, oil and gas, social issues and the history of a typical Peterhead family over the last 200 years.

In Peterhead itself, the Arbuthnot Museum houses a collection of Innuit art, maritime artefacts, coins and Peterhead silver. Exhibition space has housed recent events including exhibitions on local archaeological findings and 18th century watercolours of the town.

Peterhead has three Conservation Areas, two of which are of outstanding architectural value. The Aberdeenshire Towns programme aims to enhance the appeal of Peterhead’s historic built heritage, but as yet this is not used as a recreational resource.

Around Peterhead the Ugie Estuary and Craig Ewan, to the north of the town, provide a ‘green corridor’ of ecological interest suitable for walking, picnicking, angling and bird watching. Adjacent to this, the well-used Peterhead golf course has been in existence since 1841.

The Formartine and Buchan Way follows the disused railway line and was opened as a Right of Way by the Buchan Countryside Group. Used by walkers, cyclists and horse riders it leads from Peterhead, 13 miles west to Maud and then on to Fraserburgh and Aberdeen.

There are other public rights of way in Peterhead that are within the area of the proposed works. One footpath follows the western side of the bay south, along the northern side of the prison to the coast and continuing south from this point. Another public right of way runs along Keith Inch following a loop along Ship Street, Pleasure Walk and Pool Lane.

15.3.2. Landscape and Aesthetics

Four types of landscape have been identified as having common landscape characteristics, physical influences and historical, architectural and cultural influences. These are:

- The coastal landscape
- The coastal-influenced agricultural land
- The inland, agricultural heartlands
- The river valleys

The Peterhead Inner Harbour works lie within the Coastal Landscape Area.

Within this broad landscape type, sub-areas have been identified with subtly distinct and different characteristics defined by landform and land cover. Three areas are of relevance to the Peterhead area. These are: Cliffs of the North and South-East Coasts, Dunes and Beaches from Fraserburgh to Peterhead, and Eastern Coastal Agricultural Plain.

Cliffs of the North and South-East Coasts

Along the east coast, south of Peterhead, cliff and rugged headlines with narrow inlets and occasional sheltered sandy bays such as those at Cruden and Sandford dominate the coastal strip. South of Peterhead the rugged coastline has been eroded creating distinctive geomorphologic landforms such as blowholes and arches.

Despite the exposed environment of the coast, even the most vertical cliff-faces are colonised by vegetation such as short creeping grasses and occasional wind-swept gorse bushes.

Through the centuries settlements have been established along this rocky coastline varying in size from the prosperous fishing port of Peterhead to tiny fishing villages dotted along the north and south-east coasts of the district.

Dunes and Beaches from Fraserburgh to Peterhead

Running in an almost constant stretch from Fraserburgh South to Peterhead there are long stretches of sandy beach backed by dunes. This landscape forms a wider, gentler transition between land and sea than the rugged cliffs elsewhere along the coast. The Loch of Strathbeg protects the dune system north of Rattray Head.

Vegetation includes coastal grassland and marram, which holds together the shifting sands.

This landscape has few settlements or man-made structures other than the lighthouse off Rattray Head and St Fergus Gas Terminal.

Eastern Coastal Agricultural Plain

Bordering the eastern coast of Banff & Buchan extends a low coastal plain, a broad sweep of gently undulating land with open views to the sea.

Agricultural land predominates along this coastal stretch with localised areas of peat moorland and coniferous plantations including; St Fergus Moss, Rora Moss and the Moss of Cruden. Medium sized groups of coniferous trees are scattered elsewhere throughout the area, but it is generally sparsely wooded. Broadleaved trees are restricted to occasional shelter beds and groups around farms. The large, open fields are mostly bounded by post-and-wire fencing, with overgrown stone walls in the north of the area.

The general uniformity of the topography in the area has allowed the establishment of a random network of farms across the landscape. Villages such as Hatton, Longside and New Leeds are a legacy from the nineteenth century.

Peterhead Bay is located in the landscape context described above. However, the landscape and aesthetics of Peterhead Bay itself are predominantly industrial and typical of a port facility.

Photographs 1 and 2 show Peterhead Bay and the Harbour with the breakwaters, piers and jetties around the bay.

Photograph 1 – Aerial photo of Peterhead and Inner Harbour

Photograph 2 – North Harbour – North & West Quays

The beach and dune area, along the waterfront, provides a natural feature in the otherwise industrial and urban environment.

Beyond the port, to the north and west of the Bay, is Peterhead's main residential area. The town traditionally grew from the harbour and the fine-grained street pattern is still in evidence close to the town centre. Surrounding the urban area of Peterhead, which is mostly contained within the ring road, undulating agricultural land of the Eastern Coastal Agricultural Plain predominates.

Peterhead Bay itself cannot be seen from the distance from any point on land. When traveling from the south, the bay is first seen when the A982 from Aberdeen reaches the junction with South Road. When travelling from the north the town's buildings block all views of the bay. The only road from which there are clear views of the entire bay is the South Road, which skirts the bay to the west.

15.3.3. Cultural and Archaeological Heritage

The Earl Marischal of Inverugie originally founded Peterhead around the harbour of Keith Insche in 1587. By 1680 it had become one of the biggest fishing ports in the north of Scotland. Over the years Peterhead grew up the hill from the harbour and the fisher folk moved to the Roanheads area to the north of the harbour.

The character of the harbour area still represents the essence of Peterhead. The outer and inner harbours contain a wide variety of port related activities, which combine to create the busy environment of a working harbour.

The area between the harbour and Broad Street was laid out in the 18^{th} and early 19^{th} centuries. It is well kept and is typical of a traditional North-East Scotland townscape.

During the 18^{th} and 19^{th} centuries Peterhead became one of the premier spa towns in Scotland, due to the medicinal properties of the water from the Wynd Well, later known as the Wine Well (demolished in 1930s). The heart of the area was on Broad Street, and this phase led to the development of some fine mansions in the immediate hinterland,which were subsequently swallowed up by the town as it grew westward.

St Peter's Church is the only Scheduled Monument in the project area. The location of the church is shown on Figure 19.

Scheduled Monuments (SMs) are defined and protected under the Ancient Monuments and Archaeological Areas Act 1979. Such sites are of national importance and any works affecting them require Scheduled Monuments Consent.

Table 18 shows the sites listed on Aberdeenshire Sites and Monuments Record (SMR) that are in the vicinity of the study area. These sites are indicated in Figure 19.

Table 18 -Sites around Peterhead Bay listed on Aberdeenshire Council's Sites and monuments records

No.	Grid Ref.	Dated	Description
1	NK 1215 4466	Bronze Age/ Post-Medieval	**Meet Hill.** Site of tumulus, now destroyed. Fragments of human bones and food vessel were found.
2	NK 1231 4510	Post-Medieval (from 1560)	**Peterhead Brick Works.** Site of brick and tile works, demolished with visible remains
3	NK 1305 4435	Recent (20^{th}C)	**Salthouse Head Coastal** battery now destroyed. Two 6 inch guns were sited here during World War II.
4	NK 1280 4450	Recent (20^{th}C.)	**Invernettie.** Site of a seaplane repair & stone base opened in 1918, now destroyed. A prison is now built on the site.
5	NK 1264 4605	Medieval/ Post-Medieval	**St Peter's Church.** Remains of Church, designated as Scheduled Monument**.**
6	NK 1262 4600	Unknown	**St Peter's Churchyard.** Remains of occupation, rough pavements, undresses stones, hearths, occasional charred wood & bones found.
7	NK 1262 4612	Post-Medieval	**Kirkburn Mills.** Mills used by woollen industry in 1812 and later brewery, sawmill, bone crushing mill, and a flour and meal mill. Presently used for woollen trade**.**
8	NK 1232 4612	Unknown	**Peterhead.** Alleged site of grave where combatant of duel was killed and buried on the spot. No evidence.
9	NK1378 4577	Post-Medieval	**Peterhead Castle.** Site of castle probably constructed around 1589, demolished in 1813 to make way for the harbour. No trace
10	NK 1382 4575	Post-Medieval	**Muckle Battery.** Site of Gun Battery, now destroyed.
11	NK 1397 4585	Post-Medieval	**Little Battery.** Site of Gun Battery, now destroyed.
12	NK1365 4586	Post-Medieval	**Peterhead Harbour.** Comprising: Port Henry Harbour, North Harbour & South Harbour. Engineers over time include Smeaton, Rennie, Telford, Stevenson, Coode.
13	NK 1384 4580	Post-Medieval	**Phinnie's House.** Site of townhouse**.**
14	NK 1352 4587	Medieval/ Post-Medieval	**St Peter's Well/Wine well.** Site of well used for its medicinal water during the 17^{th}C when Peterhead was an established spa.
15	NK 136 467		**Fisherman's House.** Roanheads: mid to late 19^{th}C several parallel ranges of 2-storey ashlar houses
16	NK 136 462	Post-Medieval	**Drydock.** Late 19^{th}C: small concrete dry dock and single storey workshop and 3 storey store block.

There are 3 Conservation Areas in the town, at Roanheads, Buchanhaven and in the town centre itself (Figure 19). The Central Conservation Area lies to the north of the harbour and encompasses the main streets of Broad Street South, Lodge Walk and Harbour Street West to the junction of Charlotte Street and Errol Street.

Within the Central Conservation area, designated in 1975 and given 'Outstanding' status by the Secretary of State, there are many listed buildings. Figure 19 shows the listed structures within Peterhead.

Listings are divided into 3 categories to distinguish between different levels of interest. The definitions of the categories are as follows:

- Category A - Buildings of national or international importance, either architectural or historic, or fine little-altered examples of some particular period, style or building type.

- Category B - Buildings of regional or more than local importance, or major examples of some particular period, style or building type which may have been altered.

- Category C - Building of local importance, lesser examples of any, style or building type, as originally constructed or altered, and simple, traditional buildings which group such as an estate or an industrial complex.

There is one Category A listed building, St Peter's Church, which is also the only Scheduled Monument in the town. The majority of listed structures have Category B status.

Listed building consent is required for any works or alteration, which affect the character of a structure. In this context the entire North and South Harbours are designated as Category B.

Listed Building and Conservation Areas are principally protected under the Planning (Listed Building and Conservation Areas) Scotland) Act 1997 and guidance is given in National Planning Policy Guidance Note 18.

A number of ship wrecks (approximately 15) have been recorded within a 10km radius of Peterhead, but none have any form of statutory protection. Only one of these, of unknown origin, was within Peterhead Bay, near the Lido and had been removed by 1988.

15.4. Prediction and evaluation of likely significant effects

15.4.1. Impact of Construction

Amenity and recreation

During the construction period there is likely to be increased sediment load in the water affecting water sports in the bay and the designated bathing area. This will mainly occur during dredging.

Recreational users of the bay, visitors to the Marine Heritage Centre and residents at the Caravan site are likely to experience some increased noise related to construction activities. However, in any port or harbour setting, noise is a common and expected characteristic. Other than for the pile installation, which may prove of interest to some, this impact is considered to be minor.

The Sailing Club activity zone may need to be slightly curtailed temporarily as a result of construction vessel movements and PPA will hold discussions with the Sailing Club as necessary. No impact is predicted on the recreational use of the Formartine and Buchan Way. The work is likely to disrupt usage of the bay footpath (private footpath on PPA land) extending along Smith Embankment. As a consequence the footpath may be diverted or possibly closed during some part of the reclamation works. Diversion or closure will only be a temporary measure and therefore the impact will be minor.

Landscape and aesthetics

The works will have a visual impact particularly on users of the inner north port area, residents in the area surrounded by Charlotte Street, Bath Street and Harbour Street, Seagate and anyone travelling along those roads. The works will also be visible, though from greater distance, from South Road around Peterhead Bay, the Lido in general and the South Bay Harbour. Residents in Charlotte Street will have an outlook over the new lay down area on the reclamation to be located west of the Smith Quay.

People in Peterhead area will have some view of the works to a greater or lesser extent but apart from this, on land, the works will not be seen, and even from sea the works will be partly screened by the existing commercial harbour buildings and the main North and South Breakwaters.

It is expected that the proposed fish market will not have a detrimental effect on the overall visual impact of the Harbour or its listing. As mentioned in the description of the new market building in Chapter 2, the building to be built will be a replacement building and visually will be considerably more aesthetically pleasing than the current sheds. With regards to the existing conservation areas, it is anticipated that there will be no adverse impact on them and it is worth noting that the site already lies on a heavy traffic route used by HGV's.

Cultural and Archaeological Heritage

The following areas are planned to be demolished or covered

- Greenhill Fish market
- Queenie Bridge
- Merchant's Quay Fish market
- Jetty at Merchant's Quay
- Quays Walls of the Inner Harbour to be strengthened or stabilised.

Any historic sites, listed buildings or similar located close to roads could be affected by the local increase in traffic caused by the works with corresponding potential increase in vibrations. In this respect the properties bounded by the north side of Charlotte Street, Bath Street and Harbour Street form the boundary of a local conservation area.

Some vibration effects from the use of explosive charges for pre-treatment of rock for dredging will also arise.

St Peter's Church, the only scheduled monument noted in the area, will not be affected by the proposed development.

15.4.2. Impact of Operation

Amenity and recreation

The features affected by the completed works will be limited to the existing access path along the Smith Embankment, the existing sea area available to the Sailing Club, and the area available for local creel fisherman.

Landscape and aesthetics

The new fish market building will be visible with some change to the current landscape. The new structure will be joined to the former market shed part of which will remain.

Lighting will be sensitively addressed by provision of down lighting, which will be designed to avoid any dazzling or intrusive effect.

The armour stone on the revetment will follow the nature and pattern of the existing breakwater rock armour and as such will provide continuity along this face of the bay as well as having a visible finish that is not unattractive.

A photomontage of the new reclaimed area is shown in Photograph 3 below.

Photograph 3 - Photomontage from Lido beach of the future reclamation area

In general terms the new development will fit in with and be a closely integrated extension of an existing busy, active and thriving commercial port.

Cultural and Archaeological Heritage

Sections of the quay wall may have newly built elements covering the historical quay faces. Most of the walls are in fact already of concrete facing construction as shown in Photographs 2, 4 and 5.

Photograph 4 – North Harbour – West boom Jetty & East Pier

Photograph 5 – Mitchell Quay & east Wall South end

The length of blockwork which will be covered is on the east side over a length of approximately 160metres.

The project is not likely to generate other impacts on the cultural and archaeological heritage of the area as a result of the operation of the new works.

15.5. Mitigation of adverse effects

15.5.1. Mitigation during construction

Amenity and recreation

In general it will be important that local residents and visitors to the area are advised that the work is being undertaken, what temporary disturbance may be experienced and for how long, and what the work will achieve on completion. Notices will be posted adjacent to key recreational and amenity areas and leaflets will be distributed to local residents and occupiers of the caravans at the Lido. Specific port users and stakeholders will be informed separately and PPA has already addressed this on several fronts.

Should public rights of way be affected by the construction works, they will be diverted rather than closed during construction period where possible. No temporary public footpath closure will be made without adequate safe and satisfactory alternatives being made available. Any temporary closed path will be fully sign-posted at both ends and appropriate Orders will be obtained from Aberdeenshire Council.

Adequate safe and satisfactory alternatives routes will be made available for the private footpath which is likely to be affected during the reclamation works. The footpath will be reinstated as soon as practical.

Restrictions on working times for certain operations will limit noise generation and this will help to reduce disturbance to recreation and amenity particularly over weekends.

Landscape and aesthetics

Cranes, piling barges and other items of construction equipment are likely to be the tallest visible elements during the works. Some of these will only be onsite for certain activities, although it is likely that cranage will be on site for most of the construction period. However, the port frequently hosts offshore jack-up rigs for repair and maintenance and these dwarf any temporary construction equipment. Watering of the works area, adjacent roads and construction plant will keep dust to a minimum during any dry periods.

The main materials to be used for the fish market building will to be Fyfestone blockwork, Chinese granite (in feature areas), and ‘plastisol’ finish cladding to the walls and roof. The building shape and material chosen will be made to ensure continuity and blending into the existing industrial context of the Port.

Cultural and Archaeological Heritage

As described in Chapter 14, works traffic will be restricted to specific routes. Photographic and video surveys will be carried out to establish a baseline condition. Monitoring for damage or movement will take place throughout the construction period.

As recommended by the Aberdeenshire Council Archaeology Service following the open day, any listed structure which will be altered or covered will be recorded photographically beforehand.

15.5.2. Mitigation during operation

Amenity and recreation

The completed works will still permit a pedestrian access corridor along Smith Embankment.

PPA are in liaison with the Sailing Club to advise of new, safe zones for their activities during the works. Similar arrangements will be put in place by PPA in relation to the occasional activities of the local creel fisherman.

Landscape and aesthetics

On completion of the works the new fish market building will enhance the landscape and no mitigation is necessary. Harbour deepening will have no effect on the existing landscape.

Cultural and Archaeological Heritage

Lighthouse. It is proposed that the lighthouse is relocated to the Port entrance at Alexandra Parade in the dry open triangular space, with a descriptive plaque. A plaque identifying the original position of the lighthouse will be provided on the floor of new fish market.

Queenie Bridge. It is proposed to dismantle certain significant sections of the bridge with deposition of a small section of part of the bridge being used as a static display at the end of Bridge Street..

Quay walls - If any existing quay wall blocks have to be removed for drilling/excavation purposes, these will be stored in an appropriate location for future reuse.

15.6. Residual effects

The residual effect on landscape and visual impact are:

- The demolition and removal of Queenie Bridge and other buildings.
- The reclamation.
- The new fish market building.

In the context of the project none of these are considered to be adverse or of great significance.

16. INTERRELATIONSHIPS BETWEEN ENVIRONMENTAL FACTORS

16.1. Cumulative Effects

Although the works will be carried out over a relatively short time period with many activities taking place concurrently, the overall effect of temporary adverse impacts during this period are not expected to be greater than the sum of their parts. The potential impact of one aspect will not exacerbate the impact of another.

The Smith Quay reclamation absorbed around 1% of tidal volume of the Port. The proposed reclamation will absorb a further 3%, making a total of 4%. As a result, tidal currents will have been reduced by 4%, marginally increasing deposition. This is of little concern at this stage, but potential for increased deposition must be born in mind if further reclamations are proposed.

In terms of projects being undertaken concurrently elsewhere, Table 19 indicates the distance between Peterhead Harbour and each of the projects, as well as their anticipated construction schedules (where available). Information on construction schedules has been extracted from relevant Environmental Statements/Scoping Reports, and is therefore indicative only. Where the construction period of a project has not been defined, the assumption has been made that there is potential for construction works to overlap with those proposed at Peterhead Harbour.

Given the localised impacts of the proposed development and the distances between Peterhead Harbour and other locations in Peterhead Harbour, it is not considered that there is potential for cumulative impacts to arise.

Table 19 - Sites considered for cumulative effect

Project	Approx. Distance to Peterhead (km)	Anticipated construction period	Potential for overlap with construction works at Peterhead Harbour (Y/N)
Peterhead Harbour Development	0	2015 -2016	n/a
Telford, Stevenson and MacColl Offshore Wind Farms (MORL, 2012a)	91	2015 -2020	Y
Beatrice Offshore Wind Farm (SSE, 2014)	100	2014- 2018	Y
Inch Cape Offshore Wind Farm (ICOL, 2013)	104	2017-2020	N
SeaGreen Firth of Forth Wind Farm (Phase 1) (SeaGreen, 2012)	92	2015 -2019	y
Aberdeen Offshore Wind Farm (Vattenfall, 2014)	30	2015-?	Y
Neart na Gaoithe Wind Farm (MRP, 2012)	133	2015-2016	Y
Kincardine Offshore Wind Farm (KOWL, 2014)	45	2016 -2017	Y
Global Energy Nigg Development (Global Energy Nigg Ltd, 2013)	136	2014 - ?	?
Cromarty Firth Port Authority Berth Development (CEPA, 2013)	144	2014 -?	?
Port of Ardersier (Port of Adersier Ltd, 2013)	133	2014 -2017	Y
Forth Replacement Crossing (Transport of Scotland, 2009)	193	2011-2016	Y
Aberdeen Harbour Development (Aberdeen Harbour, 2013)	44	?	?
Port of Leith N-RIP (SKM, 2012)	189	?	?
Cockenzie Power Station (Scottish Power, 2010)	185	2014 -2015	Y

16.2. Sustainability

The principles of sustainability and protection of the environment will be embraced in the project. In particular the best possible use will be made of existing materials on the site. Dredged materials will be used for the reclamation area, and it is not envisaged that any material will need to be dumped at sea.

The new fish market building will be designed at a minimum to meet Bronze Level Active of the Technical Standards which will include a highly insulated, air tight envelope surpassing the minimum U-Values and Air Permeability targets recommended. The orientation of the building will allow the inclusion of PV panels to be directly south facing to maximise the efficiency of these.

All procedures to protect the environment will be implemented and all work will be in accordance with the Environmental Protection Act 1990. In respect of this, the works are to be designed to minimise adverse environmental effects. Recycled or recyclable products will be specified where possible, bearing in mind cost and quality objectives.

16.3. Residual Impacts

Sea bed habitats under the area of the works will be irretrievably lost but these are not considered to be of high local significance. Another lasting adverse effect of the works will be the use of non-renewable resources particularly quarried materials, but as noted above the best use will be made of existing materials in the site area.

The beneficial impacts of the project are all residual, including:

- Planning and development gain
- Maintenance of heritage and cultural aspects of the locality
- Major socio-economic benefits to local, regional and national communities
- Extension of habitats for sea mammals and other wildlife
- Reduction in noise and vibration at berths
- Improved shelter to the existing northern berths in the port

GLOSSARY

ASCo	Aberdeen Service Company
BAP	Biodiversity Action Plan
BS 5228	British Standard 5228
EIA	Environmental Impact Assessment
ES	Environmental Statement
HGV	Heavy Goods Vehicle
HW	High Water
LNR	Local Nature Reserve
MHWN	Mean High Water Neap Tide
MHWS	Mean High Water Spring Tide
MLS	Minimum Landing Size
MLWN	Mean Low Water Neap Tide
MLWS	Mean Low Water Spring Tide
MNCR	Marine Nature Conservation Review
MNR	Marine Nature Reserve
NNR	National Nature Reserve
NO	Nitric oxide
NO^2	Nitrogen dioxide
PPA	Peterhead Port Authority
PFI	Private Finance Initiative
PHT	Peterhead Harbour Trust
ppb	parts per billion
PPG	Planning Policy Guidance Note
ppt	parts per thousand

RNLI	Royal National Lifeboat Institution
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation. (cSAC candidate Special Area of Conservation)
SE	Scottish Executive
SEPA	Scottish Environmental Protection Agency
SI	Statutory Instrument
SM	Scheduled Monument. A monument of significant archaeological value, which is afforded statutory protection. Such monuments were previously referred to as Scheduled Ancient Monuments.
SMR	Sites and Monuments Record
SNH	Scottish Natural Heritage
SO^2	Sulphur dioxide
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
SW	Scottish Water
SWT	Scottish Wildlife Trust
Statutory Consultee	Any organisation with who there is a legal requirement to consult. Although many organisations can be statutory consultees in certain situations, the main organisations include the local planning authorities, Scottish Environment Protection Agency, Scottish Natural Heritage.
TAC	Total Allowable Catch

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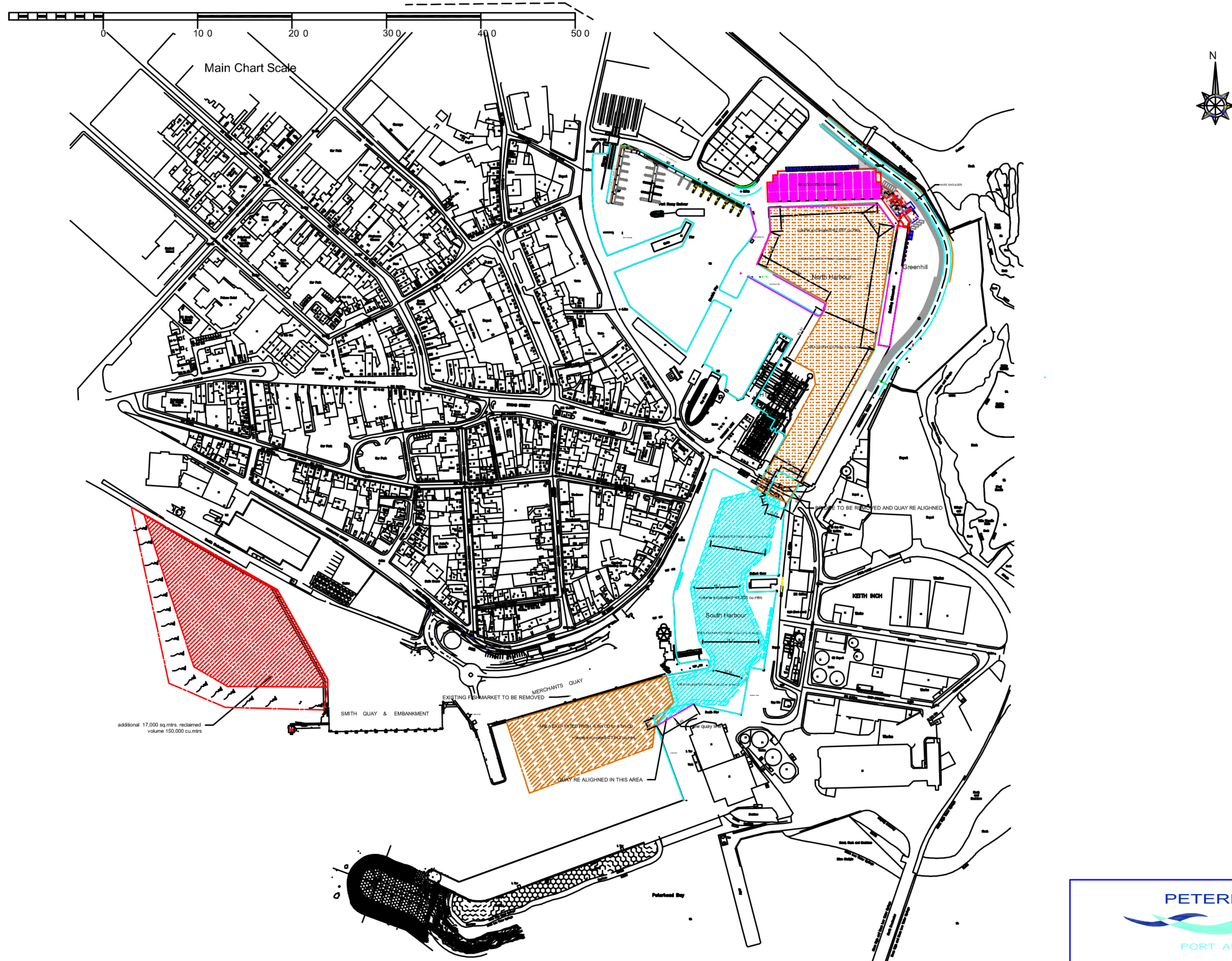
FIGURES 6 – 21 (Figures 1-5 are included within the text of the ES)



RevNo	Revision note	Date	Signature	Checked

PETERHEAD
PORT AUTHORITY

Itemref	Quantity	Title/Name, designation, material, dimension etc		Article No./Reference	
Designed by DESIGNED_BY	Checked by CHECKED_BY	Approved by - date APPROVED_BY_DATE	Filename FILENAME	Date DATE	Scale SCALE

PPA MASTERPLAN- HRO-DRAWING

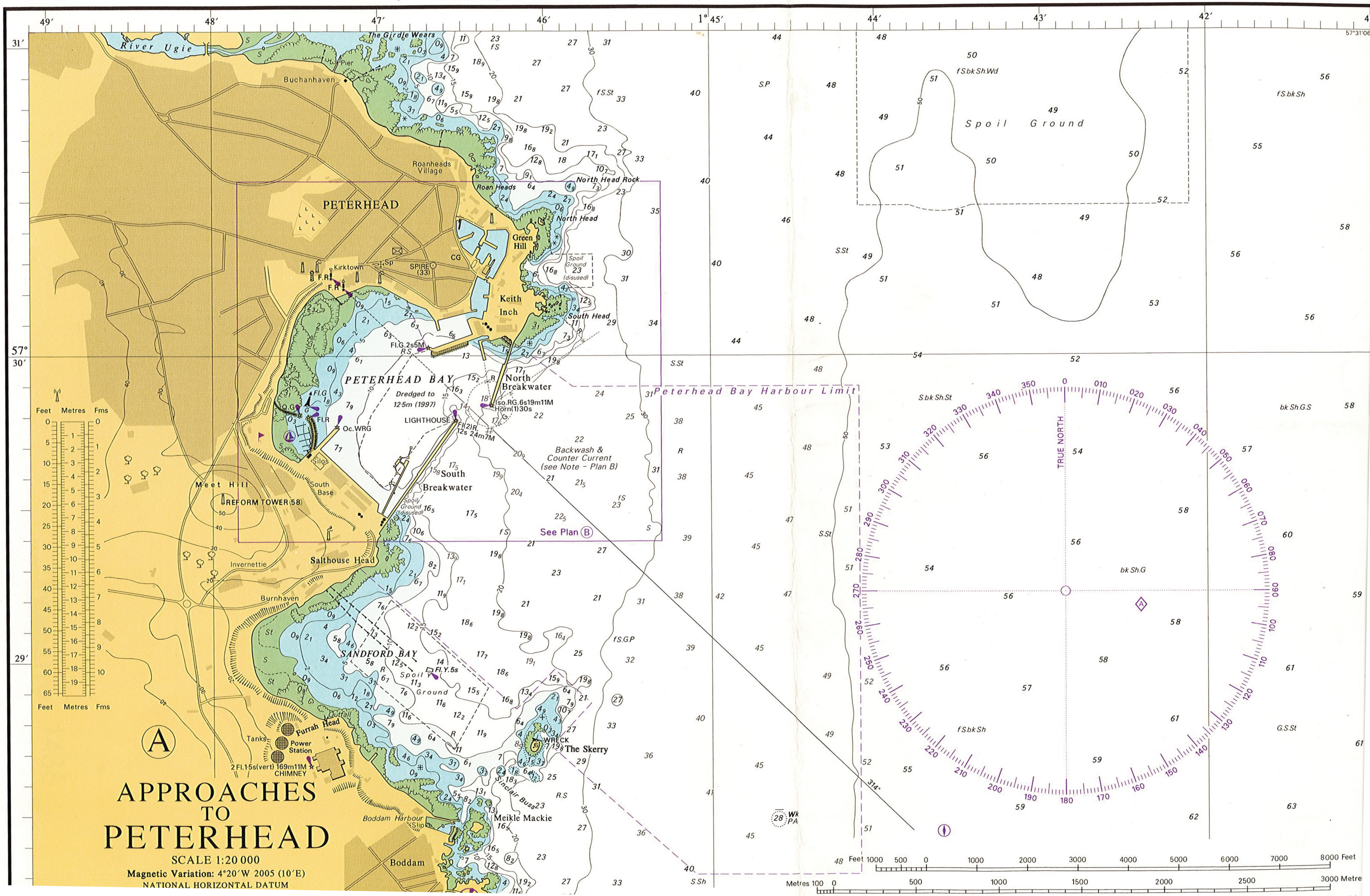
FIGURE 06

David Buchan, Peterhead Port 08/03/2013 16:42 PM HARBOUR DEV 2.dwg

0

WGS84 POSITIONS
can be plotted directly on this chart

Figure 07



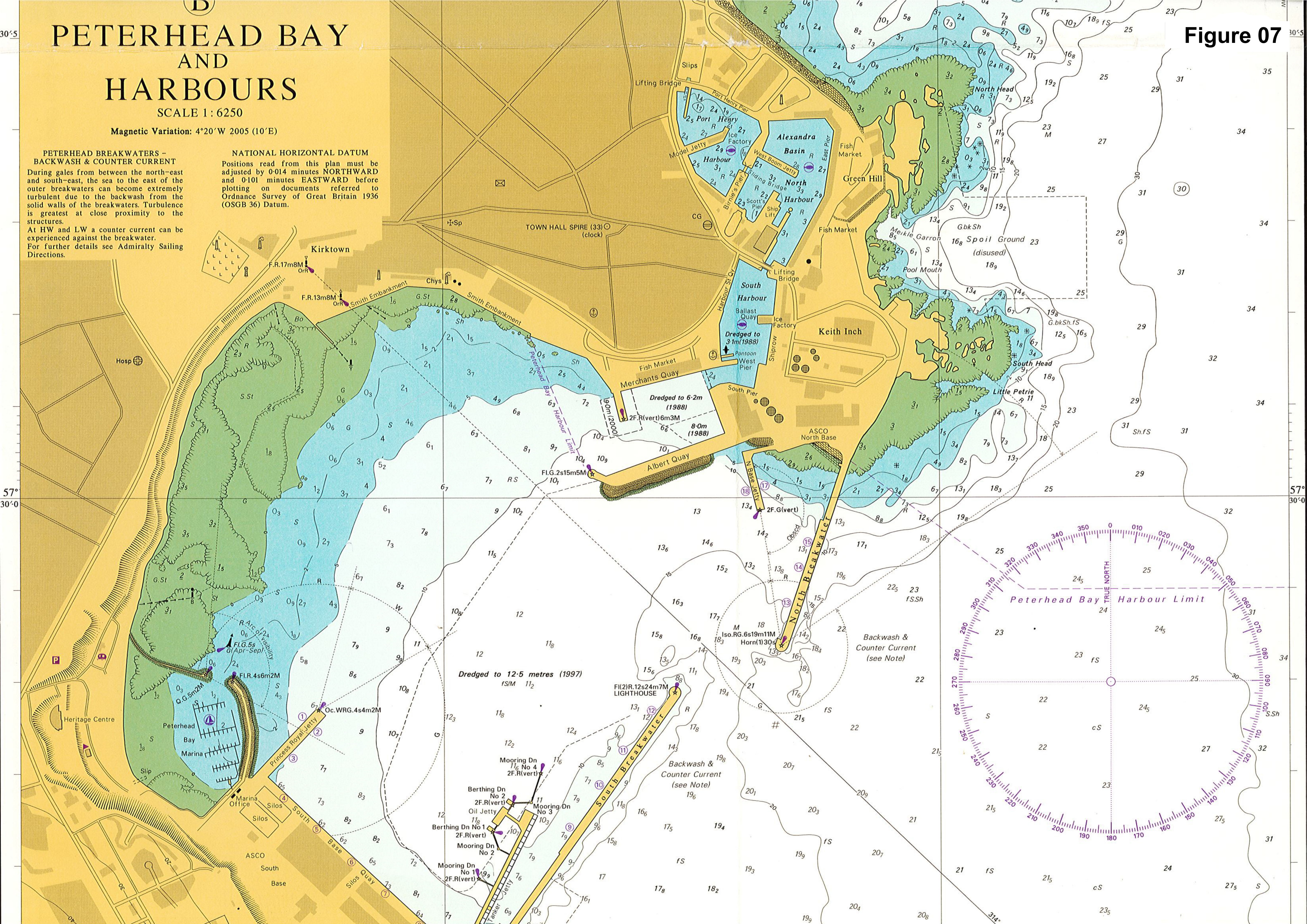

PETERHEAD BAY
AND
HARBOURS
SCALE 1:6250
Magnetic Variation: 4°20′W 2005 (10′E)
PETERHEAD BREAKWATERS – BACKWASH & COUNTER CURRENT
During gales from between the north-east and south-east, the sea to the east of the outer breakwaters can become extremely turbulent due to the backwash from the solid walls of the breakwaters. Turbulence is greatest at close proximity to the structures.
At HW and LW a counter current can be experienced against the breakwater.
For further details see Admiralty Sailing Directions.
NATIONAL HORIZONTAL DATUM
Positions read from this plan must be adjusted by 0·014 minutes NORTHWARD and 0·101 minutes EASTWARD before plotting on documents referred to Ordnance Survey of Great Britain 1936 (OSGB 36) Datum.
Kirktown
TOWN HALL SPIRE (33) (clock)
Hosp
Chys
Smith Embankment
Port Henry
Port Henry Pier
Model Jetty
Harbour
Ice Factory
Alexandra Basin
East Pier
West Boom Jetty
Sliding Bridge
North Harbour
Birnie's Pier
Scott's Pier
Ship Lift
Lifting Bridge
Slips
Fish Market
Green Hill
North Head
South Harbour
Harbour St Qy
Ballast Quay
Dredged to 3·1m (1988)
Pontoon
West Pier
Shiprow
Keith Inch
Merchants Quay
Dredged to 6·2m (1988)
8·0m (1988)
9·0m (2000)
2F.R(vert)6m3M
South Pier
Albert Quay
Fl.G.2s15m5M
ASCO North Base
N Base Jetty
2F.G(vert)
North Breakwater
Iso.RG.6s19m11M
Horn(1)30s
Meikle Garron
Pool Mouth
Spoil Ground (disused)
South Head
Little Petrie
Peterhead Bay Harbour Limit
Backwash & Counter Current (see Note)
Dredged to 12·5 metres (1997)
Fl(2)R.12s24m7M LIGHTHOUSE
South Breakwater
F.R.17m8M
F.R.13m8M
Fl.G.5s
R Arc of Visibility
G (Apr-Sep)
Fl.R.4s6m2M
Q.G.5m2M
Oc.WRG.4s4m2M
Princess Royal Jetty
Peterhead Bay Marina
Heritage Centre
Slip
Marina Office
Silos
South Base Quay
ASCO South Base
Mooring Dn No 4 2F.R(vert)
Berthing Dn No 2 2F.R(vert)
Oil Jetty
Mooring Dn No 3
Berthing Dn No 1 2F.R(vert)
Mooring Dn No 2
Mooring Dn No 1 2F.R(vert)
Tanker Jetty
TRUE NORTH
57° 30′·0
30′·5

Figure 07

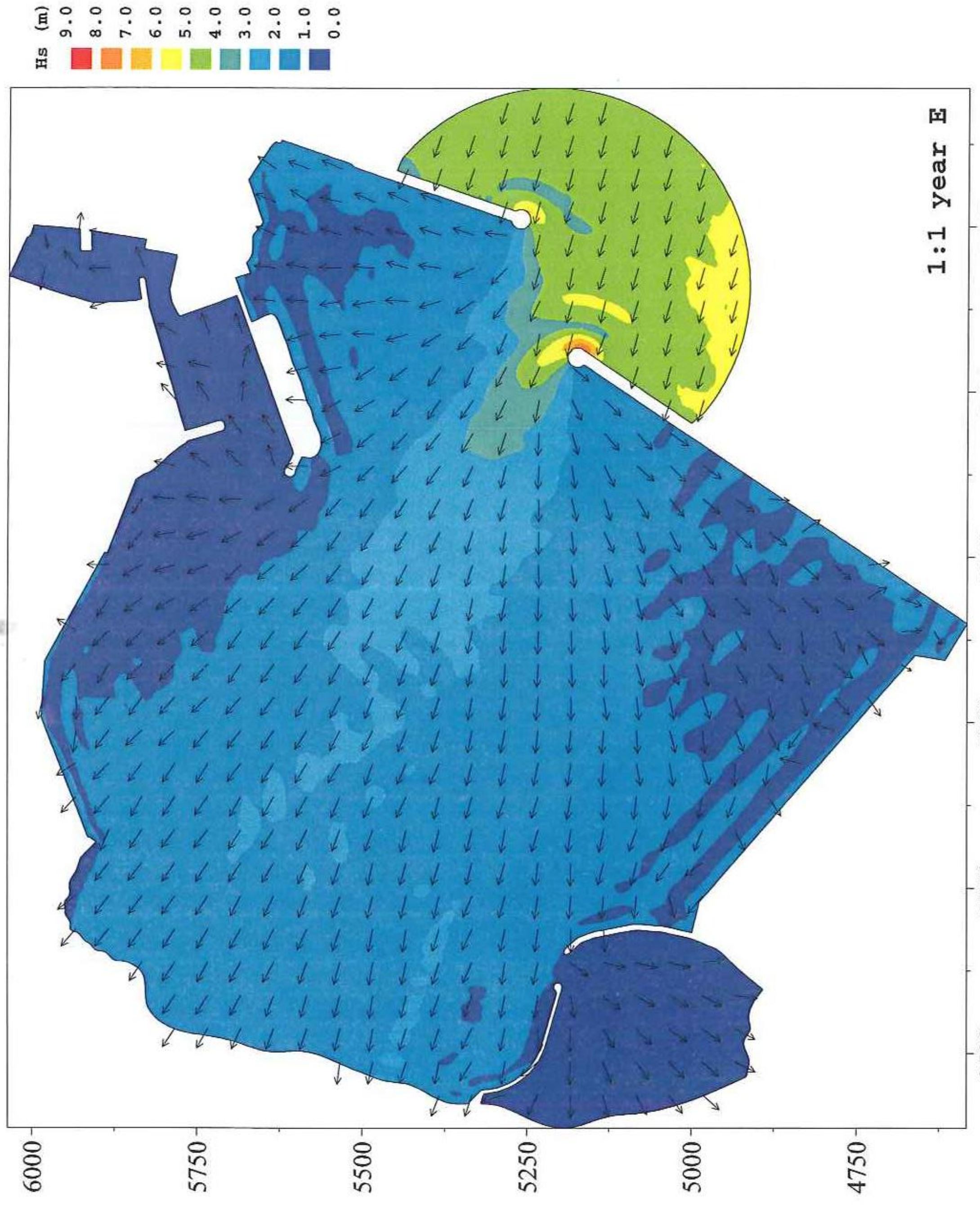


FIGURE 8 - BAY AND INNER HARBOUR, ONCE A YEAR WAVES FROM E

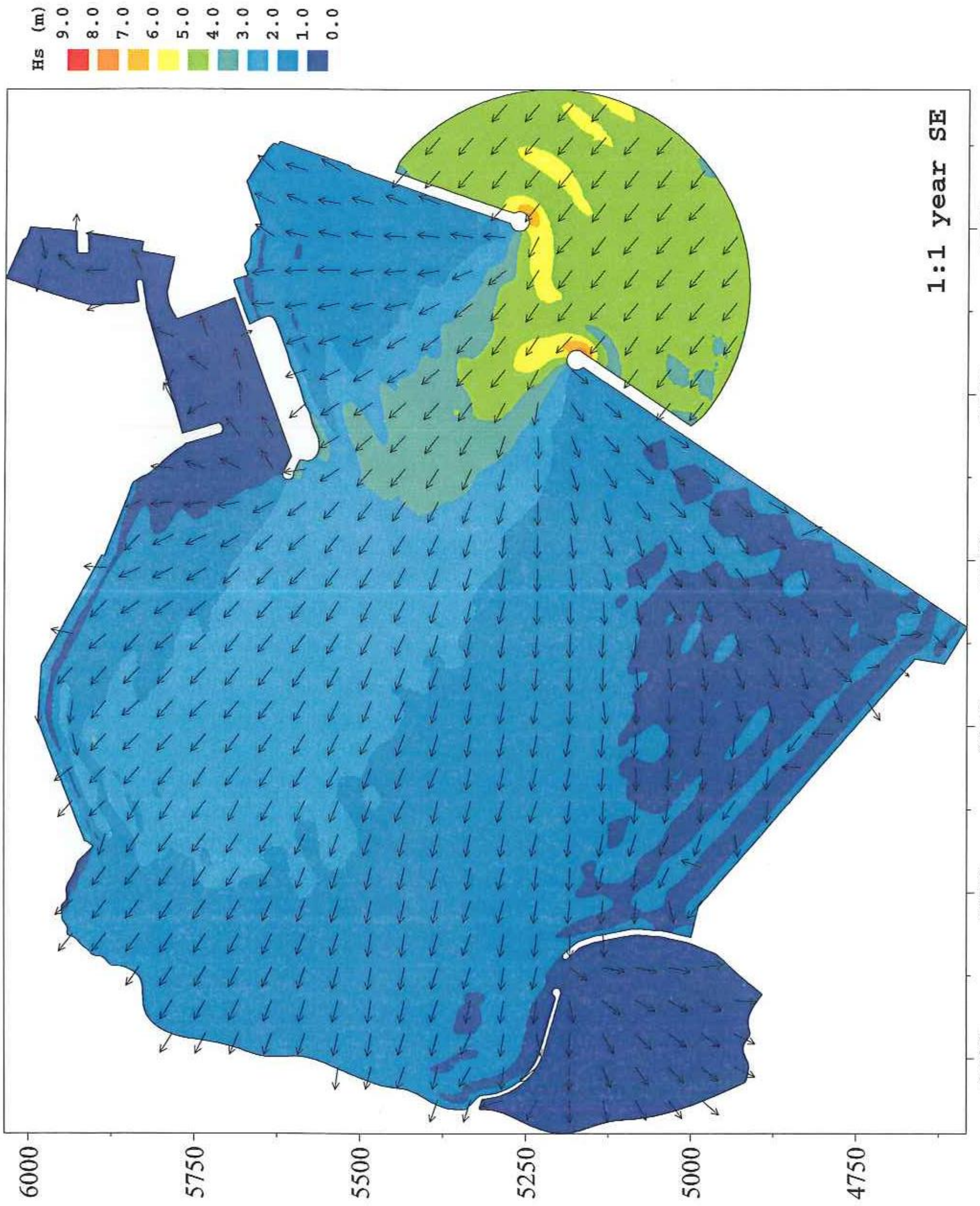


FIGURE 9 - BAY AND INNER HARBOUR, ONCE A YEAR WAVES FROM SE

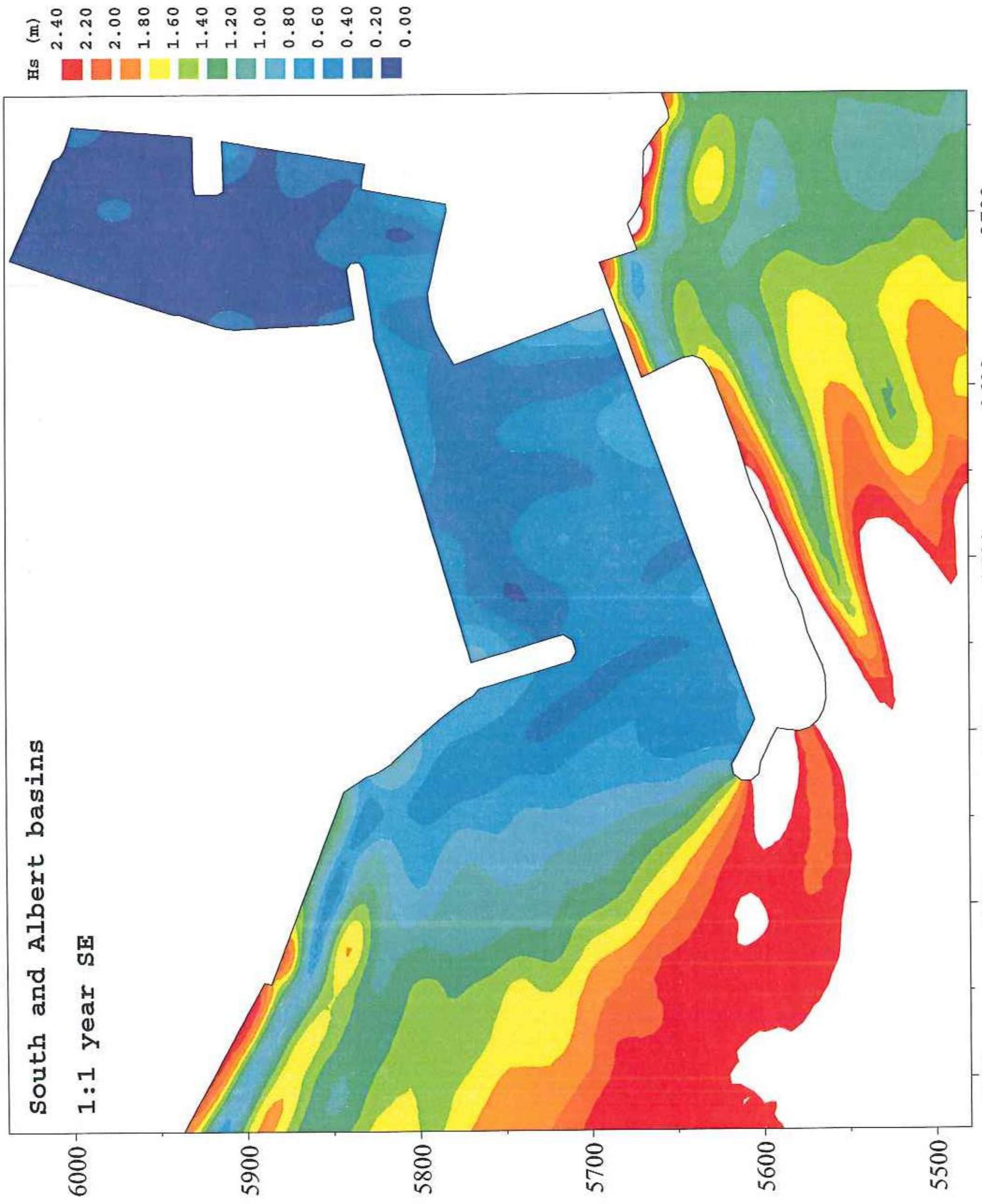


FIGURE 10 – ALBERT BASIN AND SOUTH HARBOUR, ONCE A YEAR WAVES FROM SE

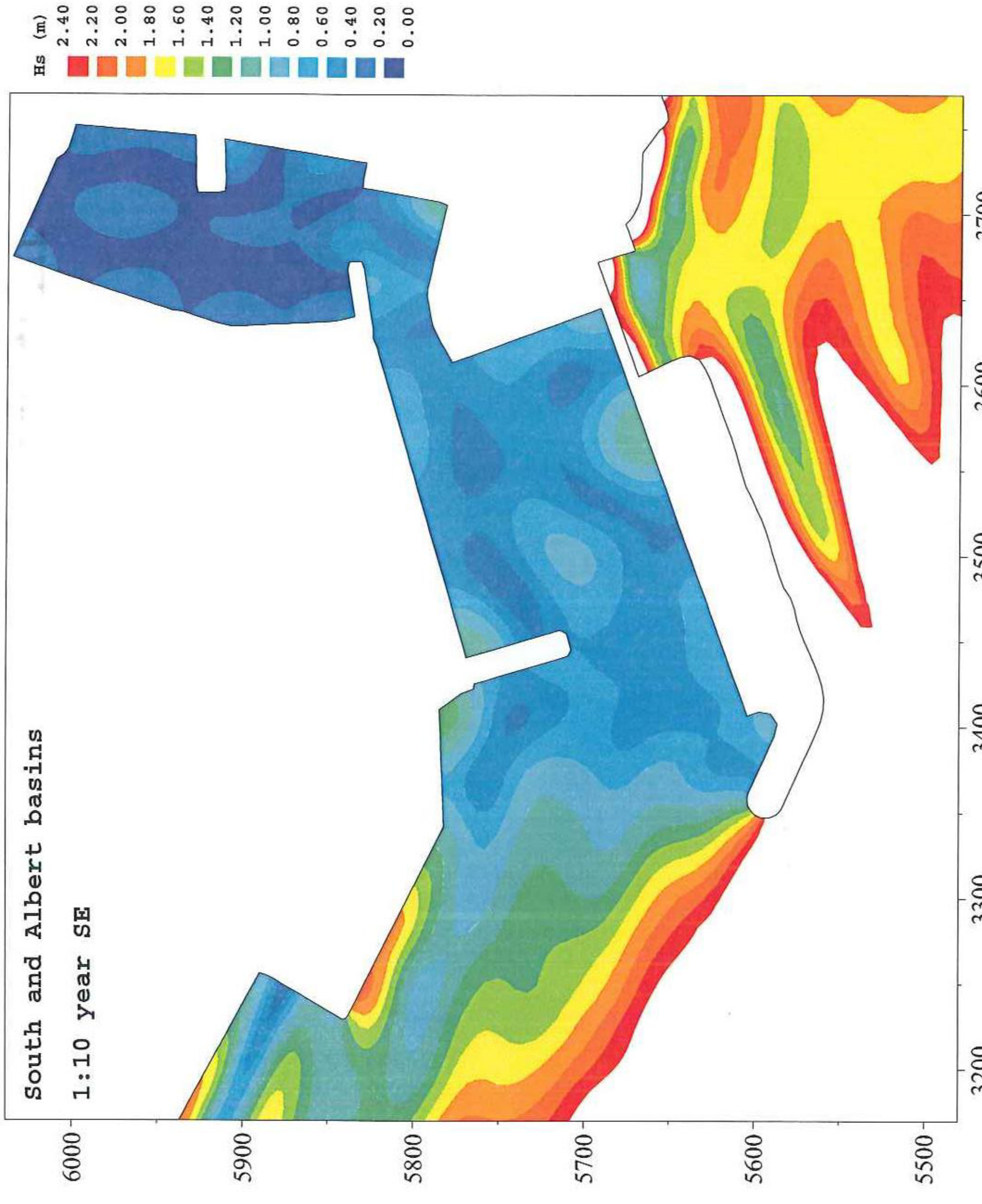


FIGURE 11 – ALBERT BASIN AND SOUTH HARBOUR, ONCE IN 1O YEAR WAVES FROM SE

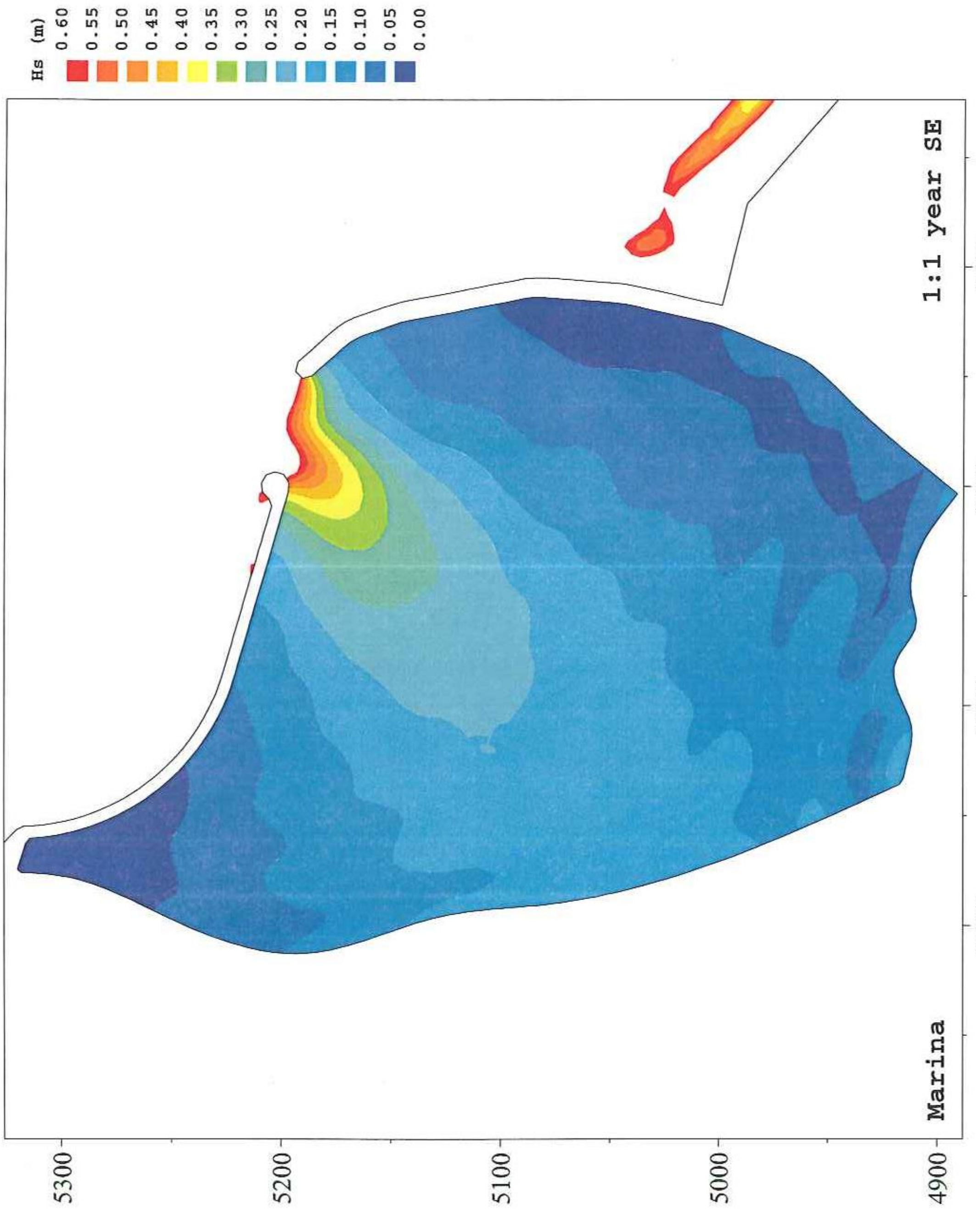


FIGURE 12 - MARINA, ONCE A YEAR WAVES FROM SE

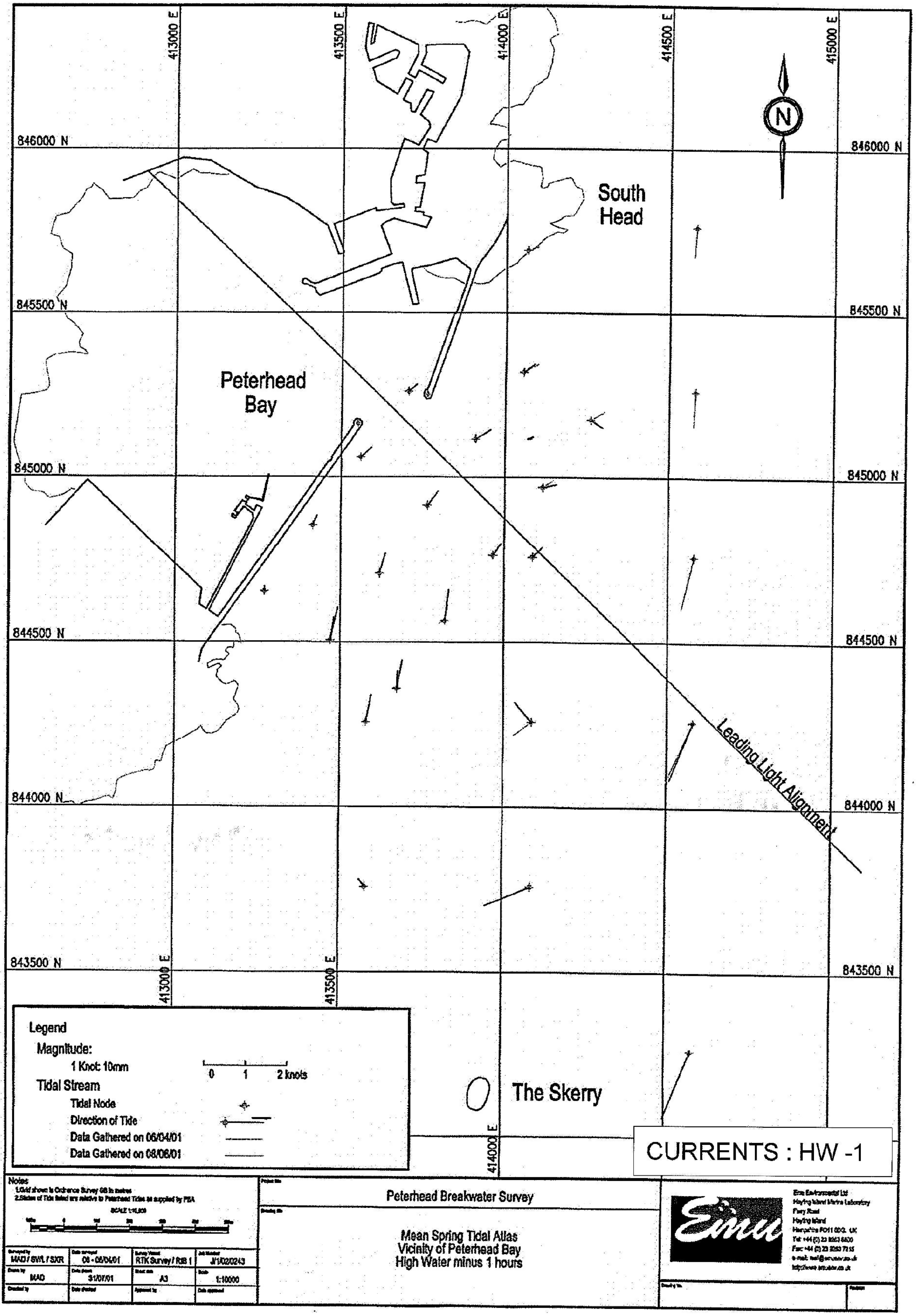


FIGURE 13 - CURRENTS IN THE APPROACHES 1 HOUR BEFORE HIGH WATER

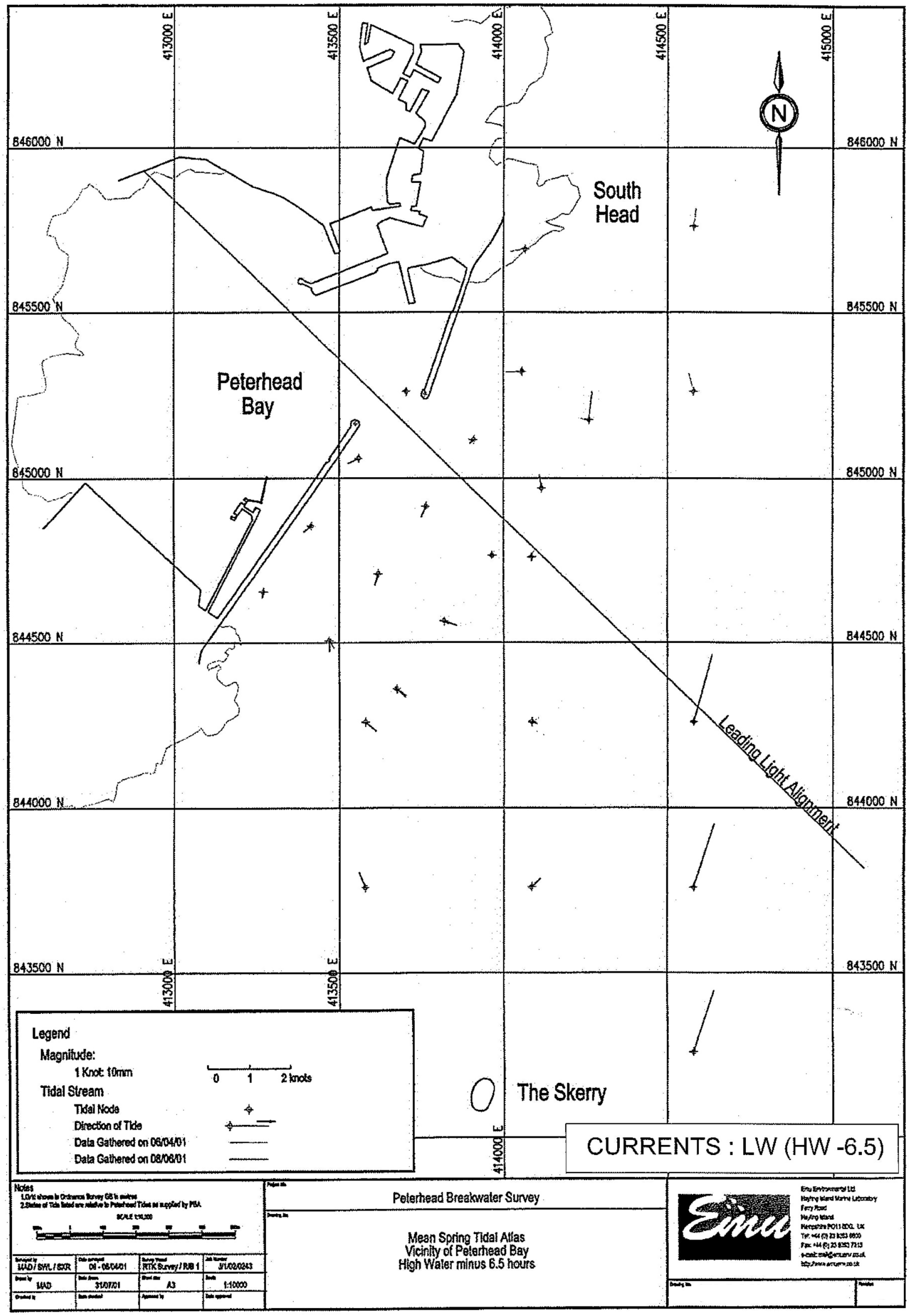


FIGURE 14 - CURRENTS IN THE APPROACHES AT LOW WATER

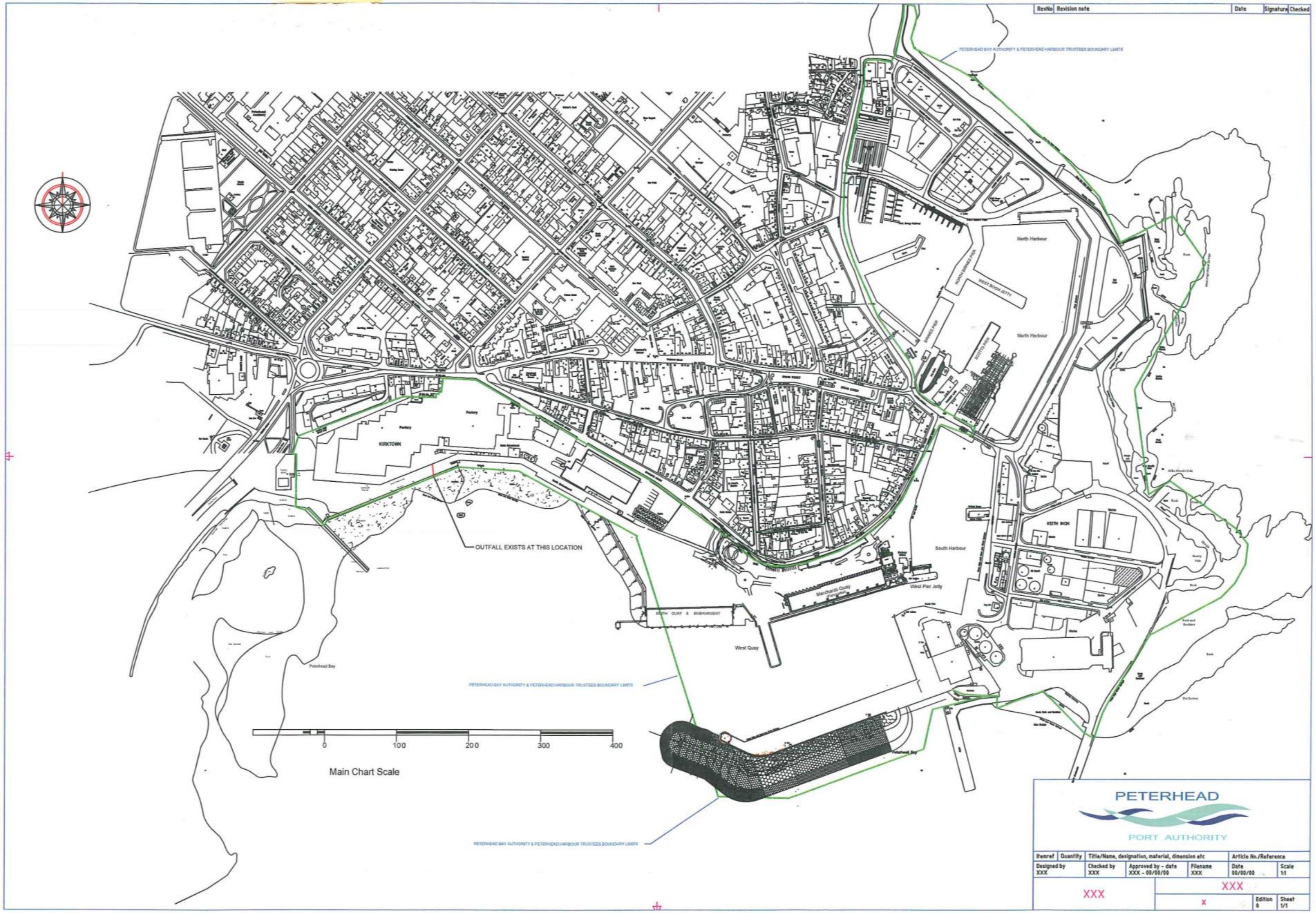


FIGURE 15 - EXISTING INNER HARBOUR

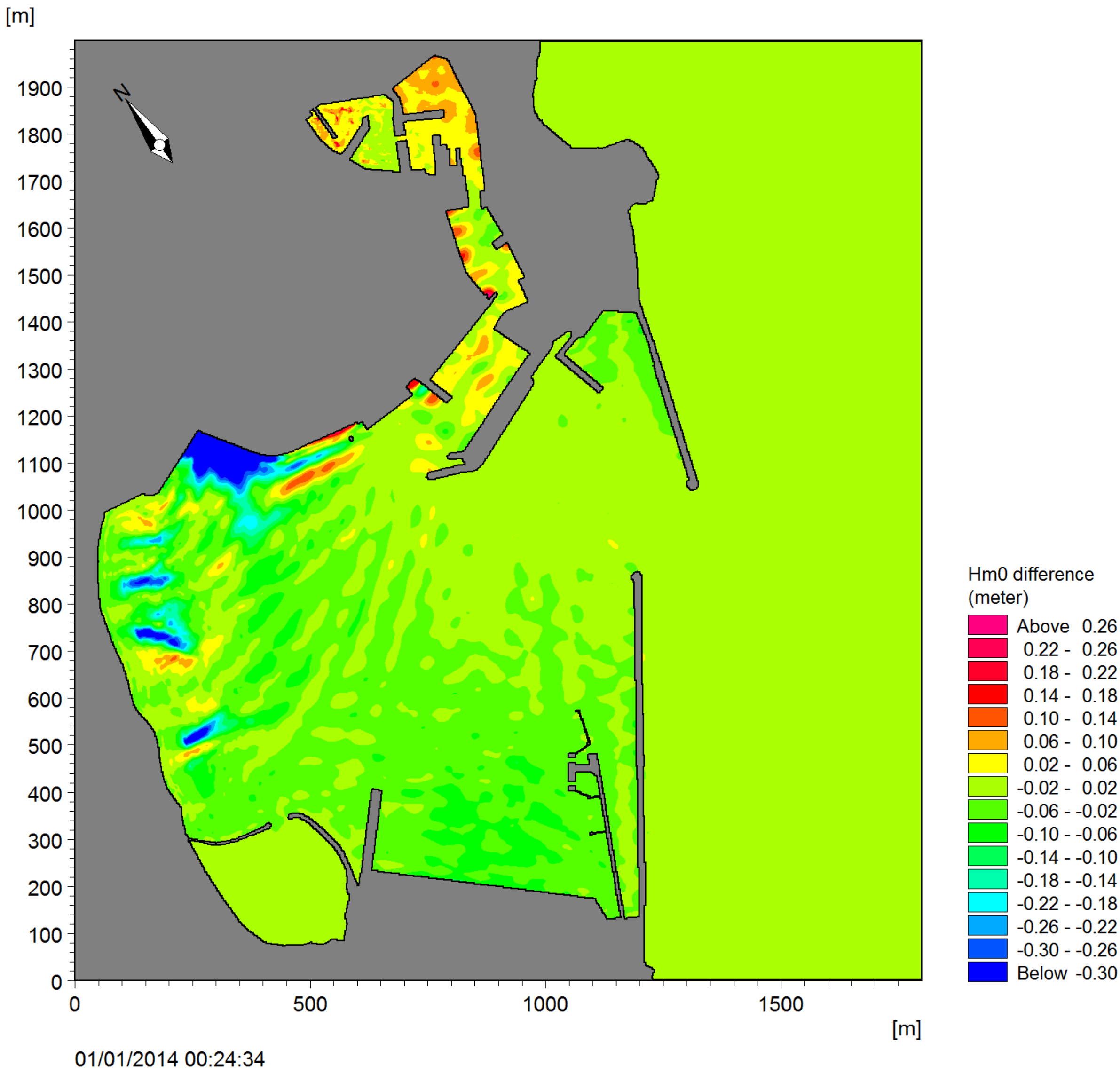


Figure 16 - Significant wave heights difference plot - Storm from 125o MHWS Values for harbour with dredging and reclamation minus values for existing harbour for a 1 in 0.2 year return period storm

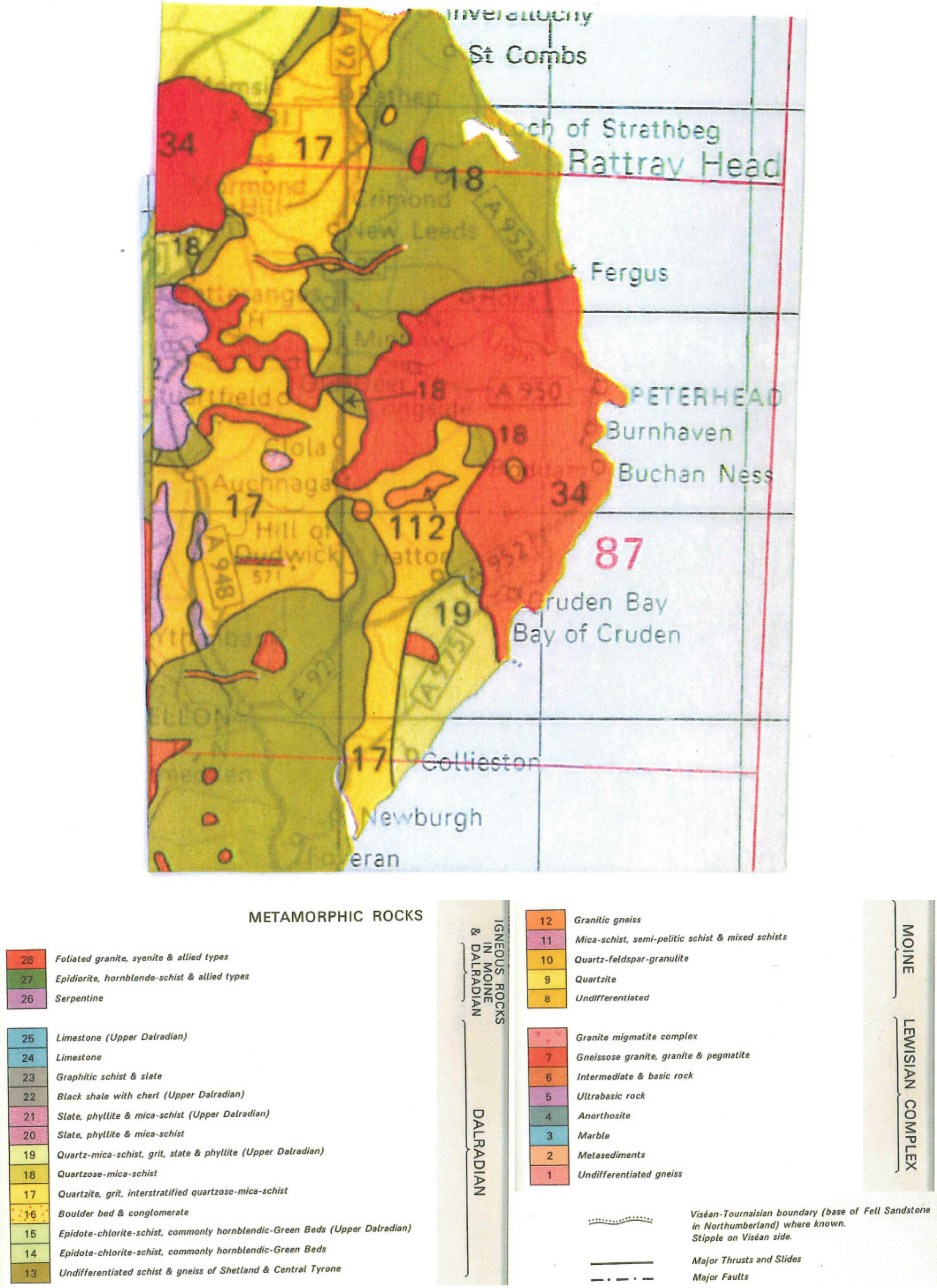


FIGURE 17 - GEOGRAPHICAL MAP OF PETERHEAD

FIGURE 18
AMENITY AND RECREATION FACILITIES

FIGURE 19
LISTED STRUCTURES/ CONSERVATION AREAS

Figure 20: Evaluation of Proposed Development against Environmental Baseline

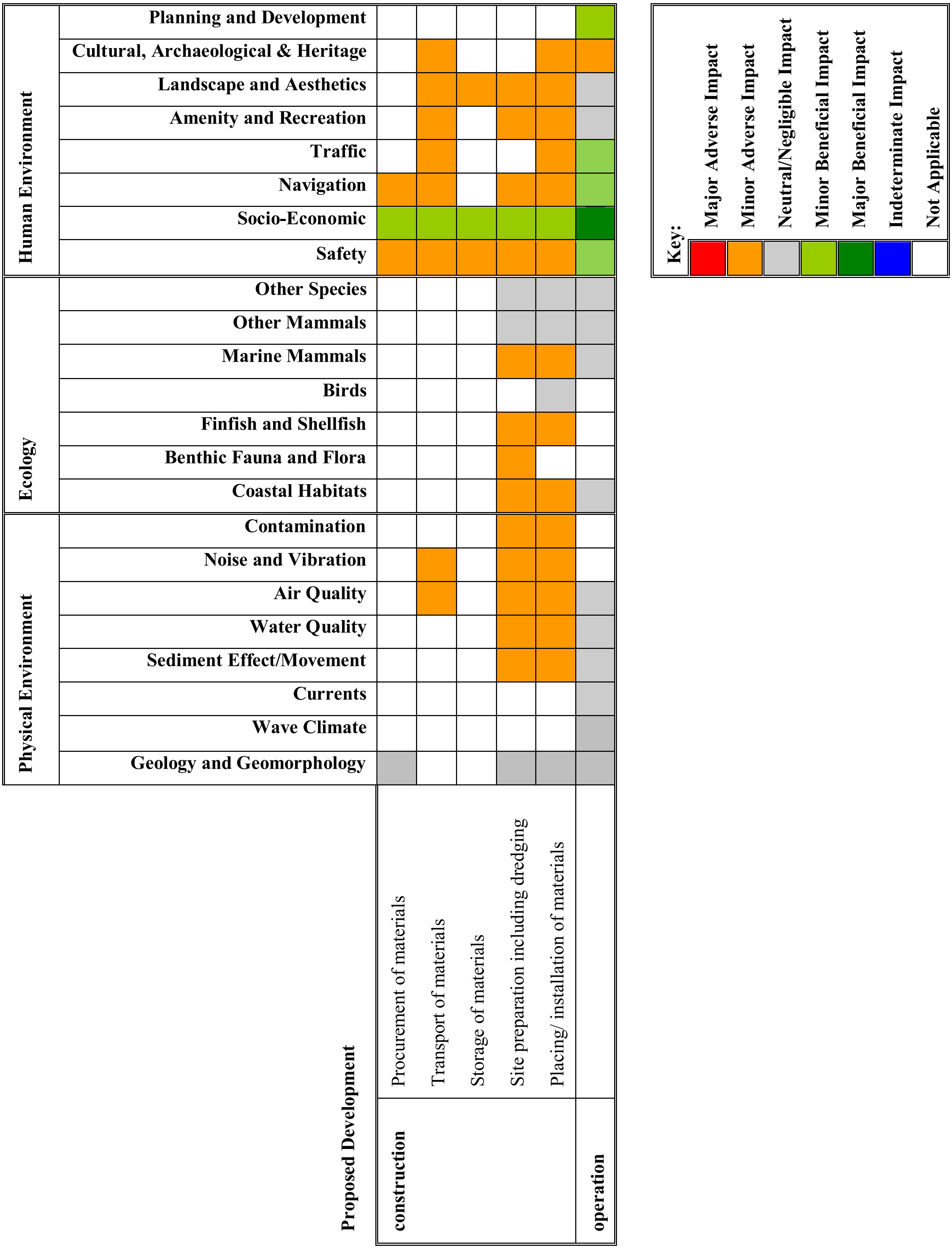


Figure 21 Environmental Impact Table

Topic Area	Specific Area	No.	Description of Impact	Impact	Probability (L,M,H) L Low M Medium H High	Geographical level of importance L Local R Regional N National			Contextual Importance (L,M,H) L Low M Medium H High	Nature Time-scale (ST,MT,LT) Reversibility (R/IR) Type of impact (D/ID)	Mitigation Available	Mitigation Agreed	Significance
						L	R	N					
Physical Environmental	Land		Loss of area of seabed due to nature of the new works.	Adverse	H	✓			L	LT,IR,D	X		Minor
			The reclamation will require the use of non-renewable stone resources.	Adverse	H		✓		M	LT,IR,D	X		Minor
			The procurement of quarry materials will be from licensed sources but may cause some local environmental damage at source.	Adverse	H		✓		L	LT,IR,D	✓		Minor
	Coastal Processes		Wave action in the bay Harbour.	Negligible	L	✓			H	LT,IR,D	✓		Negligible
			Tides, water levels and flooding issues.	Negligible	H	✓			H	LT,IR,D	✓		Negligible
	Sediment Effects		During construction, and particularly dredging, sediment may affect various areas of the harbour but will eventually settle out.	Adverse	H	✓			M	ST,R,D	X		Negligible
			The completed works may result in some redistribution of any mobile material due to changes in wave activity.	Negligible	H	✓			H	LT,IR,D	✓		Negligible
	Water Quality		Sedimentary effects as noted above during construction with associated water discolouration.	Adverse	H	✓			M	ST,R,D	X		Negligible
			During construction there will be the potential for accidental spillages, oil, fuel etc to pollute sea water.	Adverse	L	✓			M	ST,R,D	✓		Minor
	Air Quality		Potential for reduced air quality due to exhaust fumes from vehicles and plant on site and along access routes.	Adverse	H	✓			L	ST,IR,D	✓		Negligible
			Potential for dust generation during movement of vehicles and loading of materials.	Adverse	H	✓			L	ST,IR,D	✓		Negligible
	Noise & Vibration		Noise and vibration due to construction traffic to, and within the site during the construction works.	Adverse	H	✓	✓		L	ST,R,ID	✓		Minor
			Noise and vibration due to general construction activities, dredging, filling, placing armour stone and concreting.	Adverse	H	✓			L	ST,R,ID	✓		Minor
			Noise and vibration due to piling operations.	Adverse	H	✓			M	ST,R,D	✓		Minor
			Vibration due to underground explosive charges used to split hard rock to facilitate dredging.	Adverse	H	✓			M	ST,R,ID	✓		Minor

Figure 21 Environmental Impact Table

Topic Area	Specific Area	No.	Description of Impact	Impact	Probability (L,M,H) L Low M Medium H High	Geographical level of importance L Local R Regional N National			Contextual Importance (L,M,H) L Low M Medium H High	Nature Time-scale (ST,MT,LT) Reversibility (R/IR) Type of impact (D/ID)	Mitigation Available	Mitigation Agreed	Significance
						L	R	N					
	Contamination		Dredging and deposition of material in approved sea areas if contaminants were present could be problematical. Sampling and testing of sea bed samples has indicated levels well below threshold limits.	Adverse	L	✓			M	ST,IR,D	✓		Minor
			Contaminants released during the demolition of any existing buildings.	Adverse	L	✓			M	ST,IR,D	✓		Minor
			Contaminants released during the construction of any new build.	Adverse	L	✓			M	ST,IR,D	✓		Minor
	Benthic Flora & Fauna		Dredging and other operations during the construction works will remove all non mobile members of the benthic community. In exposed areas recolonisation will take place post construction.	Adverse	H	✓			L	ST,LT,IR,D	X		Minor
	Finfish & Shellfish		Any fish will move from the area during construction, but some local shellfish may be lost during these operations.	Adverse	H	✓			L	ST,IR,D	X		Minor
	Birds		The local bird population is considered to be generally unaffected by the works: any local seabirds will temporarily displace. Local protected sites are some distances from the project site.	Negligible	H	✓			L	ST,IR,D	X		Negligible
	Marine Mammals		Underground rock fracturing using explosive charges could result in vibrations having potentially adverse effects on some cetaceans.	Adverse	M	✓	✓	✓	H	ST,IR,ID	✓		Minor
			Noise from piling, and to a lesser extent other construction activities could result in disturbance to cetaceans.	Adverse	M	✓	✓	✓	H	ST,IR,ID	✓		Minor
			Impact from any fuel spillages within the harbour during construction could affect any seals or other sea mammals in the immediate vicinity.	Adverse	M	✓			M	ST,IR,ID	✓		Minor
			In the completed scheme the available habitat for some mammals, seals in particular, will increase with the additional length of rock armour breakwater and revetment.	Beneficial	H	✓			L	MT,L TIR,ID	X		Minor
	Other Mammals		With no freshwater sources within Peterhead Bay any otters would only use the site area as a temporary feeding ground if at all. These and any other mammals in the vicinity would be expected to keep away during the works.	Adverse/ Negligible	M	✓			M	ST,IR,ID	✓		Negligible
	Other Species		No other species has been identified as at all likely to be in the area of the works.	Adverse/ Negligible	L	✓			L	ST,IT,ID	X		Negligible
Human	Safety		The increase in traffic during the construction works will increase road risk.	Adverse	H	✓	✓		M	ST,IR,D	✓		Minor
			Marine construction plant at the entrance to the northern basins will increase risk for plant users in this area.	Adverse	H	✓			H	ST,IR,D	✓		Minor
			General construction activity, handling and placing of materials in a works environment.	Adverse	H	✓			H	ST,IR,D	✓		Minor
			Potential handling and use of explosive charges to fracture rock underground	Adverse	H	✓			M	ST,IR,D	✓		Minor
			Building demolition and construction (such as heavy demolition equipment or working at height) will increase risk for the worker and plant operator working on site.	Adverse	H	✓			M	ST,IR,D	✓		Minor

Topic Area	Specific Area	No.	Description of Impact	Impact	Probability (L,M,H) L Low M Medium H High	Geographical level of importance L Local R Regional N National			Contextual Importance (L,M,H) L Low M Medium H High	Nature Time-scale (ST,MT,LT) Reversibility (R/IR) Type of impact (D/ID)	Mitigation Available	Mitigation Agreed	Significance
						L	R	N					
	Socio-Economic		Short term local employment opportunities during the construction period plus benefits to local businesses including hotels, catering establishments, B&B etc.	Beneficial	H	✓	✓		M	ST,IR,ID	✓		Minor
			Overall potential benefit to the local, regional and national economy due to increase in deep water sheltered berthing.	Beneficial	H	✓	✓	✓	H	LT,R,D	✓		Major
			Increased volume of fish that could be landed and knock-on effect safeguarding/increasing the local fish processing economy and Scottish frozen fish exports.	Beneficial	H	✓	✓	✓	H	LT,R,D	✓		Major
	Navigation		During construction obstructions from floating plant will be an issue together with the potential for an increase in cross harbour traffic.	Adverse	H	✓			M	ST,IR,ID	✓		Minor
			In the operating condition a new approach into the Merchant Quay will be required to coincide with the dredging operations.	Adverse/ Negligible	H	✓			H	LT,IR,D	✓		Minor
			Some materials will be imported by sea and will increase vessel movements periodically.	Adverse/ Negligible	M	✓			M	ST,IR,ID	✓		Minor
	Traffic		Increase in traffic during the construction period will have the potential to increase noise, fumes, and vibration.	Adverse	H	✓	✓			ST,IR,D	X		Minor
	Amenity and Recreation		During construction sedimentation in the water could affect recreational users in the bay area.	Adverse	H	✓			H	ST,IR,ID	X		Minor
			Noise will be a feature of the construction works, particularly piling, and this could cause disturbance.	Adverse	H	✓			M	ST,IR,ID	✓		Minor
			The sailing club areas within the bay will be marginally affected during construction.	Adverse	H	✓			M	ST,LT,IR,ID	✓		Minor
			A few local creel fishermen will need to locally move their operations due to the position of the new reclamation.	Adverse	H	✓			M	ST,LT,IR,ID	✓		Minor
	Landscape and Aesthetic		Construction plant and working areas will be a visual addition to the area during the construction period.	Adverse	H	✓			L	ST,IR,D	✓		Minor
			The completed works will extend the visual impact of port structures and activity especially for those in closest proximity to the proposed new works.	Adverse	H	✓			L	LT,IR,D	✓		Minor
	Culture and Archaeological Heritage		Vibration impacts due to increased construction traffic activity may occur to listed buildings and those in the conservation area.	Adverse	L	✓	✓		L	ST,IR,ID	✓		Minor
			In terms of the cultural identity of Peterhead, the infrastructure additions will contribute towards reinforcing the town’s identity as a vibrant working harbour.	Beneficial	M	✓			M	LT,IR,ID	N/A		Minor
	Planning and Development		The proposed project is compatible with the aims and objectives outlined in the Aberdeen City and Shire Strategic Plan and Aberdeenshire Local Plan.	Beneficial	H	✓	✓		H	MT,LT, IR,ID	N/A		Minor

APPENDIX I – SCOPING REPORT

PETERHEAD PORT AUTHORITY

INNER HARBOUR DEEPENING
& NEW FISHMARKET DEVELOPMENT

Environmental Impact Assessment
Scoping Report

Document No 5357/01 Rev - FINAL

March 2014

Peterhead Port Authority
West Pier
Peterhead
Aberdeen
AB42 1DW

Niras Fraenkel Ltd
Merlin House
Mossland Road
Hillington Park
Glasgow G52 4XZ

PETERHEAD PORT AUTHORITY

INNER HARBOUR DEEPENING AND NEW FISHMARKET DEVELOPMENT

Environmental Impact Assessment Scoping Report

Document reference 5357/01 Rev - FINAL

Issue	Date	Status	Author	Checker	Approver	Comment
D1	14/03/14	Draft	WR			For comment
D2	24//03/14	Draft	WR	PMM		For comment
-	25/03/14	FINAL	WR	PMM	PMM	For Issue

CONTENTS

APPENDICES

LIST OF FIGURES

1. INTRODUCTION

1.1. Scheme Summary

Peterhead is situated in the north east of Scotland, just over 30 miles north of Aberdeen. With a population of about 17,700 it is the main centre for the local Buchan economy within Aberdeenshire. The main focus for this activity is the port which is administered by the Peterhead Port Authority (PPA). The port has one of the busiest fish markets in Europe and also acts as a major logistics supply base for the offshore oil and gas industry in the North Sea.

PPA has identified a significant need to modernise the existing port provision in respect of fishing and has identified works to bring facilities in line with current and anticipated vessel and market standards and demands.

Essentially the purpose of these works is to:

- Maintain and enhance Peterhead's position as the top performing UK port for both demersal and pelagic fish, catering for future market demand.

- Enhance Peterhead's position as a major fishing port in Europe, particularly with regard to white fish.

The nature of the works required to achieve these objectives is:

- Deepening of the Port's north and south harbours and approaches to allow vessels non-tidal, easy access and berthing in safe, deep water, weather protected inner basins.

- Associated strengthening of quay walls where required, and removal of relatively small structures causing narrowing of access channels.

- Construction of a new larger state-of-the-art fish market able to accommodate existing and future market demand, with a covered landing area for private sales.

- An extended reclamation area, using dredged material from the inner harbours, contiguous with the recently completed Smith Embankment
  Figure 1 indicates the extent of these proposals.

1.2. Regulatory and Statutory Requirements

A Harbour Revision Order (HRO) will be required in order to obtain consent for the proposed works. PPA will be making an application to the Scottish Ministers for the HRO under Section 14 of the Harbours Act 1964. In conjunction with this an Environmental Impact Assessment will be required. This will be prepared in accordance with The Marine Works (Environmental Assessment) Regulations 2007, Statutory Instrument 2007 No1518 Environmental Protection, as amended by The Marine Works (Environmental Impact Assessment) (Amendment) Regulations 2011 for works below the mean low water mark. This complies with European Community EC Directive 85/337/EEC, as amended by Council Directives 97/11/EC and 2011/92/EC.

The proposed development at Peterhead Port falls under Schedule 1 (clause 8 (2) trading ports which can take vessels of over 1,350 tonnes) and Schedule 2 (Any change to or extension of development of a description listed in Schedule 1) of the 1999 Regulations. The development has the potential to give rise to adverse environmental impacts. Thus a formal Environmental Impact Assessment is required in accordance with the aforementioned regulations.

The Marine (Scotland) Act 2010 (Marine Licenses) requires that a works license will be required for the project as well as a dredging license and these will form an essential part of the overall statutory process.

The impact of the UK Marine Policy Statement 2011 and the subsequent National Marine Plan (Scotland) also need to be considered in respect of the EIA.

1.3. Requirement for EIA Scoping

Schedule 4 of The Marine Works (Environmental Assessment) Regulations 2007 (as amended) sets out the items that need to accompany a request for a scoping opinion. The objective of this report is to set out these items in sufficient detail to allow the appropriate authority to comment. In this respect it is understood that Transport Scotland will be co-ordinating responses from Marine Scotland and Aberdeenshire Council Planning as well as from other statutory consultees.

1.4. Layout of Report

The report has been laid out to allow for ease of reference as follows:-

- Section 1: Introduction.
- Section 2: Project Details and Outline Methodology.
- Section 3: Proposed Method of Assessment.

- Section 4: Environment Impacts - sets out in some detail the relevant physical, ecological, and human environment aspects, baseline considerations and studies to be undertaken, potential risks and possible mitigation measures.
- Section 5: Conclusions.
- Section 6: Future Actions.

2. PROJECT DETAILS

2.1. Project Details

The scope of the project consists of a number of associated elements as indicated in Figure 1. Essentially these comprise:-

- Deepening of the North and South Harbours by 3.3m.
- Infilling of the existing basin north of the dry dock, between Birnie and Scott's Piers.
- Strengthening of the dock walls at deepened areas.
- Deepening at the Merchant's Quay by 2m.
- Removal of restrictions on the navigation route into the South Harbour i.e. the small jetty adjacent to the Port office.
- Removal of the Queenie bridge and widening of navigation channel from 10.5m to 25m.
- Extension of West Quay at the north end to provide a 78m overall berth.
- Associated services/utilities diversions.
- Formation of reclamation west of the Smith Embankment against the existing sea wall.
- Demolition of the west section of the former Greenhill Fishmarket.
- Construction of a new fish market at Greenhill, together with refurbishment of the existing east section.
- Demolition of the existing fish market at Merchant's Quay.

A separate maintenance dredging contract will remove all the soft silty material from the areas which are to be deepened allowing all excavated/dredged material to be deposited in the reclamation area. PPA have applied directly to Marine Scotland for a dredging license in respect of this, which will also include for dealing with any contamination issues.

The deepening will be almost entirely in fractured granite rock. Initial assessment of the total amount of material to be excavated/dredged is approximately 155,000m3. Approximately 780m of existing quay wall will require to be strengthened.

Typical cross sections through the works are indicated in Figures 2a and 2b.

2.2. Outline Construction Methodology

As noted above dredging of soft material would be carried out under a maintenance dredging contract and would not form part of the proposed new capital works. Sequence of works is envisaged as follows:-

- Formation of a temporary cofferdam just immediately south of the Queenie Bridge (Figure 1 refers).

- Dewatering of the North Harbour and basins north of the cofferdam (this exercise has been carried out previously some years ago) in a controlled manner.

- Start made on excavation of base material. A site investigation has been carried out by Holequest in autumn 2013. PPA appraisal of this suggests that the rock is fractured and could mainly be 'ripped' out by excavator, but potentially 20% of the area may need to have localised pre-treatment in the form of controlled blasting charges to loosen the rock.

- Quay wall strengthening would then be carried out in the dry in the north harbour areas by underpinning below the existing wall foundations providing a concrete facing, rock anchored if required. Depending on the successful contractor's detailed methodology it is envisaged that this would be carried out in local small lengths of about 5m with intermediate buttresses of existing rock base left in place until exposed sections completed, the overall length being completed on an intermittent hit and miss basis.

- In parallel with the wall strengthening the excavation work would continue in the North Harbour in the dry. A ramp exit from the basin would be formed allowing up to 40T trucks to access at Farmer's Lane. The route to the reclamation area would then briefly follow the public road at Harbour Street and thereafter entirely on PPA property through Merchant's Quay and then Smith Embankment. Depending on the amount of fish market traffic in the period 6am to 10am it may be that the routing has to temporarily use the public road at Harbour Street and Lodge Walk. The total volume of material to be shifted in this manner is approximately 87,500m3 (219,000T). Using 40T trucks at a frequency of 5 per hour would result in a time operation of approximately 1100 hours.

- Queenie Bridge removed after appropriate heritage photographs taken and records made. Entrance area to North Harbour widened.

- South Harbour and Merchant's Quay deepening would be carried out by back-hoe dredging with material then transported by barge to Merchant's Quay or West Quay where it would be unloaded and then trucked to the reclamation area. Again a site investigation has been carried out in autumn 2013. Appraisal by PPA suggests that the rock is fractured, but potentially 30% of the area may need controlled small blasting charges to loosen the rock. Volume to be dredged from these areas and deposited in the reclamation zone is of the order of 66,000m3.

- Demolition of the west section of the Greenhill fish market, with suitable material taken to the reclamation zone, and deleterious material removed from site to an approved location.

- Construction of the new Greenhill fish market, including refurbishment of the east section of the existing building.

- Demolition of the existing fish market at Merchant's Quay, with suitable material taken to the reclamation area, and deleterious material removed from site to an approved location.

- Completion of reclamation area including provision of protective side slope armourstone. The existing armourstone on the west face of the existing Smith Embankment will be reused but this will only cover part of the required area, the balance being imported from local quarries just south of Peterhead.

2.3. Options Considered

In overall terms of provision of a larger, more efficient fish market with deep water access would be to create new protected berths elsewhere. Within the Peterhead Bay area such protected areas are not available, less protected potentially adjacent to Smith Embankment but with significant imported fill required. Such an option was discarded by PPA at an early stage.

In terms of methodology the main alternative has been whether to excavate the north harbour in the dry or in the wet. The former has the significant advantages of permitting the quay wall strengthening to be carried out in the dry and not transmitting any shock waves through water. At this stage it is also assessed as being the cheaper and only affordable option.

Design options for maintaining the integrity of the quay walls have been considered, including underpinning with concrete strengthening, and as an alternative a bored piled wall, possibly non-contiguous, cut off at the existing bed level. As the detailed design develops alternatives will be considered in more detail, but at present PPA favour an underpinning solution.

3. PROPOSED METHOD OF ASSESSMENT

3.1. Baseline Data

Existing information on the site area and potentially affected surroundings will be collated from readily available sources within PPA, feedback from a large number of consultations (statutory bodies and local businesses and organisations), appropriate desk top studies and site visits. In respect of this the EIA carried out for PPA for the New Breakwater Extension, Quays and Deepening at Smith Embankment in 2007 is of particular relevance as many of the features of the current proposal are similar to those of that project. A copy of the Environmental Statement from that project is included as Appendix A to this report. Site evidence from the construction of that project, completed in 2011, has and is also being sought to inform on the environmental performance particularly related to the mitigation measures put in place.

Several studies and investigations have already commenced, including:-

- Geotechnical Site Investigation. Holequest Autumn 2013.
- Outline wave analysis within the proposed new Quay arrangements.
- Phase 1 Habitat Survey

Outcomes from the above will assist in the determination of further studies if required.

3.2. Consultation Process

3.2.1. Statutory Consultees

Transport Scotland have indicated that they will be acting as co-ordinator for all the statutory consultees including Marine Scotland and Aberdeenshire Council Planning. In respect of compiling this Scoping report and to start the process of homing in on the key risks, solutions and mitigation, initial meetings have already been held with:-

- Marine Scotland
- Aberdeenshire Council Planning
- Aberdeenshire Council Environmental Health
- SNH

Discussions and correspondence has also been ongoing with AC Roads, AC Archaeology and SEPA. Subsequent meetings and discussions will be held with the above teams and others as the EIA study develops and more information is obtained.

3.2.2. Non - Statutory Consultees

In considering the likely environmental effects that could arise from undertaking the proposed scheme, or other options considered, a consultation document has been issued to non-statutory consultees, eg local businesses and organisations, and other concerned bodies. The aim of this consultation process is:

- To explain why the proposed scheme is considered to be necessary and what options may be available.
- To obtain an initial response from these consultees on the scheme particularly in relation to the environmental concerns and issues they wish to be addressed in the EIA.
- To identify any additional information held by the consultees relating to the natural and human environment.
- To help engender good public relations and an open approach to the Peterhead community to share in PPA objectives.

In relation to the last bullet point above an 'open day' is being organised by PPA on the 3rd of April 2014 to share current details with the local community.

3.3. Impact Assessment

3.3.1. Assessment Method

An assessment table designed to examine the nature of environmental impacts will be drawn up to facilitate the examination of impacts relating to both the construction and operational phases of the development. It will examine each impact in terms of environmental components grouped under the three headings: Physical Environment, Ecology and Nature Conservation, and Human Environment.

Each potential impact in the table will be studied to determine whether the impact is likely to occur and if so, the size and type of that impact. Each topic will be analysed and assessed as outlined in Section 4 below with appropriate mitigation measures identified where relevant. The results will be outlined in the main body of the table. An example of such a table is indicated in Figure 4.

The table will classify the nature of the impact and is used to assess its significance. Impacts will be assessed as being adverse, negligible, beneficial or indeterminate. Impacts will be defined as indeterminate either because it cannot be certain they will occur, or there is not enough information to assess the significance of the impact. In assessing the significance of each impact, the following factors will be considered.

1. Type of impact: The impacts of the scheme will be classified as being, adverse, negligible, beneficial or indeterminate.

2. Probability: The likelihood or risk of the impact occurring as a result of the work undertaken. This will be judged to be low, medium or high. In most cases the classification will be subjective except where analytical and physical modelling has been undertaken, for example in determining effects of wave conditions with the proposed modifications to the harbour basins and their depths.

3. Geographical importance: The area or population, which would be affected by the impact will be defined as local (town/land adjacent to the bay), regional (county wide or of country importance), national or international. An impact will be judged to have international significance when it is detrimental to a species or habitat protected by national or international legislation.

4. Contextual importance: The consequence of an event occurring will be classified as low, medium or high. The contextual importance of an impact would be low where, for example, the habitat is poor or common or where there will be few long-term effects. It would be high where impacts affect protected habitats or spaces.

5. Nature: The nature of the impact will be described in terms of timescale (short, medium or long term), reversibility (reversible/irreversible) and type of impact (direct/indirect).

6. Mitigation measures: Are solutions to the problems available? Are they feasible or economical in this instance?

7. Significance: As a result of appraising each impact with the above factors and in light of mitigation measures available, a decision as to the size and direction of an impact will be made. The residual impacts of the scheme will be classified as major, minor or negligible.

The decisions made will be largely based on the experience of the impact assessors and the views of the consultees, as well as factual background knowledge and information: some are therefore qualitative and subjective, rather than based on quantitative information.

3.3.2. Assessment Overview

To summarise, minor impacts will be generally small-scale providing slight concern when adverse; in which case they are undesirable but acceptable. Major impacts are significant and provide greater concern. When adverse, major impacts would usually be unacceptable if considered out of the context of the scheme as a whole.

Major adverse impacts tend to be those which are difficult to mitigate against and, hence, the core of the analysis involves weighting them against the benefits which the scheme will bring. A summary table of the overall evaluation will be provided as illustrated in Figure 5.

4. ENVIRONMENTAL IMPACT CONSIDERATIONS

4.1. Introduction

This section describes in detail the considerations and details that will be pursued in respect of the possible impact of the project on specific environmental issues, including the specialist bodies with whom further consultation will be required while preparing the EIA. Specific agreements with relevant bodies are anticipated to be made during this process in terms of practical approaches that can be written into contract requirements as well as being included in the EIA. The data described in 3.1 above will be used as the database. Generally issues will be assessed for the construction period and the completion/operating condition. It is intended that all of the items noted below will be covered in adequate detail within the EIA.

4.2. Physical Environment

The major effects of the proposed works on the physical environment will be the permanent changes in the form of the deepened harbour basins, improved navigation channel, and new reclamation. During construction there will be displacement of sediment leading to increased turbidity in the vicinity of the works. There will also be a permanent loss of seabed and possible changes in the movement of the water body within the port. These issues are dealt with in this section of the report.

4.2.1. Geology and Geomorphology

Potential Effects

The aspects of construction that will affect the geology and geomorphology are:-

- Dredging, including rock dredging.
- Reclamation and fill material.

The areas of sea bed affected by the works will be permanently altered.

Approach/Methodology

No mitigation in terms of the local impact on the geology and geomorphology is possible, nor indeed desirable as this would be counter to the proposed objective. It is noted however that the borehole site investigation carried out in respect of the project has not found any evidence of any rare sediment or geological findings of any historical interest. This will be examined in more detail as further investigation results are obtained.

The reclamation may require imported fill material and the seaward slopes will require armouring. Rock and stone material for this will come partly from reuse of material from the west side of the Smith Quay reclamation with the remainder from quarries subject to the requirements of minerals licenses and other statutory and planning requirements, including environmental controls. More detailed assessment of this will be carried out and reported.

4.2.2. Coastal Process

Potential Effects

Adverse effects of:-

- waves
- flooding
- currents

On navigation, existing harbour and bay features and existing operational areas.

Approach/Methodology

The wave analysis being undertaken will examine and identify any negative impacts and how these can be avoided or mitigated. The analysis will examine any potential for adverse effects on waves on other facilities and on other areas of the bay and harbour so that these can be designed out. Potential for vessel downtime will also be considered. Waves at and outside the main harbour entrance will not change discernibly so navigation into the Bay Harbour in waves will not be changed.

In terms of potential flooding existing quays have a cope level at 6.2m above chart datum, equivalent to 4.0mOD. Initial feedback from SEPA suggests that the minimum level of 2.86m plus a minimum 600mm freeboard is a required minimum for new works subject to local council consultation. The reclamation area minimum level will be checked against these criteria. SEPA and the local authority will be further consulted regarding the final proposed levels and PPA consulted with regard to their overall flood management plan, and its potential updating.

Current speeds within the Bay Harbour are low comprising slow tide and wind induced drift, there being no watercourses entering the harbour or Peterhead Bay. It is considered that the development will do little to change existing patterns of current movements, because the scale of the development is small compared with the overall scale of the Bay Harbour. For the same reason any changes to the currents in the Bay Harbour and its approaches are likely to be negligible. Accordingly the effects of current on navigation in the Bay Harbour are considered to be minimal but this will be reviewed in the light of the final design proposals.

Currents are expected to fall in the inner harbour areas in the vicinity of the development, because of the increased depths and the widening at Queenie Bridge. The reduced currents may effect sedimentation but be of benefit to navigation.

The effect of the new reclamation with armourstone protection is likely to be mainly beneficial as any waves will be partly absorbed by the armourstone, as opposed to possible reflection from the existing solid sea wall at this location. There will however be some reflection of the armour which may affect different areas. This will be checked in more detail by as part of the wave analysis.

4.2.3. Sediment Effects

Background

As described in Section 2.2 dredging to the South Harbour and Merchant's Quay comprises an essential part of the project. Dredging is likely to be carried out using a back-hoe dredger, with the dredged material being deposited into an anchored barge. Site Investigation boreholes have generally indicated top layers of heavily weathered granite with varying degrees of strength and fracturing of granite below. Although a lot of the rock may be frangible enough to be removed by the back-hoe, small explosive charges may be required to break up some of the harder unfractured rock material.

It is anticipated that approximately 66,000 m^3 of rock material will be removed during dredging operations in order to achieve the required depths. During back-hoe dredging sediment may be released during the following phases of operation:

- Impact of the back-hoe on the seabed.
- Disturbance of the bed during closing and initial removal from the bed.
- Material spilled during hoisting.
- Material washed from the outside of the back-hoe during hoisting.
- Leakage and dripping during slewing.
- Wash off during re-entry and lowering.

Measurements of losses from back-hoe dredgers indicate the mass of material lost per cubic metre dredged varies widely from 2-25kg/m^3. The higher values are associated with the dredging of loose silts with small capacity back-hoes. The smaller values are associated with the dredging of granular materials which is the case here.

The main concentrations of suspended sediment will remain generally in the vicinity of the dredging because there is little current to disperse it. In calm conditions it will settle onto the seabed. However, during storms, sediment fines which may have settled in shallower water will be suspended and deposited in areas which are sheltered from waves.

Of significance in relation to Peterhead Bay in general and the project in particular is the fact that there are no rivers, streams or watercourses which actually flow into the Bay or harbour areas. This results in no river induced currents or flows which could affect the spread of sedimentation. Notwithstanding this any implications of the Water Framework Directive (2000/60/EC) as implemented by the Water Environment and Water Services (Scotland) Act 2003 (WEWS) that are relevant will be addressed.

Potential Effects

During the construction phase these include:-

- sedimentation reducing berthing depths at operating quays.
- turbidity over areas of construction activity
- disturbance to other users in the harbour, and particularly Peterhead Bay
- disturbance to local ecology (covered in Section 4.3 below)

Approach/Methodology

The previous EIA (Appendix A) had examined this in detail for clay dredging in a far more central bay area, and a similar exercise will be undertaken with respect to the more granular material in this instance. Additionally the effect of construction mitigation for those works as carried out in 2010/2012 will be reviewed and assessed, with the objective of achieving pragmatic mitigation measures. In respect of clean water intakes associated will local commercial fish processing then special separate provisions may need to be made and this will be subject to detailed design and liaison with the appropriate interests and this will be reviewed.

An assessment of the effects of possible sediments extending to the marina, the Lido, and other pleasure areas of the bay will also be made and appropriate mitigation measures considered.

PPA carry out regular hydrographic surveys followed by associated dredging where deemed necessary. On completion of the works this is not anticipated to involve any greater activity than at present.

4.2.4. Water Quality

Potential Effects

These are considered to be from two potential sources in respect of water quality:-

- Dredging, filling and stone placing operations which are likely to result in suspension of silt and clay particles.

- The use of plant and machinery adjacent to and within the works which could result in accidental contamination from oil or diesel leaks, or from runoff from temporary storage areas. Oil/diesel and potentially some sediment are identified as the risks.

Approach/Methodology

Aspects relating to suspension of clay and silt particles are described in section 4.2.3 above.

In terms of oil, diesel or other pollutants from the construction activities the contractor for the works will be required, by contract, to comply with numerous statutory legislation requirements including the Pollution Prevention and Coastal (Scotland) Regulations 2000, as well as the PPA emergency procedures in respect of prevention of oil pollution and to comply with the Port Marine Safety Plan, Security Plan, and Port Waste Management Plan. Checks will be made with SEPA to ensure that of all their current pollution prevention, environmental management and Waste Management Plans are covered within the EIA, as well as all relevant PPA procedures.

4.2.5. Air Quality

Potential Effects

Air quality deterioration could occur along haul and access routes to the works sites due to vehicular exhaust emissions. Exhaust fumes from plant and machinery working on the actual site locations will also cause some local deterioration in air quality in the harbour area.

Approach/Methodology

A key consideration with air quality is the quality of the receiving environment. Ambient air quality in Peterhead from previous baseline studies is believed to be very good and it is unlikely that the exhaust emissions form site plant or delivery vehicles will reduce air quality to the extent that statutory limits will be exceeded. Indeed the air quality may be improved as there will be no vessels in the North Harbour and potentially fewer in other areas. It is not considered necessary at this stage to undertake detailed air quality modelling, as the potential for air quality standards to be exceeded is minimal. In addition any impacts are likely to be localised and will only occur during the construction process.

Aberdeenshire Council Roads, and Environmental Health will be consulted regarding detailed traffic routes which will be agreed, as well as hours of operation of construction traffic. Requirements for dust and mud suppression will also be covered with these bodies.

It is not envisaged that the activities at the new reclamation, Merchant's Quay or new fishmarket will generate any air quality issues that are different from current port activities.

4.2.6. Noise and Vibration

Potential Effects

Noise and vibration during construction will emanate from the following sources:-

- Traffic to and from the site.
- Construction traffic within the site.

- Construction activities including excavation, dredging, filling, placing rock armour stone and pouring concrete. Limited use of explosive charges for rock blasting.

- Possible coring and / or anchoring into rock depending on the detailed design adopted.

Potential effects are on inhabitants, buildings and people working within proximity of these areas. Vibration aspects in relation to mammals are described in Section 4.3.2.

Approach/Methodology

Aberdeenshire Council Roads and Environmental Health Sections will be consulted in detail in relation to the above, and an initial meeting has already been held with Environmental Health. Specifically issues to be covered will include:-

- Routes for construction traffic will be carefully selected to avoid, as far as possible residential areas, and existing routes for access to different parts of the port confirmed. Section 4.4.4 refers.

- Permitted construction hours in general will be limited to avoid anti-social times and will be agreed with the Aberdeenshire Council Environmental Health Officer, with specific times designated for any required above ground blasting and any other specific construction activity. Site works will be 24 hours however initial discussions with this department have established that a base noise survey is unlikely to be required.

- Specific issues related to vibration from explosive charges, as covered in more detail below.

With regard to vibration aspects underwater/underground rock blasting has become a relatively sophisticated discipline, with the size, position, depth and firing of explosive charges designed to minimise or negate adverse effects to acceptable levels while at the same time achieving the excavation objective. Detailed items to be considered with the Environmental Officer will include:-

- Pre survey of structures, including harbour works and nearby buildings including photographs and video survey.

- Compliance with all current mandatory and statutory codes and with current British Standards.

- Use of electronic detonators with multi-second delays to trigger charges in sequence, and not altogether.

- Design of the explosive pattern to reduce the particle velocity to not more than 15mm / sec (BS 7385 Pt 2, threshold for houses).

- Other items as may be required.

It is not envisaged that the activities at the new reclamation, Merchant's Quay or the new fishmarket will generate any noise or vibration issues that are different from current port activities.

4.3. Ecology

Background/Baseline

The previous 2007 PPA EIA covering the Breakwater Extension, Smith Quay and Embankment is included in Appendix A and covers the ecological database for the area around Peterhead. A Phase 1 Habitat Survey has also been undertaken in March 2014 with results awaited.

There are no designated conservation sites within the immediate vicinity of the proposed works which are effectively within an industrial setting. The presence of a number of protected sites and species in the local vicinity which are designated both nationally and internationally is fully recognised. These can be summarised as follows:-

- Buchan Ness to Collieston SPA, SAC, Natura 2000 Site
- Ythan Estuary, Sands of Forvie and Meikle Loch SPA
- Moray Firth Marine SAC
- Loch of Strathbeg SPA, RAMSAR site

The existing baseline described above will be updated further to the Phase 1Habitat Survey by desk top study, with particular reference to the Moray Firth Marine SAC bottle-nosed dolphins which are a European Protected Species.

Potential Effects

The following aspects of the proposed development are assessed as having potentially significant adverse effects on the local ecology:-

- Dredging and filling activities involving the disturbance and removal of sediment and substrate.

- The use of underwater explosive charges to fracture rock to facilitate dredging operations.

- The noise generated from installing piles by drilling and socketing in the dry.

- The accidental spill of fuel from construction vessels, or other sources, during construction activities.

- Corkscrew injuries to seals. In respect of this it should be noted that during construction there will be less vessel activity than the present fishing vessel activity and hence less potential for such injuries.

These issues are examined in detail in the sections following in relation to the ecological aspect of concern, and how it is proposed to deal with them within the EIA.

4.3.1. Benthic Communities

Potential Effects

The dredging operation will result in the removal of any benthic community within the proposed dredge area. Given that this is all existing industrial harbour it is unlikely that there will be much benthic community in any event as this will have been disturbed over the years by maintenance dredging. Any such community will be lost in the entire North Harbour area with the dewatering exercise. Similarly within the footprint of the proposed new reclamation any benthic community will be lost.

Approach/Methodology

Given the nature of the project it is not proposed to consider this issue further, other than to include relevant commentary within the documentation. However, if the Phase 1 Habitat Survey reveals any issues of significance within the proposed reclamation area then this will be given appropriate attention and consideration of any relevant possible mitigation.

4.3.2. Marine Mammals

Potential Effects

a) Impact of Underground Rock Fracturing using Explosive Charges

Background

Based on recent past experience at Peterhead this issue had been examined in some detail at this stage, with details provided accordingly.

As described in Section 2.2 above, over approximately 30% of the area of the Merchant’s Quay and South Harbour, it will probably be necessary to fracture the underlying granite below the existing sea bed to facilitate back-hoe dredging to the required level. The blasting methodology is that small explosive charges will be inserted into holes drilled to twice the depth below sea bed of the depth of material required to be removed. The nature of the resultant shockwave in water from these charges will depend on a number of factors including the size of charge and depth of sea bed into which they are inserted. Spread and disipation of the shockwave will depend on the local physical features and depth of water.

The concern with respect to sea mammals is the effect of these shockwaves, particularly with regard to bottlenose dolphins (SAC in the Moray Firth). Whilst it is noted that neither the NESBRec nor PPA have any records of sightings of dolphins or whales within the harbour or immediately outside the harbour, these mammals are known to be present in the waters of the North Sea off the Aberdeenshire coast, and NE Scotland in general.

Explosively generated pressure waves are characterised by having a very short duration, but with high pressures and a wide frequency bandwidth. Historically, two key parameters have been used to describe the severity of an explosive source, the peak pressure and the impulse. The peak pressure of a blast wave, Pmax, is the maximum level of overpressure, that is, pressure above the local ambient pressure caused by the shock wave. This is usually at the initial peak of the waveform, and is easily read from a recording of the blast wave. The impulse, I, is defined as the integral of pressure over time and essentially can be considered as the average pressure of the wave multiplied by its duration. The importance of impulse is that in many cases a wave acting for a given time will have the same effect as one of twice the pressure acting for half the time: the impulse of both these waves would be the same.

When high explosives are confined in boreholes, the pressure wave is greatly changed from unconfined conditions; in general there is a significant reduction in level, and high frequency components are lost. Bubble pulses also do not occur when explosives are imbedded in rock.

The level of blast can be related to that for the equivalent unconfined charge. Research[34] has shown that the peak pressure for an embedded charge is reduced substantially, to approximately 5 percent, and the impulse to approximately 30 percent of that for the equivalent unconfined charge[34]. The rise time of the wave is also greatly extended to the order of a millisecond. The blast wave is therefore likely to contain a high proportion of low frequency energy components. Table 1 below gives formulae for calculating peak pressure and impulse based on these results, where W is the weight of TNT in kg and R the range in metres.

Table 1: Peak pressure and impulse for TNT charges embedded in boreholes

Parameter	Symbol	Value	Units
Peak pressure	Pmax	$2.5 \times 10^{6}\ W^{0.27}\ R^{-1.13}$	Pa
Impulse	1	$1.8 \times 10^{3}\ W^{0.63}\ R^{-0.89}$	Pa.s

Research[35] has given an indication of the effects of different impulses on mammals diving beneath the water surface, and this is noted in Table 2 below:-

Table 2: Summary of effects of different impulses on mammals diving beneath the water surface[35]

Impulse (bar .msec)	Effects
2.76	No mortality. High incidence of moderately severe blast injuries, including eardrum rupture. Animals should recover on their own.
1.38	High incidence of slight blast injuries, including eardrum rupture. Animals should recover on their own.
0.69	Low incidence of trivial blast injuries. No eardrum ruptures.
0.34	Safe level. No injuries.

Given the safe level impulse from table 2, the following ‘safe level distance’ for various charges can be derived:-

Equivalent charge of TNT (Kg)	Safe Level Distance (m)
15	588
20	720
35	1071

In respect of humans Figure 6 indicates safety distances in water for charges confined in blastholes[34]. This indicates significant danger in water at distances below 30m, but by the 200m safety distance the compatible charge is well above 200kg. The entrance to the harbour through the main breakwaters is approximately 800m from the nearest likely position of required explosive charge.

Approach/Methodology

The above brief desktop analysis is taken from the EIA of 2007 as included in Appendix A. Further desk top research will be undertaken to check more recently published sources including those from universities, specialist cetacean organisations, current JNCC publications and SNH. The objective of this will be to determine the safe distance for respective charges. An initial meeting has been held with SNH and liaison will be ongoing in relation to the finesse of these details. This will include considerations of cumulative effects as it is understood that works are proposed off Peterhead and Aberdeen in respect of off-shore wind farms and also developments in the Moray Firth. Programme timings for these will be compared with the programme expectations for the PPA proposals.

Sighting records will also be sought from these organisations to determine sightings in the Peterhead area. As stated above bottle-nosed dolphins have never been reported as being sighted in Peterhead Bay.

Rock blasting has also been undertaken successfully within the general area in the last 5 years at the entrance to Fraserburgh Harbour in a controlled manner with no adverse effects. The Smith Embankment project carried out in 2010/2012 had more blasting than that proposed under this current scheme, and was significantly closer to the main breakwater entrance into Peterhead Bay. Blasting here was carefully controlled with a mitigation plan in place including, cetacean watchers, with no incidents occurring.

The objective of all the above will be to determine a comprehensive set of limitations which can be translated into a practicable working mitigation plan.

b) Impact from Noise (Pile installation by drilling and socketing in the dry, Floating Construction Plant)

Background

If pile installation is required for wall stabilisation this will be by drilling and socketing proposed to be carried out in the dry in the North Harbour and so, being essentially 'land based' will not have any detrimental effect on sea mammals. The most significant noise generating operation in respect of the marine environment will be from the grab dredger and general floating construction plant. It should be noted that the marine activities are essentially in the working area of Peterhead Harbour, which has a 24 hour working environment, and many vessel passages per day.

Approach/Methodology

Desk top checks on currently available good practice will be sought as well as feedback from SNH in respect of current JNCC publications.

c) Impact of Pollution/Accidental Spillages

Proposed procedures for this are as per section 4.2.4 above.

d) Corkscrew Injuries to Seals

Approach/Methodology

PPA are not aware of any corkscrew injuries to seals in the harbour areas, but current findings from SNH, Marine Scotland and others will be researched and current best advice sought.

4.3.3. Birds

Impact of Construction

Birdlife at the local areas of particular concern, Buchan Ness to Collieston (Natura 2000 site, SPA, SAC, SSSI),Ythan Estury (Ramsar Site, SPA, Natura 2000 site) and Loch of Srathbeg (Natura 2000, SPA) are sufficiently distant enough from the main construction works to be considered unaffected. The site of the works, being located at a busy existing harbour, are not considered to be a natural feeding area, although many benefit from the fishing fleet movement. Any birds that may be within the area, generally common seagull, may be temporarily displaced although some may locally scavenge. Notwithstanding this any implications from the findings of the Phase 1 Habitat Survey will be appropriately addressed.

4.3.4. Others

The Phase 1 Habitat survey will also seek any evidence of bats in the existing building to be demolished or refurbished. While the marine environment is not their usual habitat any findings will be appropriately addressed.

Similarly with no fresh water inflows into the harbour it is not anticipated that otters will be present in the area of the works.

Marine Non -Native Species (MNNS), following SEPA advice will be noted in the EIA to ensure that appropriate steps are covered in construction documentation.

4.4. Human Environment

4.4.1. Safety

Potential Effects

Construction of the Works will result in health and safety issues affecting the construction contractors personnel, port users, and the general public including local residents. These issues include but will not be limited to:-

- Increase in traffic, and number of heavy goods vehicles (HGVs).
- Maritime construction activity.
- Noise.
- Vessel movement and port operations near the works.
- Handling and use of materials including heavy rock armour, and explosive charges.

Approach/Methodology

A review of the relevant PPA regulations, CDM Regulations and HSE requirements will be highlighted to ensure that all relevant issues are adequately addressed.

4.4.2. Socio-Economic

Impact of Construction

Population

The construction of the works will lead to a temporary increase in the population of the area. It is expected that approximately 60 to 100 construction workers will be required during the construction period. Although some of these workers will come from the area a number will come from outside the region. Such workers will need to use local hotel, bed and breakfast, restaurant, café and shop facilities, all of which will provide some short term benefit to the local economy. The increase in population is only minor as the population of Peterhead is large in comparison, at 17,700. The temporary increase in population is not therefore expected to have any additional or negative social impacts which can occur with large schemes in remote locations.

Employment

The construction of the works will create local employment during both the construction and operational stages. The construction phases will require the temporary employment locally of potentially 50 to 60 personnel. Although not all of these jobs will be new, there will undoubtedly be a need to employ some local workers for at least part of the construction period.

Approach/Methodology

With the proposed dewatering of the north harbour area PPA will need to provide contingency arrangements for the businesses displaced during the construction of the works. PPA will be consulted regarding this with relevant inclusion in the EIA.

The local NE Aberdeenshire economy will benefit significantly from the project with the fishing facilities enhanced and the opportunity for diverse activities enhanced. An Economic Impact Assessment of the project has been undertaken by Biggar Economics on behalf of PPA and elements of this will be included as relevant in the EIA document. The Biggar Economics report is included in Appendix B, bound separately.

4.4.3. Navigation

Potential Effects

The main navigational issue at Peterhead is the approach into the harbour between the main north and south breakwaters. This will be unaffected by the new works. During the construction works navigational impacts may arise in the inner harbour area however as follows:-

- Obstructions from floating plant.

- Reduction in navigation width due to floating plant.

- Increased cross harbour traffic

Approach/Methodology

PPA will be consulted with regard to this issue and relevant items included in the document. The Northern Lighthouse Board will also be consulted.

4.4.4. Traffic

Potential Effects

Additional traffic emanating from the construction of the new works is envisaged to constitute the following:-

- Cars and general site vehicles to the main works areas in the dried out North Harbour and at the reclamation area. It is not considered that this will exceed current traffic volumes in this area.
- HGVs to the same areas.
- Lorries operating on the haul route identified on the Proposed Layout Plan..
- Assorted deliveries of other construction materials throughout the contract period to the North Harbour and reclamation area.

Approach/Methodology

Interface has already commenced with Aberdeenshire Roads and Environmental Health sections to determine the best routes to areas of the harbour, acceptable frequency of traffic and hours of operation. Conclusions on acceptable arrangements for this will be included in the EIA.

4.4.5. Amenity and Recreation

Potential Effects

During the construction period there is a possibility of some increased sediment load in the water affecting water sports in the bay and the designated bathing area. This will mainly occur during the dredging period.

Recreational users of the bay, visitors to the Marine Heritage Centre and residents at the Caravan site may experience some disturbance due to increase noise related to construction activities. However, in any port or harbour setting, noise is a common and expected characteristic.

The Sailing Club activity zone will not be affected. No impact is predicted on the recreational use of the Formartine and Buchan Way. However, the work is likely to disrupt use of the bay footpath extending along Smith Embankment. There will be a need to divert or possibly close this footpath during construction. Diversion or closure will only be a temporary measure and therefore the impact will be minor.

A few local creel fisherman occasionally utilise part of the harbour area which will be covered by the reclamation works. It is anticipated that these areas will be moved slightly further along the bay.

Approach/Methodology

Public information is key to local acceptability of the project and aspects of this will be covered in the document. PPA have already commenced on this exercise with open meetings arranged. Likely arrangements are as noted in the paragraphs below.

In general it is important that local residents and visitors to the area are advised that the work is being undertaken, what temporary disturbance may be experienced and for how long, and what the work will achieve on completion. Notices should be posted adjacent to key recreational and amenity areas and leaflets should be posted to local residents and occupiers of the caravans at the lido. Specific port users and stakeholders should be informed separately and PPA are already addressing this.

No public rights of way are affected by the construction works, howeverno footpath closure will be made without adequate safe and satisfactory alternatives being made available. Any closed path should be fully sign-posted at both ends.

Restrictions on certain work activities will limit noise generation and this will help to reduce disturbance to recreation and amenity during weekends, a particularly important time for residents and visitors.

4.4.6. Landscape and Aesthetics

Visual Impact

The proposed new works will have a visual impact on the harbour areas at the north harbour with the new fish market, at Merchant’s Quay with the removal of the existing fish market and adjacent to the Smith embankment with the additional reclamation. These works will be highlighted in a photomontage manner in the document. Figure 4 is an example of this, considered an improvement at the North Harbour area. Visual impact from various areas will also be described.

In overall terms the new reclamation development will fit in and be a continuous extension of an existing busy, active and thriving commercial port.

4.4.7. Cultural and Archaeological Heritage

Impact of Construction

All of the port walls in the north and south harbours are 'B listed'. Initial contact with the archaeological department of Aberdeenshire Council has established that design solutions that ensure the integrity of the existing wall faces (eg underpinning, or low level support walls) is likely to be acceptable. Liaison will continue in respect of this as design progresses. Photographic records and details of the Queenie Bridge will need to be made prior to removal, but in principal AC archaeological department have no objection to such removal. Records would also be made of the historical old walls. The EIA document will cover these details.

Vibration issues as they potentially would affect other listed structures in the vicinity of the works or traffic routes would be dealt with as described in section 4.2.7 above.

4.4.8. Planning and Development

Comment will be made on the proposed project compatibility with Aberdeenshire Council objectives. One of the key Councils aims is to help sustain and develop communities by encouraging a wide range of successful economic activities, and this project complements that sentiment.

4.5. Cumulative Effects

Although the works will be carried over a relatively short period with many activities taking place concurrently, the mainly temporary adverse impacts during this period are not anticipated to be greater then the sum of their parts. The potential impact of one aspect will not exacerbate the impact of another.

The potential for cumulative effects from other projects will be reviewed as part of the EIA, particularly from the SAC mammal perspective as noted in section

4.6. Sustainability

The principles of sustainability and protection of the environment will be embraced in the project and covered in the EIA report. In particular the best possible use will be made of existing materials on the site. This will include:-

- Using all dredged and excavated materials in the reclamation, any contamination from the excavation being deposited in an approved licensed tip.
- Reuse of demolished Queenie bridge buttress within the reclamation.
- Reuse of existing armour stone at the new embankment.
- Reuse of suitable arising from the building demolition in the reclamation.

As far as possible other material will be sourced from renewable resources.

4.7. Residual Impacts

In the document a brief summary of the residual impacts will be provided, linking to a summary Table, example at Figure 5.

5. FUTURE ACTIONS

This scoping report highlights the intended actions to address the numerous potential effects that the proposed project may pose. It is understood that Transport Scotland will circulate this report to the following consultee for a formal opinion:-

- SNH
- SEPA
- Maritime and Coastguard Agency
- NLB
- Association of Salmon Fishing Boards
- Chamber of Shipping
- Crown Estate
- HSE
- Defence Infrastructure Organisation
- Historic Scotland
- Inshore Fishing Groups
- Local Planning Authority
- Marine Safety Forum
- Royal Yachting Association
- RSPB
- Scottish Fishermen's Federation
- Scottish Fishermen's Organisation
- Scottish Wildlife Trust
- Transport Scotland
- Whale and Dolphin Conservation Society

PPA encourage recipients to provide comment and feedback such that it can be included in the EIA and translated to practical and beneficial effect in achieving the project objectives. PPA consultants will be in liaison with the above organisations as appropriate in concluding the EIA documentation.

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APPENDIX A

ES for PPA for Proposed New Breakwater Extension, Quays and Deepening at Smith Embankment. Sept 2007.

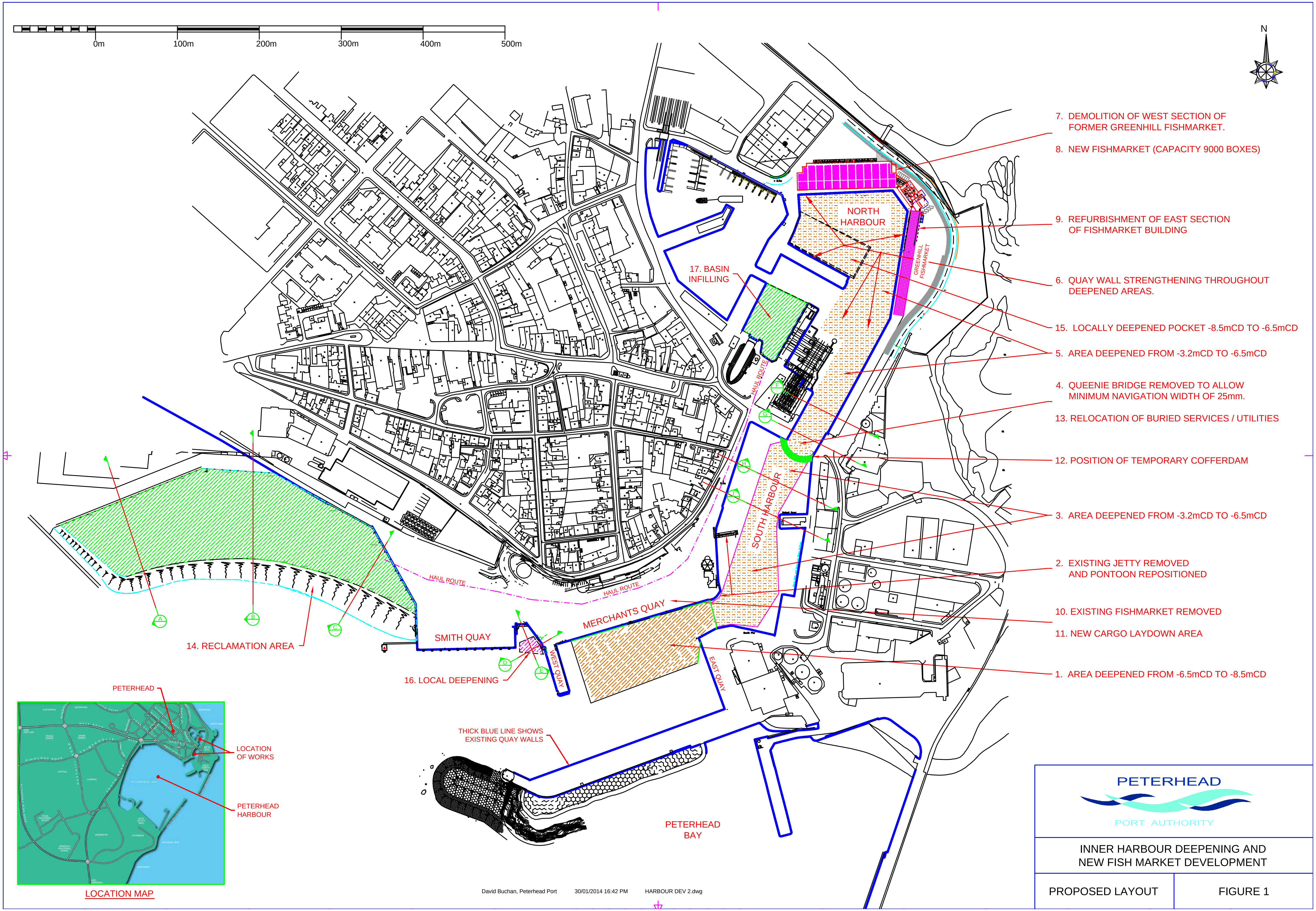
(bound separately)

APPENDIX B

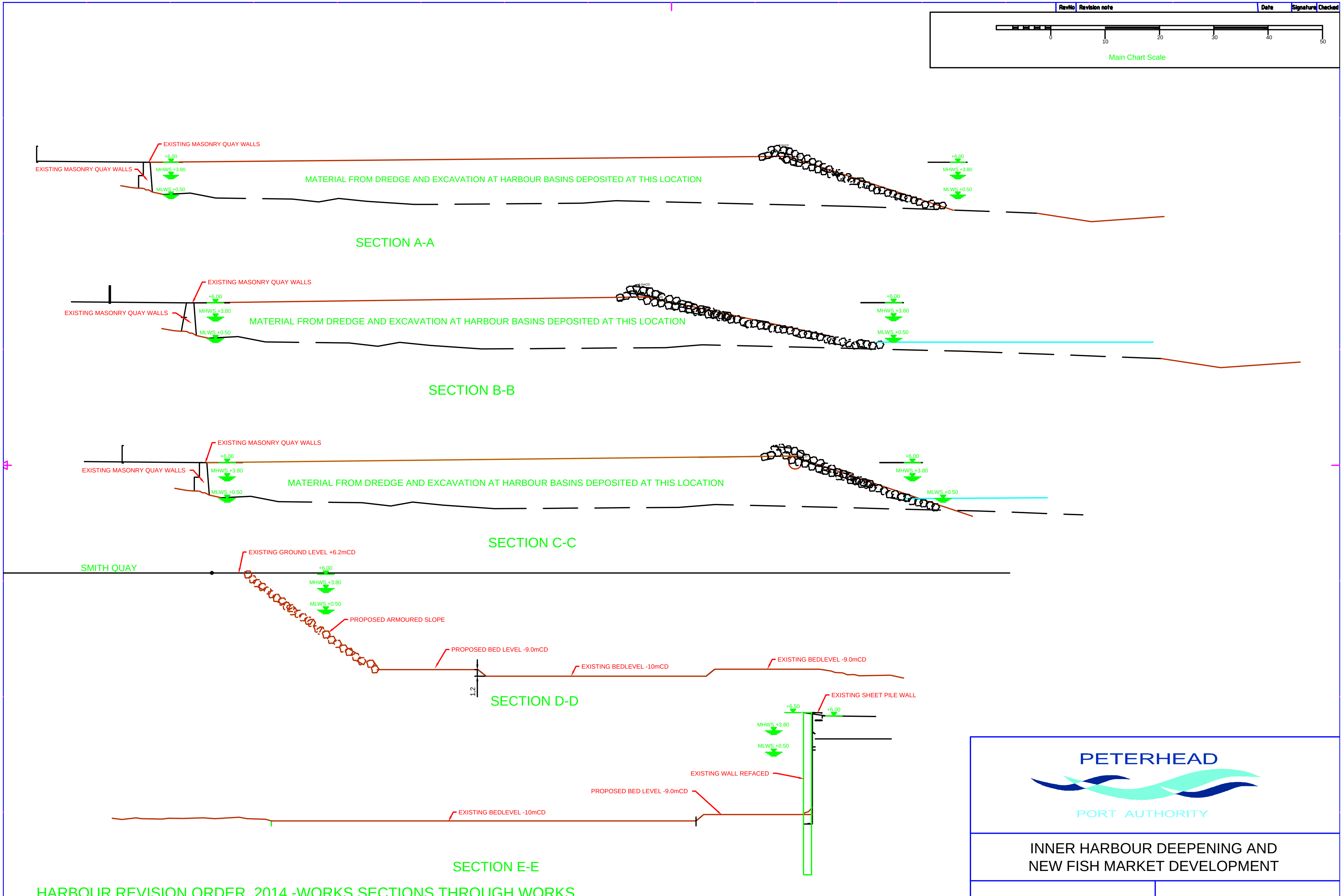
Economic Impact Report. Biggar Economics. March 2014.

(bound separately)

FIGURES



0m
100m
200m
300m
400m
500m
N
7. DEMOLITION OF WEST SECTION OF FORMER GREENHILL FISHMARKET.
8. NEW FISHMARKET (CAPACITY 9000 BOXES)
9. REFURBISHMENT OF EAST SECTION OF FISHMARKET BUILDING
6. QUAY WALL STRENGTHENING THROUGHOUT DEEPENED AREAS.
15. LOCALLY DEEPENED POCKET -8.5mCD TO -6.5mCD
5. AREA DEEPENED FROM -3.2mCD TO -6.5mCD
4. QUEENIE BRIDGE REMOVED TO ALLOW MINIMUM NAVIGATION WIDTH OF 25mm.
13. RELOCATION OF BURIED SERVICES / UTILITIES
12. POSITION OF TEMPORARY COFFERDAM
3. AREA DEEPENED FROM -3.2mCD TO -6.5mCD
2. EXISTING JETTY REMOVED AND PONTOON REPOSITIONED
10. EXISTING FISHMARKET REMOVED
11. NEW CARGO LAYDOWN AREA
1. AREA DEEPENED FROM -6.5mCD TO -8.5mCD
NORTH HARBOUR
GREENHILL FISHMARKET
17. BASIN INFILLING
HAUL ROUTE
SOUTH HARBOUR
MERCHANTS QUAY
SMITH QUAY
WEST QUAY
EAST QUAY
14. RECLAMATION AREA
16. LOCAL DEEPENING
THICK BLUE LINE SHOWS EXISTING QUAY WALLS
PETERHEAD BAY
PETERHEAD
LOCATION OF WORKS
PETERHEAD HARBOUR
LOCATION MAP
PETERHEAD
PORT AUTHORITY
INNER HARBOUR DEEPENING AND NEW FISH MARKET DEVELOPMENT
PROPOSED LAYOUT
FIGURE 1
David Buchan, Peterhead Port
30/01/2014 16:42 PM
HARBOUR DEV 2.dwg

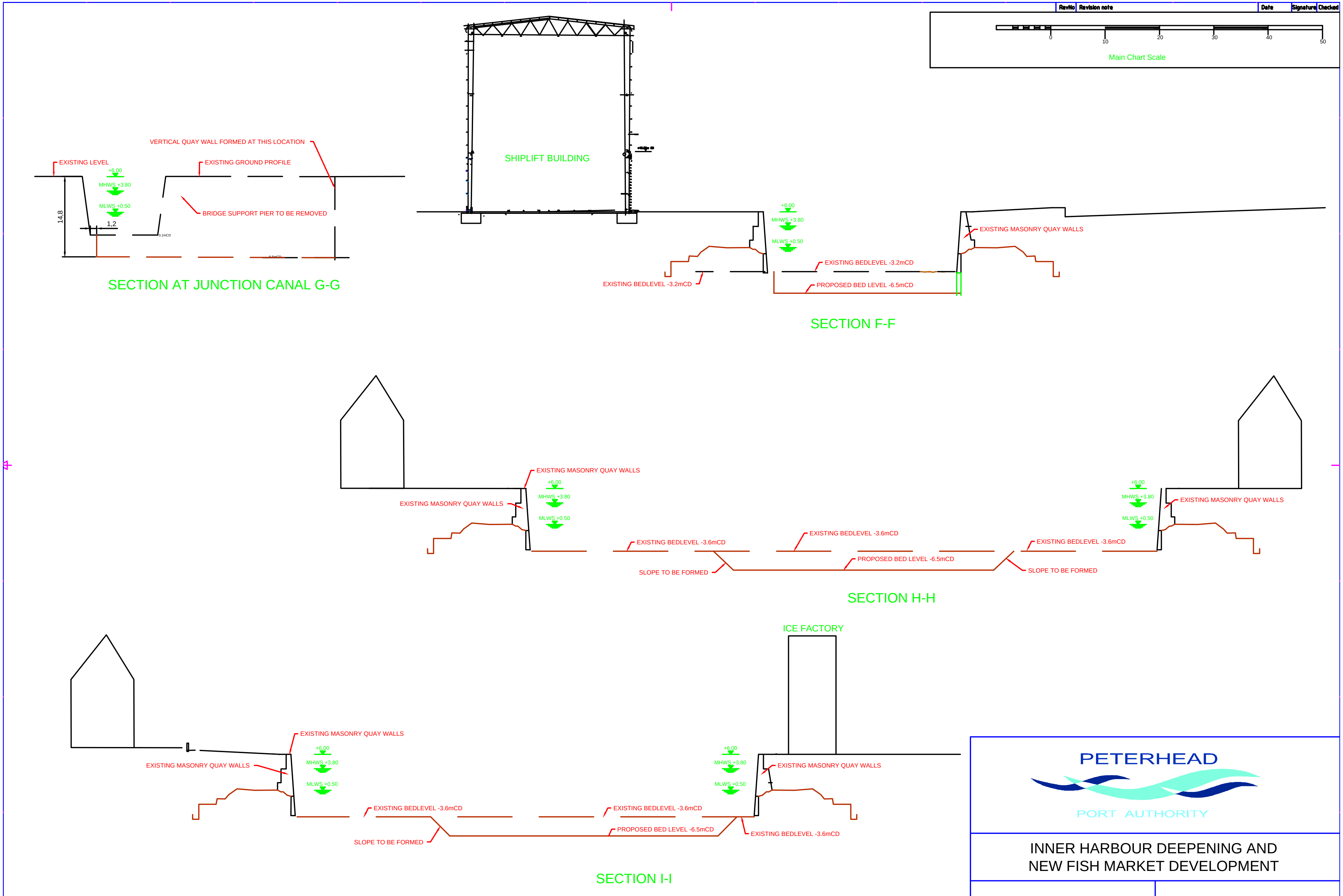


HARBOUR REVISION ORDER 2014 -WORKS SECTIONS THROUGH WORKS

PETERHEAD PORT AUTHORITY

INNER HARBOUR DEEPENING AND NEW FISH MARKET DEVELOPMENT

PROPOSED LAYOUT	FIGURE 2a



HARBOUR REVISION ORDER 2014 -WORKS SECTIONS THROUGH WORKS

INNER HARBOUR DEEPENING AND NEW FISH MARKET DEVELOPMENT

PROPOSED LAYOUT

FIGURE 2b

FIGURE 3

Figure 4 Example of Environmental Impact Table

Topic Area	Specific Area	No.	Description of Impact	Impact	Probability (L,M,H) **L** Low **M** Medium **H** High	Geographical level of importance **L** Local **R** Regional **N** National			Contextual Importance (L,M,H) **L** Low **M** Medium **H** High	Nature Time-scale (ST,MT,LT) Reversibility (R/IR) Type of impact (D/ID)	Mitigation Available	Mitigation Agreed	Significance
						L	**R**	**N**					
Physical Environmental	Land		Loss of area of seabed due to nature of the new works.	Adverse	H	✓			L	LT,IR,D	X		Minor
			The construction of the breakwater and reclamation will require the use of non-renewable stone resources.	Adverse	H		✓		M	LT,IR,D	X		Minor
			The procurement of quarry materials will be from licensed sources but may cause some local environmental damage at source.	Adverse	H		✓		L	LT,IR,D	✓		Minor
	Coastal Processes		Wave action on the southern berths: any adverse effects have been designed out.	Negligible	L	✓			H	LT,IR,D	✓		Negligible
			Wave action on western foreshore.	Negligible	H				M	LT,IR,D	✓		Negligible
			Wave action on marina: 5cm increase in 1:10 year storm predicted but subject to physical modelling results.	Adverse	H	✓			H	LT,IR,D	X		Minor
			Wave action in and around northern basins will be reduced, reducing vessel downtime.	Beneficial	H	✓			H	LT,IR,D	✓		Major
			Tides, water levels and flooding issues.	Negligible	H	✓			H	LT,IR,D	✓		Negligible
	Sediment Effects		During construction, and particularly dredging, sediment will affect various areas of the harbour but will eventually settle out.	Adverse	H	✓			M	ST,R,D	X		Minor
			The completed works may result in some redistribution of any mobile material due to changes in wave activity.	Negligible	H	✓			H	LT,IR,D	✓		Negligible
	Water Quality		Sedimentary effects as noted above during construction with associated water discolouration.	Adverse	H	✓			M	ST,R,D	X		Minor
			During construction there will be the potential for accidental spillages, oil, fuel etc to pollute sea water.	Adverse	M	✓			M	ST,R,D	✓		Minor
			Sedimentation during construction may affect the sea water intakes of local commercial interest, and these may need to be temporarily or permanently relocated.	Adverse	H	✓			H	ST,IR,ID	✓		Minor
	Air Quality		Potential for reduced air quality due to exhaust fumes from vehicles and plant on site and along access routes.	Adverse	H	✓			L	ST,IR,D	✓		Minor
			Potential for dust generation during movement of vehicles and loading of materials.	Adverse	H	✓			L	ST,IR,D	✓		Minor
	Noise & Vibration		Noise and vibration due to construction traffic to, and within the site during the construction works.	Adverse	H	✓	✓		L	ST,R,ID	✓		Minor
			Noise and vibration due to general construction activities, dredging, filling, placing armour stone and concreting.	Adverse	H	✓			L	ST,R,ID	✓		Minor
			Noise and vibration due to piling operations.	Adverse	H	✓			M	ST,R,D	✓		Minor
			Vibration due to underground explosive charges used to split hard rock to facilitate dredging.	Adverse	H	✓			M	ST,R,ID	✓		Minor

Figure 4 Example of Environmental Impact Table

Topic Area	Specific Area	No.	Description of Impact	Impact	Probability (L,M,H) L Low M Medium H High	Geographical level of importance L Local R Regional N National			Contextual Importance (L,M,H) L Low M Medium H High	Nature Time-scale (ST,MT,LT) Reversibility (R/IR) Type of impact (D/ID)	Mitigation Available	Mitigation Agreed	Significance
						L	R	N					
			Noise and vibration in the final operating condition will potentially be improved as with power supply to the quay, vessels will be able to switch off their engines.	Beneficial	H	✓			M	LT,R,ID	✓		Minor
	Contamination		Dredging and deposition of material in approved sea areas if contaminants were present could be problematical. Sampling and testing of sea bed samples has indicated levels well below threshold limits.	Adverse	L	✓			M	ST,IR,D	✓		Minor
Ecology & Nature Conservation	Coastal Habitats		Littoral rock habitats and other littoral habitats are found within the harbour, and there is an area of improved grassland near the proposed development.	Adverse	H	✓			L	ST,LT,IR,D	X		Minor
	Benthic Flora & Fauna		Dredging and other operations during the construction works will remove all non mobile members of the benthic community. In exposed areas recolonisation will take place post construction.	Adverse	H	✓			L	ST,LT,IR,D	X		Minor
	Finfish & Shellfish		Any fish will move from the area during construction, but some local shellfish may be lost during these operations.	Adverse	H	✓			L	ST,IR,D	X		Minor
	Birds		The local bird population is considered to be generally unaffected by the works: any local seabirds will temporarily displace. Local protected sites are some distances from the project site.	Negligible	H	✓			L	ST,IR,D	X		Negligible
	Marine Mammals		Underground rock fracturing using explosive charges could result in vibrations having potentially adverse effects on some cetaceans, particularly bottle-nosed dolphins from the Moray Firth SAC .	Adverse	M	✓	✓	✓	H	ST,IR,ID	✓		Minor
			Noise from piling, and to a lesser extent other construction activities could result in disturbance to cetaceans.	Adverse	M	✓	✓	✓	H	ST,IR,ID	✓		Minor
			Impact from any fuel spillages within the harbour during construction could affect any seals or other sea mammals in the immediate vicinity.	Adverse	M	✓			M	ST,IR,ID	✓		Minor
			In the completed scheme the available habitat for some mammals, seals in particular, will increase with the additional length of rock armour breakwater and revetment.	Beneficial	H	✓			L	MT,L TIR,ID	X		Minor
	Other Mammals		With no freshwater sources within Peterhead Bay any otters would only use the site area as a temporary feeding ground if at all. These and any other mammals in the vicinity would be expected to keep away during the works.	Adverse/ Negligible	M	✓			M	ST,IR,ID	✓		Negligible
	Other Species		No other species has been identified as at all likely to be in the area of the works.	Adverse/ Negligible	L	✓			L	ST,IT,ID	X		Negligible
Human	Safety		The increase in traffic during the construction works will increase road risk.	Adverse	H	✓	✓		M	ST,IR,D	✓		Minor
			Marine construction plant at the entrance to the northern basins will increase risk for plant users in this area.	Adverse	H	✓			H	ST,IR,D	✓		Minor
			General construction activity, handling and placing of materials in a works environment.	Adverse	H	✓			H	ST,IR,D	✓		Minor
			Potential handling and use of explosive charges to fracture rock underground	Adverse	H	✓			M	ST,IR,D	✓		Minor

Figure 4 Example of Environmental Impact Table

Topic Area	Specific Area	No.	Description of Impact	Impact	Probability (L,M,H) L Low M Medium H High	Geographical level of importance L Local R Regional N National			Contextual Importance (L,M,H) L Low M Medium H High	Nature Time-scale (ST,MT,LT) Reversibility (R/IR) Type of impact (D/ID)	Mitigation Available	Mitigation Agreed	Significance
						L	R	N					
	Socio-Economic		Short term local employment opportunities during the construction period plus benefits to local businesses including hotels, catering establishments, B&B etc.	Beneficial	H	✓	✓		M	ST,IR,ID	✓		Minor
			Overall potential benefit to the local, regional and national economy due to increase in deep water sheltered berthing.	Beneficial	H	✓	✓	✓	H	LT,R,D	✓		Major
	Navigation		During construction obstructions from floating plant will be an issue together with the potential for an increase in cross harbour traffic.	Adverse	H	✓			M	ST,IR,ID	✓		Minor
			In the operating condition a new approach into the Albert Quay/Merchant Quay will be required.	Adverse/ Negligible	H	✓			H	LT,IR,D	✓		Minor
	Traffic		Increase in traffic during the construction period will have the potential to increase noise, fumes, and vibration.	Adverse	H	✓	✓			ST,IR,D	X		Minor
	Amenity and Recreation		During construction sedimentation in the water could affect recreational users in the bay area.	Adverse	H	✓			H	ST,IR,ID	X		Minor
			Noise will be a feature of the construction works, particularly piling, and this could cause disturbance.	Adverse	H	✓			M	ST,IR,ID	✓		Minor
			The sailing club areas within the bay will be marginally affected during construction.	Adverse	H	✓			M	ST,LT,IR,ID	✓		Minor
			A few local creel fishermen will need to locally move their operations due to the position of the new reclamation.	Adverse	H	✓			M	ST,LT,IR,ID	✓		Minor
	Landscape and Aesthetic		Construction plant and working areas will be a visual addition to the area during the construction period.	Adverse	H	✓			L	ST,IR,D	✓		Minor
			The completed works will extend the visual impact of port structures and activity especially for those in closest proximity to the proposed new works.	Adverse	H	✓			L	LT,IR,D	✓		Minor
	Culture and Archaeological Heritage		Vibration impacts due to increased construction traffic activity may occur to listed buildings and those in the conservation area.	Adverse	L	✓	✓		L	ST,IR,ID	✓		Minor
			In terms of the cultural identity of Peterhead, the infrastructure additions will contribute towards reinforcing the town's identity as a vibrant working harbour.	Beneficial	M	✓			M	LT,IR,ID	N/A		Minor
	Planning and Development		The proposed project is compatible with the aims and objectives outlined in the Aberdeenshire Structure Plan and Local Plan	Beneficial	H	✓	✓		H	MT,LT, IR,ID	N/A		Minor

Figure 5: Example of Evaluation of Proposed Development against Environmental Baseline

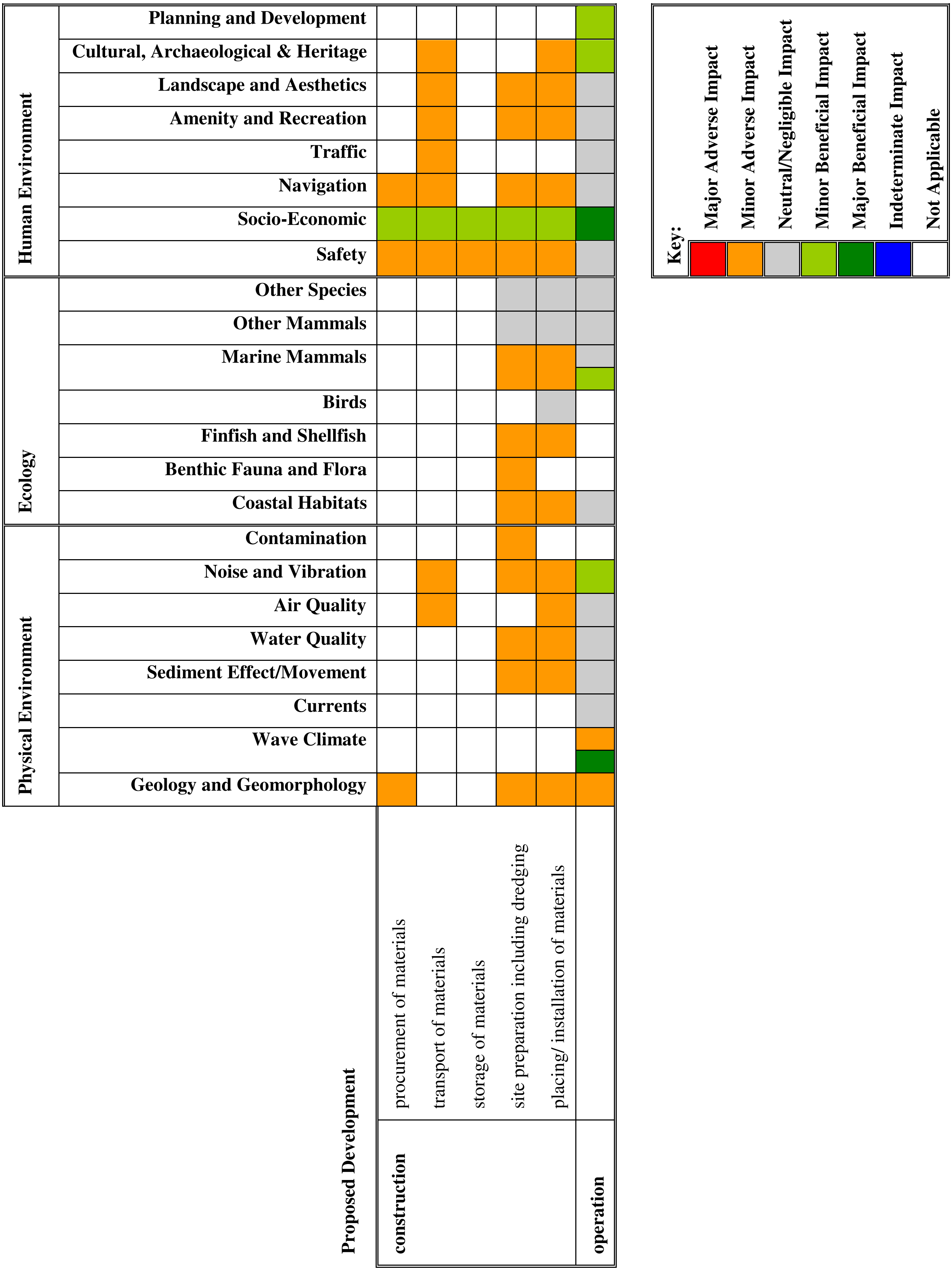


Figure 6. Safety distances for charges confirmed in blastholes (total charge per round)

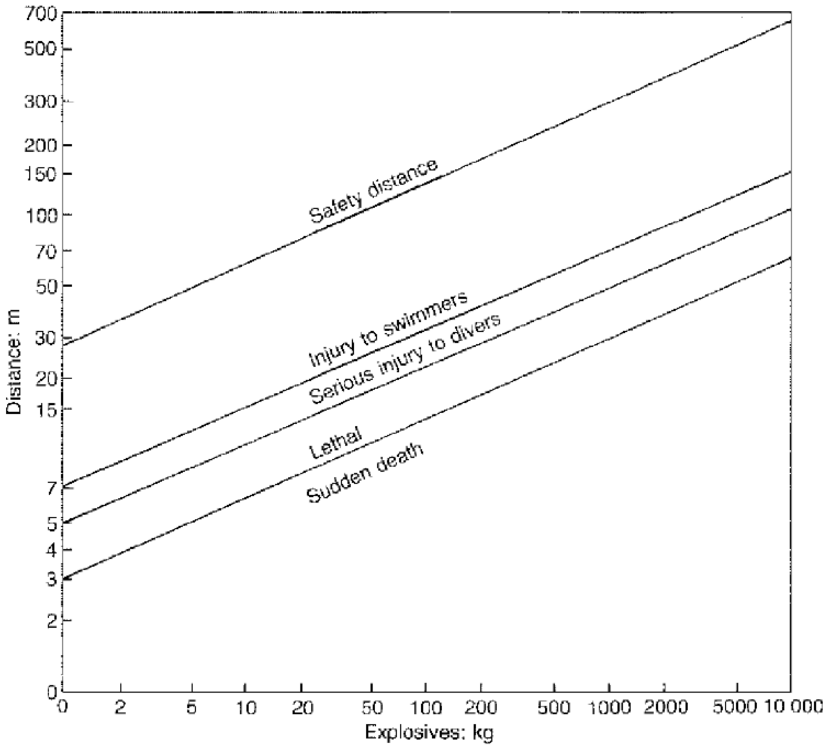


FIGURE 6
CHARGE EFFECTS

APPENDIX II – LIST OF STATUTORY AND NON-STATUTORY CONSULTEES

Response Summary for Non Statutory Consultees

RESPONSE SUMMARY	Support for the proposal	Landscape/visual impact	Commercial impacts	Recreational impacts	Noise/traffic/dust	Socio/economic impacts	Navigational approach	Port Issues/ Wave Climate	Archaeology/ Listed buildings/ Historic bldgs	Water quality	Benthic Communities pollution	Sedimentation patterns	Bird feeding/Bird life	Marine life e.g. Dolphins	No Comment	Against Proposal	No Response
Allied Grain (Scotland) Ltd																	X
Argyll Scaffolding Ltd																	X
ASCO Plc Peterhead			X			X		X									
Bill Mackie Engineering Ltd			X			X											
Box Pool Solutions Ltd																	X
Boxpal Ltd																	X
Buchan InShore Fisherman's Association (Chairman)			X			X											
Crown Estate Office																	X
Dales Engineering Services Ltd			X			X											
Davidsons Ltd			X			X											
Denholm Seafoods	X																
Don Fishing Co (Peterhead) Ltd																	X
Enterprise North East Trust																	X
Favonius Fishing			X			X											
Fresh Catch Limited																	X
Grampian Police Force HQ																	X
H M Prison Peterhead																	X
Health and Safety Executive																	X
J & J Buchan	X		X			X											
J Buchan & Sons																	X
J H Milne																	X
JC Hydraulics																	X
John A Smith & Sons																	X
Lunar Freezing and Cold Store			X		X	X											
Malahide Filter Services Ltd																	X
Maritime & Coastguard Agency																	X
N E Fisherman's Training Association																	X
N E of Scotland Fisherman's Org Ltd (NESFO)															X		
North East Ice & Cold Storage Co Ltd			X			X											
Northern Oils																	X
Northern Oils Ltd																	X
Peterhead Business Forum																	X
Peterhead Community Council																	X
Peterhead Fish Salesmen's Association (Ian Petrie)																	X
Peterhead Fish Salesmen's Association (Roy Malcolm)															X		
Peterhead Sailing Club (Club Commodore)				X			X										
R D Buchan & Sons																	X
Rapp Ecosse UK Ltd					X										X		

Response Summary for Non Statutory Consultees

RESPONSE SUMMARY	Support for the proposal	Landscape/visual impact	Commercial impacts	Recreational impacts	Noise/traffic/dust	Socio/economic impacts	Navigational approach	Port Issues/ Wave Climate	Archaeology/ Listed buildings/ Historic bldgs	Water quality	Benthic Communities pollution	Sedimentation patterns	Bird feeding/Bird life	Marine life e.g. Dolphins	No Comment	Against Proposal	No Response
RNLI Peterhead																	X
RNMDSF																	X
RSPB East Scotland													X				
Scottish & Southern Energy, Peterhead Power Station															X		
Scottish Enterprise Grampian																	X
Scottish Fishermen’s Federation																	X
Scottish Fishermens Organisation Ltd																	X
Scottish Power Plc																	X
Scottish Seafood Association																	X
Scottish White Fish Producers Association			X			X											
Scottish Wildlife Trust																	X
Seagate Fabrication Ltd																	X
Searoute Port Services Ltd	X		X			X											
Seletar Shipping Ltd																	X
Stephen Buchan																	X
Sub-Lieutenant Peterhead Sea Cadets																	X
The Scottish Fisheries Protection Agency																	X
Thistle Marine Ltd																	X
Ugie District Salmon Fishery Board																	

Response Summary for Statutory Consultees

RESPONSE SUMMARY	Support for the proposal	Landscape/visual impact	Commercial impacts	Recreational impacts	Noise/traffic/dust	Socio/economic impacts	Navigational approach	Port Issues/ Wave Climate	Archaeology/ Listed buildings/ Historic bldgs	Water quality	Benthic Communities pollution	Sedimentation patterns	Bird feeding/Bird life	Marine life e.g. Dolphins	No Comment	Against Proposal	No Response
(Aberdeenshire Council) Local Planning Authority		X		X	X	X		X	X	X	X			X			
SNH							X			X	X	X	X	X			
SEPA					X			X		X		X					
Maritime and Coastguard Agency															X		
NLB																	X
Association of Salmon Fishing Boards																	X
Chamber of Shipping																	X
Crown Estate																	X
HSE																	X
Defence Infrastructure Organisation																	X
Historic Scotland																	X
Inshore Fishing Groups																	X
Marine Safety Forum																	X
Marine Scotland			X			X	X			X	X	X		X			
Royal Yachting Association Scotland							X										
RSPB																	X
Scottish Fishermen's Federation																	X
Scottish Fishermen's Organisation																	X
Scottish Wildlife Trust																	X
Transport Scotland					X												
Whale and Dolphin Conservation Society																	X

APPENDIX III – ECOLOGICAL IMPACT ASSESSMENT / HABITAT REGULATION APPRAISAL

Annexes:

Draft marine mammal mitigation plan

Underwater noise calculation report

NIRAS FRAENKEL

November 2014
Peterhead Port Development – Inner Harbour deepening and new fish market development
Ecological Impact Assessment

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Final Document Sign-Off

	Name	Signature	Date
Issued by (NIRAS)	Mike Barker		**04/11/2014**
Accepted by (Client)			

Third Party Disclaimer

Contents

1. Introduction

1.1.1. This report has been prepared by NIRAS Consulting Ltd. to inform the Environmental Impact Assessment (EIA) being prepared by NIRAS Fraenkel for the planned inner Harbour deepening and new fish market development at Peterhead Harbour. The report presents the results of an assessment of the known and potential ecological resources which may be affected by development work at Peterhead Harbour (hereafter referred to as the 'development site'). Included within the report are the results of an Ecological Appraisal of the site incorporating a desk study, Phase 1 and extended survey techniques and an assessment of potential impacts on the habitats and species identified. In addition, a Habitats Regulations Appraisal (HRA) has also been included in this report.

1.1.2. The development site is located in Peterhead, on the eastern coast of Scotland approximately 44 km north of Aberdeen. The Harbour entrance is accessible from Peterhead Bay on the southern coast of the town. The proposed development includes both marine and terrestrial aspects. Terrestrially, the development includes the removal of the existing fish market buildings at Merchant's Quay and the refurbishment of existing buildings at Greenhill fish market in the North Harbour. Marine aspects of the development include deepening works in both the North Harbour and South Harbour and the addition of a reclamation area adjacent to the existing Smith Quay within Peterhead Bay.

1.1.3. An Environmental Impact Assessment has previously been undertaken for the harbour in relation to a new breakwater and quays and the deepening of part of the Harbour (PPA, 2007). In relation to the harbour deepening and the fish market, the current ecological baseline was explored through a desk study which highlighted sites of nature conservation within the vicinity of the site, along with records of protected, rare or notable habitats and species.

1.1.4. The habitats within the site were recorded during February 2014 through an Ecological Assessment of the site incorporating Phase 1 and extended survey techniques. The main objectives of this assessment were to:

- Record the intertidal habitats of the site;
- Assess areas of development for the presence of bats;
- Determine the ornithological value of the area; and
- Record incidental sightings of other species. Target notes were used to describe habitat and species composition and highlight features of ecological interest. Incidental records of fauna were also made during the survey.

1.1.5. The findings of the above studies and surveys have been reviewed in light of relevant contextual information from current legislation, planning policy and biodiversity action plans, in relation to the proposed development.

2. Legislation, Policy and Relevant Guidelines

2.1.1. This report has considered relevant legislation and the available guidance in relation to potential impacts of the development on ecological receptors. Documents of particular relevance include:

- Directive 2009/147/EC on the Conservation of Wild Birds (the Birds Directive);
- Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive);
- The Conservation (Natural Habitats & c.) Regulations 1994 (as amended);
- The Wildlife and Countryside Act 1981 (as amended);
- The Wildlife and Natural Environment (Scotland) Act 2011 (as amended); and
- Nature Conservation (Scotland) Act 2004 (referencing the Convention on Biological Biodiversity (1992) and the Scottish Biodiversity Strategy which are implemented through Biodiversity Action Plans (BAPs), namely the UK Biodiversity Action Plan (UKBAP) and Local Biodiversity Action Plan (LBAP)[1].

[1] http://www.nesbiodiversity.org.uk/

3. Project Description

3.1. Background

3.1.1. Peterhead port, administered by Peterhead Port Authority (PPA), is one of the busiest fish markets in Europe, also acting as a major logistics supply base for the offshore oil and gas industry in the North Sea.

3.1.2. PPA has identified need to modernise the existing port provision in respect of fishing and has proposed works to bring facilities in line with current and anticipated vessel and market standards and demands. The works proposed by PPA encompass the deepening of the inner harbour as well as the development of a new fish market.

3.1.3. The purpose of these works is to:

- Maintain and enhance Peterhead's position as the top performing UK port for both demersal and pelagic fish, catering for future market demand; and
- Enhance Peterhead's position as a major fish port in Europe, particularly with regard to white fish.

3.2. Proposed Works

3.2.1. The scope of the project consists of a number of associated elements as indicated in **Figure 3.1**. Essentially these comprise:

- Deepening of the North and South Harbours by 3.3 m.
- Strengthening of the dock walls at deepened areas.
- Deepening at the Merchant's Quay by 2 m.
- Removal of restrictions on the navigation route into the South Harbour i.e. the small jetty adjacent to the Port office.
- Removal of the Queenie bridge and widening of navigation channel from 10.5 m to 25 m.
- Extension of West Quay at the north end to provide a 78 m overall berth.
- Associated services/utilities diversions.
- Formation of reclamation west of the Smith Embankment against the existing sea wall.
- Demolition of the west section of the former Greenhill Fish market.
- Construction of a new fish market at Greenhill, together with refurbishment of the existing east section; and
- Demolition of the existing fish market at Merchant's Quay.

3.2.2. A separate maintenance dredging contract will remove all the soft silty material from the areas which are to be deepened allowing all excavated/dredged material to be deposited in the reclamation area. PPA have applied directly to Marine Scotland for a dredging license in respect of this, which will also include for dealing with any contamination issues. The deepening will be almost entirely in fractured granite rock. Initial assessment of the total amount of material to be excavated/dredged is approximately 155,000 m^3.

3.3. Outline of Construction Methodology

3.3.1. As noted above dredging of soft material would be carried out under a maintenance dredging contract and would not form part of the proposed new capital works. Sequence of works is envisaged as follows:

- The construction works will take place entirely in the tidal waters of the harbour;
- Queenie Bridge removed after appropriate heritage photographs taken and records made;
- Entrance area to North Harbour widened;

South Harbour and Merchant's Quay deepening would be carried out by back-hoe dredging with material then transported by barge to Merchant's Quay or West Quay where it would be unloaded and then trucked to the reclamation area. Again a site investigation has been carried out in autumn 2013. Appraisal by PPA suggests that the rock is fractured, but potentially 30% of the area may need controlled small blasting charges to loosen the rock. Volume to be dredged from these areas and deposited in the reclamation zone is of the order of 66,000 $m^{3.}$ The construction steps would be:

- Construct the new strengthened wall sections by underwater coring and concreting;
- Deepen the North Harbour same as indicated for the South Harbour above;

The new fish market construction would not be affected by the choice of deepening methodology.

- Demolition of the west section of the Greenhill fish market, with suitable material taken to the reclamation zone, and deleterious material removed from site to an approved location; and
- Construction of the new Greenhill fish market, including refurbishment of the east section of the existing building.

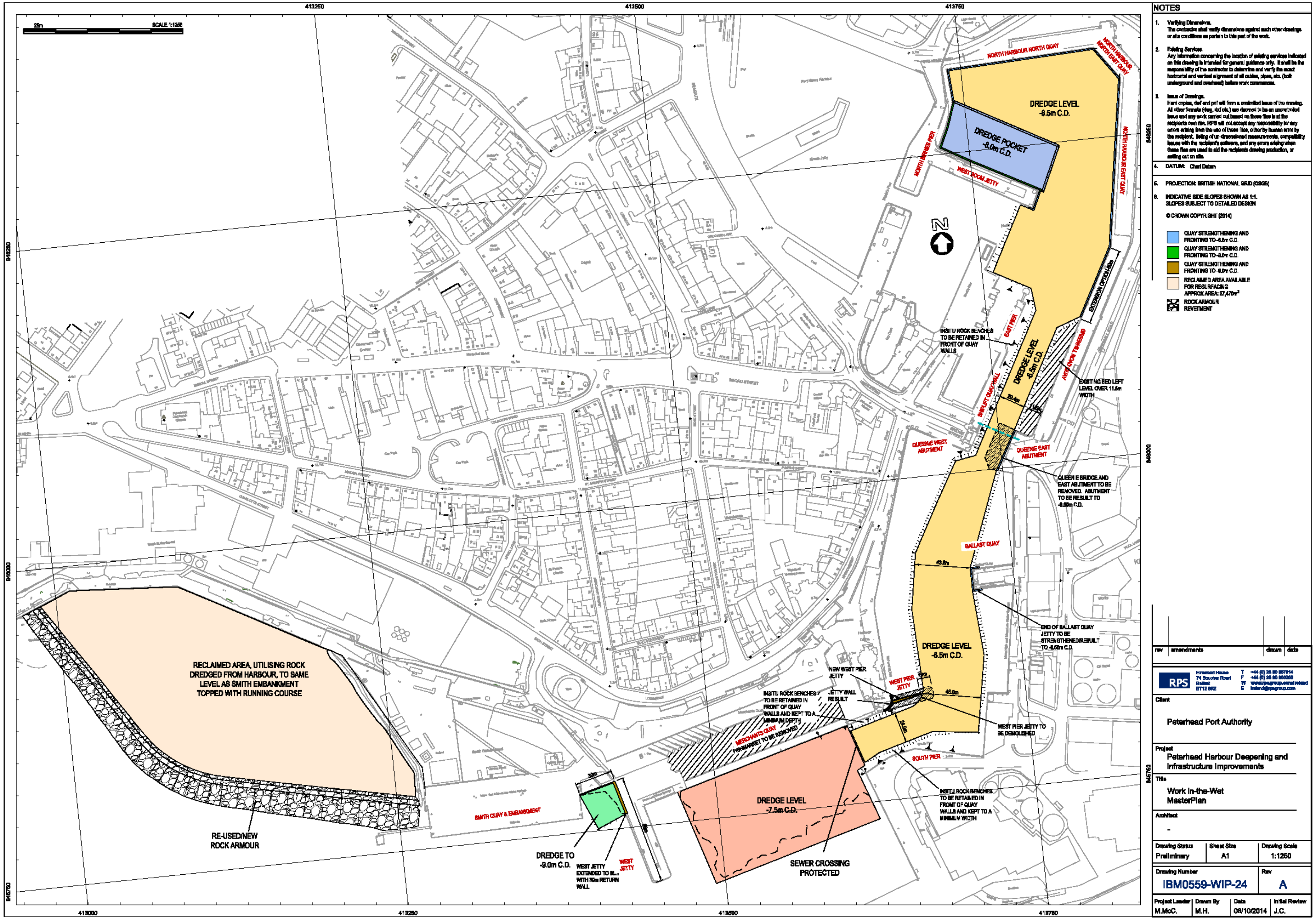

Figure 3.1: Peterhead Port Development – Inner Harbour deepening and new fish market development.

4. Methodology

4.1. Baseline Data Collection

Desk study

4.1.1. A desktop search for relevant biological records was undertaken in order to:

- Identify actual and potential valued receptors;
- Focus survey effort; and
- Support the evaluation process by providing contextual information.

4.1.2. Information to inform the desk study was collated from the following statutory and non-statutory sources:

- The North East Scotland Biological Records Centre (NESBReC);
- Multi-Agency Geographic Information for the Countryside (MAGIC);
- Marine Scotland's Interactive Planning Tool;
- Sitelink (SNH);
- Wetland Bird Survey (WeBS) results from the British Trust for Ornithology (BTO)
- JNCC Seabird Monitoring Programme (SMP)

4.1.3. Information on designated species and sites was requested from the NESBReC for an area of 2 km radius centred on the development area (grid reference: NK13560 45840. Latitude: 57.502568, Longitude: -1.7753863). For some records this area of search was extended to a 10 km resolution (e.g. marine mammals). A full list of these data is included in Appendix 1.

4.1.4. Additional information pertaining to the identification of designated sites was also collated from the MAGIC website[2]., Marine Scotland's Interactive Planning Tool and Sitelink

4.1.5. Additional ornithological data was sourced from the online Wetland Bird Survey (WeBS) report[3] for Peterhead Bay and Sandford Bay, together with data relating to breeding seabirds from the JNCC SMP database[4]. WeBS is the monitoring scheme for non-breeding waterbirds in the UK. It includes monthly coordinated 'core' counts at wetland sites made during high tide periods at estuaries, principally from September to March. WeBS is a joint scheme run by the British Trust for Ornithology (BTO), Royal Society for the Protection of Birds (RSPB) and JNCC, in association with the Wildfowl and Wetlands Trust (WWT). The scheme aims to identify population sizes, to determine trends in numbers and distribution and to identify important sites for waterbirds (Austin *et al.,* 2014).

4.1.6. The Seabird Monitoring Programme (SMP) is an on-going annual monitoring programme of 26 seabird species that regularly breed in Britain and Ireland. The programme aims to collect data pertaining to the breeding numbers and breeding success of seabirds both regionally and nationally to enable an assessment of conservation status. The most recent SMP counts for Peterhead were recorded as part of Seabird 2000. Seabird 2000 was an extensive UK-wide census of 25 seabird species (the SMP now includes red-throated diver) that regularly breed in Britain and Ireland in order to obtain accurate population estimates for each species (Mitchell *et al.,* 2004).

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[2] http://www.magic.gov.uk/
[3] http://blx1.bto.org/webs-reporting/
[4] http://jncc.defra.gov.uk/smp/

4.1.7. In the particular case of marine mammals, a detailed literature review of the key species potentially present in the area was undertaken. This is presented in Section 13.5 (Appendix 5 - Marine Mammals Desktop Study). Data and information used to inform this literature review were primarily based on:

- The SCANS (Small Cetaceans in the European Atlantic and the North Sea) survey;
- Seal telemetry studies undertaken in the North Sea by the Sea Mammal Research Unit (SMRU);
- Special Committee on Seals (SOCS) publications; and
- Information and data provided by Marine Scotland Science (MSS).

4.1.8. Information on key fish receptors potentially present in the area has been derived from Cefas (Centre for Environment, Fisheries and Aquaculture Science), MSS, JNCC and Scottish Natural Heritage (SNH) publications.

Survey work

4.1.9. A number of field surveys were undertaken at the development site, focussing on those habitats and species[5] for which there may be impacts arising from development activity. A Phase 1 habitat survey was carried out covering intertidal habitat within Peterhead Bay. This was supported by extended survey work, including wintering bird surveys, focussing on Peterhead Harbour and Peterhead Bay across a tidal cycle, and a bat inspection, investigating the roosting opportunities for bats within the two buildings affected by the potential development. Incidental sightings, including those of marine mammals, were also recorded during these surveys.

Phase 1 intertidal habitat survey

4.1.10. An intertidal Phase 1 Habitat Survey was conducted on the 5th March 2014 in Peterhead Bay. The survey zone encompassed the intertidal area within Peterhead Bay that is bounded by the Harbour wall to the north, amenity grassland to the west and the marina to the south of the bay (Figure 5.1).

4.1.11. The aims and objectives of the intertidal habitat survey were:

- To survey the shore from high spring to low spring tidal extents, using field survey methods based on the JNCC Guidance for intertidal habitat classification (Connor *et al*., 2004); and
- To produce a digitised map identifying and characterising the distribution of the main sediment characteristics and biotopes (marine habitat classifications). Target Notes have been used to indicate biotopes present only in small patches, as well as noteworthy features such as species of conservation concern.

4.1.12. The timing of the survey was within two hours of low spring tide to ensure adequate coverage of the habitats within the survey zone (Table 4.1). Notes were made on the main sediments, biotopes and species present. All biotopes present were identified, and the extent of these mapped with the aid of photographic techniques and hand held GPS recorders. Target notes were used to identify/record species and features present on the shore. On-site sediment sampling and analysis was undertaken

[5] In the particular case of marine mammals and fish, survey work was not undertaken. Instead, a review of key species potentially present in and around the proposed development including the results of surveys carried out by research organisations (i.e. SMRU, SCANS, Cefas, MSS) is presented in relevant sections of this report and has been used to inform the impact assessment on these receptors.

using a 1 mm sieve to filter and identify any species within these habitats. Target notes were also used to record sediment characteristics (e.g. anoxic conditions or sediment type).

Table 4.1: Tidal information for Peterhead on the 5th March 2014.

Date	Time of low tide	Tidal height (above chart datum) (m)
5th March 2014	09:34	0.70

Extended survey

4.1.13. The Phase 1 intertidal habitat survey was supplemented with extended survey techniques: bat inspections of the two buildings that will be affected by the development and ornithological surveys within the harbour and Peterhead Bay.

Bat surveys

4.1.14. A building inspection was conducted from ground level to assess the presence of, or potential for, bat roosts in the buildings. Bat survey was undertaken during daytime hours on the 4th March 2014 by an experienced surveyor, following guidelines published by the Bat Conservation Trust (BCT) (Hundt, 2012). The inspection involved the investigation of two buildings: the existing fish market at Merchant's Quay, and the Greenhill fish market located in the North Harbour.

4.1.15. The building inspection focussed on identifying features that may provide roosting opportunities for bats. Visual inspections of buildings were carried out to identify features including gaps/cracks in brickwork, the roof covering, fascia/barge boards and soffit boxes which may provide suitable points of entry or roosting areas for bats. If findings indicated high roost potential, dusk and dawn bat surveys were then conducted to observe and identify bats emerging from or returning to roost sites. Buildings were also inspected for any additional evidence (e.g. droppings) which may suggest the presence of bats.

4.1.16. Each building was categorised based on the potential for supporting roosting bats, taking into account the number and type of features present (Table 4.2). The level of disturbance from human activities (e.g. lighting) and potential predators and the ecology of bats were also taken into account in order to determine the roosting potential within each building. This assessment scale follows guidance provided within the BCT Survey Guidelines (Hundt, 2012).

Table 4.2: Assessment criteria used during the bat inspection at the proposed development site.

Potential to support roosting bats	Description
Confirmed	A feature/structure within which bats are seen to be present (either live bats or bat carcasses) or heard 'chattering'. Feature found to contain droppings during inspections will be considered a confirmed roost.
High	A feature which, due to its size, depth, shape orientation or other physical properties (such as ability to maintain a constant temperature, accessibility for bats) is considered to be ideal for use by roosting bats. The quality of the surrounding habitat for

Potential to support roosting bats	Description
	bats will also be considered.
Moderate	A feature which would be considered ideal for use by bats were it not for one or more key factors which limit its potential.
Low	A feature where use by bats cannot be ruled out but it is considered unlikely based on size, depth, construction aspect, habitat location etc.
Negligible	A feature which is considered to lack any attributes suitable for use by roosting bats.

Ornithological surveys

4.1.17. The ornithological surveys undertaken at the development site incorporated the Harbour area and Peterhead Bay. The aim of the surveys was to record all bird species present, together with any behaviours (foraging, roosting) that may indicate the importance of an area to these birds. Two locations were used to maximise coverage of the development site. A high tide count was undertaken at both locations on the 4th March 2014, with the low tide count undertaken on the 5th March 2014. Surveys were conducted across high and low tidal extents to account for the changes in the assemblage of birds between these periods, associated with foraging and roosting behaviours. Surveys followed standard WeBS methodology, recording only those birds seen or heard[6]. Species observed were plotted on base maps indicating location and number of birds observed. Surveys undertaken within Peterhead Bay were conducted from the amenity grassland area located alongside the beach within the bay. This grassland is above the level of the beach and provides a good vantage point from which surveys could be conducted. Surveys within the Harbour were undertaken from ground level and encompassed the entire Harbour area. All surveys were conducted by an experienced observer using, where appropriate, binoculars and a telescope.

Survey limitations

4.1.18. The Phase 1 intertidal habitat survey was limited to the intertidal environment adjacent to the amenity grassland (Figure 5.1), and as such any intertidal habitat adjacent to Smith Quay or the breakwaters further out in Peterhead Bay were not surveyed. However, these areas are likely to be of poor quality and represent only a small extent of the intertidal habitat found in Peterhead Bay.

4.1.19. Bat inspections were not carried out inside the existing Merchant's Quay or Greenhill fish markets, due to the associated access restrictions. Such surveys may have provided further evidence for the presence or absence of bats. Bat surveys carried out in respect of the development were also undertaken outside of the active season for bats, and thus it is possible that any additional evidence (such as droppings) that may have been left during the 2013 active season may have been removed by the elements.

4.1.20. Two ornithological surveys were carried out at each location (high tide and low tide), and specific breeding/migratory bird surveys were not carried out. However, these surveys are supported

[6] http://www.bto.org/volunteer-surveys/webs/publications/webs-annual-report/numbers-trends/methods/core-counts

by WeBS data spanning a five year period, and it is considered that the extent of potential breeding habitat within Peterhead Bay or Peterhead Harbour is limited.

4.2. Ecological Impact Assessment Methodology

4.2.1. The methodology for Ecological Impact Assessment has been informed by the IEEM Ecological Impact Assessment Guidelines (IEEM, 2010), a summary of which is provided below.

4.2.2. The Guidelines state that the assessment of impacts should be undertaken in relation to the baseline conditions within the zone of influence, that are expected to occur if the development were not to take place. Having identified the activities likely to cause significant impacts, it is then necessary to describe the resultant changes and to assess the impact on Valued Ecological Receptors (VERs).

4.2.3. The Guidelines recommend that the process of identifying impacts should make explicit reference to aspects of ecological structure and function on which the feature/VER depends. Impacts must be assessed in the context of the baseline conditions within the zone of influence during the lifetime of the development.

4.2.4. The Guidelines state that it is important to consider the likelihood that a change/activity will occur as predicted and also the degree of confidence in the assessment of the impact on ecological structure and function. Any limitations with respect to certainty should be described and the consequences for confidence in predictions must be stated clearly.

Assessment criteria

4.2.5. The evaluation of VERs has been made with reference to the IEEM Ecological Impact Assessment Guidelines (IEEM, 2010), a summary of which is provided below. The Guidelines advocate an approach to valuing features that involves professional judgement based on available guidance and information, together with advice from experts who know the locality of the project and/or the distribution and status of the species or features that are being considered. In accordance with the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011(referred to as 'the Regulations'), and the guidance set out by IEEM, it is considered inappropriate to attempt to investigate in detail all potential ecological issues in relation to the development. It is thus necessary, under the Regulations, to focus on those activities that could potentially generate significant ecological effects on VERs.

4.2.6. The Guidelines recommend that the value or potential value of an ecological resource or feature should be determined within a defined geographical context, and that the following frame of reference be used:

- International;
- National (i.e. England/Northern Ireland/Scotland/Wales);
- Regional;
- County;
- District;
- Local; and
- Within zone of influence only.

4.2.7. Given the nature of the project, the zone of influence varies for each species assessed. As such, the definition of the zone of influence is informed by an understanding of the likely impacts upon each species. For example:

- Bats: the zone of influence for bats is limited to the two buildings included within the Ecological Assessment;
- Birds: the zone of influence incorporates the harbour area and Peterhead Bay;
- Benthic habitats: the zone of influence is defined as Peterhead Bay;
- Marine mammals and fish: a conservative zone of influence has been applied to ensure that potential disturbance to these receptors in the wider area (particularly in relation to noise effects) is accounted for. This includes the harbour area, Peterhead Bay and coastal areas off Peterhead (i.e. up to 10 km seaward).

Valuing Designated Sites

4.2.8. Where sites have already been assigned a level of nature conservation value through designation, the Guidelines recommend that the reasons for this designation need to be taken into account in the assessment. Such designations include:

- Internationally important sites such as Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and Ramsar sites;
- Nationally important sites such as Sites of Special Scientific Interest (SSSIs) and National Nature Reserves (NNRs); and
- Regional/County important sites.

4.2.9. Where a feature has value at more than one designation level, its overriding value is that of the highest level.

Valuing Biodiversity

4.2.10. The Guidelines state that there are various characteristics that can be used to identify ecological resources or features likely to be important in terms of biodiversity and that consultation, especially with local specialists, can be crucial for identifying less obvious important resources and features.

Valuing Habitats

4.2.11. The Guidelines recommend that the value of areas of habitat and plant communities should be measured against published selection criteria where available. Where areas of a habitat or plant communities do not meet the necessary criteria for designation at a specific level, the Guidelines recommend that the ecologist may consider the local context if appropriate.

Valuing Species

4.2.12. The Guidance is focussed on the assessment of species according to their biodiversity value, as opposed to the status of their legal protection (although some species may fit in both categories). For the purposes of this assessment, if connectivity with a designated site can be established for a species present at the development site, this is taken into account.

4.2.13. In assigning value to a species, it is necessary to consider its distribution and status, including a consideration of trends based on available historical records. The valuation of populations should make use of any relevant published evaluation criteria.

4.2.14. For those bird species recorded within the zone of influence either during desk study or as part of ornithological surveys, 1% population thresholds from Wetland International (2012) and Burton *et al.* (2012) are used to determine value. The 1% criterion, although not of biological relevance, has previously been used as a standard for designating areas of conservation interest (Skov *et al*., 2007).

Assessing Significance

4.2.15. Legislation and policy guidance often require significant negative or positive impacts to be distinguished from others, although there is little guidance on how this distinction should be made. The IEEM Guidance defines an ecologically significant impact as an "*impact (negative or positive) on the integrity of a defined site or ecosystem and/or the conservation status of habitats or species within a given geographical area*".

4.2.16. When describing changes/activities and impacts on ecosystem structure and function, reference should be made to the following parameters:

- Positive or negative;
- Magnitude;
- Extent;
- Duration;
- Reversibility; and
- Timing and frequency.

4.2.17. In order to characterise the likely change and impact, it is necessary to take into account all the above parameters. Those sites, habitats and/or species classified at 'District' level and above are considered to be sufficiently valuable for a significant effect upon them to be material in decision making. Therefore, this assessment considers in detail those ecological receptors equivalent to or greater than 'District' value , as ecological receptors of 'key' nature conservation importance (VERs).

4.3. Cumulative Impact Assessment Methodology

4.3.1. In addition to the assessment of the potential effects of the development alone, an assessment of the impacts of the project cumulatively with other plans or projects has been carried out.

4.3.2. Other plans and projects considered in the cumulative assessment are shown in Table 4.3. These plans and projects have been recommended by Marine Scotland (MS-LOT Scoping advice letter, 6th June 2014) for consideration in cumulative assessment.

4.3.3. The minimum distance between Peterhead Harbour and each of these projects, as well as their anticipated construction schedules (where available) is presented in Table 4.3. Information on construction schedules is based on information provided in specific project Environmental Statements/Scoping Reports, and is therefore indicative only. Where the construction period of a project has not been defined, the assumption has been made that there is potential for construction works to overlap with those proposed at Peterhead Harbour.

Table 4.3 Other Plans and Projects included for Cumulative Assessment.

Project	Approx. Distance to Peterhead Harbour (km)	Anticipated construction period	Potential for overlap with construction works at Peterhead Harbour (Y/N)
Peterhead Harbour Development	0	2015 -2016	n/a
Telford, Stevenson and MacColl Offshore Wind Farms (MORL, 2012a)	91	2015 -2020	Y
Beatrice Offshore Wind Farm (SSE, 2014)	100	2014- 2018	Y
Inch Cape Offshore Wind Farm (ICOL, 2013)	104	2017-2020	N
SeaGreen Firth of Forth Wind Farm (Phase 1) (SeaGreen, 2012)	92	2015 -2019	y
Aberdeen Offshore Wind Farm (Vattenfall, 2014)	30	2015-?	Y
Neart na Gaoithe Wind Farm (MRP, 2012)	133	2015-2016	Y
Kincardine Offshore Wind Farm (KOWL, 2014)	45	2016 -2017	Y
Global Energy Nigg Development (Global Energy Nigg Ltd, 2013)	136	2014[7] - ?	?
Cromarty Firth Port Authority Berth Development (CEPA, 2013)	144	2014 -?	?
Port of Ardersier (Port of Adersier Ltd, 2013)	133	2014 -2017	Y
Forth Replacement Crossing (Transport of Scotland, 2009)	193	2011-2016	Y
Aberdeen Harbour Development (Aberdeen Harbour, 2013)	44	?	?
Port of Leith N-RIP (SKM, 2012)	189	?	?
Cockenzie Power Station (Scottish Power, 2010)	185	2014[8] -2015	Y

[7] All piling activity to be completed in 2014.
[8] Works anticipated to start in January 2014 and last for a period of up to 12 months.

4.4. Habitats Regulations Appraisal Methodology

4.4.1. The Habitats Directive is implemented in the UK through The Conservation of Habitats and Species Regulations (2010) and The Offshore Marine Conservation (Natural Habitats & c.) Regulations (2007) (as amended). These Regulations are collectively referred to as 'the Habitats Regulations'.

4.4.2. The Habitats Regulations require that wherever a project that is not directly connected to, or necessary to the management of a Natura 2000 site has the potential to have a significant effect on the conservation objectives of the site (directly, indirectly, alone or in-combination with other plans or projects) then an 'Appropriate Assessment' (AA) must be undertaken by the competent authority (Regulation 61 of the Habitats Regulations).

4.4.3. HRA is a three stage process which includes: Screening; Appropriate Assessment (AA); and consideration of mitigation and alternatives (SNH, 2012; Scottish Government, 2013). The aim of HRA is to provide the information necessary to allow the competent authority to determine whether there will be an adverse effect on the integrity of a European site(s) as a result of the proposed development.

4.4.4. The screening exercise is carried out to identify those sites and features for which a likely significant effect (LSE) is predicted (or where there is reasonable doubt, and therefore those sites and features cannot be discounted). Screening with respect to the Peterhead development has considered the potential for connectivity between the development site and the sites of international importance identified in Table 3.4.

4.5. Conservation Designations

Statutory Designations

4.5.1. The UK has a variety of statutory designations with differing levels of importance. Internationally important designated sites include SPAs, SACs and Ramsar Sites. Sites of national importance include Sites of Special Scientific Interest (SSSIs) and National Nature Reserves (NNRs). Of local importance are Local Nature Reserves (LNRs).

4.5.2. The information requested from the NESBReC indicated that no statutory designated sites were present within 2 km of the development site. The closest statutory designated site, which is just over 2 km south of the development site, is the Buchan Ness to Collieston Coast SPA. This SPA comprises a 15 km stretch of south-east facing sea cliff which also incorporates Cruden Bay. The broken sea cliffs exhibit many erosional features including stacks, arches, caves and blowholes. At the top of the cliffs is a variety of coastal vegetation including maritime heath, grassland and brackish flushes. This SPA includes a marine extension that extends approximately 2 km into the marine environment to include the seabed, water column and surface (Figure 4.1). The SPA is designated for breeding populations of fulmar, shag, herring gull, kittiwake and guillemot. This stretch of coastline is also designated as a SAC. The Buchan Ness to Collieston Coast SPA incorporates two SSSIs: Bullers of Buchan SSSI and the Collieston to Whinnyfold Coast SSSI, located approximately 4 km and 13 km of the development respectively. The Loch of Strathbeg SPA and Ramsar is located approximately 14 km from Peterhead and consists of a naturally eutrophic loch and adjoining reedbeds, freshwater marshes and Alder and willow carr. The loch is separated from the sea by a wide dune system which supports a rich flora. The site is designated for a breeding population of Sandwich tern and wintering populations of whooper swan, pink-footed goose, greylag goose, teal and goldeneye.

4.5.3. The Ythan Estuary, Sands of Forvie and Meikle Loch SPA is located approximately 20 km south of Peterhead. The site consists of the estuary of the river Ythan and Meikle Loch. There is an extensive area of sand dunes at the mouth of the estuary with mud-flats in the upper reaches of the estuary and coarser gravels, which support mussel beds, closer to the sea. Areas of saltmarsh, reedbed and poor fen are found on the margins of the estuary. The site is designated for a wintering population of pink-footed goose and breeding populations of little tern, Sandwich tern and common tern. The Sands of Forvie also form the Sands of Forvie SAC. This SAC is designated due to the presence of embryonic shifting dunes, shifting dunes along the shoreline with *Ammophila arenaria* (“white dunes”), decalcified fixed dunes with *Empetrum nigrum* and humid dune slacks.

4.5.4. As part of the ongoing development of the SPA network within Scotland, especially within the marine environment, SNH have recently published information pertaining to a suite of Scottish marine draft SPAs (dSPAs) (SNH and JNCC, 2014). Of those dSPAs presented in SNH and JNCC (2014) only one, the Ythan Estuary dSPA, has qualifying features which may exhibit potential connectivity with Peterhead Harbour. The Ythan Estuary dSPA is approximately 33.7 km in length stretching from Aberdeen to just north of Cruden Bay. The northernmost point of the dSPA is located approximately 9.8 km from Peterhead Harbour. The Ythan Estuary dSPA is designated for Sandwich tern and little tern.

4.5.5. The Moray Firth SAC is located over 100 km further north from Peterhead on the Scottish coast.. The site has an area of over 1,513 km^2 and is designated mainly for the only known resident population of bottlenose dolphin in the North Sea. These dolphins range widely in the Moray Firth and more recently have been recorded as far as Aberdeen and the Forth Estuary (Scottish Natural Heritage, 2006). The site is also designated due to the presence of sandbanks which are slightly covered by sea water all the time.

4.5.6. SNH has advised the consideration of four other SACs with respect to marine mammals (Letter 20th May 2014, Ref: CEA130608). These are: the Isle of May SAC (grey seal); the Berwickshire and North Northumberland Coast SAC (grey seal); the Firth of Tay and Eden SAC (harbour seal); and Dornoch Firth and Morrich More SAC (harbour seal). Following the recommendation from MS (MS-LOT Scoping advice letter, 6th June 2014) that consideration be given to populations of diadromous fish, the following SACs have also been included: the Spey SAC (Atlantic salmon and sea lamprey) and the River Dee SAC (Atlantic salmon). Further, the potential for indirect impacts to occur on freshwater pearl mussel populations of the River Spey SAC and the River Dee SAC, has also been noted in this report, given their dependence on salmonids during early stages of their lifecycle.

4.5.7. Finally, account has also be taken of potential impacts on qualifying features of the Southern Trench MPA search area, as advised by SNH (Letter 20th May 2014, Ref: CEA130608). A summary of the Natura 2000 sites (SPAs and SACs), MPAs and their qualifying features relevant to this assessment is given in Table 4.4. The location of the sites is illustrated in Figure 4.1.

Table 4.4: Designated sites and relevant features considered in this assessment.

Designated Sites		Feature (s)	Distance to Peterhead Harbour (km)
SACs	Moray Firth SAC	Bottlenose dolphin	92.1
	Isle of May SAC	Grey seal	152.9
	Berwickshire and North Northumberland Coast SAC	Grey seal	174.6
	Firth of Tay and Eden SAC	Common (harbour) seal	125.7
	Dornoch Firth and Morrich More SAC	Common (harbour) seal	128.3

Designated Sites		Feature (s)	Distance to Peterhead Harbour (km)
	River Spey SAC	Atlantic salmon; Sea lamprey; (Freshwater pearl mussel).	76.6
	River Dee SAC	Atlantic salmon; Sea lamprey (Freshwater pearl mussel).	43.2
SPAs	Buchan Ness to Collieston Coast SPA	Breeding populations of fulmar; guillemot, herring gull, kittiwake, shag and seabird assemblage.	2.4
	Loch of Strathbeg SPA	Breeding population of sandwich tern. Non-breeding populations of pink-footed goose, greylag goose, barnacle geese, whooper swan, teal, and waterfowl assemblage.	12.2
	Ythan Estuary, Sands and Forvie and Meikle Loch SPA	Breeding populations of common tern, little tern and sandwich tern. Non-breeding populations of eider duck, pawing, redshank, pink-footed goose and waterfowl assemblage.	17.9
dSPA	Ythan Estuary	Breeding populations of Sandwich tern and little tern	9.8
MPA	Southern Trench MPA proposal	Minke whale[9]	3.2

4.5.8. Further to the above, species and habitats included in the SNH and JNCC Priority Marine Features (PMFs) list have also been noted in this assessment. As set out in Marine Scotland's Marine Nature Conservation Strategy, these are features that represent species and habitats of marine conservation importance for which it would be appropriate to use both area-based and non-area based mechanisms to achieve better protection, and for which action will be prioritised via a three-pillar approach, i.e. species measures, site-based measures, and wider seas policies and measures.

[9] The assessment of potential impacts on cetaceans presented in Section 8.4 includes minke whale as a VER. Given the location of the Southern Trench MPA proposal (3.2 km from Peterhead Harbour at its closest point), it is considered that the assessment carried out for cetaceans in Section 8.4 provides a conservative assessment of the potential impacts of the proposed development on minke whale as a feature of the MPA proposal. As such, a separate impact assessment for minke whale as a feature of the Southern Trench MPA has not been undertaken..

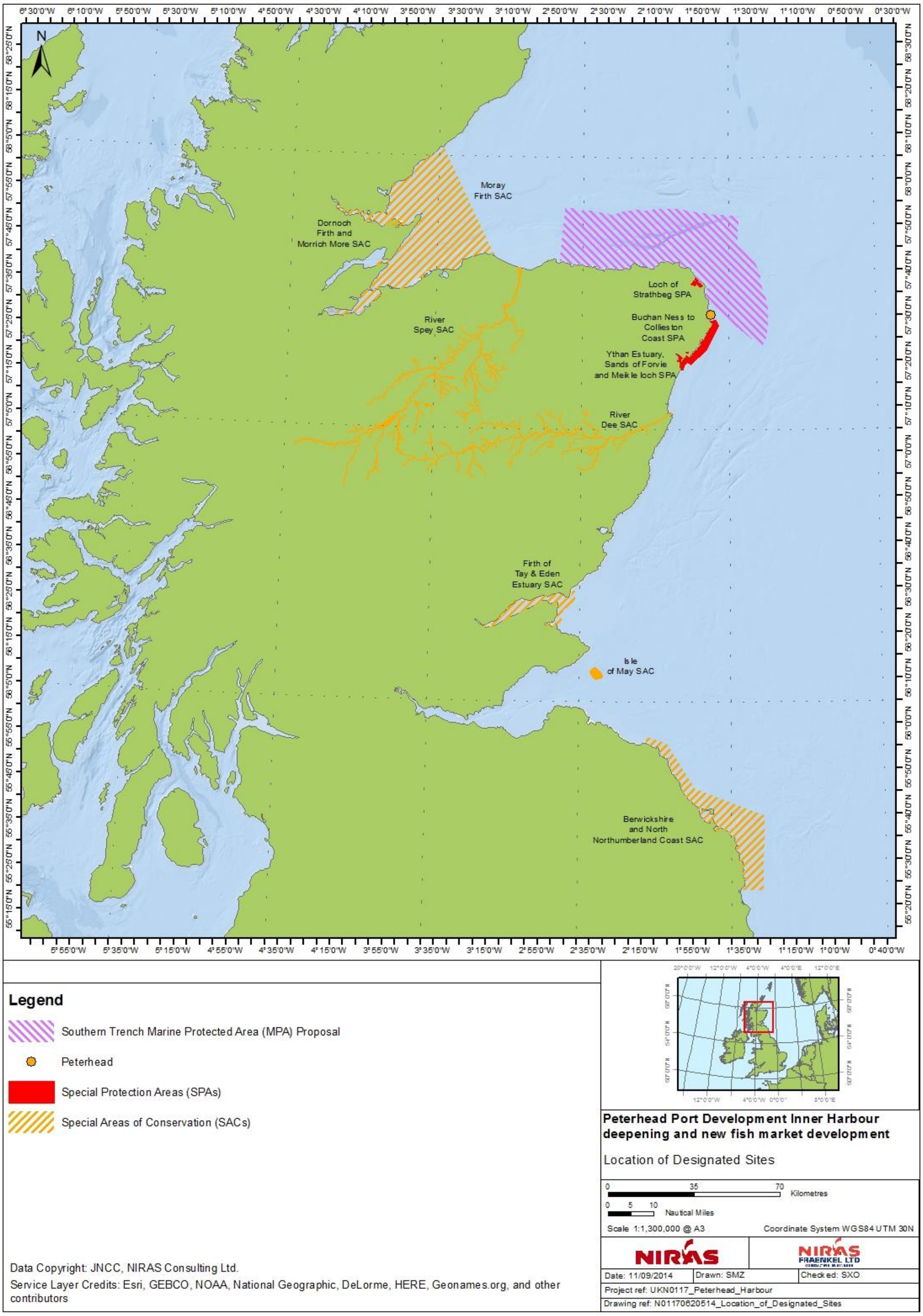

Figure 4.1 Location of Designated Sites considered for Assessment.

Non-statutory Designations

4.5.9. The information from the NESBReC indicated that one Local Nature Conservation Site (LNCS), Rattray Head to Peterhead, was within 2 km of the development site. Local Nature Conservation Sites are designated by local authorities and include areas of locally important nature and landscapes. Rattray Head to Peterhead LNCS is located on the coast north of Peterhead and does not incorporate the development area. It is designated for a variety of coastal habitats such as sand dunes containing a good flora diversity, including several species that are rare in north-east Scotland. Agricultural fields adjacent to the coast are also included in the designation due to the importance of these areas for geese, waders and wildfowl which use these areas for roosting and foraging.

5. Benthic Ecology

5.1. Baseline Information

Desk study

5.1.1. Peterhead Bay is a sheltered bay due to a south-easterly aspect and by virtue of the breakwaters which extend from the north of the bay from the harbour and the south of the bay from the marina. Information received from the NESBReC identified a number of intertidal habitats with Peterhead Bay and the Harbour area (Figure 5.1). The intertidal habitats within the search area were designated as part of the Integrated Habitat System (IHS) which is the most recent and comprehensive dataset for the Peterhead Harbour area. The IHS is an integration of existing classification in the UK: Biodiversity Broad, Biodiversity Priority, Annex 1 Habitats Directive and Phase 1. The intertidal habitats identified within the bay and harbour area were:

- Littoral rock;
- Man-made littoral rock; and
- Other littoral sediment.

5.1.2. Under IHS, littoral habitats are those defined as being influenced by the geology and wave exposure of the shore. These factors influence the form of the shore and the communities that these features support. In all cases habitats and communities present on littoral rock display distinct zonation which reflects the degree of tidal immersion which influences biotic factors such as temperature.

5.1.3. The zonation within a littoral habitat is usually described in three zones, upper, mid- and lower shore. These zones are characterised by differing communities which are adapted to cope with the differing levels of exposure on a shore. For a sheltered shore such as that within Peterhead Bay, the upper shore is dominated by lichens and algae tolerant to higher levels of desiccation (e.g. *Pelvetia canaliculata* and *Fucus spiralis*) dominate. Sparsely distributed barnacles may also be present. Algae dominant the mid- and lower shore with species such as *Asocphyllum nodosum, Fucus serratus* and *F. vesiculosus* present. On spring tides kelp (e.g. *Laminaria digitata* and *Alaria esculenta*) may be evident.

5.1.4. Marine boreholes collected within Peterhead Harbour have indicated thin layers of mobile sand, and overlying boulder clay on top of granite. Dredging within the Harbour has removed much of the mobile surface layer exposing the boulder clay beneath. Towards the coast within Peterhead Bay the underlying granite is exposed (PPA, 2007).

5.1.5. There are no benthic survey or habitat data available specifically for Peterhead Harbour, however, survey data collected as part of the Marine Nature Conservation Review (MNCR) can be used to give an indication of the benthic ecology present within the vicinity of Peterhead Harbour. Surveys used to inform the MNCR were undertaken between 1987 and 1998, commissioned by the Nature Conservancy Council and subsequently by JNCC.

5.1.6. The benthic community in the Peterhead area is typical of that found in other areas of the North Sea where the substratum comprises sand, gravel, rock and bedrock. Characteristic species of this habitat include polychaetes (*Spirorbis* sp., and Nereididae), echinoderms (*Asterias rubens, Henrica oculata* and *Ophiothrix fragilis*), crustaceans (*Cancer pagurus, Carcinus maenas* and *Pagurus bernhardus*) and cnidarians (*Urticina felina*).

5.1.7. No sensitive, rare of threatened benthic communities or habitats protected under Annex I of the Habitats Directive are known to exist in the vicinity of Peterhead**.**

Phase 1 habitat survey

5.1.8. The Phase 1 intertidal survey was completed on the 5th March 2014 and investigated the habitats present within Peterhead Bay. Target notes also identified a number of species present within the bay. The survey area comprised the intertidal habitats between Learwick's Point to the north of the bay stretching south towards the marina to the south of the bay. The survey did not include any of the intertidal habitats to the north or east of Peterhead Harbour as it is unlikely this will be impacted by the proposed development.

5.1.9. The intertidal survey identified a number of biotopes which are listed in Table 5.1 and presented on Figure 5.1. A list of species recorded during intertidal surveys through target notes is presented in Appendix 2.

5.1.10. The intertidal area within the bay is dominated by three main substrates, rock, boulder field and sand. A broad characterisation of the bay splits the intertidal area in to three main areas. Rock and boulder fields, present in the north and south of the survey zone which extended from the upper shore into the sublittoral, were divided by an area of sand which extended from the upper shore into the sublittoral. These areas were separated from amenity grassland which borders the bay by an area of coarse sand (biotope class: LS.LSA.St).

5.1.11. The sand substrate (IR.MIR.KR.LdigTX.Ft) in the central region of the survey zone did not extent as far into the bay as the rocky substrate found to the north and south of the bay. The sand substrate area in the lower shore (IR.MIR.KR.LdigTX.Ft) contained small areas of rock which were dominated by barnacles (*Semibalanus balanoides*) and algae of the family Fucaceae (*Fucus spiralis, F. serratus* and *Ascophyllum nodosum*). With the exception of these rocky areas no fauna were found in this area. The lower shore (IR.MIR.KR.LdigTX.Pk) is sublittoral, creating a lagoon which is separated from the remaining sublittoral further out in the bay by an elevated boulder ridge (LR.LLR.F.Fserr) and a large boulder field (IR.MIR.KR.Ldig.Bo) which connects with the rocky substrate to the north of the bay. At low tide water drains from this lagoon through a channel (LS.LSAMoSa.BarSa) which separates the elevated boulder ridge from the rocky substrate in the south of the bay. No fauna was evident in this channel with this confirmed through the use of a 1 mm sieve.

5.1.12. The elevated boulder ridge and boulder fields (LR.LLR.F.Fserr, LR.HLR.FT.FSer.TX and LR.LLR.Ffspi.X) which form a boundary between the sand substrate (IR.MIR.KR.LdigTX.Pk) and the sublittoral outer bay was relatively species poor when compared with other boulder areas within the bay. The boulder ridge connected with further boulder fields to the north of the survey zone (LR.HLR.FT.FSerTX and LR.HLR.MusB.Sem.Sem) which were bounded by the Harbour wall (LR.Rkp). These boulder fields were dominated by algal species (*Fucus serratus, F. spiralis* and *Asocphyllum nodosum*) and barnacles (*Semibalanus balanoides*).

5.1.13. The boulder areas to the south of the survey zone were algal dominated with algal zonation characteristic throughout the shore. The upper shore (LR.HLR.MusB.Sem.Sem) contained a thin band of *Pelvetia canaliculata* and *Fucus spiralis,* which are characteristic of the upper shore environment, which were replaced by *F. spiralis, F. serratus* and *Ascophyllum nodosum* in the mid to lower shore (LR.HLR.FT.FSer.TX). Although the southern part of the survey zone was noted as being more species rich, anoxic sediment was noted beneath some of the boulders, a feature not noted to the north of the survey zone.

5.1.14. The sublittoral fringe which bordered the intertidal area was dominated by kelp, *Laminaria digitata, Saccharina latissima* and *Alaria esculenta.*

5.1.15. Three of the biotopes listed in Table 5.1 are associated with UKBAP Priority Habitat Descriptions (JNCC, 2011). SS.SMP.KSwSS and LR.HLR.FT.FSerTX are included as constituent communities of Tide-swept Channels however, it is not considered that the habitats represented by these biotopes within Peterhead Bay are illustrative of the Tide-swept Channels habitat as covered under the UKBAP. IR.MIR.KR.Ldig.Bo is listed as part of the habitat description for Intertidal Underboulder Communities. However, investigation of this habitat during the Phase 1 intertidal habitat survey did not conclude that this was an area of high biodiversity, with biodiversity especially low in the area stretching south into Peterhead Bay.

5.1.16. It should be noted that SS.SMP.KSwSS and LR.HLR.FT.FSerTX in addition to be associated with UKBAP Priority Habitat Descriptions are also listed as PMFs.

Table 5.1: Biotopes recorded during the intertidal survey at low tide within Peterhead Bay on the 5th March 2014.

Biotope code	Marine Habitat Classification (Connor *et al.*, 2004)	Dominant community and characteristic species as recorded during survey	Substratum/notes
LR.Rkp.	N/A	*Semibalanus balanoides* *Patella vulgata* *Fucus serratus*	Artificial sea wall; large boulders
LR.HLR.MusB.Sem.Sem	*Semibalanus balanoides, Patella vulgata* and *Littorina* spp. On exposed to moderately exposed or vertical sheltered eulittoral rock	*Semibalanus balanoides* *Fucus serratus* *Ascophyllum nodosum* *Corallina officinalis*	Scattered boulder field
LR.HLR.FT.FSerTX	*Fucus serratus* with sponges, ascidians and red seaweeds on tide-swept lower eulittoral mixed substrata	*Semibalanus balanoides* *Fucus serratus* *Fucus spiralis* *Ascophyllum nodosum*	Elevated boulder ridge
IR.MIR.KR.Ldig.Bo	*Laminaria digitata* and under-boulder fauna on sublittoral fringe boulders	*Halichondria panacea* *Fucus vesiculosus* *Laminaria digitata*	Lower shore medium boulder field, concrete Harbour wall at northern end
LS.LSA.St	Strandline	*Fucus serratus* *Fucus spiralis*	Upper shore, coarse sand
IR.MIR.KR.LdigTX.Ft	*Laminaria digitata* on tide-swept, infralittoral mixed substrata	*Semibalanus balanoides* *Fucus serratus* *Fucus spiralis* *Ascophyllum nodosum* *Littorina littorea*	Mid-shore, sand, mid-tidal pebble/cobble band, scattered boulders
IR.MIR.KR.LdigTX.Pk	*Laminaria digitata* park and foliose red seaweeds on tide-swept, lower infralittoral mixed substrata.	*Fucus vesiculosus*	Lower shore, sand, sparse boulders

Biotope code	**Marine Habitat Classification (Connor *et al.*, 2004)**	**Dominant community and characteristic species as recorded during survey**	**Substratum/notes**
LR.LLR.F.Fserr	*Fucus serratus* on sheltered lower eulittoral rock	*Semibalanus balanoides* *Fucus serratus* *Fucus spiralis* *Ascophyllum nodosum*	Elevated boulder ridge
LR.LLR.Ffspi.X	N/A	*Fucus serratus* *Fucus spiralis* *Fucus vesiculosus* *Ascophyllum nodosum*	Drainage channel, boulder rich
SS.SMp.KSwSS	Kelp and seaweed communities on sublittoral sediment	*Fucus vesiculosus* *Laminaria digitata*	Lower foreshore, sandy with rocky patches
LR.HLR.MusB.Sem.Sem	*Semibalanus balanoides, Patella vulgata* and *Littorina* spp. On exposed to moderately exposed or vertical sheltered eulittoral rock	*Semibalanus balanoides* *Fucus spiralis*	Upper shore boulder field
LR.HLR.FT.FSerTX	*Fucus serratus* with sponges, ascidians and red seaweeds on tide-swept lower eulittoral mixed substrata	*Semibalanus balanoides* *Fucus spiralis* *Fucus serratus* *Ascophyllum nodosum*	Mid-shore boulder slope
LS.LSAMoSa.BarSa	Barren littoral coarse sand	*No fauna present*	Mid/lower shore drainage channel, clean coarse sand
LR.HLR.FT.FSerTX	*Fucus serratus* with sponges, ascidians and red seaweeds on tide-swept lower eulittoral mixed substrata	*Fucus vesiculosus* *Laminaria digitata*	Foreshore boulder field
SS.SMxLdigCho	N/A	*Fucus spiralis* *Fucus vesiculosus* *Laminaria digitata*	Lower sand/small boulder field

Biotope code	Marine Habitat Classification (Connor *et al.*, 2004)	Dominant community and characteristic species as recorded during survey	Substratum/notes
LR.HLR.FT.FSerTX	*Fucus serratus* with sponges, ascidians and red seaweeds on tide-swept lower eulittoral mixed substrata	*Semibalanus balanoides* *Fucus serratus* *Fucus spiralis* *Ascophyllum nodosum*	Upper shore boulder field and channels
LR.HLR.FT.FSerTX	*Fucus serratus* with sponges, ascidians and red seaweeds on tide-swept lower eulittoral mixed substrata	*Fucus spiralis*	Upper shore boulder field

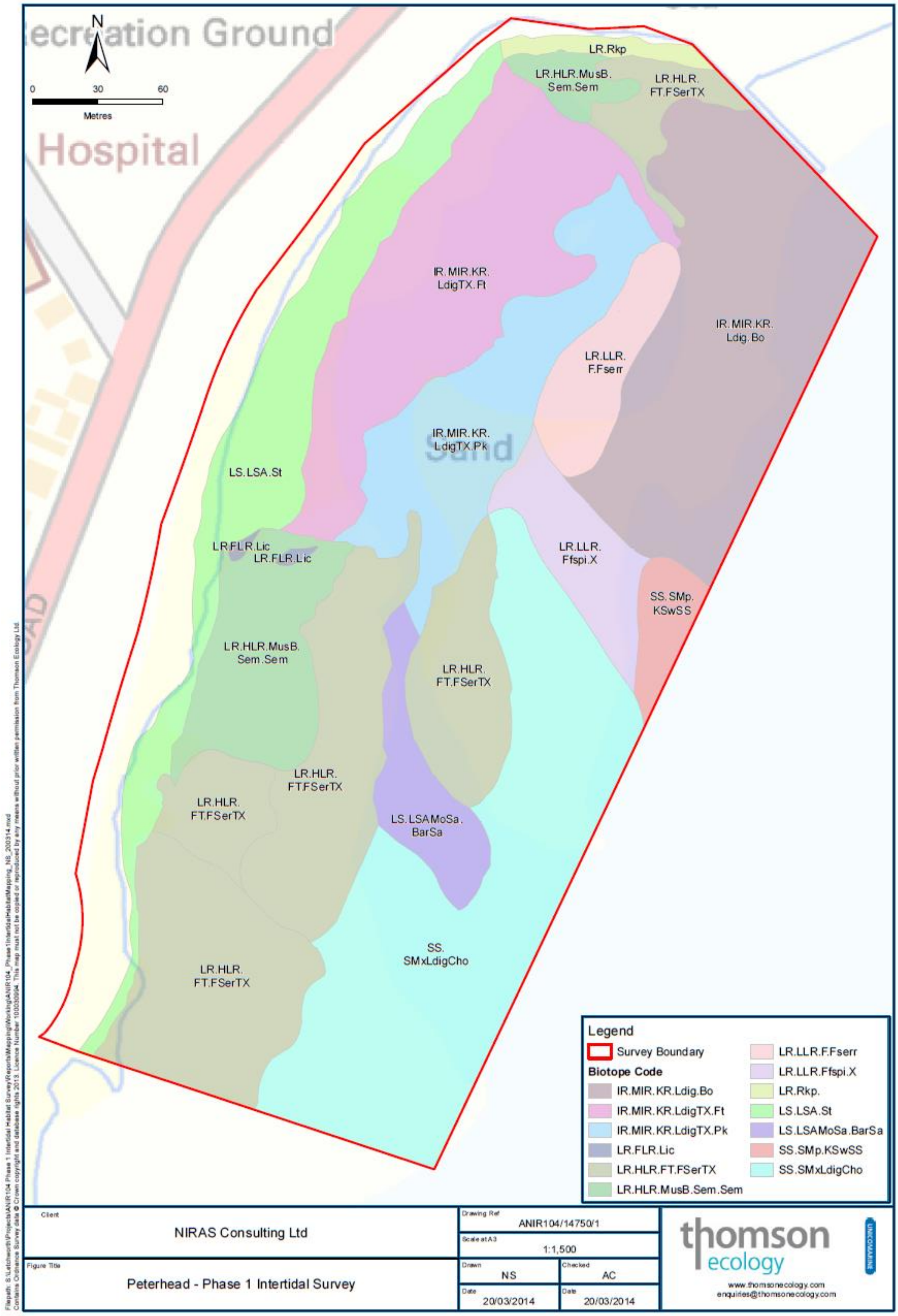

Figure 5.1: Intertidal biotopes recorded at low tide in Peterhead Bay during the intertidal survey on the 5th March 2014.

5.2. Valued Ecological Receptors (VERs)

5.2.1. Three biotopes were identified that are constituent habitats of UKBAP Priority Habitats Descriptions (JNCC, 2011). These were IR.MIR.KR.Ldig.Bo, SS.SMp.KSwSS and LR.HLR.FT.FSer.TX. As previously mentioned, SS.SMp.KSwSS and LR.HLR.FT.FSer.TX are also listed as PMFs.

5.2.2. IR.MIR.KR.Ldig.Bo formed the intertidal habitat that was located alongside the harbour wall to the north of the survey zone and extended south into Peterhead Bay, running parallel with the coast (Figure 5.1). As such, this biotope is considered to be a Valued Ecological Receptor and is considered to be Regionally important given the extent of the habitat within Peterhead Bay.

5.2.3. SS.SMp.KSwSS and LR.HLR.FT.FSer.TX are listed as constituent habitats of Tide-swept Channels. SS.SMp.KSwSS was located on the edge of the survey zone at the southern edge of the elevated boulder ridge present on the eastern edge of the survey zone with LR.HLR.FT.FSerTX located between the elevated boulder ridge and the rocky shore area to the south of the survey zone (Figure 5.1). These habitats although present within Peterhead Bay, are not considered representative of the UKBAP habitat Tide-swept Channels as described in JNCC (2011) and as such are not included as VERs.

5.3. Potential Impacts

5.3.1. One intertidal VER has been identified which is a constituent habitat type of a UKBAP priority habitat. Dredging activities associated with the proposed development incorporates areas in the North Harbour and the South Harbour which will be deepened from -3.2 m to -6.5 m (Chart Datum). Further to this a reclamation area adjacent to Smith Quay will be created utilising spoil collected during dredging activities. The intertidal VER may be indirectly impacted by dredging and filling activities in the North Harbour and South Harbour associated with the proposed development. These activities may result in increased concentrations of suspended sediment within the water column which may be transported out of the Harbour into Peterhead Bay affecting a wider area that that being dredged/filled. As this sediment settles non-mobile species within Peterhead Bay may be susceptible to smothering. Further to this although not identified as VERs, intertidal and benthic habitat loss will occur in the area adjacent to Smith Quay where a reclamation area (17,000 m^2) will be constructed.

5.4. Impact Assessment

5.4.1. Dredging activities have previously been conducted within Peterhead Harbour associated with the construction of a new breakwater and deepening of the outer Harbour with no adverse effect noted on the intertidal biotopes within Peterhead Bay. Data from borehole analyses indicate that the benthic environment within the Harbour is mainly composed of coarse sand, gravel and rock, with most of the soft overlying sediment having been removed by previous dredging activities. As such, the amount of sediment available for suspension is minimal. The duration of the impact is likely to be short-term although of constant frequency. The intertidal VER is considered to be of Regional Importance with the magnitude of the effect deemed to be low. Suspended sediment concentrations arising from the proposed works are therefore considered to result in a negative impact of minor significance which is not significant in EIA terms.

5.4.2. Habitat loss of approximately 17,000 m^2 will occur as a result of the creation of a reclamation area adjacent to the western side of Smith Quay. This area is considered to contain intertidal and benthic habitat of poor quality due to its location close to the harbour wall. The impact upon intertidal and benthic habitat affected by the creation of the reclamation area is considered irreversible. The receptors affected by this impact are considered to be of Local importance with higher quality intertidal habitat, that will not be adversely impacted, present in larger extents elsewhere in Peterhead Bay. The magnitude of this effect is considered to be low given the minimal extent of intertidal and benthic habitat impacted. Habitat loss is therefore considered to result in a negative impact of negligible significance, which is not significant in EIA terms.

5.4.3. Benthic habitats within the Harbour will be impacted by dredging activities associated with the proposed development. However, the habitat within the Harbour is likely to of poor quality having been previously dredged and is a small proportion of the benthic habitat within the whole of Peterhead Bay. The presence of habitat within the Peterhead Bay that will not be adversely impacted by the development will also facilitate recovery of those habitats within the harbour. The benthic habitat within the Harbour is considered to be of Local importance with higher quality benthic habitat, that will not be adversely impacted, present in larger extents elsewhere in Peterhead Bay. The magnitude of the effect is considered low given the minimal extent of benthic habitat impacted, resulting in a negative impact of negligible significance, which is not significant in EIA terms.

5.5. Cumulative Impact Assessment

5.5.1. Given the predicted localised impacts of the proposed development on intertidal ecological receptors and the distance between Peterhead Harbour and other plans and projects included for cumulative assessment (see Table 4.3), it is not considered that there is potential for cumulative impacts to arise in relation to the proposed development. Cumulative impacts in relation to intertidal ecology are therefore not discussed further in this assessment.

6. Ornithology

6.1. Baseline Information

Desk study

6.1.1. Appendix 3 presents WeBS counts for Peterhead Bay and Sandford Bay recorded between 2008 and 2012. The five year averages indicate that eider, oystercatcher, redshank, herring gull and Sandwich tern are commonly recorded in Peterhead Bay and Sandford Bay although no species occurred in Internationally or Nationally important numbers[10].

6.1.2. Records pertaining to birds of conservation concern received from the NESBReC are presented in Appendix 1. Thirty-two species of conservation value have been recorded within 2 km of the development area that are listed on Annex 1 of the EU Birds Directive and/or Schedule 1 of the Wildlife and Countryside Act 1981, as amended. Of those species listed on Annex 1 or Schedule 1, sixteen are classed as marine species with potential to be impacted by the development with eleven of these species having been recorded in the last five years (Table 6.1).

Table 6.1: Species listed on Annex 1 of the EU Birds Directive (Directive 2009/147/EC) and/or Schedule 1 of the Wildlife and Countryside Act 1981 recorded within 2 km of the development site.

Species	Designation	Number of records in the last 5 years	Nearest record (m)[11]	Most recent record
Red-throated diver	Annex 1 Schedule 1	30	1000	2010
Black-throated diver	Annex 1 Schedule 1	33	1000	2010
Great northern diver	Annex 1 Schedule 1	11	1000	2010
European storm petrel	Annex 1	57	1000	2010
Slavonian grebe	Annex 1 Schedule 1	3	1000	2009
Purple sandpiper	Schedule 1	5	1000	2012
Black-tailed godwit	Schedule 1	1	1000	2010
Bar-tailed godwit	Annex 1	32	1000	2010
Sandwich tern	Annex 1	28	500	2010
Common tern	Annex 1	2	1000	2010
Arctic tern	Annex 1	12	1000	2010

6.1.3. The JNCC Seabird Monitoring Programme (SMP)[12] records breeding seabirds around the coast of the UK. There are three SMP sites within the vicinity of the development site:

- The headland on which the Harbour is located (Peterhead Roanheads);

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[10] Numbers breaching 1% of the national or international population for a species (http://wpe.wetlands.org/ and Burton *et al.,* 2012).
[11] Values used represent buffer areas around the development area.
[12] http://jncc.defra.gov.uk/smp/

- The north of the Harbour (Peterhead North Harbour); and
- To the south of Peterhead Bay (Peterhead South Harbour).

6.1.4. The most recent counts at these sites occurred in 2001 as part of Seabird 2000, a UK wide survey of breeding seabirds. This survey estimated 15 breeding pairs of herring gull at Peterhead North Harbour, 40 breeding pairs of herring gull at Peterhead Roanheads and 268 breeding pairs of herring gull at Peterhead South Harbour. Four breeding pairs of lesser black-backed gull were also recorded in Peterhead South Harbour.

Survey Work

6.1.5. Ornithological surveys were conducted in two areas, Peterhead Bay and Peterhead Harbour at high and low tidal extents. Table 6.2 shows those species recorded during ornithological surveys in both survey areas at high and low tide and incorporates the conservation status of each species based on the Birds of Conservation Concern Red, Amber and Green lists (Eaton *et al.,* 2009).

Table 6.2: Bird species recorded during the ornithological survey of Peterhead Harbour and Peterhead Bay on March 4th and 5th 2014.

Species	Conservation status	Peterhead Bay		Peterhead Harbour	
		High tide	Low tide	High tide	Low tide
Common shelduck	BoCC Amber list		2		
Common eider	BoCC Amber list	36	53	26	21
Red-breasted merganser	BoCC Green list	2	2		
Great crested grebe	BoCC Green list	1			
Great cormorant	BoCC Green list	1		2	
European shag	BoCC Amber list	3	1		
Grey heron	BoCC Green list		1		
Eurasian oystercatcher	BoCC Amber list	9	32		
Common ringed plover	BoCC Amber list		1		
Grey plover	BoCC Amber list		1		
Sanderling	BoCC Green list		3		
Purple sandpiper	BoCC Amber list	2			
Dunlin	BoCC Red list		3		
Curlew	BoCC Amber list		4		
Common redshank	BoCC Amber list	34	8		
Ruddy turnstone	BoCC Amber list	16	4		
Black-legged kittiwake	BoCC Amber list		2	3	7
Black-headed gull	BoCC Amber list	4	3	12	2
Common gull	BoCC Amber list	2	5	2	3
Lesser black-backed gull	BoCC Amber list			3	2
Herring gull	BoCC Red list	32	92	112	87
Iceland gull	BoCC Amber list			1	
Great black-backed gull	BoCC Amber list	9	13	26	14
Razorbill	BoCC Amber list		1		
Eurasian starling	BoCC Red list		12	5	10
Pied wagtail	BoCC Green list		1		
Rock pipit	BoCC Green list	1			1

6.1.6. A total of 735 birds of 27 species were recorded during surveys with species richness highest in Peterhead Bay where 25 species were recorded across both high tide and low tide surveys. In comparison, a total of 11 species were recorded in the Harbour across high and low tides. Of those species recorded dunlin, herring gull and starling are listed on the Birds of Conservation Concern Red List, with a further seventeen listed on the BoCC Amber List (Table 6.2). The desk study identified two further wader species, black-tailed godwit and bar-tailed godwit, that utilise Peterhead Bay. However, these species do not occur regularly during winter with the majority of records associated with the post-breeding migration of these species. Other species identified by the desk study but not as part of the ornithological surveys undertaken within Peterhead Bay and the Harbour include diver species, storm petrel and tern species. Storm petrel and tern species are not present in British waters during the non-breeding season having migrated from breeding colonies to areas further south to waters off central and southern Africa (Wernham *et al.,* 2002). Diver species are generally recorded off the northern coast of the harbour with fewer records within Peterhead Bay. The temporal extent of the surveys undertaken within Peterhead Bay may have contributed to the absence of divers within the results of these surveys.

6.1.7. No Annex I species and only one Schedule 1 species, purple sandpiper, were recorded during ornithological surveys of the Harbour and Peterhead Bay. The protection afforded to purple sandpiper as part of the Wildlife and Countryside Act 1981 (as amended) is relevant to the breeding populations of that species.

6.1.8. Both the harbour and Peterhead Bay contain habitats suitable for roosting and foraging birds including areas of rocky substrate and soft substrate. The most abundant species within the Harbour was herring gull which exploit foraging opportunities created by the fishing activity within the Harbour. At low tide within Peterhead Bay eider, wading birds (especially oystercatcher) and gull species take advantage of foraging opportunities. A high tide wader roost was noted on one of the breakwaters in the southern part of the bay during the high tide survey in this area. Species within this roost included oystercatcher, purple sandpiper, redshank and turnstone with the numbers of each shown in Table 6.2.

6.2. Valued Ecological Receptors (VERs)

6.2.1. The zone of influence for bird species is defined as the Harbour area and Peterhead Bay. No species were recorded in Internationally or Nationally important numbers during the Ecological Assessment survey within the zone of influence. Similarly, records of species collected as part of the desk study did not indicate the presence of Internationally or Nationally important populations. Table 6.3 presents those VERs considered to be of Regional importance that were recorded as part of the Ecological Assessment survey work or identified as part of the desk study. Whimbrel is listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). The protection afforded under this Act is only relevant to the breeding population of whimbrel. These species are taken forward for impact assessment in Section 6.4.

Table 6.3: Valued Ecological Receptors of regional importance recorded during the Ecological Assessment at the development site or identified as part of the desk study.

Valued Ecological Receptors	Importance	Justification
Black-tailed godwit	Regional	Listed on the BoCC Red list Three records of species identified in desk study with a maximum count of 13 individuals.
Lapwing	Regional	Listed on the BoCC Red list

Valued Ecological Receptors	Importance	Justification
		Maximum count of 10 individuals recorded during WeBS surveys, 5 year average of 3 birds.
Dunlin	Regional	Listed on the BoCC Red list Recorded during WeBS surveys (5 year average of 5 birds) and in the 2014 ornithological surveys undertaken within Peterhead Bay at low tide (3 individuals).
Whimbrel	Regional	Listed on the BoCC Red list Maximum count of 2 individuals recorded during WeBS surveys, 5 year average of 1 bird.
Herring gull	Regional	Listed on the BoCC Red list Recorded during 2014 ornithological surveys within Peterhead Bay and Peterhead Harbour with a maximum of 112 birds recorded within the Harbour at high tide. Also recorded in WeBS surveys (5 year average of 243 birds) and identified within the desk study. Breeding records identified within the Harbour.
Eurasian starling	Regional	Listed on the BoCC Red list Recorded during ornithological surveys at the development site in both Peterhead Bay and Peterhead Harbour. A maximum count of 12 birds was recorded within Peterhead Bay at low tide.

6.2.2. No further bird species are considered within the impact assessment.

6.3. Potential Impacts

6.3.1. Ornithological VERs will potentially be impacted by visual and noise disturbance effects associated with construction activities for the proposed development. This applies to construction activity on land only as vessel movements within the harbour are expected to decrease during this phase. There will not be any loss of habitat that has value for ornithological receptors as a result of the proposed development.

6.3.2. Disturbance often implies a short-term or temporary effect that is unlikely to impact upon the individuals or populations concerned. In this assessment this characterisation holds true in that, disturbance is limited to that initiated by moving physical objects or noise causing evasive action to be taken by birds including flushing, typically into flight. Peterhead Harbour is a busy port by virtue of supporting a considerable fishing fleet in addition to its proximity to oil and gas activities in the North Sea. As such, additional activity within the Harbour associated with the proposed development, including the presence of construction vessels and noise is considered unlikely to significantly compound baseline visual and noise disturbance levels.

6.4. Impact Assessment

6.4.1. The principal aspect of disturbance within the construction phase is through the result of increased noise and visual activity within the harbour, associated with construction works on the existing and new fish market buildings. The increased vehicular traffic within the Harbour area is expected to remain throughout the construction phase. Impacts upon ornithological receptors are considered to be intermittent and short-term in nature.

6.4.2. For each ornithological VER the impact of disturbance from increased activity has been evaluated on the basis of knowledge of the sensitivity of bird species and the assessed magnitude and temporal span (i.e. temporary) of the disturbance that is considered likely to occur.

6.4.3. Dunlin, lapwing, whimbrel and black-tailed godwit were not identified as having been recorded within the harbour (i.e. the development area), with these three species more likely to be associated with foraging and roosting habitat either inter-tidally within Peterhead Bay or on the breakwater in the south of the Bay. The high tide roost observed within Peterhead Bay during ornithological surveys was noted on a breakwater in the south of the Bay, approximately 1 km from the area in which activities will occur. It should also be noted that the roost only contained small numbers of constituent species (oystercatcher, purple sandpiper, redshank and turnstone (Table 6.2) during the single survey undertaken in March 2014. As these species are likely to be present only within Peterhead Bay and not the development area, it is unlikely that an increase in activity within the Harbour will significantly increase the disturbance effects for these species. These four VERs are considered to be of Regional importance due to their presence on the BoCC Red List, with the magnitude of the effect considered to be negligible, resulting in a negative impact of negligible significance, which is not significant in EIA terms.

6.4.4. Herring gull and starling were both recorded within the harbour area during ornithological surveys of the development area undertaken during March 2014 and therefore occur within closer proximity of any potential disturbance. Herring gull and starling are both listed on the BoCC Red List making them species of Regional importance. It is however, considered unlikely that either species will be adversely affected. Herring gulls are largely unaffected by human activity within the Harbour, exploiting the foraging opportunities created by the fishing industry. Starlings were only recorded in small numbers within the Harbour and are not sensitive to disturbance in areas where human activity is high (BWPi, 2009). As such, disturbance effects are considered to be of negligible magnitude for both species, resulting in a negative impact of negligible significance, which is not significant in EIA terms.

6.4.5. It has not been possible to obtain information relating to breeding bird interest within the harbour. There is potential for crevice nesting species (including starling) to exploit areas within the two buildings affected by the proposed development. Any damage, destruction or interference with the nest of a wild bird whilst that nest is in use of being built is an offence under the Wildlife and Countryside Act 1981. Measures to counteract any potential effects on breeding birds will be presented in detail in the Construction Environmental Management Plan (CEMP).

6.5. Cumulative Impact Assessment

6.5.1. Given the predicted localised impacts of the proposed development on ornithological receptors and the distance between Peterhead Harbour and other plans and projects included for cumulative assessment (see Table 4.3), it is not considered that there is potential for cumulative impacts to arise in relation to the proposed development. Cumulative impacts in relation to ornithology are therefore not discussed further in this assessment.

6.6. Habitats Regulations Appraisal

Introduction

6.6.1. Based on the SNH scoping response (Annex B, Letter 20th May 2014, Ref: CEA130608), SPAs requiring consideration for HRA in relation to the Peterhead Harbour development are as follows:

- Buchan Ness to Collieston Coast SPA;
- Loch of Strathbeg SPA; and
- Ythan Estuary, Sands of Forvie and Meikle Loch SPA.

6.6.2. In addition, as described in para. 4.5.4, consideration has also been given the to the Ythan Stuary dSPA.

6.6.3. Of those species identified as VERs within the EIA, only herring gull is a qualifying feature at those SPAs mentioned above.

HRA Screening

Buchan Ness to Collieston Coast SPA

6.6.4. The Buchan Ness to Collieston Coast SPA incorporates two SSSIs: Bullers of Buchan SSSI and the Collieston to Whinnyfold Coast SSSI, located approximately 4 km and 13 km of the development respectively. The site is designated for breeding fulmar (1,765 pairs), herring gull (4,292 pairs), shag (1,045 pairs), kittiwake (30,452 pairs) and guillemot (8,640 pairs). The site also regularly supports a breeding assemblage of 95,000 seabirds.

6.6.5. Of the five qualifying features for which Buchan Ness to Collieston Coast SPA is designated, data from the NESBReC included records of only herring gull. The mean-max foraging ranges of these five species also show there is potential for connectivity between the SPA and development site (Thaxter *et al.,* 2012).

6.6.6. Furness and Wade (2012) present the sensitivity of seabird species to disturbance from ship and helicopter traffic. Although potential disturbance during the construction phase at Peterhead Harbour is considered to be associated with activity on land the information presented within Furness and Wade (2012) is still considered to be relevant to this assessment. Of the five qualifying features at Buchan Ness to Collieston Coast SPA the most sensitive to disturbance are shag and guillemot which are considered to have moderate sensitivity to disturbance from ship and helicopter traffic. Fulmar and kittiwake are considered less sensitive to disturbance with herring gull the species with the lowest sensitivity, a conclusion supported by the expected presence of herring gull within Peterhead Harbour throughout the year due to abundant foraging opportunities associated with the fishing activity in the port.

6.6.7. Tracking data of the five qualifying features at Buchan Ness to Collieston Coast SPA, collected as part of the FAME project[13] indicates that the majority of foraging tracks of fulmar, shag, kittiwake and guillemot occur between breeding colonies and offshore foraging areas, with minimal connectivity with inshore areas. Of these species shag has the smallest foraging range (mean-max of 14.5 km) (Thaxter *et al.,* 2012) although there exist no records of shag in Peterhead Bay as part of the NESBReC dataset.

6.6.8. Based on the information presented above it is not considered that there is connectivity between any of the qualifying features of the Buchan Ness to Collieston Coast SPA and the proposed development.

Loch of Strathbeg SPA

6.6.9. The Loch of Strathbeg SPA and Ramsar is located approximately 12 km from Peterhead and consists of a naturally eutrophic loch and adjoining reedbeds, freshwater marshes and Alder and willow carr. The loch is separated from the sea by a wide dune system which supports a rich flora. The site is designated for a breeding population of Sandwich tern (530 pairs) and wintering populations of whooper swan (183 individuals), pink-footed goose (39,924 individuals), greylag goose (3,325

[13] http://www.fameproject.eu/en/

individuals), teal (1,898 individuals) and goldeneye (109 individuals). The site also regularly supports 49,456 wintering waterfowl.

6.6.10. There is considered to be no connectivity between whooper swan and the development site given that the development site is outside of the 5 km core range of whooper swan (SNH, 2013) from the Loch of Strathbeg SPA. There are also limited records of the species within Peterhead Bay with only 2 records of a total of 35 birds from data collated in the last five years by the NESBReC. The species has not been recorded by WeBS in the last five years or as part of site-specific surveys at the development site.

6.6.11. The core ranges of pink-footed goose and greylag goose (15-20 km) exhibit potential connectivity between the development site and the Loch of Strathbeg SPA (SNH, 2013) which is an important roost site for both species. However, there is not considered to be suitable foraging habitat for either of these species within Peterhead Bay and as such there occurrence is unlikely. Indeed this assessment is supported by the results of the recent mapping of known feeding distribution in Scotland for both pink-footed goose and greylag goose which showed no records of either species at Peterhead (Mitchell, 2012). Within the last five years, only one pink-footed goose and two greylag geese have been recorded as part of WeBS counts with neither species recorded as part of site-specific surveys.

6.6.12. Teal are predominantly found in freshwater wetlands although wintering distribution extends to brackish lagoons and estuarine habitats with limited connectivity with marine habitats (Forrester *et al.,* 2007). Teal has not been recorded, in the last five years, in WeBS counts undertaken within Peterhead Bay, similarly there exist no records of the species in the last five years in the dataset sourced from NESBReC. Further to this, site-specific surveys did not record the species.

6.6.13. No goldeneye were recorded during site-specific surveys however, WeBS surveys have recorded a five year average of 19 birds. In winter, goldeneye are widespread on the eastern coast of Scotland with the exception of the cliff dominated Sutherland coast (Forrester *et al.,* 2007). The Loch of Strathbeg SPA is over 10 km away from the development site and there is no known evidence of regular movements between the SPA and Peterhead Harbour. The response distances of goldeneye to disturbance caused by people on the shore has been recorded as mean distances of 100 and 280 m (Kirby *et al.,* 2004 and Ruddock and Whitfield, 2007), with birds generally re-settling immediately elsewhere (Hume, 1976). Vehicular traffic has been found to induce an alert response at 200-250 m whereas sailing boats evoked a flight response at 350-400 m (Hume, 1976). The vast majority of birds can be expected to be over 200 m from any source of potential disturbance from the proposed development. For example, demolition works at Merchant's Quay will occur over 200 m from the main entrance to the port at Smith Quay, beyond which occurrence of goldeneye is more likely.

6.6.14. Based on the information presented above it is not considered that there is connectivity between any of the qualifying features of the Loch of Strathbeg SPA and the proposed development.

Ythan Estuary, Sands of Forvie and Meikle Loch SPA

6.6.15. The Ythan Estuary, Sands of Forvie and Meikle Loch SPA is located approximately 18 km south of Peterhead. The site consists of the estuary of the river Ythan and Meikle Loch. There is an extensive area of sand dunes at the mouth of the estuary with mud-flats in the upper reaches of the estuary and coarser gravels, which support mussel beds, closer to the sea. Areas of saltmarsh, reedbed and poor fen are found on the margins of the estuary. The site is designated for a wintering population of pink-footed goose (17,213 individuals) and breeding populations of little tern (less than 41 pairs), Sandwich tern (600 pairs) and common tern (less than 265 pairs). The site also regularly supports 22,817 wintering waterfowl.

6.6.16. Pink-footed geese are unlikely to occur within Peterhead Bay where there is considered to be no appropriate foraging habitat. Indeed this assessment is supported by the results of the recent mapping of known feeding distribution in Scotland for pink-footed goose which showed no records of this species at Peterhead (Mitchell, 2012). Peterhead Bay is also not typical of a roost site locality for the species which typically uses for undisturbed freshwater water bodies (BWPi, 2009). The species was not recorded during site-specific surveys, with only one bird recorded as part of WeBS surveys in the last five years. The species was also not present in records sourced from the NESBReC.

6.6.17. There is considered to be no connectivity between the little tern and common tern qualifying features of the Ythan Estuary, Sands of Forvie and Meikle Loch SPA and the development site based on the mean-max foraging ranges of the species (6.3 km and 15.2 km, respectively) (Thaxter *et al.* 2012).

6.6.18. Sandwich tern is classified as having a moderately-low sensitivity to disturbance by ship and helicopter traffic (Furness and Wade, 2012), with this impact considered to be of higher magnitude when compared to the type of disturbance considered during construction at Peterhead Harbour. The mean-max foraging range of Sandwich tern is estimated at 49 km (Thaxter *et al.,* 2012) which suggests potential connectivity with the development site. There have been only 30 records of Sandwich tern within 2 km of the development site in the last five years with the seasonal occurrence of most suggestive of these being of passage birds. Given the minimal number of records of Sandwich tern within Peterhead Bay during the breeding season it is unlikely that there will exist connectivity between Sandwich tern from the Ythan Estuary , Sands of Forvie and Meikle Loch SPA and the development site.

6.6.19. Based on the information presented above it is not considered that there is connectivity between any of the qualifying features of the Ythan Estuary, Sands of Forvie and Meikle Loch SPA and the proposed development.

Ythan Estuary dSPA

6.6.20. It is assumed for this assessment that the Sandwich tern and little tern qualifying features designated at the Ythan Estuary dSPA are present in the breeding season and not during migration. This is based on the precautionary assumption that birds are more vulnerable to disturbance during the breeding season. It is further assumed that the designation of these species is due to this area being used by birds for foraging from the breeding colony within the Ythan Estuary.

6.6.21. There is considered to be no connectivity between the little tern qualifying feature of the Ythan Estuary dSPA and the development site based on the mean-max foraging ranges of the species (6.3 km) (Thaxter *et al.* 2012).

6.6.22. Sandwich tern is classified as having a moderately-low sensitivity to disturbance by ship and helicopter traffic (Furness and Wade, 2012), with this impact considered to be of higher magnitude when compared to the type of disturbance considered during construction at Peterhead Harbour. The mean-max foraging range of Sandwich tern is estimated at 49 km (Thaxter *et al.,* 2012) which suggests potential connectivity with the development site. There have been only 30 records of Sandwich tern within 2 km of the development site in the last five years with the seasonal occurrence of most suggestive of these being of passage birds. Given the minimal number of records of Sandwich tern within Peterhead Bay during the breeding season it is unlikely that there will exist connectivity between Sandwich tern from the Ythan Estuary dSPA and the development site.

Conclusion

6.6.23. The screening exercise presented above concluded that there is no connectivity between the proposed development and any of the qualifying features associated with the three SPAs included in this assessment, and therefore, no further assessment in HRA terms is required. This is consistent with advice provided by SNH as part of consultation on the Scoping Report for the project (Annex B, Letter 20th May 2014, Ref: CEA130608).

7. Bats

7.1. Baseline Information

Desk study

7.1.1. There were no records of bats within 2 km of the development site as indicated by the information provided by the NESBReC. However, common pipistrelle, a species listed on the North East Scotland Priority Species List, have been recorded in low numbers foraging close to buildings at Sandford Lodge located approximately 3 km south-west of the Harbour (Peterhead Port Authority, 2007).

Survey work

7.1.2. Survey work was carried out to investigate the potential for roosting bats within the two buildings that will be affected by development within the Harbour. One of these buildings, the fish market at Merchant's Quay is to be demolished as part of the development with the other, the Greenhill fish market, to be developed. As such, the demolition of the fish market at Merchant's Quay would result in the mortality of any bats present. Development of the Greenhill fish market is likely to result in disturbance of bats which may indirectly result in mortality.

7.1.3. The first of these buildings is the existing fish market located at Merchants Quay in the south of the Harbour. The western side of this building is rendered (Plate 1) with the southern side constructed of tightly fitting bricks with no cracks or crevices (Plate 2). The northern side of the building is where fish are loaded for transportation (Plate 3). This building is metal roofed which reduces the suitability of this building for roosting due to the thermal properties of metal. There is a low potential for bats on the western side of the building with the only roosting areas within the metal roof (Plate 1). Similarly, there is a low potential for bats on the southern side of the building with the minimal roosting potential between the brick wall and metal roof (Plate 2). There is also likely to be a significant level of disturbance on the southern side of the building with human activity associated with unloading fishing boats and the presence of significant lighting which would light potential access points for bats reducing roosting potential further. The northern side of the fish market (Plate 3) is the area in which fish are loaded for transportation. This area has a low potential for bats as there are no suitable entry points for bats with the metal frame around the loading bay having poor thermal properties (Plate 4). Further to this any areas that may be used for roosting are light, draughty and exposed to the elements. Disturbance caused by loading activity and the presence of significant lighting further reduce the potential for roosting bats.

7.1.4. Further to the disturbance from human activity and the lighting present on the fish market at Merchant's Quay, there are potential predators within the area (gulls) and there is limited habitat connectivity to suitable foraging habitats within the surrounding area. In conclusion, the potential for roosting bats in the fish market at Merchant's Quay is considered to be negligible.

7.1.5. The second building inspected was the Greenhill fish market in the north of the Harbour. This building has both brick and rendered walls (Plates 5 and 6) and is metal roofed, the thermal properties of which reduce the suitability of this building for roosting. Cracks in brickwork at corners of the building and where the metal roof connected with the wall were present (Plates 5 and 6) however, it is not believed these enabled access to areas in which roosting opportunities may occur. Further to this, the cracks were noted as being fairly shallow which reduces the potential for crevice dwelling species. Significant lighting was present all around the building although disturbance levels due to human activity are likely to be lower when compared to the building at Merchant's Quay.

7.1.6. As with the building at Merchant's Quay, there are potential predators (gulls) within the vicinity of the building and limited habitat connectivity to suitable foraging habitat within the surrounding area. In conclusion, the potential for roosting bats in the Greenhill fish market is considered to be negligible.

7.2. Valued Ecological Receptors (VERs)

7.2.1. The external inspections of the two buildings associated with the proposed development concluded that despite the noted limitations of the survey (para.7.1.4) the potential for the presence of roosting bats was negligible. The two buildings provided minimal suitable entry points and any potential roosting areas were limited in the shelter and conditions they could provide. For example, the limited potential roosting opportunities were generally associated with metal surfaces which have poor thermal properties. In addition to a lack of suitable roosting opportunities, disturbance from human activities and lighting is likely to be significant in the immediate area surrounding the buildings. It is also considered that there is limited or no connectivity between any local foraging habitat and the two buildings affected by the development. As such bats are not considered further in this assessment.

8. Marine Mammals

8.1. Baseline Information

8.1.1. The marine mammals desk study (Appendix 5 – Marine Mammals Desktop Study) carried to inform this assessment identified six key species of marine mammals in and around the Peterhead Harbour area. These are as follows:

- Grey seal (*Halichoerus grypus);*
- Harbour (common) seal (*Phoca vitulina*);
- Harbour porpoise (*Phocoena phocoena*);
- Bottlenose dolphin (*Tursiops truncatus*);
- White-beaked dolphin (*Lagenorhynchus albirostris)*; and
- Minke whale (*Balaenoptera acutorostrata)*.

8.1.2. Marine mammal sightings were recorded as part of the ornithology survey undertaken on 4th and 5th March 2014. Grey seals were observed within the harbour during this period. The presence of these seals is thought to be associated with the fishing activity within the harbour, and the individuals observed appeared to be habituated to the noise and activity in the area. Further information provided by the Peterhead Port Authority indicates that it is estimated that there are approximately ten grey seals moving around the harbour at various locations. These tend to be in the South Harbour and Sir Albert Basin, occasionally resting on the back of the Sir Albert Quay rock protection (PPA, pers. comm. 2014).

8.1.3. Detailed baseline information on key marine mammals potentially present in areas relevant to the proposed development is provided in Section 13.5 (Appendix 5 – Marine Mammals Desktop Study).

8.2. Valued Ecological Receptors (VERs)

8.2.1. A conservative zone of influence (para. 4.2.7) has been defined for the assessment of marine mammals comprising the harbour area, Peterhead Bay and coastal areas off Peterhead up to 10 km seaward.

8.2.2. Table 8.1 presents the marine mammal VERs identified in this area of influence together with their level of conservation importance.

Table 8.1: Valued Ecological Receptors identified as part of the marine mammals desk study

Valued Ecological Receptors	Importance	Justification
Grey seal	International	Listed in Annex II and Annex V of the of the Habitats Directive.
Common (harbour)	International	Listed in Annex II and Annex V of the Habitats Directive.
Harbour porpoise	International	Listed in Annex II and Annex IV (EPS) of the Habitats Directive.
Bottlenose dolphin	International	Listed in Annex II and Annex IV (EPS) of the Habitats Directive.
White-beaked dolphin	International	Listed in Annex IV (EPS) of the Habitats Directive.
Minke whale	International	Listed in Annex IV (EPS) of the Habitats Directive.

8.3. Potential Impacts

8.3.1. In line with the project description and the proposed construction methodology, the proposed development has potential to adversely affect marine mammals VERs are a result of the following key potential impacts:

- Noise and vibration;
- Changes to water quality; and
- Risk of corkscrew injury (seal species only).

Noise and vibration

Underground rock fracturing using explosives

8.3.2. Over approximately 30% of the area of the Merchant's Quay and South Harbour will probably be necessary to fracture the underlying granite below the existing seabed to facilitate back-hoe dredging to the required level. Similarly, some level of blasting will also be required in the North Harbour (i.e. up to 20% of the area).

8.3.3. The blasting methodology involves the insertion of small explosive charges into holes drilled to twice the depth below seabed of the depth of the material required to be removed. The resulting shockwave has potential to result in fatal effects, injury and/or disturbance to marine mammal VERs.

Dredging and general floating plant

8.3.4. Increased levels of underwater noise will also arise from the operation of the grab dredger and vessel noise around the construction floating plant. This has the potential to result in disturbance to marine mammal VERs.

Pile installation by drilling and socketing

8.3.5. If pile installation is required for wall stabilisation in the North Harbour this will be undertaken by drilling and socketing. Further pile installation may be required in a couple of pinch points in the South Harbour. As above for dredging, noise generated by this activity has potential to result in disturbance to marine mammal VERs.

Vessel traffic

8.3.6. Noise associated with increased vessel activity has potential to result in further disturbance to marine mammals VERs. Peterhead Harbour currently sustains a high level of vessel traffic, with circa 3,000 commercial vessels arrivals, 2,800 fish landings and 500 other movements annually (PPA pers. comm., 2014). In light of the current levels of activity, however, any increased vessel noise in the area associated with the construction phase (i.e. that associated with construction vessels) is expected to be insignificant. Further, during dredging/drilling works the level of vessel movements is expected to be reduced, given the relatively static nature of the work.

8.3.7. During operation it is not anticipated that vessel traffic will increase as the proposed development is aimed at improving the efficiency of the port rather than increasing the total volume of traffic.

8.3.8. In light of the above noise related effects associated with vessel traffic are not considered further for assessment.

Changes to water quality

Increased suspended sediment concentrations

8.3.9. Dredging, filling and stone placing operations are likely to result in re-suspension of silt and clay particles. These activities may result in increased concentrations of suspended sediment within the water column, which may be transported out of the harbour into Peterhead Bay affecting a wider area that that being dredged/filled. Increased suspended sediment concentrations have the potential to impair the foraging abilities of marine mammals.

8.3.10. Dredging is likely to be carried out using a back-hoe dredger, with the dredged material being deposited into an anchored barge. During back-hoe dredging sediment may be released into the water column. Measurements of losses from this type of dredgers suggest that the mass of material lost per cubic metre dredged varies widely. Dredging of granular materials, which is anticipated to be the case at the proposed development, may result in losses of approximately 2-kg/m³ (PPA, 2014).

Accidental release of contaminants

8.3.11. The use of plant and machinery adjacent to and within the works could result in accidental contamination from oil or diesel leaks, or from runoff from temporary storage areas. Accidental pollution events, may these occur, could adversely impact marine mammal VERs within and in the vicinity of the harbour via deteriorating water quality.

8.3.12. As above for the construction phase, accidental pollution events, may these occur during the operational phase, could also adversely impact marine mammals VERs within and in the vicinity of the harbour.

Risk of Corkscrew Injuries to Seals

8.3.13. Vessel activity during construction and operation, particularly if the number of vessels with ducted propellers transiting the harbour and its vicinity increases, may result in an increased risk of corkscrew injuries to seals. Further, the risk of corkscrew injuries may increase whether the use of vessels with ducted propellers holding station within or outside the harbour increases.

8.4. Impact Assessment

Impacts during construction

Underwater noise

Blasting

8.4.1. Rock fracturing using explosive charges is the noise generating activity with the greatest potential to result in detrimental impacts on marine mammals during the construction phase. This activity can result in various effects on marine mammals depending on the level of exposure and sensitivity, including severe organ trauma and mortality, permanent hearing loss (permanent threshold shift, PTS), temporary hearing loss (temporary threshold shift TTS) and behavioural disturbance (Broner and Huber, 2012).

8.4.2. Historically, the peak pressure (P max) and the impulse (I) are the units that have been used to describe the severity of a blast. The peak pressure is defined as the maximum level of overpressure, that is, the pressure above the local ambient pressure caused by the shock wave, whilst the impulse is defined as the integral of pressure over time (Parvin *et al*., 2007).

8.4.3. The blasting methodology proposed at Peterhead Harbour involves the insertion of small explosive charges (i.e. up to 25 kg) into holes drilled to twice the depth below seabed of the depth of the material required to be removed. Explosives shot in open water produce both higher amplitude and higher frequency shock waves than contained detonations (Hempen *et al.,* 2007). Positioning charges within the seabed significantly changes the pressure wave associated with blasting; the pressure level generated is lower and the higher frequency components are lost (DECC, 2011). Research by Nedwell (1989) found that the peak pressure for an embedded charge is reduced substantially, to approximately 5%, and the impulse to approximately 30 % of that for the equivalent unconfined charge.

8.4.4. The corresponding peak pressure (P max) for an underwater TNT explosion in rock, typical of that during borehole blasting, can be estimated from (Parvin *et al.*, 2007):

$$P = 2.5 \times 10^{6} W^{0.37} R^{-1.13} \text{ Pa}$$

With the impulse (I) estimated from:

$$I = 1.8 \times 10^{3} W^{0.63} R^{-0.89} \text{ Pa.s}$$

8.4.5. Borehole blasting generally uses up to a tonne of explosive in a single blasting operation but distributed on delay timer in individual charge weights or "delays" of approximately 20 kg, so that each explosion is a discrete event (Parvin *et al.,* 2007). At Peterhead Harbour it is anticipated that up to 20 - 25 kg charges with a 25 msec delay will be used.

8.4.6. In order to inform the assessment of potential effects associated with the proposed blasting activity, noise modelling was undertaken by Subacoustech Environmetnal Ltd (see Annex A: Underwater Noise Impact Calculation Report). The outputs of the modelling are summarised below.

Noise Modelling Outputs

8.4.7. The noise modelling exercise took account of the use of charges of a maximum size of between 25 and 35 kg per delay. The calculated ranges of impact on marine mammals (lethal and injury effects) are summarised in Table 8.2. The 5% to 15% correction factors presented refer to the effect of the head wave as a consequence of transmission through the substrate only. The 100% correction factor assumes direct line of sight. Detailed information on the lethal and injury criteria and guidelines used to inform the noise modelling is provided in Annex A (Underwater Noise Impact Calculation Report).

Table 8.2: Lethal and Injurious ranges of effect from blasting using various correction factors.

25 kg charge per delay					
Corrector Factor	**Description**	**Peak SPL range**		**Impulse range**	
		240 dB (Lethal)	**220 dB (Injury)**	**100 Pa.s (Lethal)**	**35 Pa.s (Injury)**
5%	Head wave only	<1 m	~ 3 m	~ 10 m	~ 30 m
15%	Head wave only	~ 1 m	~ 7 m	~ 30 m	~ 100 m
100%	Full wave	< 5 m	~ 40 m	~ 275 m	~ 850 m
35[14] kg charge per delay					
5%	Head wave only	<1 m	~ 3 m	~ 15 m	~ 40 m
15%	Head wave only	~ 1 m	~ 8 m	~ 40 m	~ 130 m
100%	Full wave	5 - 10 m	~ 50 m	~ 350 m	~ 1000 m

[14] Note that charges of up to a maximum of 25 kg are anticipated to be used at the proposed development. The values presented in Table 8.2 for 35 kg charges are provided for illustrative purposes only.

8.4.8. The closest straight-line distance of blast to the entry to Peterhead Bay is approximately 500 m. As line of sight is completely broken there, it is reasonable to assume that only the head (substrate-borne) wave can reach this point. Using an upper estimate of the 15% correction factor, noise level at 500 m for the two charge weights modelled would be as presented in Table 8.3.

Table 8.3: Unweighted noise level at entry to Peterhead Bay.

	25 kg charge per dealy	**35 kg charge per dealy**
Noise level, re 1µPa	178.0 dB SPL_{peak}	178.8 dB SPL_{peak}
Impulse	8.1 Pa.s	10.0 Pa.s

8.4.9. It is expected that the results of calculations using the 100% correction factor represent the maximum or upper limit of the effects from the underwater marine blast. In the rest of Peterhead Bay, processes of underwater reflection and refraction will mean that, even where line of sight to the blast location is broken, some waterborne pressure wave will remain although moving further off line of sight to the blast location will lead to diminishing pressures and noise levels.

8.4.10. Based on an avoidance level of 168[15] dB re 1 µPa SPL_{peak}, this level will be reached at approximately 150 m throughout the surrounding waters *without* line of sight, for both 25 kg and 35 kg charges. 168 dB re 1 µPa SPL_{peak} will be exceeded anywhere where there is line of sight to the blast.

Assessment

8.4.11. As presented in Table 8.2 lethal effects could occur over distances of few hundred metres and injury at distances of up to approximately 1 km from blasting operations. It should be noted, however, that this would only be the case whether blasting activity is undertaken in areas where there is direct line of sight. As described in Annex A (Underwater Noise Impact Calculation Report), there is no direct line of sight between the works area in front of Merchants Quay and the entrance of Peterhead Bay to the south, and open water and only a small proportion of the works site in front of Merchant Quay has line of sight to any location within Peterhead Bay, with the majority blocked by quay walls and the breakwater. As such, blasting activity at most locations would result in significantly smaller lethal and injury impact ranges (i.e. in line with the values given in Table 8.2 using the 15% correction factor). Behavioural effects may occur over greater distances (i.e. 150 m throughout the surrounding waters at entry level to Peterhead Bay). In this context, however, the extremely short term and intermittent nature[16] of blasting events and therefore the short term associated potential behavioural disturbance to marine mammals should be noted.

8.4.12. Grey and harbour seals may be present in the harbour and/or its immediate vicinity at the time that blasting takes place. Taking account of the findings of the noise modelling described above, there is potential for fatality and injurious effects to occur on these species. There is no evidence of other marine mammal VERs being present within the harbour area and Peterhead Bay and therefore the potential for fatality/injury associated with blasting is considered unlikely.

8.4.13. Given the severity and irreversibility of a potential lethal/injurious impact, the magnitude of effect of blasting activity is considered high, constituting a negative impact of moderate significance, which is significant in EIA terms. In the particular case of harbour seals, it should be noted that the the

[15] The 168 dB re 1 µPa SPL_{peak} avoidance noise level is based on work undertaken by Lucke (2009) for marine mammals, specifically harbour porpoise.

[16] The blasting regime is anticipated to consist of one blast with multiple charges every two or three days, over a period of up to three months and blasting activity will only be carried out during daylight hours, within the normal working day.

population of the East Management Unit is in serius decline (see Appendix 5: Marine Mammals Desktop Study) and as advised by SNH (e-mail 02/09/2014) the loss of one harbour seal is significant for that population[17].

8.4.14. The conservative nature of this assessment in relation to cetaceans, which are not anticipated to be present in the harbour and Peterhead Bay, should however be recognised. Whilst there is limited information available to date to allow for accurate estimates of safe zones associated with explosions, the information provided above suggests that a safe zone of up to 1 km would be appropriate at Peterhead Harbour during blasting activity, provided charges up to a maximum of 25 to 35 kg are used. As such, in order to avoid lethal/injury effects on marine mammals and minimise disturbance, a mitigation zone of a radius of 1 km is proposed to be implemented. This is in line with the safe distance suggested by JNCC in their "*Guidelines for minimising the risk of disturbance and injury to marine mammals whilst using explosives"* (JNCC, 2010). In addition, the use of acoustic deterrent devices (ADD) to scare seals away from the vicinity of rock fracturing operations will be explored and whether deemed necessary its implementation defined in consultation with SNH and MSS (see Annex B: Draft Marine Mammals Mitigation Plan).

8.4.15. Adherence to the mitigation and monitoring measures described above (para. 8.4.14) will reduce the significance of the potential impact previously identified, resulting in a residual negative impact of minor significance on marine mammal VERs, which is not significant in EIA terms.

Pile installation

8.4.16. As above for blasting activity the impact assessment of noise in relation to pile installation by drilling is supported by noise modelling undertaken by Subacoustech Environmental Ltd (see Annex A: Underwater Noise Impact Calculation Report). The outputs of the modelling are summarised below.

Noise Modelling Outputs

8.4.17. Noise emission during drilling work within Peterhead Harbour has been assessed using Subacoustech's SPEAR model, which provides an estimation of the transmission of a variety of underwater construction noise sources. The nearest location for drilling to Peterhead Bay is the south end of South Harbour. This distance is approximately 350 m.

8.4.18. Although the exact drill to be used is not yet finalised, calculations of machinery capable of drilling the 1500 mm pile are based on the Reverse Circulation Rock Drill manufactured by Xuzhou Hercules Machine Manufacture Co., Ltd. The noise level expected at the entrance to the harbour (Smith Quay) is 120 dB SPL_{RMS} re 1 µPa.

8.4.19. A noise level of approximately 118 dB SPLRMS re 1 µPa is estimated at 500 metres from the drill. This assumes a direct line of sight; with no line of sight the drilling would be substantially less than this, noting that this level of noise is of the order of background noise levels (less than 120 dB re 1 µPa).

8.4.20. The noise level during drilling is not expected to reach levels where any significant avoidance would be expected, except the immediate vicinity of the drill.

Assessment

8.4.21. Taking the localised potential for disturbance to marine mammals in relation to drilling activity, limited to the immediate vicinity of the vessels, together with the intermittent and short term[18] nature

[17] The potential Biological Removal (from all activities) for harbour seal in the East Coast Management Unit is two, with no licences for removal being granted.

of drilling activity, the magnitude of the impact is considered to be low. As previously mentioned, with the exception of seals, marine mammal VERs are not anticipated to be present within the harbour or Peterhead Bay, and therefore for these VERs a negative impact of negligible significance is predicted. In the particular case of seals, as they may be present in the proximity of drilling operations, a negative impact of minor significance is predicted. As such, the potential impact on both seals and other marine mammal VERs is not considered significant in EIA terms. No specific mitigation measures are deemed necessary in this respect.

Dredging

8.4.22. Comparative analysis of noise source levels associated with various noise sources suggests that operations such as impact pile driving, explosions, seismic exploration and echolocation via sonar produce much higher source levels than those associated with dredging (Thomsen *et al.,* 2009). Further, as for drilling, it is generally accepted that noise levels associated with this activity is unlikely to result in physiological damage in marine fauna, having greatest potential to result in local disturbance, masking and behavioural responses (i.e. avoidance) in the vicinity of the vessels (Malme *et al.,* 1989; Richardson *et al.,* 1995; WODA, 2013; ESF, 2008).

8.4.23. Noise associated with dredging may arise from a number of discrete events all of which contribute to the overall underwater noise generated (DECC, 2011). Back-hoe dredging activity results in both, continuous sounds (such as engine and generator sounds transmitted through hull) and repetitive, punctuated sounds (such as those associated with bucket bottom contact and the repositioning of spuds) (Reine *et al.,* 2012). As suggested above (para. 8.4.22) effects associated with noise from dredging are anticipated to be localised to the immediate proximity of the vessels. This together with the intermittent and short term[19] nature of this activity will result in an impact of low magnitude. As described above for assessment of impacts associated with drilling, a negative impact of negligible significance is predicted on marine mammals VERs other than seals (as they are not anticipated to be present in the harbour or Peterhead Bay). In the particular case of seals, as they may be present in the proximity of dredging operations, a negative impact of minor significance is predicted. As such, the potential impact on both seals and other marine mammal VERs is not considered significant in EIA terms. No specific mitigation measures are deemed necessary in this respect.

Changes to water quality

8.4.24. Increased suspended sediment concentrations have potential to impair the feeding ability of marine mammals. It should be noted, however, that marine mammals regularly occur in turbid environments and are therefore likely to be habituated to finding prey in such conditions.

8.4.25. Harbour porpoise, bottlenose dolphin and white-beaked dolphin are able to use echolocation to locate prey and therefore are able to find prey that is out of sight. Prey capture may be more difficult for non-echolocating species in turbid environments. Most marine mammals have however an acute sense of touch and hearing. Seals have well adapted tactile and auditory receptors to aid prey detection and navigation (Schusterman *et al*., 2000). They possess highly sensitive whiskers that they use to detect prey items either through direct contact or through vibrations in the water column (Denhart *et al.,* 2001). Similarly, minke whales are thought to use vibrissae to sense their prey (Pyenson *et al.,* 2012).

[18] Drilling of piles for wall strengthening will be carried out intermittently over a six month period. Limited drilling may also be required for pile installation at a couple of pinch points in the South Harbour (i.e. order of days).
[19] Dredging is anticipated to be carried out intermittently over a six month period both at the North Harbour and South Harbour.

8.4.26. Dredging activities have previously been conducted within Peterhead Harbour associated with the construction of a new breakwater and deepening of the outer Harbour with no adverse effect noted on marine mammals in and around Peterhead Bay. As described in para. 5.4.1 for assessment of impacts on benthic ecology, data from borehole analyses indicate that the seabed within the harbour is mainly composed of coarse sand, gravel and rock, with most of the soft overlying sediment having been removed by previous dredging activities. As such, the amount of fine sediment available for re-suspension is likely to be minimal. The duration of the impact will be short-term, with dredging activity anticipated to occur intermittently over a four month period both in the North and South Harbour. It should be noted that currents are limited in the harbour area and there are no rivers, streams or watercourses flowing into Peterhead Bay or the harbour, resulting in no river induced currents or flows which could affect the spread of sedimentation. The greatest increases in suspended sediment concentrations are therefore anticipated to remain within areas immediately adjacent to where dredging is taking place.

8.4.27. Pinnipeds, particularly grey seals, may be present in the harbour whilst dredging works are carried out. Cetaceans are not anticipated in the proximity of dredging activity (as previously mentioned there are no records of cetaceans within the harbour or Peterhead Bay (PPA, 2007; PPA pers. comm., 2014)). Given the local extent of the predicted effects (limited to the immediate vicinity of where works are being carried out) and relatively short term nature of dredging activity, the potential effects of increased suspended sediment concentrations on marine mammal VERs (both pinnipeds and cetaceans) is expected to be minimal. Taking into account the ability of marine mammals to detect prey by means other than sight, the localised and short term nature of any potential disturbance, together with the anticipated low degree of interaction between marine mammal VERs and increased suspended sediment concentrations, the magnitude of the impact is considered to be negligible. Further, it should be noted that any effect will be reversible with levels of increased suspended sediment returning to baseline conditions shortly after cessation of works. As such, a negative impact of negligible significance, which is not significant in EIA terms is predicted to occur. Specific mitigation measures are therefore not deemed necessary in this respect.

8.4.28. Changes in water quality associated with accidental contamination events have also potential to result in detrimental impacts on marine mammal VERs. The release of contaminants into the water column may lead to direct impacts through ingestion, inhalation or absorption through the skin, and potentially longer-term indirect impacts from bioaccumulation in the food chain. It should be noted that measures will be implemented to follow published guidelines and best working practice for the prevention of pollution events. These will be described in detail in the CEMP. Due to these management measures, it is considered that there will be limited potential for accidental pollution events. Further, an emergency plan will be put in place and in the unlikely event of an incident occurring this will be strictly controlled. It is therefore considered that, provided best practice measures are implemented, there will be a negligible risk to marine mammals associated with accidental pollution events. As such, the potential effects of accidental release of contaminants are considered to be of negligible significance for marine mammal VERs, and this is not significant in EIA terms.

Increased Risk of Corkscrew injuries to seals

8.4.29. In 2009, a previously unidentified source of anthropogenic mortality in harbour and grey seals was described in Scotland. Damaged carcasses were also recorded in 2010 and 2011, and termed 'corkscrew injuries' (SCOS, 2012). Corkscrew injuries are termed thus because of the characteristic single, smooth-edged cut starting at the head and spiralling around the body. The earliest documented report of this type of injury is from 1993, when ninety-five dead seals (predominantly grey seals) were found on Sable Island, Nova Scotia. In 1998 the bodies of over 1,000 immature harp seals were washed ashore on Prince Edward Island in the Gulf of St. Lawrence (Bexton *et. al.*, 2012). Since 1985, seal carcasses with spiral lacerations have been found on other beaches in eastern Scotland (including Aberdeen, Montrose, St Andrews Bay, Tay and Eden Estuaries and the Firth of Forth), and in Orkney and Ardrossan. Injured and dead seals have also been found in North Norfolk (Blakeney Point), Northumberland, Strangford Lough (Northern Ireland), and south west Wales (SCOS, 2012).

8.4.30. It is considered that the nature of the wound strongly suggests the effects of a smooth blade applied with considerable force, and with rotation about the longitudinal axis of the animal (SCOS, 2012). Further, it is thought that the injuries are consistent with the seal being drawn through a ducted propeller (e.g. a Kort nozzle, or some types of Azimuth thrusters), common in a variety of ships. Each trauma appears to have been sustained head-first, suggesting that seals may initially have been attracted towards the cause of the lacerations. There are numerous hypotheses for this, including the potential role of floating structures as fish aggregation devices, and also the theory that certain vessel propeller acoustics mimic seal vocalisations (Bexton *et al*., 2012). Cavitation of propellers underwater is the most prevalent source of underwater sound in the ocean, and it is often the dominant noise source associated with a marine vehicle (Seol *et al.*, 2005). This might suggest that there is a degree of habituation to these sounds in marine mammals, and that the mimicry hypothesis is less likely.

8.4.31. All the locations where corkscrew carcasses have been found have been relatively shallow coastal waters with sand or gravel seabed (Bexton *et al.*, 2012). Analysis of tide and wave induced surface currents in north Norfolk (including estimated drift tracks) suggested that seal deaths off Norfolk are likely to have occurred relatively close to the shore. Preliminary analyses for the St Andrews Bay seal population also suggests seal mortality has occurred close to the shore (Thompson *et al.,* 2010). No other common factors have been associated with the location of corkscrew strandings, except the occasional workboat (e.g. tugboat or offshore support vessel) operating in the local area (Bexton *et al.,* 2012).

8.4.32. At this time, the connection between the use of ducted propeller vessels and corkscrew injuries in seals is not conclusive. It is therefore very difficult to present a quantitative assessment of the likelihood of such occurrences in relation to the proposed development, or to the potential population effects of such occurrences. It should be noted however, that the majority of both grey and harbour seal carcasses with spiral injuries observed to date have occurred during these species breeding seasons and as described in Section 13.5 (Appendix 5 – Marine Mammals Desktop Study) important breeding colonies of either species have not been reported in the vicinity of Peterhead.

8.4.33. Further, advice by JNCC (2012) in this respect considers the risk to seals is low for activities proposed to take place beyond 4 nm (7.5 km) and 30 nm (55.5 km) of grey seal and harbour seal SACs, respectively. As presented in Table 4.4, the closest SAC to Peterhead Harbour for which seals are a qualifying feature is located approximately 126 km away (Firth of Tay & Eden Estuary SAC).

8.4.34. It should also be noted that there is currently a significant number of vessels with ducted propellers transiting Peterhead Harbour with approximately 70 over-10 m fishing vessels equipped with this type of propellers landing at the port. These vessels, however, generally present an outer banding to protect the propeller which may reduce the potential for corkscrew injuries to occur. There are however further 53 under-10 m vessels equipped with ducted propellers, in this case with no outer banding protecting them, of which approximately 40 are actively engaged in operations at the harbour (PPA pers. comm., 2014).

8.4.35. Given that vessel traffic during construction is not anticipated to increase significantly[20], the relatively short duration of construction works, and the fact that there is a considerable number of vessels using ducted propellers already engaged in operations in the harbour and no corkscrew injuries have been reported in the area to date, the magnitude of the impact is considered negligible.

8.4.36. As such, taking the information presented above, the potential increased risk of corkscrew injuries to seals associated with the construction phase of the proposed development is anticipated to be minimal, resulting in a negative impact of negligible significance, which is not significant in EIA terms.

Impacts during operation

Changes to water quality

8.4.37. As described above for the construction phase, there may also be potential for accidental pollution events to occur during the operational phase of the project. In line with the assessment presented for the construction phase, published guidelines and best working practice for the prevention of pollution events will be followed. As such, there will be limited potential for accidental release of contaminants to occur. Further, an emergency plan will be put in place and therefore in the unlikely event of an incident occurring this will be strictly controlled. It is therefore considered that provided best practice measures are implemented there will be a negligible risk to marine mammals associated with potential accidental pollution events As such, the potential for accidental release of contaminants is predicted to result in a negative impact of negligible significance on marine mammal VERs, which is not significant in EIA terms.

Increased Risk of Corkscrew injuries to seals

8.4.38. As previously mentioned for the construciton phase (para. 8.4.34), there is currently a significant number of vessels with ducted propellers transiting Peterhead Harbour with approximately 70 over-10 m fishing vessels equipped with this type of propellers landing at the port and further 53 under-10 m vessels equipped with ducted propellers, of which approximately 40 are actively engaged in operations at the harbour (PPA pers. comm., 2014).

8.4.39. Further, during operation it is not anticipated that vessel traffic will increase as the proposed development is aimed at improving the efficiency of the port rather than increasing the total volume of traffic (para. 8.3.7).

8.4.40. Given that there is a considerable number of vessels already using ducted propellers in the harbour and no corkscrew injuries have been reported in the area to date, together with the fact that an increase in vessel traffic is not anticipated as a result of the proposed developmet, the magnitude of the impact is considered negligible.

8.4.41. As such, taking the information presented above, the potential increased risk of corkscrew injuries to seals associated with the operational phase of the proposed development is anticipated to be minimal, resulting in a negative impact of negligible significance, which is not significant in EIA terms.

[20] i.e. during dredging/drilling activity the level of vessel movements is expected to be reduced, given the relatively static nature of the work.

Cumulative Impact Assessment

Introduction

8.4.42. Given below is the assessment of the potential impacts of the proposed development cumulatively with other plans or projects. The projects given consideration for assessment are those previously listed in Table 4.3.

8.4.43. Of the potential impacts identified in relation to the proposed development on marine mammals only those associated with blasting noise during construction are considered relevant for cumulative assessment. Given the short term and localised nature of any effects related with changes to water quality, noise associated with drilling and dredging and increased risk of corkscrew injuries, together with the fact that there are no plans or projects planned/consented in the immediate vicinity of Peterhead Harbour, it is not considered that there is potential for cumulative impacts to occur in relation to these potential impacts.

Assessment

8.4.44. Noise generating activities associated with the construction and operational phase of the plans and projects listed in Table 4.3, such as blasting, impact piling, drilling, dredging and increased vessel noise, may result in cumulative impacts on marine mammals VERs in relation to noise.

8.4.45. As described in Section 8.4, blasting activity at the proposed development has been predicted to result in a residual impact of minor significance on marine mammals. Given the short term and localised effects arising from blasting at Peterhead Harbour (practically confined within the boundaries of Peterhead Bay), the contribution of the project to any cumulative impact is anticipated to be very limited (i.e. in comparison to other projects, particularly wind farms). Further, as described in para..8.4.14, a series of mitigation and monitoring measures will be implemented to ensure that disturbance to marine mammals VERs is minimised.

8.4.46. As such, significant cumulative impacts (i.e. of above minor significance) are not predicted to occur on marine mammal VERs.

8.5. Habitats Regulations Appraisal

Introduction

8.5.1. As noted in Table 4.4, grey seals, harbour seals and bottlenose dolphin are listed under Annex II of the Habitats Directive and are qualifying features in a number of designated SACs around UK. Based on SNH scoping response (Annex B, Letter 20th May 2014, Ref: CEA130608), the marine mammal SACs for consideration in relation to the Peterhead Harbour development are as follows:

- Isle of May SAC – Grey seal;
- Berwickshire and North Northumberland Coast SAC – Grey seal;
- Firth of Tay and Eden Estuary SAC – Harbour seal;
- Dornoch Firth and Morrich More SAC – Harbour seal; and
- Moray Firth SAC – Bottlenose dolphin.

Isle of May SAC

8.5.2. The Isle of May SAC, located at the entrance to the Firth of Forth, supports a breeding colony of grey seals. The site is the largest east coast breeding colony of grey seals in Scotland and the fourthlargest breeding colony in the UK, contributing approximately 4.5 % to the annual UK pup production (JNCC, 2014; Thompson and Duck, 2010; Moore *et al*., 2009). The SAC populations is estimated at approximately 5,900 individuals (JNCC, 2007a).

Berwickshire and North Northumberland Coast SAC

8.5.3. The Berwickshire and North Northumberland Coast SAC, comprises an extensive and diverse stretch of coastline in north-east England and south-east Scotland. The north-east England coastal section is representative of grey seal breeding colonies in the south-east of their breeding range in the UK. The SAC populations is estimated at 501-1,000 individuals (JNCC, 2007b). It is the most south-easterly site selected for this species, and supports around 2.5% of annual UK pup production (JNCC, 2014).

Firth of Tay and Eden Estuary SAC

8.5.4. The Firth of Tay & Eden Estuary SAC supports an internationally important breeding colony of harbour seal. It should be noted, however, that this population has declined dramatically, by approximately 85% since 2000. Since 2009, the rate of decline seems to have slowed, however, the population is at critical low numbers (SCOS, 2013). The decline in this population is illustrated in Figure 8.1 below.

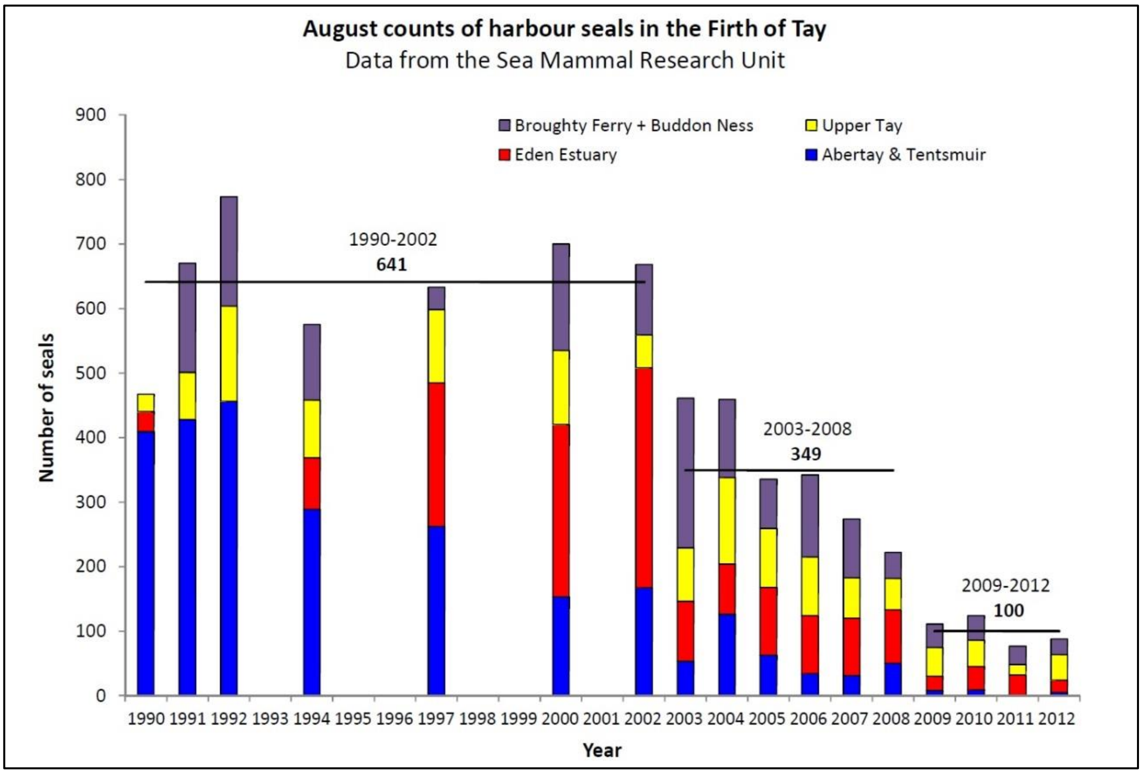

Figure 8.1: August counts of harbour seals in the Firth of Tay (Horizontal lines are the mean counts for the three time periods) (Source: SCOS, 2013).

Dornoch Firth and Morrich More SAC

8.5.5. The Dornoch Firth is the most northerly large estuary in Britain and supports a significant proportion of the inner Moray Firth population of harbour seal. The seals utilise sand-bars and shore at the mouth of the estuary as haul out and breeding sites, and are the most northerly population to utilise sandbanks. Their numbers represent approximately 2% of the UK population (JNCC, 2014). The SAC population is estimated at 251- 500 individuals (JNCC, 2007c).

The Moray Firth SAC

8.5.6. The Moray Firth SAC is one of the largest marine SACs in the UK, comprising the “triangular” area of water west of a line between Helmsdale on the Sutherland coast and Lossiemouth on the Moray coast (Moray Firth SAC Management Group, 2009). Monitoring studies carried out to date in the SAC, suggest that the number of dolphins using the area have remained relatively stable in the last decade. However, due to the apparent increase in the east coast population size, the actual proportion of the population using the SAC appears to have declined (Cheney *et al.*, 2012b).

HRA Screening

Grey seals

8.5.7. The results of tagging surveys at haul out sites in areas relevant to the Isle of May SAC and the Berwickshire and North Northumberland Coast SAC (i.e. Farne Islands, Isle of May and Abertay Sands) suggest the foraging activity of seals at these haul out sites is concentrated around the Farne Islands (Thompson and Duck, 2010). Similarly, research on the Isle of May SAC population indicates that after the breeding season (generally between late September and mid- December) grey seas generally forage in areas in the vicinity of their most favoured haul out sites (i.e. more than 80% of the time they are within a 50 km radius) (Isle of May SAC, 2006).

8.5.8. It is therefore expected that grey seal individuals from the Isle of May SAC and the Berwickshire and North Northumberland Coast SAC will, for the most, forage in their local area. However, it is not possible to exclude the possibility for grey seals from these SACs to be present in the vicinity of Peterhead harbour. The analysis of predicted relative density of grey seals from Albertay and Farnes haul out regions in north east Scotland (Thomson and Duck, 2010) suggests that, although in relatively low densities, there is potential for grey seal individuals from these haul out sites to be present in coastal areas around Peterhead. Furthermore, as described in Section 13.5 (Appendix 5: Marine Mammals Desktop Study, para. 13.5.14 - 13.5.15), there is evidence of larger scale movements of grey seals between haul out sites and therefore, there may be potential for individuals found in haul out sites around Peterhead (see Section 13.5 - Appendix 5: Marine Mammals Desktop Study, Figure 13.2 and Figure 13.3) to originate from these SACs. Taking the above into account it is considered that there is potential for connectivity between the Isle of May SAC and the Berwickshire and North Northumberland Coast SAC and the proposed development at Peterhead Harbour.

8.5.9. Therefore, the potential for connectivity between these SACs and the proposed development site cannot be excluded.

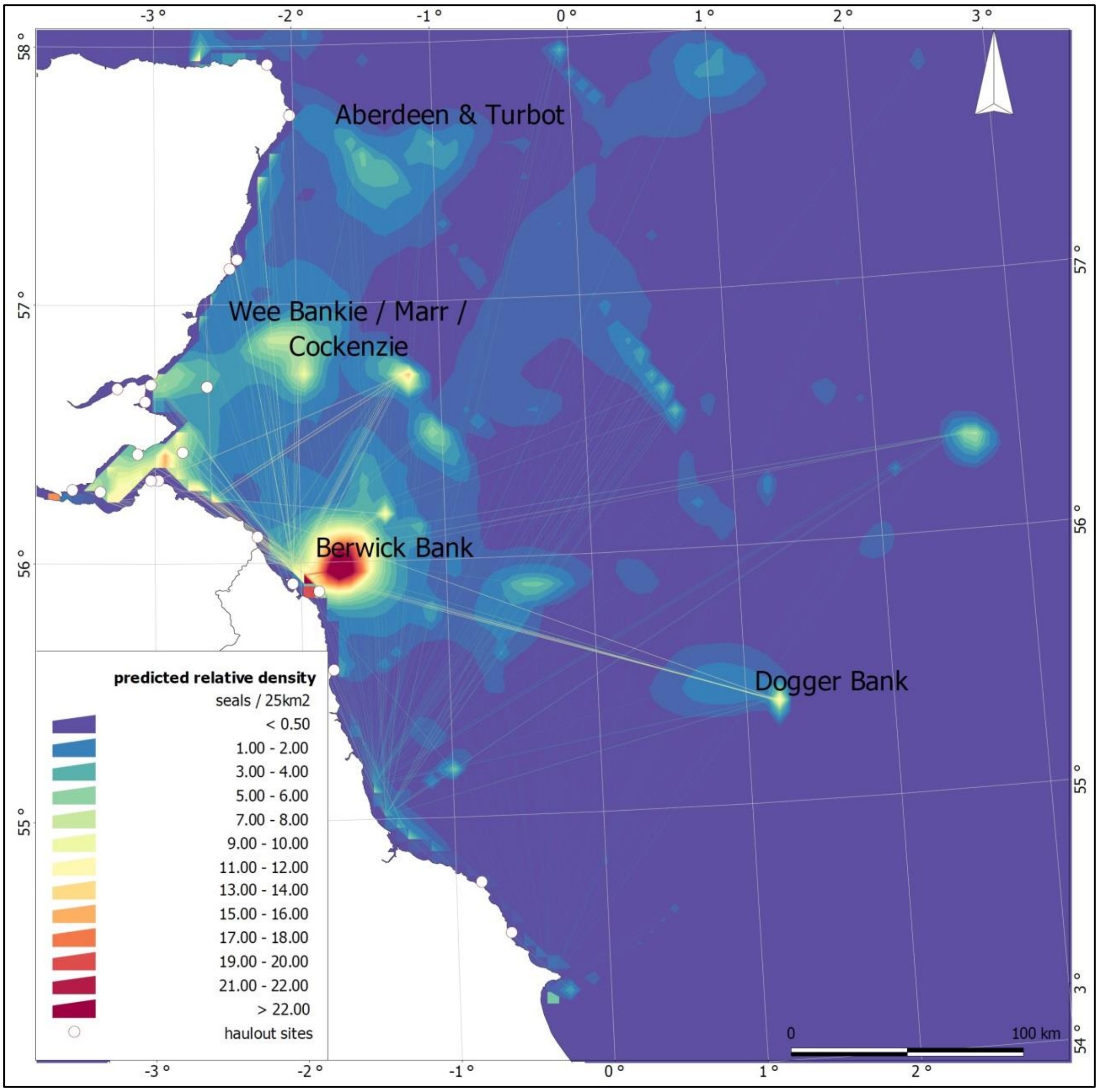

Figure 8.2: Contour map of predicted relative density of grey seals in 25 km^2 grid cells from north east Scotland, Abertay and Farnes haul-out regions in 1991-2008 (Source: Thompson and Duck, 2010).

Harbour seals

8.5.10. Harbour seal telemetry data of seals tagged at the Firth of Tay and Eden Estuary SAC indicate that they show a very high degree of site fidelity with seals found travelling relatively locally to forage and returning to the SAC to haul out (Sparling *et al.*, 2012).

8.5.11. In line with the above, analysis of harbour seal telemetry data in the Moray Firth including VHF, Argos satellite and GPS GMS data collected from 1989 to 2009, and integrated using Bayesian State Space Modelling (SSM) (MORL, 2012b), suggests harbour seals from the Dornoch Firth and Morrich More SAC also show a high degree of site fidelity. The majority of records of seals tagged at haul out sites in the Dornoch Firth and Lock Fleet, were found in the proximity of haul out sites and high numbers also recorded around and to the north of Tarbet Ness (Figure 8.3).

8.5.12. The Firth of Tay & Eden Estuary SAC and Dornoch Firth and Morrich More SAC are located approximately 126 and 128 km of the proposed development at Peterhead Harbour respectively. In light of the distance between these SACs and Peterhead and given their reported site fidelity, relatively local distribution at sea and anticipated foraging ranges of harbour seals (i.e. 40 – 50 km from haul out sites), as well as evidence from short range movements to alternative haul out sites (i.e. 75 km) (Thompson *et al*., 1996), It is not considered that there is potential for connectivity between these SACs and the proposed development. As such harbour seals are not considered further in this assessment.

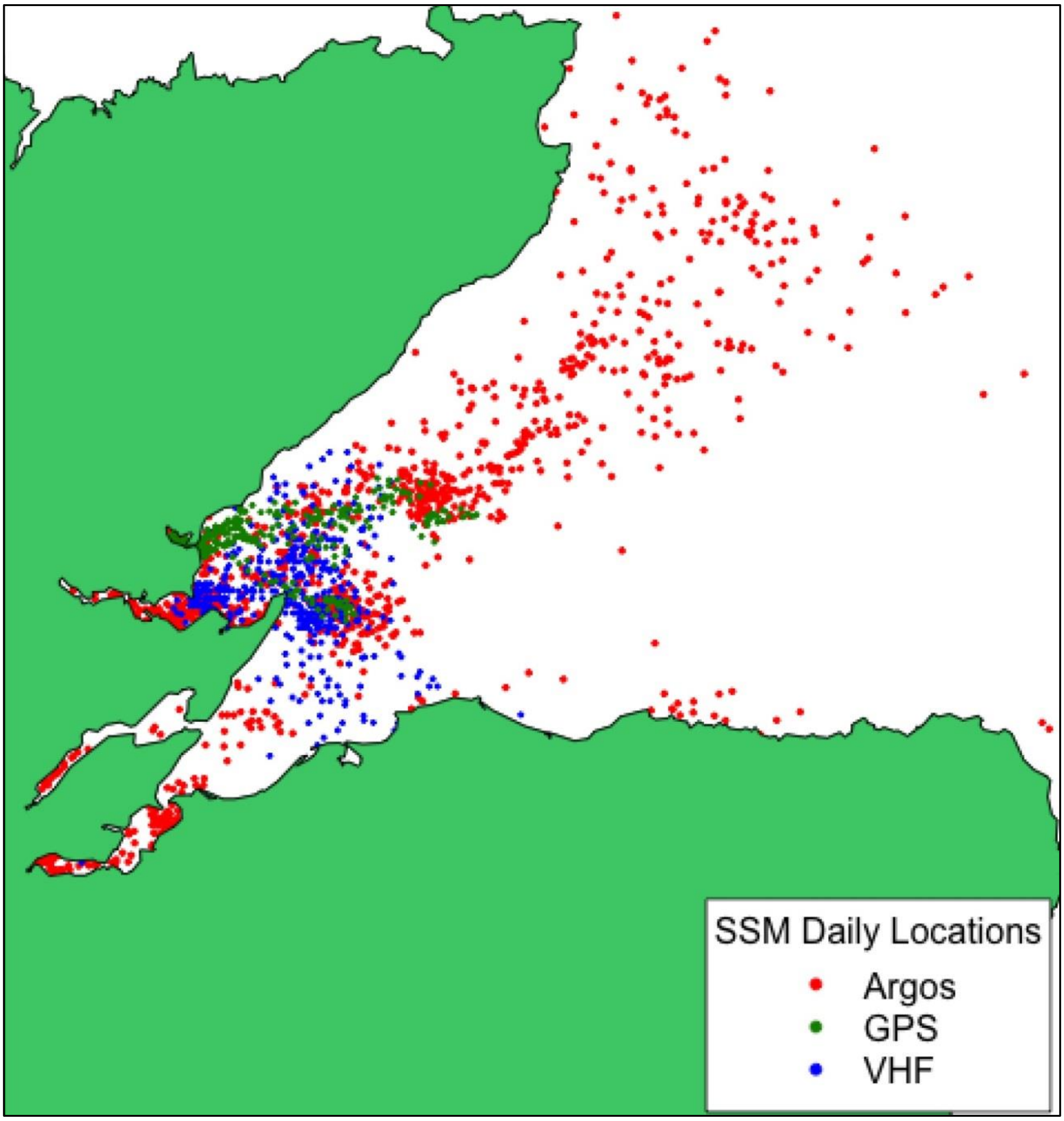

Figure 8.3: Daily seal SSM locations derived from Argos satellite (red), GPS GSM (green), and VHF (blue) positions (circles). (Source: MORL, 2012b).

Bottlenose dolphin SAC

8.5.13. As described in see Section 13.5 (Appendix 5: Marine Mammals Desktop Study, para. 13.5.33) there are records of bottlenose dolphins of the Moray Firth SAC transiting areas as far south as the Fife and they have been sighted, although in comparatively low numbers, in the proximity of Peterhead. It is thus considered that there is potential for connectivity between the Moray Firth SAC population of this species and the proposed development at Peterhead Harbour.

Assessment of Potential Effects on Site Integrity

8.5.14. The screening exercise presented above concluded that there is potential for connectivity between the proposed development and the following sites and designated features:

- Isle of May SAC – Grey seal;
- Berwickshire and North Northumberland Coast SAC – Grey seal; and
- Moray Firth SAC – Bottlenose dolphin.

8.5.15. These SACs and their designated marine mammal features are considered below with respect to the potential for effects on the integrity of each SAC.

Conservation Objectives

8.5.16. The assessment of potential effects on the integrity of a European site is made in light of the Conservation Objectives of each site.

8.5.17. The Conservation Objectives of the Moray Firth SAC, Isle of May SAC and Berwickshire and North Northumberland Coast SAC with regard to the species for which the sites have been designated, are as follows (SNH, 2014):

- To avoid the deterioration of habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving Favourable Conservation Status (FCS) of each of the qualifying features; and
- To ensure for the qualifying species that the following are maintained in the long term:
    - Population of the species as a viable component of the site;
    - Distribution of the species within the site;
    - Distribution and extent of habitats supporting the species;
    - Structure, function and supporting processes of habitats supporting the species; and
    - No significant disturbance of the species.

8.5.18. Given the distance from the SACs to the proposed development and the distribution and ecology of relevant marine mammals species, there is no potential for the proposed development to result in significant impacts on the distribution, extent, structure, function and supporting processes of habitats supporting the species. Similarly, there is no potential for the distribution of the species within any of the sites to be affected. It is therefore considered that key conservation objectives in relation to the proposed development are those relating to avoiding significant disturbance of the qualifying species and ensuring that the population of the species as a viable component of the site is maintained in the long term.

Impacts of Peterhead Project Alone

Isle of May SAC and Berwickshire and North Northumberland Coast SAC

8.5.19. The potential effects of the construction and operational phase of the proposed development on the grey seal populations of the Isle of May and Berwickshire and North Northumberland Coast SACs relate to effects associated with underwater noise, changes to water quality (increased suspended sediment concentrations and accidental pollution events) and increased risk of corkscrew injuries.

8.5.20. As described in para 9.3.3, in line with JNCC guidance (JNCC, 2010) a mitigation zone of 1 km will be implemented to ensure that no lethal/injurious effects occur on marine mammals as a result of rock fracturing activity and that behavioural effects are minimised. In addition, the use of ADDs will be explored and discussed with the relevant authorities..

8.5.21. Other noise generating activities which may result in detrimental impacts on the grey seal populations of these SACs include dredging and drilling for pile installation during construction. As mentioned in para. 8.4.17, these activities may result in behavioural responses (i.e. avoidance).

8.5.22. In light of the above, the potential effects of underwater noise on the grey seal populations of the Isle of May SAC and Berwickshire and North Northumberland Coast SAC are not considered to be significant, and therefore adverse effects on the integrity of these SACs are not anticipated.

8.5.23. There may also be potential for grey seals from the SACs under assessment to be subject to increased suspended sediment concentration during construction. The key impact on marine mammal species associated with this relates to the potential impaired ability to forage As described in para. 8.4.26 - 8.4.27 the effect of increased suspended sediment concentrations is expected to be of negligible magnitude, being highly localised and short term, and therefore have minimal effects on the foraging ability of seals.

8.5.24. The potential effects of increased suspended sediment concentrations on the grey seal populations of the Isle of May SAC and Berwickshire and North Northumberland Coast SAC are not considered to be significant, and therefore adverse effects on the integrity of these SACs are not anticipated.

8.5.25. Similarly, there may be potential for grey seals to be affected to accidental pollution events. Both during construction and operation the magnitude of the effect of accidental pollution events is considered to be negligible, provided suitable mitigation and best practice control measures are implemented. Measures will be implemented to follow published guidelines and best working practice for the prevention of pollution events. These will be described in detail in the CEMP. As such, there will be limited potential for accidental release of contaminants to occur. Further, an emergency plan will be put in place and therefore in the unlikely event of an incident occurring this will be strictly controlled. The risk of exposure to accidental pollution events would therefore be minimal.

8.5.26. The potential effects of accidental pollution events on the grey seal populations of the Isle of May SAC and Berwickshire and North Northumberland Coast SAC are not considered to be significant, and therefore adverse effects on the integrity of these SACs are not anticipated.

8.5.27. In line with the above, effects associated with potential increased risk of corkscrew injury on the grey seal populations of the Isle of May SAC and Berwickshire and North Northumberland Coast SAC are not considered to be significant (see para. 8.4.29 to 8.4.36 and para. 8.4.38 to 8.4.41), and therefore adverse effects on the integrity of these SACs are not anticipated. Note that advice by JNCC (2012) in this respect considers the risk to seals is low for activities proposed to take place beyond 4 nm (7.5 km) of grey seal SACs. As presented in Table 4.4, the closest SAC to Peterhead Harbour for which grey seal is a qualifying feature is located approximately 153 km away (Isle of May SAC).

Conclusion

8.5.28. No adverse effects on the integrity of grey seal populations of the Isle of May SAC and Berwickshire and North Northumberland Coast SAC are predicted as a result of the proposed development.

8.5.29. In light of the SACs Conservation Objectives, no significant disturbance to the grey seal populations of the Isle of May SAC and Berwickshire and North Northumberland Coast SAC, nor adverse effects which could affect that the populations of this species as a viable component of the sites are maintained in the long term, are to be expected.

<u>*Moray Firth SAC*</u>

8.5.30. The potential effects of the construction and operational phase of the proposed development on the Moray Firth SAC bottlenose dolphin population relate to effects associated with underwater noise and changes to water quality (increased suspended sediment concentrations and accidental pollution events).

8.5.31. In terms of underwater noise, there is potential for blasting associated with the use of explosives for rock fracturing to result in lethal/physical injury effects and behavioural responses in this species. As described in para 9.3.3, however, in line with JNCC guidance (JNCC, 2010) a mitigation zone of 1 km will be implemented to ensure that no lethal effects occur and that auditory and behavioural effects are minimised. It is important to note in this context that this species is not anticipated to be in the immediate vicinity of the proposed development (i.e. within the harbour or Peterhead Bay).

8.5.32. Other noise generating activities which may result in detrimental impacts on the bottlenose dolphin population of the Moray Firth SAC include dredging and drilling of piles during the construction phase. As previously mentioned (para. 8.4.17) these activities may result behavioural reactions (i.e. avoidance). It should be noted, however, that bottlenose dolphins are not anticipated to be present in the immediate proximity of where works are carried out and therefore the potential disturbance to this species associated with these noise generating activities would be minimal. The noise modelling excercise carreid out and detailed in Sections 8.4.5 and 8.4.6 also refers.

8.5.33. In light of the above, the potential effects of underwater noise on the bottlenose dolphin population of the Moray Firth SAC are not considered to be significant, and therefore adverse effects on the integrity of this SAC are not anticipated.

8.5.34. There may also be potential for bottlenose dolphin from the Moray Firth SAC to be subject to increase suspended sediment concentrations during construction. The key impact on marine mammal species associated with this relates to the potential impaired ability to forage. As described in para. 8.4.26 - 8.4.27, the effect of increased suspended sediment concentrations during construction is considered to be of negligible magnitude, being highly localised and short term, and therefore have minimal effects on the foraging ability of bottlenose dolphin. Further, this species can use means other than sight to locate prey (i.e. echolocation) and are not expected to be found in the harbour or Peterhead Bay where the highest suspended sediment concentrations may be reached.

8.5.35. The potential effects of increased suspended sediment concentration on the bottlenose dolphin population of the Moray Firth SAC are not considered to be significant, and therefore adverse effects on the integrity of this SAC are not anticipated.

8.5.36. Effects associated with accidental pollution events (both during construction and operation) are anticipated to be of negligible magnitude provided suitable mitigation and best practice control measures are implemented. Suitable measures will be implemented to follow published guidelines and best working practice for the prevention of pollution events. These will be described in detail in the CEMP. As such, there will be limited potential for accidental release of contaminants to occur. Further, an emergency plan will be put in place and therefore in the unlikely event of an incident occurring this will be strictly controlled. This together with the expected distribution of bottlenose dolphins around Peterhead (i.e. in coastal areas off Peterhead but not within the harbour or Peterhead Bay) means the risk of exposure to accidental pollution events would be minimal.

8.5.37. The potential effects of accidental pollution events on the bottlenose dolphin population of the Moray Firth SAC are not considered to be significant, and therefore adverse effects on the integrity of this SAC are not anticipated.

Conclusion

8.5.38. No adverse effects on the integrity of the Moray Firth SAC are predicted as a result of the proposed development.

8.5.39. In light of the SAC Conservation Objectives, no significant disturbance to the Moray Firth bottlenose dolphin population, nor adverse effects which could affect that the population of this species as a viable component of the site is maintained in the long term, are to be expected.

Peterhead Project In – Combination with other Plans and Projects

Introduction

8.5.40. Given below is the assessment of the potential impacts of the proposed development in-combination with other plans or projects. The projects given consideration for assessment are those previously listed in Table 4.3.

8.5.41. Of the potential impacts identified in relation to the proposed development on marine mammals only those associated with blasting noise during construction are considered relevant for in-combination assessment. Given the short term and localised nature of any effects related with changes to water quality, noise associated with drilling and dredging and increased risk of corkscrew injuries, together with the fact that there are no plans or projects planned/consented in the immediate vicinity of Peterhead Harbour, it is not considered that there is potential for in-combination impacts to occur in relation to these potential impacts.

Assessment

8.5.42. As described above for assessment of cumulative impacts (para. 8.4.44). noise generating activities associated with the construction and operational phase of the plans and projects listed in Table 4.3, such as blasting, impact piling, drilling, dredging and increased vessel noise, may result in cumulative impacts on marine mammals VERs in relation to noise, and therefore on marine mammal qualifying features of the Isle of May SAC, North Northumberland Coast SAC and Moray Firth SAC.

8.5.43. Blasting activity at the proposed development has been predicted to result in a residual impact of minor significance on marine mammals. Given the short term and localised effects arising from blasting at Peterhead Harbour (practically confined within the boundaries of Peterhead Bay), the potential for in-combination impacts to arise is considered to be very limited. Further, as described in para..8.4.14, a series of mitigation and monitoring measures will be implemented to ensure that disturbance to marine mammals VERs (and qualifying features) is minimised.

8.5.44. As such, the potential in-combination effect of noise on the bottlenose dolphin population of the Moray Firth SAC and the grey seal populations of the Isle of May SAC and Berwickshire and North Northumberland Coast SAC is not considered to be significant, and therefore adverse effects on the integrity of these SACs are not anticipated.

Conclusion

8.5.45. No adverse effects on the integrity of the Moray Firth SAC, Isle of May SAC and North Northumberland Coast SAC are predicted as a result of the proposed development in-combination with other plans or projects.

8.5.46. In light of the SACs Conservation Objectives, no significant disturbance to the Moray Firth bottlenose dolphin population, the Isle of May SAC and North Northumberland Coast SAC grey seal populations, nor adverse effects which could affect that the populations of these species as a viable component of the sites are maintained in the long term, are to be expected.

9. Fish

9.1. Baseline Information

9.1.1. A review of the current fish ecology baseline in coastal areas around Peterhead has been undertaken and is presented below. This is centred on key sensitive life stages, being focused on juveniles/nursery areas and spawning and, in the particular case of diadromous fish, on their migration to and from rivers.

Species with Spawning and Nursery Grounds

9.1.2. The ICES Divisions relevant to coastal areas off Peterhead are Divisions IVa and IVb (the central and northern North Sea). In these areas the fish assemblage in shallower waters (50 -100 m) is dominated by species such as haddock (*Merlanogrammus aeglefinus*), whiting (*Merlangius merlangus*), herring (*Clupea harengus*), dab (*Limanda limanda*) and plaice (*Pleuronectes platessa*) (Teal, 2011). A number of these and other species are known to use coastal areas around Peterhead as spawning and nursery grounds. These are listed in Table 9.1 based on information provided in Ellis *et al.* (2012). There may therefore be potential for these species to use areas in the proximity of Peterhead Harbour and/or Peterhead Bay as spawning/nursery grounds. It should be noted, however, that there are no records of fish spawning or nursery grounds within Peterhead Harbour itself (PPA, 2007).

9.1.3. Of the species listed in Table 9.1, herring, being demersal spawners, are considered particularly sensitive to anthropogenic activities which may result on seabed habitat loss and/or changes in the sediment composition of the seabed. They show a high preference for coarse sediment and high energy environments when selecting spawning grounds (Barreto and Bailey, 2013; de Groot 1980; Maucorps, 1969) with females depositing sticky eggs in single batches directly onto the seabed in areas of coarse sand, gravel, small stones or rocks (Barreto and Bailey, 2013; Munro *et al.,* 1998; Hodgson, 1957).

9.1.4. As for herring, the life cycle of sandeels (*Ammodytidae spp.*) is also closely related to the seabed. They spend most of the year buried, only emerging into the water column briefly in winter for spawning and for an extended feeding period in spring and summer (Van der Kooij *et al*., 2008). They are also demersal spawners, with females laying eggs on the seabed and have very specific substrate requirements. This results in sandeel distribution being extremely patchy and of varying intensity in relation to sediment type (Wright, 1999). They favour seabed habitats containing a high proportion of medium and coarse sand (particle size ≥ 0.25 to < 2 mm) and low silt content (Holland *et al.,* 2005) being rare in sediments where silt content (particle size < 0.63 µm) is greater than around 4 % and absent where silt content is greater than 10 % (Holland *et al.,* 2005; Wright *et al*., 2000). In addition, a habitat preference for areas on the sloping edges of sand banks has been reported for this species (Greenstreet *et al.,* 2010).

9.1.5. Further to the increased sensitivity of herring and sandeel to habitat disturbance due to their substrate requirements, these two species are of importance as they are major predators of zooplankton and the principal prey of many top predators, including seabirds, marine mammals and piscivorous fish. As such, these species are considered to play a key role in the North Sea's food-web. In addition, in the case of herring, they are considered particularly sensitive to underwater noise, being hearing specialists and able to hear in an extended range of frequencies (between 30 Hz and 4 kHz) (Thomsen *et al.,* 2006).

9.1.6. The remaining species for which spawning and/or nursery grounds have been defined in coastal areas around Peterhead (Table 9.1) are not strictly restricted by substrate requirements, they are highly mobile and the extent of their spawning and nursery grounds is very large in the context of the relatively small footprint and potential area of influence of effects associated with the proposed development on fish. As such, significant impacts on these species as a result of the proposed development are not anticipated to occur.

Table 9.1: Principal fish species with defined spawning and nursery grounds in coastal areas around Peterhead (Source: Ellis *et al.*, 2012).

Species	Latin name	Spawning Period												Spawning Intensity	Nursery Intensity
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Herring	*Clupea harengus*													Not defined	
Cod	*Gadus morhua*		*	*											
Whiting	*Merlnagius merlangus*														
Blue whiting	*Micromesistius poutassou*	N/A: No spawning grounds defined in the vicinity of Peterhead													
Ling	*Molva molva*	N/A: No spawning grounds defined in the vicinity of Peterhead													
Hake	*Merluccius merluccius*	N/A: No spawning grounds defined in the vicinity of Peterhead													
Anglerfish	*Lophius piscatorius*	N/A: No spawning grounds defined in the vicinity of Peterhead													
Sandeels	*Ammodytidae spp.*														
Mackerel	*Scomber scombrus*	N/A: No spawning grounds defined in the vicinity of Peterhead													
Plaice	*Pleuronectes platessa*	*	*												
Spurdog	*Squalus acanthias*	Viviparous species (gravid females can be found all year)												Not defined	
Tope shark	*Galeorhinus galeus*	Viviparous species (gravid females can be found all year)												Not defined	
Common skate	*Dipturus batis-complex*	?	?	?	?	?	?	?	?	?	?	?	?	Not defined	
Spotted ray	*Raja montagui*				?	*	*	*	?					Not defined	

Key

	Spawning period
*	Peak spawning
	Low intensity
	High intensity
	Location and temporal stability of specific parturition grounds not well established
	Insufficient information available to delineate spawning grounds but assumed to broadly overlap with nursery areas
Not defined	Spawning/ nursery intensity not defined in Ellis *et al.*, 2012

Diadromous Migratory Species

9.1.7. Records from the NESBReC (See Section 13.1: Appendix 1 – Data received from the NESBReC) indicate the presence of a number of diadromous migratory species to the north of the harbour associated with the Ugie Estuary. These include European eel (*Anguilla anguilla*), Atlantic salmon (*Salmo salar*) and sea trout (*Salmo trutta*). There are no watercourses running into Peterhead Bay and therefore this area is not anticipated to support diadromous species in significant numbers, however, these species could at times, enter the Bay and, more likely, transit coastal areas in its vicinity during their migrations to and from rivers.

9.1.8. A review of the current state of knowledge on the migratory behaviour of the diadromous species identified above is given in the following sections.

9.1.9. It is recognised that in addition to the diadromous species mentioned above, there may be potential for other species such as sea lamprey (*Petromizon marinus*), river lamprey (*Lampetra fluviatilis*) and shads (Allis *spp*.) to transit areas in the proximity of the proposed development. These are however expected on a much more occasional basis, with coastal areas around the east coast of Scotland and in the proximity of the proposed development presenting comparatively low records for these species (NBN Gateway, 2014).

European eel

9.1.10. After spawning in the Sargasso Sea, European eel newly hatched larvae use oceanic currents to cross the Atlantic Ocean towards the European continental shelf and once there, metamorphose into glass eels (Malcolm *et al.,* 2010). Glass eels generally migrate into fresh water in their first year after arrival, although some may remain in coastal waters until they mature, while others may move back and forth between coastal, estuarine and freshwaters throughout their lives (Daverat *et al.,* 2006). After living and growing in these various environments for up to 60 years, adult eels (yellow eels) turn silver and start their migration back to the Sargasso Sea to spawn and, presumably, die (Malcolm *et al*., 2010).

9.1.11. The migratory behaviour of eels in Scottish coastal waters is poorly understood and migration seasons for both adults and juveniles are probably quite protracted. Tesch (2003) notes that eels typically arrive off Shetland and the Western Isles in September, Orkney and Caithness in November, and areas off the rest of eastern mainland Scotland in December. The first eels may, however, arrive as early as August and continuous glass eel arrival is likely to occur for several months after the midwinter peak and perhaps even through the whole year, although in lower numbers. It has been suggested that glass eels destined for Scottish rivers remain in coastal regions until April or May before river temperatures rise sufficiently for them to enter fresh water. The bulk of the return of silver eel migration is thought to extend from September to January (Malcolm *et al.,* 2010).

Salmon

9.1.12. As described above for European eel, there is also limited information available to date in relation to the migratory behaviour and exact routes used by Atlantic salmon during their marine migration to and from rivers. The migration of salmon smolts[21] into the marine environment is thought to be a critical stage in their life cycle, as during this period they are most vulnerable to marine predators and changes in environmental conditions which may affect the viability of food (Potter and Dare, 2003). In Scottish Rivers, the main smolt run generally occurs from April to June. Studies of the

[21] Smolts are fully silvered juvenile salmon migrating from rivers to the sea (Hendry and Cragg-Hine, 2003).

movement of Atlantic salmon post-smolts[22] indicate active, directed swimming during migration, as opposed to passive drifting, with fish generally moving close to the surface (Lacroix *et al*., 2005). They are thought to move in schools whilst heading off to feeding areas (Shelton *et al.,* 1997; Mills *et al.*, 2003) and no period of acclimation appears to be required during the transition from freshwater to saltwater (Moore *et al.,* 1998a, Lacroix and McCurdy, 1996) with post-smolts making limited use of the estuarine habitat and moving rapidly to the open ocean (Marschall *et al*., 1998; Moore *et al.,* 1998a, Malcolm *et al*., 2010). Research carried out in Norwegian Fjords (Thorstad *et al.,* 2004) suggests salmon post-smolts do not use the immediate near-shore areas during migration (the mean reported distance to shore being 370 m). In line with this, research carried out by Finstad *et al*. (2005) in the same area recorded salmon using the full width of the fjord and travelling rapidly and studies in the Bay of Fundy in Canada (Lacroix and Knox , 2005) found fish swimming at a distance of 2.5 – 5 km from shore.

9.1.13. It should be noted, however, that the current knowledge on salmon post-smolt migration and behaviour is for the most based on research carried out in Norway and Canada, and information on post-smolts originating in Scottish rivers is currently limited. Furthermore, in the case of the east coast Scottish rivers there are no substantial bays or sea lochs (fjords) and therefore this coastal areas differ considerably from the locations where research has been carried out in Norway and Canada. Predictions on the behaviour of salmon post-smolts in the east coast of Scotland based on these studies should therefore be made with caution.

9.1.14. As described above for post-smolts, the return migration of adult salmon is also considered an active process and there does not seem to be a period of acclimation during the transition from the marine environment to freshwater (Hogåsen, 1998). Further, provided river conditions are favourable, river entry appears to take place relatively quickly (Thorstad *et al*., 1998).

9.1.15. The majority of grilse[23] (1SW salmon) enter Scottish rivers from early summer until shortly before spawning in autumn and early winter. Many of the MSW[24] salmon also enter rivers over that same period of time, however, for the Scottish MSW salmon class as a whole, river entry occurs over a greater period of time, extending back to the autumn months of the year before spawning (Youngson *et al.*, 2002).

9.1.16. A number of potential migratory routes have been suggested for adult salmon around Scottish coastal waters. The review of the migratory behaviour of salmon in Scottish waters carried out by Malcolm *et al.* (2010) suggests a dominant direction of movement towards the north in areas south of Aberdeenshire with no dominant directions of movement having been recorded in other coastal areas around Scotland.

Sea trout

9.1.17. As for salmon, seaward migration in sea trout is thought to be an active process (Thorstad *et al.*, 2004; Thorstad *et al*., 2007). Research carried out by Moore *et al* .(1998b) found indication of directed swimming and no apparent period of acclimation when moving from fresh to saltwater. The majority of sea trout smolts exit rivers between April and early June.

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[22] Post-smolt: Salmon life stage which runs from departure from the river to the end of the first winter at sea (Hendry & Cragg-Hine, 2003).
[23] Grilse or 1SW (One-sea-winter) salmon: Adult salmon after the first winter at sea (Hendry and Cragg-Hine, 2003).
[24] MSW (Multi-sea-winter) salmon: Adult salmon after more than one winter in the sea, commonly referred as "spring" fish when entering rivers before June (Hendry and Cragg-Hine, 2003).

9.1.18. On the east coast of Scotland information on sea trout post-smolts movements is scarce and is principally derived from tagging studies carried out in the North Esk. Studies carried out by Pratten and Shearer (1983) found that the majority of reported recaptures were from the Montrose area, however, tagged sea trout individuals moving over considerable distances along the coast (>100 km) were also reported. Studies by Shearer (1990) in the North Esk, suggest that most sea trout post-smolts probably stay within a short distance from the river, however recaptures over greater distances (e.g. as far north as the River Spey and as far south as the River Tweed) were also reported (Malcolm *et al*., 2010).

9.1.19. The limited information available to date in relation to the distribution of sea trout at sea and the use that they may make of discrete sea areas, does not allow for common patterns, behaviour or migration routes be confidently determined. Whilst tagging studies carried out in the east coast of Scotland suggest that sea trout generally remain in their local area, as suggested above, a wider range of migratory patterns have been reported for this species.

Other Species

9.1.20. In addition to the species mentioned above, as presented in the records from the NESBReC (See Section 13.1: Appendix 1 – Data received from the NESBReC), there may be potential for basking sharks (*Cetorhinus maximus*) to be present around coastal areas off Peterhead. Basking sharks migrate from the western English Channel in spring to the west Scottish waters, where they spend the summer and early autumn before moving offshore between November and March. In Scotland, hot spots for this species are located on the west coast (during the summer) and sightings of this species are scarce both in the vicinity of Peterhead and in coastal areas off the east coast of Scotland in general (Bloomfield and Solandt, 2008; Solandt and Ricks, 2009). The harbour and Peterhead Bay are therefore not considered to support this species in significant numbers, with basking sharks being only expected in coastal areas off the east coast of Scotland (including areas around Peterhead) on an occasional and infrequent basis.

Key fish species identified

9.1.21. Taking account of the information provided above, the following key fish species have been identified in respect of the proposed development:

- Herring (*Clupea harengus);*
- Sandeels (*Ammoditydae spp*.);
- European eel (*Anguilla anguilla);*
- Atlantic salmon (*Salmo salar*); and
- Sea trout (*Salmo trutta*).

9.1.22. Although at varying degrees, these species are all of conservation interest. A summary of their the conservation status is given in Table 9.2.

Table 9.2: Summary of conservation status of key fish ecology species in and around Peterhead.

Species	PMFs	UK BAP	OSPAR	IUCN Red List	Bern Convention	Habitats Directive
Herring	✓	✓	-	Least concern	-	-
Sandeels	✓	✓	-	-	-	-
European eel	✓	✓	-	Critically endangered	-	-
Atlantic salmon	✓	✓	✓	Lower risk/least concern	Appendix III	Annex II & V
Sea trout	✓	✓	-	Least concern	-	-

9.2. Valued Ecological Receptors

9.2.1. As for marine mammals, a conservative zone of influence has also been defined for fish receptors, comprising the harbour area, Peterhead Bay and coastal areas off Peterhead up to 10 km seaward.

9.2.2. Table 9.3 presents the fish ecology VERs identified in the defined zone of influence together with their importance. Given that fish specific survey work was not undertaken the level of importance assigned to fish VER is primarily based on their conservation status. As described in Section 9.1 none of the fish VERs identified is expected to make significant use of the area of the harbour or Peterhead Bay. As such, the levels of importance presented in Table 9.3 are considered conservative.

Table 9.3: Valued Ecological Receptors identified as part of the fish ecology desk study.

Valued Ecological Receptors	Importance	Justification
Herring	National	Substrate specific spawners and hearing specialists. Spawning and nursery grounds defined in coastal areas off Peterhead. UK BAP species. Listed as PMF.
Sandeels	National	Substrate specific spawners and highly substrate dependent over their life cycle. Spawning and nursery grounds defined in coastal areas off Peterhead. UK BAP species Listed as PMF.
European eel	National	Potential for adults and juveniles to transit coastal areas off Peterhead during migration to and from rivers. UK BAP species. Listed as a PMF.
Atlantic salmon	International	Potential for smolts and adults to transit coastal areas off Peterhead during migration to and from rivers. Listed in Annex II and V of the Habitats Directive and Appendix III of the Bern Convention. Listed under the OSPAR List of threatened and/or declining species and habitats. UK BAP species. Listed as a PMF.
Sea trout	National	Potential for smolts and adults to transit coastal areas off Peterhead during migration to and from rivers. UK BAP species. Listed as a PMF.

9.3. Potential Impacts

9.3.1. The proposed development has potential to adversely affect fish VERs are a result of the following key potential effects:

- Noise and vibration;
- Changes to water quality;
- Loss of habitat.

Noise and vibration

9.3.2. As described above for marine mammals, the resulting shockwave associated with blasting activity for rock fracturing, can potentially result in lethal effects and behavioural disturbance to fish VERs.

9.3.3. Similarly, noise associated with pile installation by drilling and socketing and dredging activity may also result in disturbance to fish VERs.

Changes to water quality

9.3.4. Dredging, filling and stone placing operations are likely to result in suspension of silt an clay particles. These activities may result in increased concentrations of suspended sediment within the water column which may be transported out of the harbour into Peterhead Bay affecting a wider area that that being dredged/filled. Increased suspended sediment concentrations and subsequent deposition has potential to result in detrimental effects on fish VERs (i.e. disturbance to migration, avoidance reactions, smothering of eggs, etc).

9.3.5. Further to increased suspended sediment concentrations associated with dredging activity, there may be potential for accidental pollution events (both during construction or operation), may these occur, to adversely affect fish VERs within and in the vicinity of the harbour.

Loss of habitat

9.3.6. The creation of a reclamation area adjacent to the western side of Smith Quay will result in a loss of seabed habitat of approximately 17,000 m^2. This could potentially result in a detrimental impact on fish VERs, particularly those which are strongly dependent on the seabed habitat during key periods of their life cycle are strongly (i.e., sandeels and herring). It should be noted, however, that spawning and nursery grounds for fish species (including those with substrate specific requirements), have not been reported within the harbour. Similarly, in the case of diadromous fish VERs the reclamation area is not considered to provide an habitat of particular importance to these species (i.e. migration/feeding). Given the localised and relatively small loss of seabed habitat and the anticipated limited use that fish VERs may make of this area, it is not considered that there is potential for a significant impact in this respect. As such, the potential impact of loss of seabed habitat is not considered further in relation to fish VERs.

9.4. Impact Assessment

Impacts during construction

Underwater noise

9.4.1. Rock fracturing is the noise generating activity with greatest potential to result in detrimental impacts on fish VERs.

9.4.2. Information from explosive blast studies (i.e. Yelverton *et al.,* 1975) indicate that high-level acoustic exposures can result in severe impacts on fish, including physical damage and mortality. Lesser effects may also occur although information in this respect (i.e. potential behavioural reactions) is limited (Hastings and Popper, 2005). Noise modelling undertaken in support of this assessment (see Annex A: Underwater Noise Impact Calculation Report) suggests that noise level from blasting at which fatality/injury to fish could occur would be limited to the vicinity of blasting activity. Level of noise at which behavioural reactions may occur would extend over a wider area, however, this is for the most expected to be confined within Peterhead Bay. Noise associated with dredging activity and drilling for pile installation has also potential to result in detrimental impacts on fish. As for marine mammals, however, these noise generating activities are considered unlikely to result in physiological damage, having greatest potential to result in local disturbance, masking and behavioural responses (i.e. avoidance) in the vicinity of the vessels.

9.4.3. Blasting activity will be undertaken in parallel with dredging, being and intermittent and short term activity[25]. It should be noted, that sandeels and herring are not anticipated to be present in the harbour or Peterhead Bay in significant numbers and therefore are unlikely to be subject to mortality or physical damage as a result of blasting. The key potential effect for assessment is therefore that associated with potential behavioural disturbance. Works in the South Harbour are expected to be carried out over a period of approximately four months. Some level of blasting may also be required in the North Harbour, with works in this area anticipated to be also undertaken over a four month period. In this context it is important to note the extremely short term nature of blasting events, and in the particular case the North Harbour, the increased distance to coastal areas off Peterhead, where spawning grounds have been defined for fish VERs. Taking the above into account, together with the limited potential for behavioural reactions to occur outside Peterhead Bay, it is considered that there is limited potential for noise related effects arising from blasting to affect a significant number of the local spawning or juvenile populations of these VERs. As such, the magnitude of the effect on herring and sandeels is considered low, resulting in a negative impact of minor significance which is not significant in EIA terms.

9.4.4. In the particular case of diadromous fish VERs, there may be potential for juveniles and/or adults to transit areas in the vicinity of Peterhead whilst blasting activity is taking place. As for the remaining fish VERs, these species are not anticipated to be present in the harbour/Peterhead Bay in significant numbers and therefore are unlikely to be subject to mortality or physical damage as a result of blasting. Diadromous VERs transiting areas further afield (i.e. in coastal areas in the immediate proximity of Peterhead Bay) may be behaviourally affected (i.e. avoidance reactions) however any impacts would be extremely short term (given the short duration of blasting events) and extend over a very localised area, therefore the potential interaction between diadromous fish VERs and blasting activity would be minimal. As such, the magnitude of effect is considered low, resulting in a negative impact of minor significance which is not significant in EIA terms.

9.4.5. In the particular case of noise associated with dredging and drilling the potential for behavioural reactions in fish is expected to be limited to the immediate vicinity of where works are carried out. Noise modelling produced in support of offshore wind farm applications where impact ranges at which strong and milder behavioural reactions in fish of different hearing abilities were modelled for a number of activities including dredging (i.e. MORL, 2012c[26]), suggest that significant behavioural reactions are only to be expected at ranges of few metres. Further, fish VERs are not expected in significant numbers in the harbour, and therefore in the proximity of dredging/drilling activities.

[25] The blasting regime is anticipated to consist of one blast with multiple charges every two or three days, over a period of up to three months and blasting activity will only be carried out during daylight hours, within the normal working day

[26] Noise modelling carried out in relation to suction dredging (MORL, 2012c) estimated strong behavioural reactions (95dB$_{ht}$ (Species) level) at distances up to 13 m and milder behavioural reactions (75 dB$_{ht}$ (Species) level) at distances up to 65 m from the activity for hearing specialists such as herring. For species with poor hearing such as salmon, significantly smaller ranges of behavioural impact were defined (i.e. 1 m for strong behavioural reactions and 5 m for milder behavioural reactions).

9.4.6. Taking the above into account the magnitude of the impact associated with noise from dredging and drilling for pile installation is considered negligible, and these activities are predicted to result in a negative impact of negligible significance on fish VERs, which is not significant in EIA terms.

Water quality

9.4.7. Increased suspended sediment concentrations associated with dredging, filling and rock placing activity have potential to result in negative impacts on fish VERs. It should be noted, however, that dredging activities have previously been conducted within Peterhead Harbour associated with the construction of a new breakwater and deepening of the outer Harbour with no adverse effect noted on fish species in and around Peterhead Bay. As described in para. 5.4.1 for assessment of impacts on benthic ecology, data from borehole analyses indicate that the seabed within the Harbour is mainly composed of coarse sand, gravel and rock, with most of the soft overlying sediment having been removed by previous dredging activities. As such, the amount of sediment available for suspension will be minimal. It should be noted that currents are limited in the harbour area and there are no rivers, streams or watercourses flowing into Peterhead Bay or the harbour, resulting in no river induced currents or flows which could affect the spread of sedimentation. The main concentrations of suspended sediment are therefore anticipated to remain within areas immediately adjacent to where dredging is taking place. Further, the duration of the impact will be short-term, with dredging activity in the South Harbour and the North Harbour anticipated to occur intermittently over a four month period in each area.

9.4.8. Early life stages such as fish eggs and larvae are generally less tolerant to suspended sediments than adults, with larvae being generally considered to be more sensitive than eggs (Appleby and Scarratt, 1989). Eggs and larvae are of limited mobility and therefore may not be able to avoid areas disturbed by increased suspended sediment concentrations as they passively drift through (if pelagic) or remain (if demersal) in areas in the immediate proximity of dredging operations. Further, larvae of many species of fish use sight to locate prey and therefore there may be potential for increased suspended sediment concentrations to result in disturbance to larval feeding. As previously noted (Table 9.1) there are a number of fish species with defined spawning and nursery grounds in coastal areas around Peterhead, hence there may be potential for their eggs and larvae to be present in the vicinity of areas where increased suspended sediments are to be expected as a result of construction works. It should be noted however that there are no records of fish spawning or nursery grounds within Peterhead Harbour itself (PPA, 2007) and therefore eggs and larvae are not anticipated to be subject to the highest levels of suspended sediment expected in the immediate proximity of where construction activity is taking place. Similarly, adults and juveniles are not expected in significant numbers in the immediate proximity of where works are carried out.

9.4.9. Herring and sandeels' eggs, as they are deposited on the seabed, could potentially be subject to smothering as a result of sediment re-deposition. However, given that there are no records of spawning and nursery grounds within Peterhead Harbour itself, and in light of the localised area where significant increased suspended sediment concentrations are expected (i.e. in areas immediately adjacent to where dredging is taking place), the eggs of these species are not anticipated to be subject to sediment deposition/smothering.

9.4.10. In the particular case of diadromous migratory species there may be potential for increased suspended sediments to result in disturbance to their migratory patterns. Although not all fish avoid turbid waters, elevated turbidity or levels of suspended solids of induce avoidance reactions and may modify natural movement and migration of fish (Kerr, 1995). As reported by Wilber and Clark, (2001) the biological responses of juvenile and adult salmonids to suspended sediment concentrations typically associated with dredging tend to be behavioural, with avoidance being the most frequent response.

9.4.11. It should be noted that migratory fish are frequently found in high turbidity areas and therefore expected to be used and able to cope with some level of disturbance in terms of suspended sediment concentrations (i.e. juvenile salmonids are frequently present in turbid estuaries prior to starting their marine migration and in natal streams characterised by high natural turbidity; Gregory and Northcote, 1993). Furthermore, diadromous species are not anticipated to be present in the harbour, where the greatest levels of increased suspended sediment will be reached. As such, the potential interaction between diadromous migratory fish and increased suspended sediment concentrations is expected to be minimal.

9.4.12. Taking the short term and localised effects associated with dredging in terms of increased suspended sediment concentrations and its limited potential interaction with fish VERs the magnitude of the effect is considered negligible. Further, any impact will be reversible with increased suspended sediment concentrations returning to baseline levels shortly after cessation of works. As such, a negative impact of negligible significance, which is not significant in EIA terms, is predicted on fish VERs.

9.4.13. As previously described for marine mammals (para. 8.4.28), changes in water quality associated with accidental pollution events also have potential to result in detrimental impacts on fish VERs. It should be noted, however, that measures will be implemented to follow published guidelines and best working practice for the prevention of pollution events, resulting in limited potential for accidental releases of contaminants to occur. Further, an emergency plan will be put in place so that in the unlikely event of an incident occurring this will be strictly controlled. It is therefore considered that provided best practice measures are implemented there will be a negligible risk to fish VERs associated with accidental pollution events. As such, water quality effects associated with accidental pollution events are predicted to result in a negative impact of negligible significance on fish VERs, which is not significant in EIA terms.

Impacts during operation

Water quality

9.4.14. As described above for the construction phase, changes in water quality associated with accidental pollution events during the operational phase have potential to result in detrimental impacts on fish VERs. Measures will be implemented to follow published guidelines and best working practice for the prevention of pollution events, resulting in limited potential for accidental release of contaminants to occur. Further, an emergency plan will be put in place so that in the unlikely event of an incident occurring this will be strictly controlled. It is therefore considered that provided best practice measures are implemented there will be a negligible risk to fish VERs associated with potential accidental pollution events. As such, water quality effects associated with accidental pollution events are predicted to result in a negative impact of negligible significance on fish VERs, which is not significant in EIA terms.

Cumulative Impacts

Introduction

9.4.15. Given below is the assessment of the potential impacts of the proposed development cumulatively with other plans or projects. The projects given consideration for assessment are those previously listed in Table 4.3.

9.4.16. Of the potential impacts identified in relation to the proposed development on fish VERs only those associated with blasting noise during construction are considered relevant for cumulative assessment. Given the short term and localised nature of any effects related with changes to water quality and noise associated with drilling and dredging, together with the fact that there are no plans or projects planned/consented in the immediate vicinity of Peterhead Harbour, it is not considered that there is potential for cumulative impacts to occur in relation to these potential impacts.

Assessment

9.4.17. Noise generating activities associated with the construction and operational phase of the plans and projects listed in Table 4.3, such as blasting, impact piling, drilling, dredging and increased vessel noise, may result in cumulative impacts on fish VERs in relation to noise.

9.4.18. Given the short term and localised effects arising from blasting at Peterhead Harbour on fish VERs (practically confined within the boundaries of Peterhead Bay), the contribution of the project to any cumulative impact is anticipated to be very limited (i.e. in comparison to other projects, particularly wind farms).

9.4.19. As such, significant cumulative impacts (i.e. of above minor significance) are not predicted to occur on fish VERs.

9.5. Habitats Regulations Appraisal

Introduction

9.5.1. As noted in Table 4.4, Atlantic salmon is listed under Annex II of the Habitats Directive and is a qualifying feature in a number of designated SACs around the UK. As advised by Marine Scotland in their scoping response (MS-LOT Scoping Advice Letter, 6th June 2014) the two closest SACs to Peterhead Harbour where Atlantic salmon is a qualifying features are as follows:

- River Dee SAC (Aberdeenshire); and
- River Spey SAC.

9.5.2. Given the high mobility of Atlantic salmon and the uncertainties in relation to their migration routes and behaviour at sea, the potential impacts on the salmon populations of these SACs have been investigated and included for assessment.

9.5.3. An overview of the River Dee SAC and River Spey SAC is given below, including information on Atlantic salmon, and where relevant, other diadromous fish which are qualifying features in these SACs. In addition, given the dependence on salmon of freshwater pearl mussel (*Margaritifera margaritifera*) during early life stages of their life cycle (also a qualifying feature for designation of the aforementioned SACs), information on this species is also provided.

The River Dee SAC

9.5.4. The River Dee SAC is located approximately 43 km south of the proposed development and supports a high quality Atlantic salmon population. The high proportion of the river accessible to salmon has resulted in it supporting the full range of life-history types found in Scotland, with sub-populations of spring, summer salmon and grilse all being present. The headwaters which drain the southern Cairngorm and northern Grampian mountains are particularly important for MSW spring salmon, but there has been a significant decline in their abundance in recent years. The extensive areas accessible to salmon means the River Dee supports a significant proportion of the Scottish salmon resource. In recent years it has contributed about 4 or 5% of all salmon caught in Scotland (JNCC, 2014).

9.5.5. In addition, the Dee supports a functional population of freshwater pearl mussel. Juveniles make up approximately 30% of the recorded population, among the highest proportions recorded in Scotland. This indicates that the population is recruiting strongly and is one of the most important in the UK.

The River Spey SAC

9.5.6. The River Spey SAC is located approximately 77 km west of the proposed development. It supports one of the largest Atlantic salmon populations in Scotland, with little evidence of modification by non-native stocks. The salmon population includes fish of all ages including migrating smolts and returning adults, possibly reflecting genetic differences within the Spey stock.

9.5.7. In addition, the River Spey supports an important population of sea lamprey. Recent surveys show that sea lamprey larvae are widely distributed throughout the middle and lower reaches of the river, where the particularly fast-flowing waters of the River Spey provide ideal spawning conditions for this species. In addition, as an unpolluted and relatively little modified system, the River Spey matches the other key habitat requirements of the sea lamprey in terms of good water quality, clean gravels and marginal silts and an unhindered migration route to the sea.

9.5.8. Further, the Spey supports an outstanding freshwater pearl mussel population in its middle to lower reaches. In parts of the River Spey, extremely dense mussel colonies have been recorded (225 m^2) and the total population is estimated at several million. As the population also shows evidence of recent recruitment and a high proportion of juveniles, the River Spey is considered to support a pearl mussel population of great international significance.

HRA Screening

Atlantic salmon

9.5.9. Prevalent travel directions for grilse and MSW salmon are illustrated in Figure 9.1 as presented in Malcolm *et al.* (2010). As shown, dominant travel directions for adult salmon around the Moray Firth are currently not clearly defined, and therefore, the assumption needs to be made that there is potential for adult salmon originating in the River Spey to transit coastal areas off Peterhead during their return migration.

9.5.10. In the particular case of the east coast of Scotland, a dominant direction of movement towards the north in areas south of Aberdeenshire has been suggested for adult salmon (both grilse and MSW salmon) (Malcolm *et al*., 2010). On this basis, it may be reasonable to assume that there is limited potential for salmon originating in the River Dee SAC to transit areas as far north as Peterhead during their return migration. Nevertheless, given the limited studies and information available to date in relation to the migratory behaviour of salmon at sea, the relative proximity of the River Dee SAC to the proposed development (43 km) and the highly mobile nature of salmon populations, the conservative assumption that adult salmon originating in the River Dee may also transit areas in the immediate proximity of Peterhead has been made.

9.5.11. With regards to smolts, as described in para. 9.1.13, there is also limited information on the exact routes followed and the distance from the coast at which they travel upon river exit. As such, it has also been considered that there may be potential for smolts originating in both the River Dee and River Spey to transit coastal areas off Peterhead.

9.5.12. In light of the uncertainties highlighted above in relation to the movement of adult and juvenile salmon, and again, taking a conservative approach, the assumption has been made that the potential for connectivity between the proposed development and the Atlantic salmon populations of the River Dee and the River Spey SACs cannot be excluded.

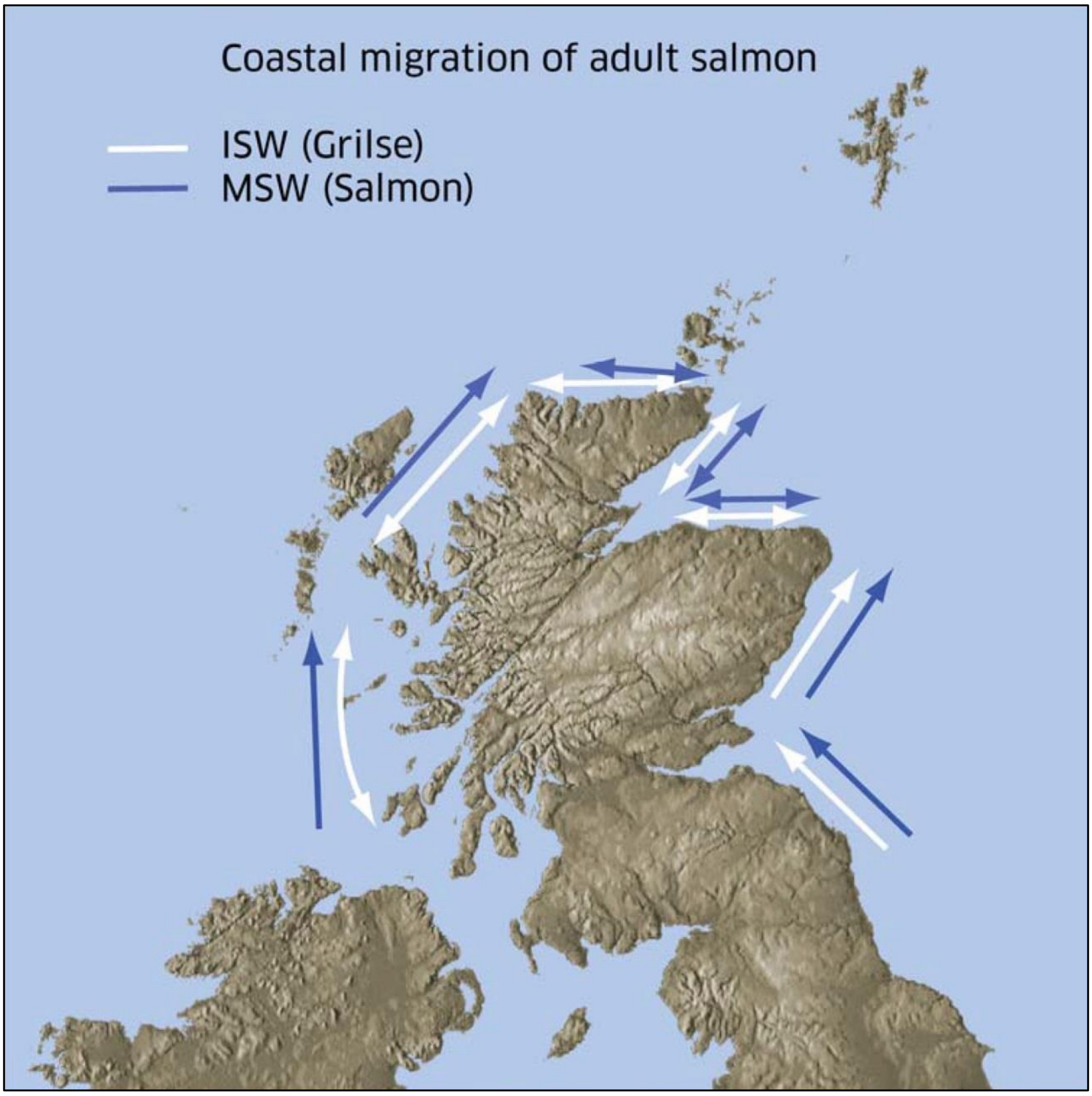


Figure 9.1: Directions of Travel of Atlantic Salmon (Grilse and MSW salmon) in Scottish coastal waters based on tagging studies (Source: Malcolm *et al*., 2010).

Freshwater Pearl Mussel

9.5.13. Freshwater pearl mussel is a qualifying feature for site selection of both the River Dee SAC and the River Spey SAC. Given the dependence of this species on salmonids during early stages of their life cycle, the conservative assumption has been made that that whether there is potential connectivity between the salmon population of a given SAC, there may also be potential for connectivity in relation to its freshwater pearl mussel population.

Sea lamprey

9.5.14. As previously mentioned (para. 9.5.7), in addition to Atlantic salmon and freshwater pearl mussel, sea lamprey is also a qualifying feature for selection of the River Spey SAC. Sea lampreys are parasitic feeders and their distribution is considered to be largely dictated by their host (Waldman *et al.*, 2008). They are rarely caught in coastal and estuarine waters and are thought to be solitary hunters and widely dispersed at sea (Henderson, 2003). Further, as previously mentioned (para. 9.1.9), they are only expected on an occasional basis in coastal areas off Peterhead. Taking this into account together with the distance of the River Spey SAC to Peterhead Harbour (77 km) and the relatively localised area of influence of the effects associated with the proposed development on fish, It is not considered that there is potential for connectivity between the River Spey SAC sea lamprey population and the proposed development. As such, sea lamprey is not considered further for the purposes of the HRA assessment.

Assessment of Potential Effects on Site Integrity

9.5.15. The screening exercise presented above concluded that there is potential for connectivity between the proposed development and the following sites and designated features:

- River Dee SAC – Atlantic salmon and freshwater pearl mussel; and
- River Spey SAC – Atlantic salmon and freshwater pearl mussel.

9.5.16. These SACs and their relevant features are considered below with respect to the potential for effects on the integrity of each SAC.

Conservation Objectives

9.5.17. The assessment of potential effects on the integrity of a European site is made in light of the Conservation Objectives of each site.

9.5.18. The Conservation Objectives of the River Dee SAC and the River Spey SAC with regard to the species for which the sites have been designated, are as follows (SNH, 2014):

- To avoid the deterioration of habitats of the qualifying species or significant disturbance or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and
- To ensure for the qualifying species that the following are maintained in the long term:
    - Population of the species as a viable component of the site;
    - Distribution of the species within the site;
    - Distribution and extent of habitats supporting the species;
    - Structure, function and supporting processes of habitats supporting the species;
    - No significant disturbance of the species;
    - Distribution and viability of freshwater pearl mussel host species; and
    - Structure, function and supporting processes of habitats supporting freshwater pearl mussel host species.

9.5.19. Given the distance from the SACs to the proposed development, the relatively localised area of influence of potential impacts on fish and the distribution and ecology of salmon (and freshwater pearl mussel), there is no potential for the proposed development to result in significant impacts on the distribution, extent, structure, function and supporting processes of habitats supporting the species.

Similarly, there is no potential for the distribution of the species within any of the sites to be affected. It is therefore considered that key conservation objectives in relation to the proposed development for assessment of impacts on salmon (and freshwater pearl mussel) are those relating to avoiding significant disturbance of the qualifying species (and their host species in the case of freshwater pearl mussel) and ensuring that the population of the species as a viable component of the site is maintained in the long term.

Impacts of Peterhead Project Alone

9.5.20. The potential impacts of the construction and operational phase of the proposed development on the Atlantic salmon populations of the River Dee SAC and the River Spey SAC relate to effects associated with underwater noise and changes to water quality.

9.5.21. In terms of underwater noise, blasting associated with the use of explosives for rock fracturing has potential to result in physical injury and behavioural responses in this species. It should be noted that whilst Atlantic salmon may transit coastal areas in the proximity of Peterhead Harbour, they are not anticipated to be present within the harbour, and therefore there is limited potential for lethal effects associated with blasting to occur on this species. Noise levels at which behavioural reactions may be triggered as a result of blasting activity may however reach areas further afield (i.e. coastal waters in the immediate proximity of Peterhead Bay). At the behavioural level, any effects would however be extremely short term by virtue of the limited duration of blasting events and very localised (practically confined within Peterhead Bay).

9.5.22. Other noise generating activities such as dredging and drilling for pile installation may also result in behavioural disturbance to the Atlantic salmon populations of the River Dee and River Spey SACs. As described in para. 9.4.5, significant behavioural disturbance as a result of dredging and drilling activity would only be expected in the immediate vicinity of the vessels and Atlantic salmon are not anticipated to be found within the harbour.

9.5.23. In light of the above, the potential effects of underwater noise on the Atlantic salmon populations of the River Dee SAC and the River Spey SAC (and consequently on their freshwater pearl mussel populations) are not considered to be significant, and therefore, adverse effects on the integrity of these SACs are not anticipated.

9.5.24. In addition to underwater noise, Atlantic salmon may be affected by changes in water quality as a result of increased suspended sediment concentrations and accidental pollution events. As described in para. 9.4.7, the effect of increased suspended sediment concentrations during construction is expected to be of negligible magnitude, being highly localised and short term. The key impact on Atlantic salmon associated with this relates to the potential disturbance to their migration. As previously mentioned in para. 9.4.11, however, any interaction between Atlantic salmon and increased suspended sediment concentrations is expected to be minimal, as this species is not anticipated within the harbour, where the highest increased suspended sediment concentrations will be reached. Further, migratory fish are frequently found in high turbidity areas and therefore expected to be used and able to cope with some level of disturbance in terms of suspended sediment concentrations.

9.5.25. The potential effects of increased suspended sediment concentrations on the Atlantic salmon populations of the River Dee SAC and the River Spey SAC (and consequently on their freshwater pearl mussel populations) are not considered to be significant, and therefore, adverse effects on the integrity of these SACs are not anticipated.

9.5.26. In the particular case of water quality changes arising from accidental pollution events, provided suitable mitigation and best practice control measures are implemented the risk of detrimental effects to Atlantic salmon is considered minimal (see para. 9.4.13).

9.5.27. The potential effects of accidental pollution events on the Atlantic salmon populations of the River Dee SAC and the River Spey SAC (and consequently on their freshwater pearl mussel populations) are not considered to be significant, and therefore, adverse effects on the integrity of these SACs are not anticipated.

Conclusion

9.5.28. No adverse effects on the integrity of the River Dee SAC and the River Spey SAC are predicted as a result of the proposed development.

9.5.29. In light of the SACs Conservation Objectives, significant disturbance to the Atlantic salmon populations of the River Dee SAC and the River Spey SAC and adverse effects which could affect that the population of this species as a viable component of these sites is maintained in the long term, are not to be expected (and consequently, significant indirect impacts on the freshwater pearl mussel populations of these SACs are also not to be expected).

Impacts of the Peterhead Project In-Combination with other Plans or Projects

Introduction

9.5.30. Given below is the assessment of the potential impacts of the proposed development in-combination with other plans or projects. The projects given consideration for assessment are those previously listed in Table 4.3.

9.5.31. Of the potential impacts identified in relation to the proposed development on fish only those associated with blasting noise during construction are considered relevant for in-combination assessment. Given the short term and localised nature of any effects related with changes to water quality and noise associated with drilling and dredging, together with the fact that there are no plans or projects planned/consented in the immediate vicinity of Peterhead Harbour, it is not considered that there is potential for in-combination impacts to occur in relation to these potential impacts.

Assessment

9.5.32. Noise generating activities associated with the construction and operational phase of the plans and projects listed in Table 4.3, such as blasting, impact piling, drilling, dredging and increased vessel noise, may result in in-combination impacts on relevant qualifying features of the River Dee SAC and River Spey SAC.

9.5.33. Given the short term and localised effects arising from blasting at Peterhead Harbour (practically confined within the boundaries of Peterhead Bay), the potential for in-combination impacts to arise is considered to be very limited (i.e. in comparison to other projects, particularly wind farms).

9.5.34. As such, in-combination effects as a result of noise on the Atlantic salmon (and freshwater pearl mussel) populations of the River Dee SAC and the River Spey SAC are not considered to be significant, and therefore adverse effects on the integrity of these SACs are not anticipated.

Conclusion

9.5.35. No adverse effects on the integrity of the River Dee SAC and the River Spey SAC are predicted as a result of the proposed development in-combination with other plans or projects.

9.5.36. In light of the SACs Conservation Objectives, significant disturbance to the River Dee SAC and River Spey SAC Atlantic salmon (and freshwater pearl mussel) populations, nor adverse effects which could affect that the populations of these species as a viable component of the sites are maintained in the long term, are to be expected.

10. Other Habitats and Species

10.1. Habitats

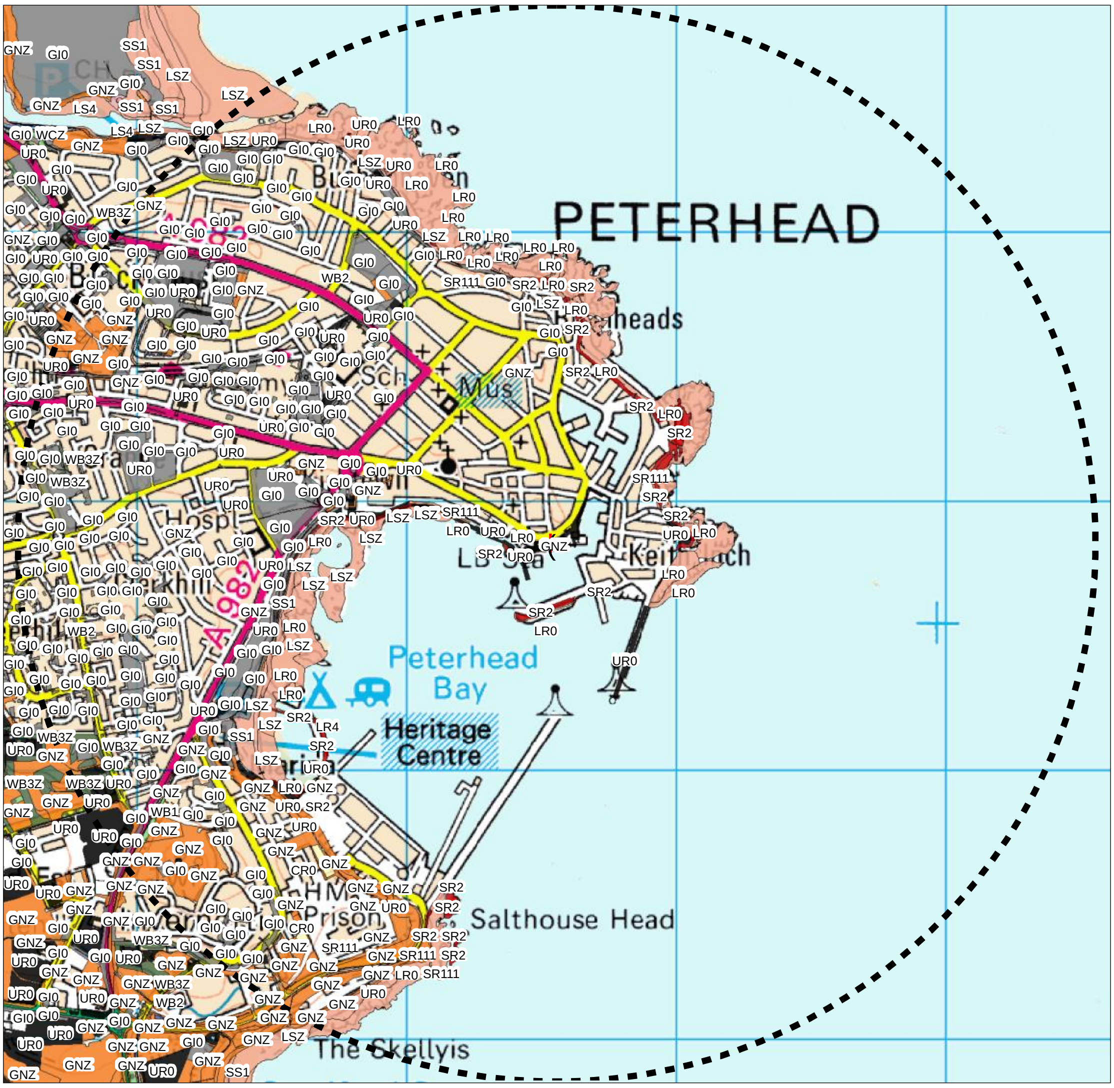
10.1.1. There exist other habitats and species within Peterhead Harbour and the area potentially impacted by the development that were not specifically covered during site specific survey. However, incidental sightings during other surveys conducted in the area provide an indication as to the presence of other habitats and species within the Harbour.

10.1.2. Information received from the NESBReC identified habitats that were present within 2 km of the development site (Figure 10.1). The habitats within the search area were designated as part of the Integrated Habitat System (IHS) which is the most recent and comprehensive dataset for the Peterhead Harbour area. The IHS is an integration of existing classification in the UK: Biodiversity Broad, Biodiversity Priority, Annex 1 Habitats Directive and Phase 1.

10.1.3. A total of 15 habitat types were identified within 2 km of the development site by the IHS, with those listed below present within or adjacent to Peterhead Harbour:

- Improved grassland;
- Other neutral grassland;
- Littoral rock;
- Other littoral sediment;
- Coastal grassland;
- Boulders and rock above the high tide mark; and
- Built up areas and gardens.

10.1.4. The majority of the Harbour area is not classified under the IHS as it is predominantly buildings and hard-standing.



Habitat codes

CR0 - arable and horticulture

GI0 - improved grassland

GNZ - other neutral grassland

LR0 - littoral Rock

LR4 - man-made littoral rock

LSZ - other littoral sediment

RE2 - artificial rock exposures and waste SR1 - maritime cliff and slopes

SR111 - coastal grassland

SS1 - coastal sand dunes

SR2 - boulders and rock above the high tide mark

UR0 - built-up areas and gardens

WB1 - mixed woodland

WB2 - scrub woodland

WB3Z - other broadleaved woodland

Figure 10.1: Habitats within 2 km of the development site and the surrounding area as categorised by the Integrated Habitat System.

10.1.5. The habitats identified above are not considered VERs in relation to the proposed development and therefore they have not been taken forward for impact assessment.

10.2. Other species

10.2.1. The records received from the NESBReC identified four terrestrial mammals (badger, hedgehog, otter and red squirrel), five moth species (garden tiger, grey dagger, Haworth's minor, red carpet and rosy rustic) and four plant species (white-ramping fumitory, oysterplant, wych elm, wild pansy) for which records existed within 2 km of the development site.

10.2.2. The records of these species all occur outside of the Harbour. The terrestrial works for this project are restricted to the two fish market buildings with no connectivity between these buildings and the species recorded. The only species that may be affected by aspects of the development occurring within the marine environment is otter. However, the records from the NESBReC do not indicate the presence of otter within the areas where works will take place. The only record of otter occurs to the north of the Harbour in the Ugie Estuary.

10.2.3. The species identified above are not considered VERs in relation to the proposed development and therefore they have not been taken forward for impact assessment.

11. Conclusions and Recommendations

11.1.1. A total of 18 VERs, including one intertidal biotope, six bird species, six marine mammals and five fish species were identified through desk study and as part of the Phase 1 intertidal habitat survey and extended surveys undertaken within Peterhead Harbour and Peterhead Bay. No significant impacts, in terms of EIA, are predicted for these VERs with impacts considered to be of negligible or minor significance.

11.1.2. An exception to this is the effect of underwater noise associated with blasting activity on marine mammals, for which a potential impact of moderate significance was identified. Through the implementation of adequate mitigation and monitoring measures (see para. 8.4.14 and Annex B: Draft Marine Mammals Mitigation Plan) a residual impact of minor significance, which is not significant in EIA terms, is however predicted.

11.1.3. The HRA assessment considered the potential effects of the project on four SPAs/dSPAs and their ornithological qualifying features and seven SACs (five in relation to marine mammal species and two in relation to diadromous migratory fish and freshwater pearl mussel).

11.1.4. For five of the sites (all the SPAs and two SACs where harbour seal is the relevant qualifying feature), it was concluded that there was no potential connectivity with the proposed development and therefore no further assessment in relation to these sites and features was carried out.

11.1.5. For the remaining sites (two grey seal SACs, one bottlenose dolphin SAC and two Atlantic salmon and freshwater pearl mussel SACs) the potential for connectivity with the proposed development could not be excluded. As such, those sites and qualifying features were taken forward for assessment of potential effects on site integrity. In all cases it was concluded that the proposed development, either alone or in combination with other plans and projects, would not result in adverse effects on the integrity of the SACs.

11.1.6. To further minimise the impacts associated with development activity upon the VERs and other ecological receptors within the harbour the following good practice measures are proposed:

- Control measures associated with dredging and filling activities including the use of grab or back-hoe bucket type dredging plant instead of cutter suction to reduce seabed disturbance and suspension of sediment within the water column;
- A soft-start approach is recommended with regard to any necessary blasting activities to minimise potential impacts on marine mammals and fish;
- Should demolition of the fish market at Merchant’s Quay be carried out during the breeding season for birds, a Breeding Bird Survey may be required in order to prevent potential disturbance or destruction of nesting attempts by birds (e.g. starling) and to comply with the Wildlife and Countryside Act 1981 (as amended). Demolition of this building outside of the breeding season would not adversely affect breeding birds.

11.1.7. In addition to the good practice measures proposed above, a Marine Mammal Mitigation Plan (MMMP) and CEMP will be implemented to further minimise environmental effects potentially arising from the proposed development.

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13. Appendices

13.1. Appendix 1 - Data received from the NESBReC

Common name	Latin name	Number of records	Nearest record to the development site (m)	Most recent record
Birds				
Whooper swan	*Cygnus cygnus*	3	1000	2010
Barnacle goose	*Branta leucopsis*	37	1000	2010
Garganey	*Anas querquedula*	6	500	2008
Pochard	*Aythya farina*	5	1000	2009
Scaup	*Aythya marila*	8	1000	2010
Eider	*Somateria mollissima*	121	500	2010
Common scoter	*Melanitta nigra*	1	2000	1995
Goldeneye	*Bucephala clangula*	104	1000	2010
Smew	*Mergellus albellus*	1	2000	1995
Grey partridge	*Perdix perdix*	10	1000	2004
Red-throated diver	*Gavia stellata*	114	1000	2010
Black-throated diver	*Gavia arctica*	38	1000	2010
Great northern diver	*Gavia immer*	195	500	2010
Manx shearwater	*Puffinus puffinus*	216	500	2010
Balearic shearwater	*Puffinus mauretanicus*	1	1000	2005
European storm-petrel	*Hydrobates pelagicus*	58	1000	2010
Leach's storm-petrel	*Oceanodroma leucorhoa*	1	2000	1995
Red-necked grebe	*Podiceps grisegena*	7	500	2010
Slavonian grebe	*Podiceps auritus*	4	1000	2009
Hen harrier	*Circus cyaneus*	1	2000	2010
Osprey	*Palidon haliaetus*	3	1000	2010
Kestrel	*Falco tinnunculus*	69	1000	2010
Merlin	*Falco columbarius*	14	1000	2010
Peregrine	*Falco peregrinus*	36	500	2010
Golden plover	*Pluvialis apricaria*	83	1000	2010
Lapwing	*Vanellus vanellus*	31	1000	2010
Purple sandpiper	*Calidris maritima*	113	500	2012
Dunlin	*Calidris alpina*	68	1000	2010
Ruff	*Philomachus pugnax*	11	1000	2010
Snipe	*Gallinago gallinago*	18	1000	2010
Woodcock	*Scolopax rusticola*	15	1000	2010
Black-tailed godwit	*Limosa limosa*	5	1000	2010
Bar-tailed godwit	*Limosa lapponica*	38	1000	2010
Curlew	*Numenius arquata*	98	1000	2010
Green sandpiper	*Tringa ochropus*	6	1000	2010
Redshank	*Tringa totanus*	103	500	2012
Grey phalarope	*Phalaropus fulicarius*	8	1000	2010
Arctic skua	*Stercorarius parasiticus*	217	1000	2010

Common name	Latin name	Number of records	Nearest record to the development site (m)	Most recent record
Black-headed gull	*Chroicocephalus ridibundus*	13	500	2010
Herring gull	*Larus argentatus*	29	250	2012
Sandwich tern	*Sterna sandvicensis*	87	500	2010
Common tern	*Sterna hirundo*	40	1000	2010
Roseate tern	*Sterna dougallii*	1	2000	2000
Arctic tern	*Sterna paradisaea*	20	1000	2010
Cuckoo	*Cuculus canorus*	1	2000	1995
Barn owl	*Tyto alba*	4	1000	2009
Short-eared owl	*Asio flammeus*	12	1000	2008
Swift	*Apus apus*	45	1000	2010
Kingfisher	*Alcedo atthis*	1	1000	2008
Hooded crow	*Corvus cornix*	18	1000	2009
Skylark	*Alauda arvensis*	11	1000	2010
Wood warbler	*Phylloscopus sibilatrix*	1	2000	2004
Grasshopper warbler	*Locustella naevia*	1	2000	1995
Reed warbler	*Acrocephalus scirpaceus*	2	1000	2002
Starling	*Sturnus vulgaris*	40	500	2010
Song thrush	*Turdus philomelos*	90	1000	2010
Redwing	*Turdus iliacus*	36	1000	2010
Spotted flycatcher	*Muscicapa striata*	5	1000	2010
Dunnock	*Prunella modularis*	17	1000	2010
House sparrow	*Passer domesticus*	44	1000	2010
Tree sparrow	*Passer montanus*	8	1000	2010
Tree pipit	*Anthus trivialis*	1	1000	2002
Brambling	*Fringilla montifringilla*	15	1000	2010
Siskin	*Carduelis spinus*	22	1000	2010
Linnet	*Carduelis cannabina*	10	500	2010
Twite	*Carduelis flavirostris*	5	1000	2010
Lesser redpoll	*Carduelis cabaret*	3	1000	2010
Bullfinch	*Pyrrhula pyrrhula*	2	1000	2009
Snow bunting	*Plectrophenax nivalis*	12	1000	2010
Yellowhammer	*Emberiza citronella*	1	2000	2010
Reed bunting	*Emberiza schoeniclus*	2	2000	2010
Corn bunting	*Emberiza calandra*	1	2000	1995
Fish				
Atlantic salmon	*Salmo salar*	1	2000	1995
Basking shark	*Cetorhinus maximus*	1	1000	2006
European eel	*Anguilla anguilla*	1	2000	1995
Sea trout	*Salmo trutta*	1	2000	1995
Marine mammals				
Common seal	*Phoca vitulina*	1	2000	1995
Killer whale	*Orcinus orca*	1	2000	2013

Common name	Latin name	Number of records	Nearest record to the development site (m)	Most recent record
Minke whale	*Balaenoptera acutorostrata*	1	2000	2013
Terrestrial mammals				
Badger	*Meles meles*	1	2000	2000
Hedgehog	*Erinaceus europaeus*	1	2000	1995
Otter	*Lutra lutra*	1	2000	1995
Red squirrel	*Sciurus vulgaris*	1	2000	1989
Invertebrates				
Garden tiger	*Arctia caja*	1	2000	1995
Grey dagger	*Acronicta psi*	1	2000	1995
Haworth's minor	*Celaena haworthii*	1	2000	1995
Red carpet	*Xanthorhoe decoloraria*	1	2000	1954
Rosy rustic	*Hydraecia micacea*	1	2000	1995
Plants				
Oysterplant	*Mertensia maritime*	3	2000	2012
White ramping-fumitory	*Fumaria capreolata*	1	2000	1995
Wild pansy	*Viola tricolor*	1	2000	1995
Wych elm	*Ulmus glabra*	4	2000	2006

13.2. Appendix 2 - Peterhead Phase 1 intertidal survey – list of taxa and species observed

Crustacea	
Semibalanus balanoides Paguridae *Bathyporeia sp.*	*Cancer pagurus* *Liocarcinus depurator*
Echinodermata	
Asterias rubens	Ophiuroidea
Mollusca	
Patella vulgata *Littorina littorea* *Ensis sp.*	*Mytilus edulis* *Littorina sp.* *Nucella lapillus*
Pisces	
Ciliata mustela	
Porifera	
Halichondria panicea	
Polychaeta	
Lanice conchilega Sigalonidae Spirorbidae	*Nepthys sp.* *Pomatoceros triqueter*
Cnidaria	
Actinia equina	
Tunicata	
Ascidiella scabra	
Rhodophyceae	
Callophyllis laciniata *Cryptopleura ramosa* *Ceramium shuttleworthianum*	*Mastocarpus stellatus* *Lomentaria clavellosa*
Corallinaceae	
Corallina officinalis	
Chlorophyceae	
Ulva sp. *Bryopsis sp.*	*Rhizoclonium riparium*
Phaeophyceae	
Fucus serratus *Fucus vesisculosus* *Laminaria digitata* *Cystoseira sp.* *Pelvetia canaliculata* *Saccharina latissima*	*Fucus spiralis* *Ascophyllum nodosum* *Alaria esculenta* *Halidrys siliquosa* *Chorda filum*

13.3. Appendix 3 – WeBS survey data for Peterhead Bay and Sandford Bay 2007/08 – 2011/12[27]

Species	07/08	08/09	09/10	10/11	11/12	Month of peak abundance	5yr average	Current average
Mute swan		0	0	1	1	Feb	1	1
Pink-footed goose		0	0	1	0		0	0
Greylag goose		2	0	(0)	0		1	1
Canada goose		0	0	(0)	6	Jul	2	2
Brent goose		0	1	(0)	0		0	0
Brent goose (Light-bellied)		0	1	(0)	0		0	0
Teal		0	0	(0)	0		0	0
Mallard		3	0	21	5	Dec	7	7
Eider		130	190	235	170	Mar	181	181
Long-tailed duck		1	0	1	2	Nov	1	1
Goldeneye		15	22	23	14	Dec	19	19
Red-breasted merganser		5	5	2	3	Jan	4	4
Red-throated diver		1	0	(0)	1	Nov	1	1
Cormorant		27	17	20	16	Dec	20	20
Shag		42	21	17	45	Oct	31	31
Grey heron		6	4	4	3	Oct	4	4
Little grebe		0	1	1	1	Nov	1	1
Slavonian grebe		0	0	0	0		0	0
Oystercatcher		93	62	94	75	Sep	81	81
Ringed plover		28	12	14	9	Sep	16	16
Golden plover		3	0	2	0		1	1
Lapwing		0	2	10	0		3	3
Knot		1	0	(0)	0		0	0
Sanderling		0	0	(0)	(2)	Aug	1	1
Purple sandpiper		2	5	4	1	Dec	3	3
Dunlin		7	2	6	(1)	Aug	5	5
Snipe		1	1	2	0		1	1
Woodcock		0	0	3	0		1	1
Bar-tailed godwit		0	0	(0)	10	Sep	3	3
Whimbrel		0	1	(0)	2	Jun	1	1
Curlew		26	12	8	60	Feb	27	27
Common sandpiper		0	0	0	0		0	0
Redshank		109	160	92	69	Jan	108	108
Turnstone		29	110	54	44	Nov	59	59
Kittiwake			0	(0)	1	Jul	1	1
Black-headed gull			0	61	135	Feb	65	65

[27] Figures in brackets indicate an incomplete count

Species	07/08	08/09	09/10	10/11	11/12	Month of peak abundance	5yr average	Current average
Common gull			0	64	25	Feb	30	30
Lesser black-backed gull			10	(11)	37	May	24	24
Herring gull			0	180	550	Feb	243	243
Iceland gull			0	(0)	5	Mar	3	3
Glaucous gull			0	(0)	2	Feb	1	1
Great black-backed gull			0	20	155	Feb	58	58
Sandwich tern		141	206	134	60	Sep	135	135
Common tern		40	20	19	(11)	Aug	26	26
Arctic tern		130	2	(1)	5	Sep	46	46

13.4. Appendix 4 – Plates

Plate 1: Merchant's Quay fish market – western wall.

Plate 2: Merchant's Quay fish market – southern wall.

Plate 3: Merchant's Quay fish market – northern side.

Plate 4: Merchant's Quay fish market – northern side loading bay.

Plate 5: Greenhill fish market – southern and western sides.

Plate 6: Greenhill fish market – western side.

13.5. Appendix 5 - Marine Mammals Desktop Study

Introduction

13.5.1. In order to inform a robust assessment of the potential impacts on marine mammals associated with the Peterhead development, a baseline assessment of the key marine mammal species expected to be present in and around the proposed development area has been carried out. This appendix supports the impact assessment presented in Section 8.4 of this report.

Data and Information Sources

13.5.2. The principal sources of data and information used to collate baseline information on marine mammals are detailed in Table 13.1. A full reference list is provided at the end of the document.

Table 13.1: Principal sources of data and information for marine mammals.

Source	Publication	Year (s)
SOCS	Special Committee on Seals Scientific Advice on matters that relate to the management of seal populations	2010-2013
SCANS	Small Cetaceans in the European Atlantic and North Sea Survey Results	1994
SCANS-II	Small Cetaceans in the European Atlantic and North Sea Survey Results	2005
IAMMWG	Interagency Marine Mammal Working Group: Management Units of marine mammals in the UK waters	2013
Marine Scotland	Grey and harbour seal usage maps	2014
Defra	Charter Progress 2 Report, Chapter 3 -Seals	2010
Hammond *et al.*	Background information on marine mammals relevant to Strategic Environmental Assessment 5.	2004
Hammond *et al.*	Cetacean abundance and distribution in European shelf waters to inform conservation and management	2013
Anderwald and Evans	Cetaceans of the East Grampian Region	2010
Evans	UK cetaceans status review	2003

Principal Species Overview

13.5.3. The term marine mammals includes seals (pinnipeds) and whales, dolphins and porpoises (cetaceans).

13.5.4. There are two species of seals which are resident and breed in the UK. These are the grey seal (*Halichoerus grypus*) and the common seal, also known as harbour seal, (*Phoca vitulina*) (Duck, 2007).

Both species occur regularly in the North Sea and are commonly found in the north-east coast of Scotland, including coastal areas around Peterhead.

13.5.5. In terms of cetaceans, a wider range of species have been recorded in the proximity of Peterhead, either regularly or on a more occasional basis. Table 13.2 presents an indication of the principal species of cetaceans which may be found in this area based on information collated by Anderwald and Evans (2010) for the period 1973 – 2009 on the East Grampian Coast (from Kinnaird Head in Fraserburgh to the mouth of the River Esk by St. Cyrus). In this region, a total of fifteen cetacean species have been recorded in near-shore waters (within 60 km of the coast).

Table 13.2: Summary of cetacean sightings records in East Grampian, 1973-2009 (Source: Anderwald and Evans, 2010).

Species	**Latin name**	**No. records**	**% of total No. records**	**No. individuals**	**% of total No. of individuals**
Bottlenose dolphin	*Tursiups truncatus*	4,016	62.7	40,068	79.1
Harbour porpoise	*Phocoena phocoena*	1,523	23.8	6,295	12.4
White-beaked dolphin	*Lagenorhynchus albirostris*	398	6.2	2,788	5.5
Minke whale	*Balaenoptera acutorostrata*	323	5	516	1
Risso's dolphin	*Grampus griseus*	44	0.7	190	0.4
Killer whale	*Orcinus orca*	39	0.6	86	0.2
Atlantic white-sided dolphin	*Lagenorhynchus acutus*	19	0.3	114	0.2
Short-beaked common dolphin	*Delphinus delphis*	16	0.2	392	0.8
Long-finned pilot whale	*Globicephala melas*	12	0.2	168	0.3
Humpback whale	*Megaptera novaeangliae*	7	0.1	8	<0.1
Fin whale	*Balaenoptera physalus*	3	<0.1	5	<0.1
Northern bottlenose whale	*Hyperoodon ampullatus*	2	<0.1	3	<0.1
Striped dolphin	*Stenella coeruleoalba*	1	<0.1	6	<0.1
Sperm whale	*Physeter macrocephalus*	1	<0.1	2	<0.1
Total		**6,404**	**100**	**50,641**	**100**

13.5.6. Of the species of cetaceans listed above only four are considered significant members of the coastal marine mammal community in the East Grampian region (Anderwald and Evans, 2010). These are bottlenose dolphin, harbour porpoise, white-beaked dolphin and minke whale, which combined account for 97.7% and 98.0% of the total number of records and individuals recorded in this region, respectively (see Table 13.2). As such, for the purposes of this assessment the collation of baseline information on cetaceans has been focused on these four key species.

13.5.7. It should be noted that whilst cetaceans may transit and/or forage in areas in the vicinity of Peterhead, there are to date no records of sightings of these species within the harbour or Peterhead Bay[28] (PPA, 2007; PPA pers. comm., 2014). In the particular case of pinnipeds, however, there is potential for both harbour and more likely grey seals[29] to be present in and around Peterhead Harbour.

13.5.8. Taking the information provided above, the baseline assessment provided here has been focused on the following six marine mammal species:

- Grey seal;
- Common seal;
- Harbour porpoise;
- Bottlenose dolphin;
- White-beaked dolphin; and
- Minke whale.

Management Units and Reference Populations

13.5.9. In order to define reference populations of marine mammals around the British Isles a number of Management Units (MUs) have been set out by the UK Statutory Nature Conservation Bodies (SNCBs) (IAMMWG, 2013). These are primarily based on natural geographical boundaries, the ecology and life history of the species and pre-existing management schemes. Population estimates for each MU and each species are primarily derived from recent modelled abundance estimates for SCANS-II (Hammond *et al.,* 2013). However, where MUs extend outside the SCANS survey areas, data from the Cetacean Offshore Distribution and Abundance (CODA) in the European Atlantic is also used to estimate abundances for cetacean species. In the particular case of pinnipeds, reference populations are based on data from the Special Committee on Seals (SCOS).

13.5.10. The population estimates of the species included in this baseline assessment for the management units relevant to the Peterhead Harbour development are given in Table 13.3.

[28] Peterhead Harbour Authority have a 24 hr 365 days a year control tower which covers the Bay, and to date, no sightings of cetaceans have been recorded in the area. Further, the harbour has a full time Environmental Officer on staff.

[29] Grey seals were observed within the harbour during the ornithological survey conducted at Peterhead Harbour (4th and 5th March, 2014). It is estimated that there are about grey 10 seals moving around the harbour at various locations. They tend to be in the South Harbour and Sir Albert Basin, then rest on the back of the Sir Albert Quay rock protection (PPA, pers. comm. 2014).

Table 13.3: Management Units and population of estimates of key marine mammal species (Source IAMMWG, 2013).

Species	Management Unit (MU)	Population estimate
Grey seal	East Coast	Pup production (autumn) 4,300
		Summer abundance 8,350
Harbour seal	East Coast	315
Harbour porpoise	North Sea	227, 298 (CV: 0.13, CI: 176,360 – 292,948)
Bottlenose dolphin	East Coast of Scotland	195 (95% HPDI 162-253)
White-beaked dolphin	British and Irish waters	15,895 (CV: 0.29; 95% CI =9,107 – 27,734)
Minke whale	British and Irish waters	23,163 (CV: 0.27, CI: 13,772 – 38,958)

Conservation and Legislation

13.5.11. Marine mammals are protected under various legislative arrangements and international agreements. A summary of the conservation legislation currently in place to protect marine mammals is given in Table 13.4 for the key species identified in relation to the Peterhead development area.

Table 13.4: Summary of conservation legislation for marine mammals.

Legislation	Species relevant to this assessment	Details
The OSPAR Convention	Harbour porpoise	The OSPAR Convention guides international cooperation on the protection of the marine environment of the north-east Atlantic. Work under the Convention is managed by the OSPAR Commission, made up of representatives of the Governments of 15 Contracting Parties and the European Commission, representing the European Union. The OSPAR Convention has set in place Ecological Quality Objectives to help assess the state of grey and harbour seal populations in the North Sea. The OSPAR Convention addresses sources of pollution which might affect the maritime area, as well as matters relating to the protection of the marine environment.
The Bonn Convention 1979/ ASCOBANS	Porpoises and dolphins	The Bonn Convention, which aims to conserve migratory species across their range, is a framework Convention which supports a number of agreements between participating countries. The UK is a contracting party to the Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS). The purpose of which is to offer protection to porpoises and dolphins and to provide resources to monitor and carry our research within these seas.
EU Council Directive 92/43/EEC Conservation of Natural Habitats and Species (1992) (referred to as 'the Habitats Directive') **As amended by Directive 97/62/EC**	***Annex II (designation of SACs)* –** harbour porpoise; bottlenose dolphin; grey seal; common seal	The Habitats Directive (together with the Birds Directive) establishes a network of internationally important sites designated for their ecological status. This network is known as 'Natura 2000'. Annex II of the Habitats Directive lists Species of Community Interest whose conservation requires the designation of Special Areas of Conservation (SACs) (see left *Annex II designation of SACs*). There are currently five grey seal and eight harbour seal SAC in Scotland. There is also one SAC designated for the bottlenose dolphin but none for the harbour porpoise.
	Annex IV (EPS) - All UK cetaceans	The Habitats Directive makes provision for European Protected Species licensing, for animals and plants in need of strict protection, which are listed on Annex IV and whose natural range includes Great Britain.
	Annex V (Species of Community Interest) - grey seal; common seal	Annex V of the Habitats Directive includes animal and plant Species of Community Interest, whose taking in the wild and exploitation may be subject to management measures. The UK is required to conduct surveillance of the conservation status of species included on Annex V, and to use this surveillance to inform whether extra measures are necessary. The UK is further required to report on the conservation status of Annex V species every six years.

Legislation	Species relevant to this assessment	Details
The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) in Scotland *and* Offshore Marine Conservation (Natural Habitats, and c.) Regulations 2007	***Schedule 2 and 4 (EPS)* –** All species of dolphins, porpoises and whales	The EU Habitats Directive is transposed into Scottish Law in the terrestrial environment and out to 12 nm by the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended). And into UK law for territorial water beyond 12 nm by the Offshore Marine Conservation Regulations 2007. The Habitats Regulations detail the protection given to EPS and describe the licencing system which allows otherwise illegal activities to be carried out.
	Schedule 3 (restrictions on capture/kill) – grey sea; common seal (all species of seal)	The Habitats Regulations enable the designation and protection of areas that host habitats and species of European importance in the offshore marine area. These sites can be designated as SACs (for the protection of habitats and species listed on Annex I and II of the Regulations), or Special Protection Areas (SPAs) (for the protection of wild bird species). As a matter of UK policy, protection is also extended to Ramsar sites.
Nature Conservation (Scotland) Act 2004	All cetaceans	The Act places duties on public bodies in relation to the conservation of biodiversity, increases protection for Sites of Special Scientific Interest (SSSI), amends legislation on Nature Conservation Orders and strengthens wildlife enforcement legislation among other things (see Wildlife and Countryside Act 1981 below)
Wildlife and Countryside Act 1981	***Schedule 5*** - All UK cetaceans	The Bern convention and the Bonn conventions are transposed into UK law through the Wildlife and Countryside Act 1981, amended in Scotland by the Nature Conservation (Scotland) Act 2004. It applies to the terrestrial environment and inshore waters (0-12 nautical miles), although certain provisions are gathered under the Nature Conservation Act 2004. The Act makes it an offence to intentionally kill, injure, sell or take any wild animal listed on Schedule 5, which includes a number of marine species. In some circumstances these activities are allowed but only for certain purposes and using particular methods. It also prohibits interference with or destruction of places used for shelter or protection, or intentionally disturbing animals.
	Schedule 6 – protection of wildlife	Nature Conservation (Scotland) Act 2004 contains measures to improve the existing species protection offered by the Wildlife and Countryside Act 1981, including the extension of existing protection for cetaceans from international disturbance.
Marine (Scotland) Act (2010) and the Marine and Coastal Access	All seals	Marine (Scotland) Act (2010) replaces the Conservation of Seals Act 1970. It provides for the protection and conservation of seals in Scotland and adjacent territorial waters, establishing new powers to designate MPAs in Scotland, and in UK offshore waters (MCAA). The Marine (Scotland) Act (2010) provides enhanced seal protection measures balanced by appropriate management under a new licensing system. It considers an offence to disturb seals at designated haul-out

Legislation	Species relevant to this assessment	Details
Act (2010) (MCAA)		sites and prohibits the taking of seals unless a licence is granted (Section 6), which must advocate for the protection of fisheries and/or aquaculture activities, or with a scientific and/or welfare purpose.
Marine Works (Environmental Impact Assessment) Regulations (2007) as amended *and* Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011	All marine mammals	EIA Directive (85/337/EEC as amended by 97/11/EC) is transposed into Scottish law through the Marine Works Regulations (2007) as amended, relevant to those elements of the Project which require a marine license under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Action 2010; and the Town and Country Planning (Scotland) Regulations 2011, relevant to the onshore elements of the Project which require planning permission under the Town and Country Planning (Scotland) Act 1997. The purpose of the EIA Directive is to ensure that the potential effects of a project on the environment are taken in consideration before development consent is granted.
Marine Nature Conservation Strategy: *Priority Marine Features*	Bottlenose dolphin, Harbour porpoise, Minke whale, White-beaked dolphin, Harbour and grey seals.	The Marine Nature Conservation Strategy establishes a number of Priority Marine Features, which are species and habitats that have been identified through a scientific evaluation of Scotland's marine biodiversity. They represent species and habitats of marine conservation importance for which it would be appropriate to use both area based and non-area based mechanisms to achieve better protection, and for which action will be prioritised via a three-pillar approach, i.e. species measures, site-based measures, and wider seas policies and measures as set out in Marine Scotland's Marine Nature Conservation Strategy.

Species accounts

Grey seal

13.5.12. The distribution of grey seal is restricted to the North Atlantic. The northeast Atlantic population is estimated at around 110,000 individuals, 60,000 of which are associated with the colonies in Orkney, Shetland and the East coast of Scotland (Hammond *et al.,* 2004).

13.5.13. Grey seals are the larger of the two resident UK seal species, with males weighing over 300 kg and females around 150-200 kg. Males may live for over 20 years and begin to breed from about age 10 whilst females often live longer (up to 30 years) and begin to breed at about age 5 (Thompson and Duck, 2010). They tend to congregate at traditional breeding colonies and often return to the same place in the same colony in successive years (Duck, 2007; SCOS, 2010).

13.5.14. Grey seals are generalists, feeding primarily on the sea bed at depths up to 100 m (Thompson and Duck, 2010). In the UK their diet is primarily composed of sandeels, whitefish (cod, haddock, whiting, ling) and flatfish (plaice, sole, flounder, dab). They forage in the open sea returning to haul out on land to rest, moult and breed. Tracking of individual seals has shown that they can feed up to several hundred kilometres offshore, however most foraging activity generally takes place within 100 km of a haul out site (SOCS, 2010; Thompson and Duck, 2010). Research carried out in the Moray Firth on grey seal (Thompson *et al*., 1996), suggest foraging ranges may extend up to 145 km from haul out sites.

13.5.15. Individual grey seals based at a specific haul out site often make repeated trips to the same region offshore, but will occasionally move to a new haul out site, often several hundred km away and begin foraging in a new region (e.g. there is evidence of movements of grey seals between haul out sites in the North Sea and the Outer Hebrides) (Thompson and Duck, 2010). In the UK they spend longer hauled out during their annual moult (December to April) and during the breeding season (August to December) than during other times (Thompson and Duck, 2010).

13.5.16. An indication of the spatial distribution of the main grey seal breeding colonies around the UK is given in Figure 13.1, from Defra (2010). As shown, the area around Peterhead is not considered to be of particular relevance in terms of breeding for this species. Survey work carried out by SMRU outside the breeding season, however, indicate that there a number of haul out sites of relative importance in the vicinity of Peterhead (Thompson and Duck, 2010). In the proximity of the proposed development seals are frequently observed hauled out on the Skerry just outside the harbour and in other neighbouring areas where they are expected to occur year-round. Thus, it is anticipated that at times they will be present within the harbour[30] (PPA, 2007).

13.5.17. The location of grey seal haul out sites in the East coast of Scotland as recorded during SMRU's surveys in 2008 is shown in Figure 13.2 and Figure 13.3.

13.5.18. Further information on the distribution of grey seals is given in Figure 13.4 This shows total (at sea and hauled out) estimated densities of seals by 5 x 5 km grid squares (Jones *et al*., 2013). As shown, areas around Peterhead record relatively low seals densities.

[30] Grey seals were observed within the harbour during the ornithological survey conducted at Peterhead Harbour (4th and 5th March, 2014). It is estimated that there are about grey 10 seals moving around the harbour at various locations. They tend to be in the South Harbour and Sir Albert Basin, then rest on the back of the Sir Albert Quay rock protection (PPA, pers. comm. 2014).

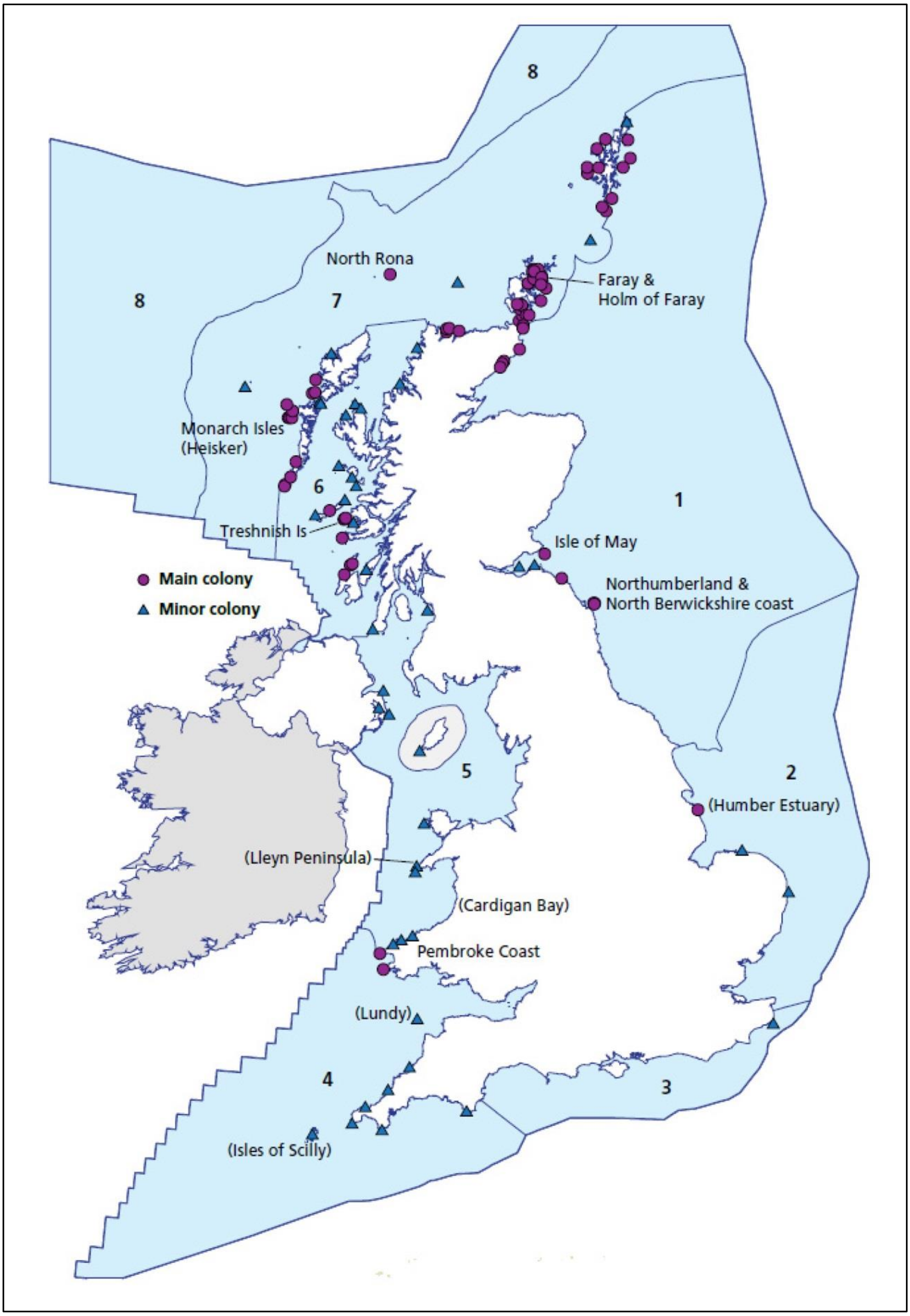


Figure 13.1: The location of grey seal breeding colonies in UK. Text labels identify SACs where grey seals are primary reason for site selection. Site names in brackets are SACs where grey seals are qualifying features, but not primary reason for site selection (Source: Defra, 2010).

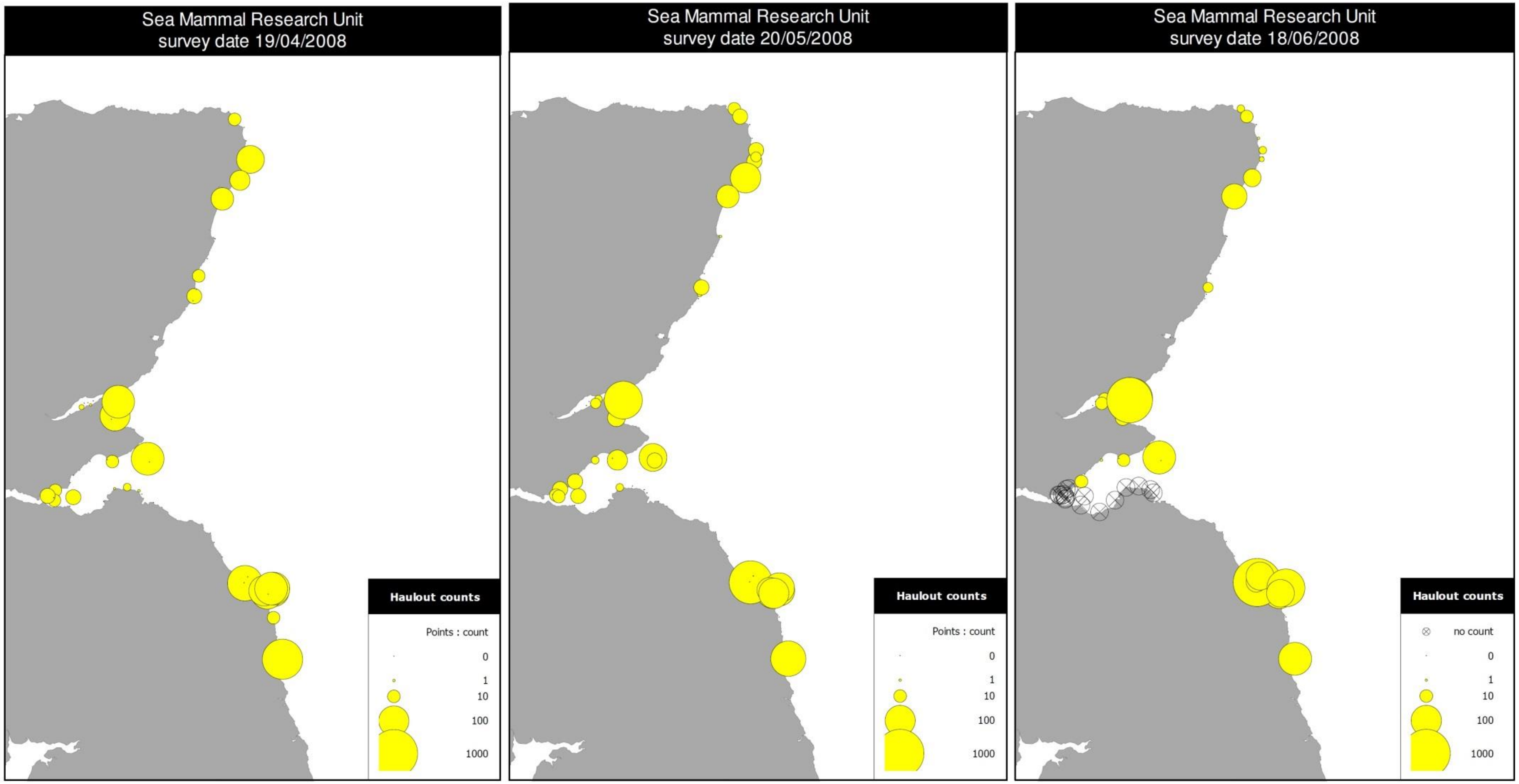


Figure 13.2: Distribution of grey seal haul out site along the east coast from Fraserburgh to Coquet Islands. April-June 2008 SMRU Surveys (Source: Thompson and Duck, 2010).

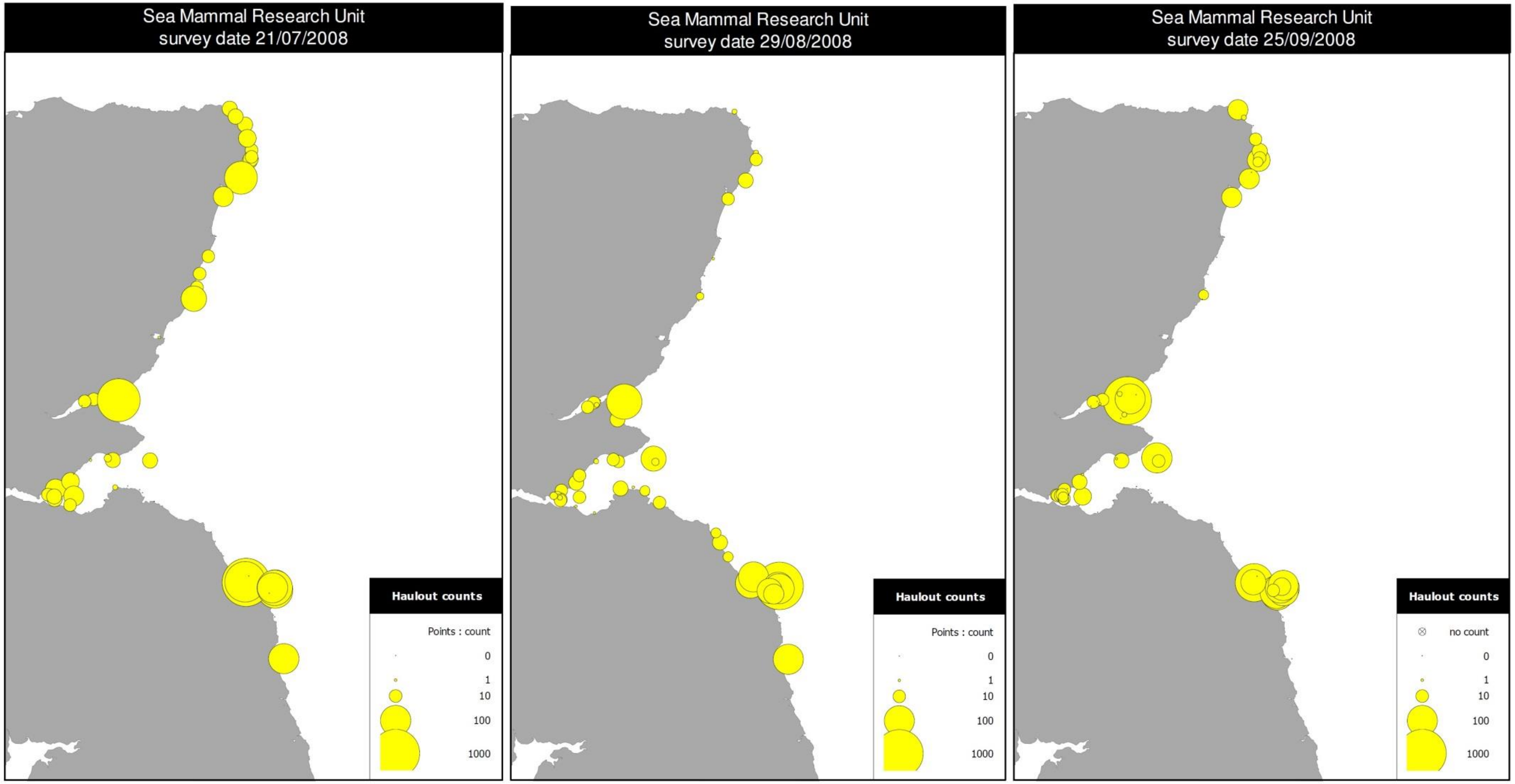


Figure 13.3: Distribution of grey seal haul out site along the east coast from Fraserburgh to Coquet Islands. July-September 2008 SMRU Surveys (Source: Thompson and Duck, 2010).

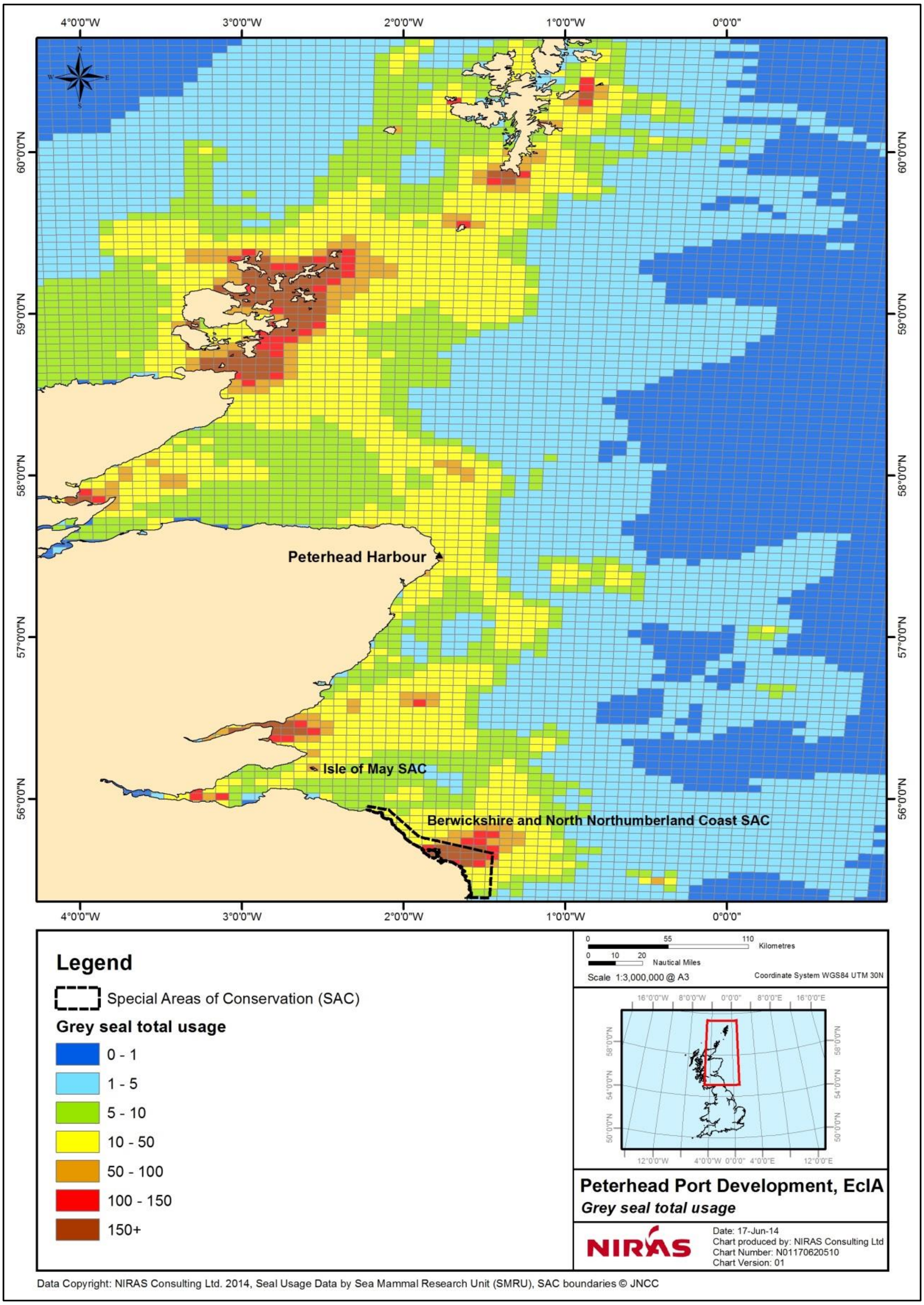


Figure 13.4 Total (at sea and hauled out) estimated densities of grey seals in the East Coast of Scotland (Source: MSi, 2014).

Harbour seal

13.5.19. Harbour seals are one of the most widespread species of pinnipeds, being found throughout the coastal waters of the Northern Hemisphere, form temperate to polar regions. They are mainly found in coastal waters of the continental shelf and slope, and are also commonly found in bays, river, estuaries and intertidal areas (Thompson & Härkönen, 2008).

13.5.20. In Scotland, they are widespread around the west coast, Hebrides and Northern Isles, whereas on the east coast, their distribution is restricted to the Firth of Tay and the Moray Firth (SCOS, 2013).

13.5.21. Female harbour seals become sexually mature at 3 to 5 years of age and gestation lasts between 10.5 to 11 months, including a two month delayed implantation period. Longevity is typically 35 years in females and 25 years in males (Thompson and Härkönen, 2008).

13.5.22. Studies on the diet of harbour seals suggest that whiting and sandeels are their dominant prey species (Hall and Kershaw, 2012). They tend to forage over shorter distances from haul out sites compared with grey seal, with published studies from the North Sea suggesting that most harbour seals forage within 40 km to 50 km of their haul outs (Hammond *et al*., 2004; Duck, 2010; SCOS, 2013). Studies undertaken in the Moray Firth (Thompson *et al.,* 1996) indicate that harbour seals from this areas forage within 60 km of their haul out sites and move over relatively short distances to alternative haul out sites (i.e. 75 km).

13.5.23. An indication of the distribution and number of harbour seal in the UK is given in Figure 13.6 (Defra, 2010). This is based on survey data collected between 2000 and 2006 during August. Population surveys of harbour seals are not carried out during their breeding season but during their annual moult given that, unlike grey seals, harbour seals do not congregate for breeding (SMRU, 2011). As shown in Figure 13.6, records of harbour seals in areas around Peterhead appear to be limited. Similarly, records from surveys carried out between 2007-2009 (Hall and Kershaw, 2012), further suggest a limited presence of harbour seals around the Peterhead area in comparison to other areas in Scotland.

13.5.24. Further information on the distribution of harbour seals is given in Figure 13.7. This shows total (at sea and hauled out) estimated densities of seals by 5 x 5 km grid squares (Jones *et al*., 2013). As shown, relatively low seal densities have been recorded in areas around Peterhead.

13.5.25. It should be noted that Scottish harbour seal numbers have been reduced dramatically over the last decades. This was first observed following surveys undertaken in early 2000's (Hall and Kershaw, 2012) with a decline in numbers of over 50% in Shetland, Orkney and the east coast of Scotland, and a smaller decline in the Outer Hebrides (Baxter *et al.,* 2011). This decline is illustrated in Figure 13.5 based on counts of harbour seals in individual management areas in Scotland.

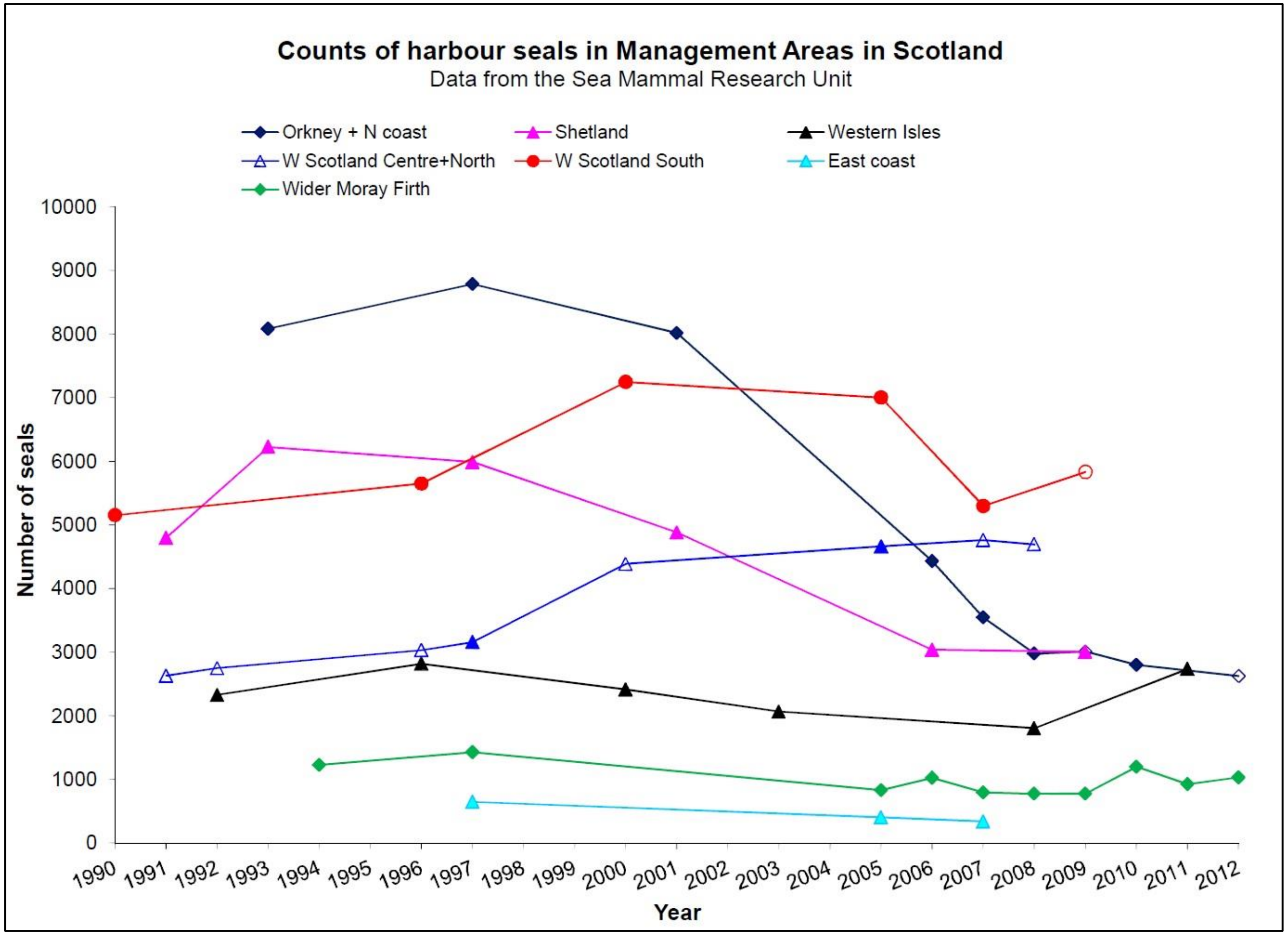


Figure 13.5: Trends in counts of harbour seal by Management Area in Scotland (Source: SCOS, 2013).

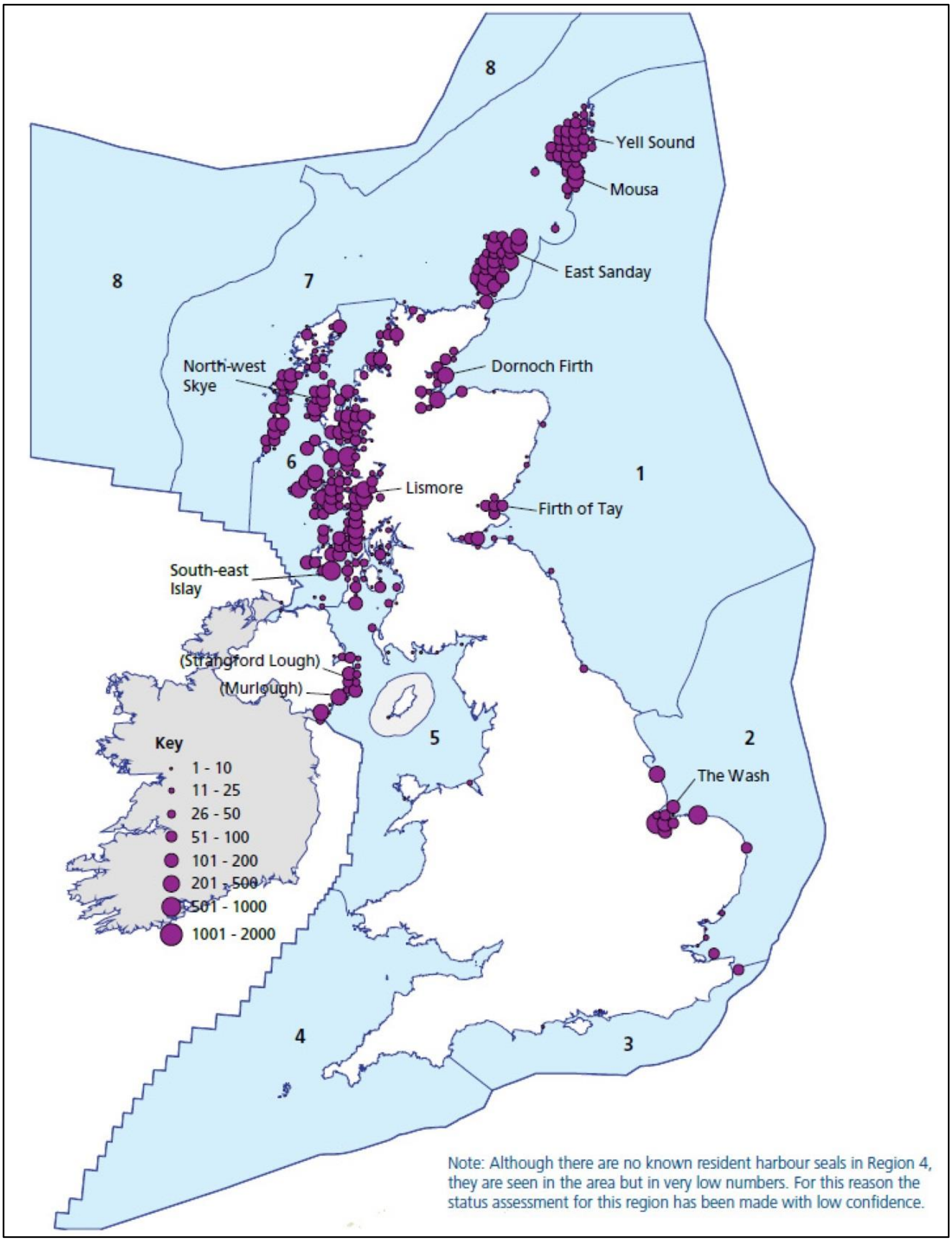


Figure 13.6: The distribution and number of harbour seals in Great Britain and Northern Ireland in August, by 10 km squares, from surveys carried out between 2000 and 2006. Text labels identify SACs where grey seals are primary reason for site selection. Site names in brackets are SACs where harbour seals are qualifying features, but not primary reason for site selection (Source: Defra, 2010).

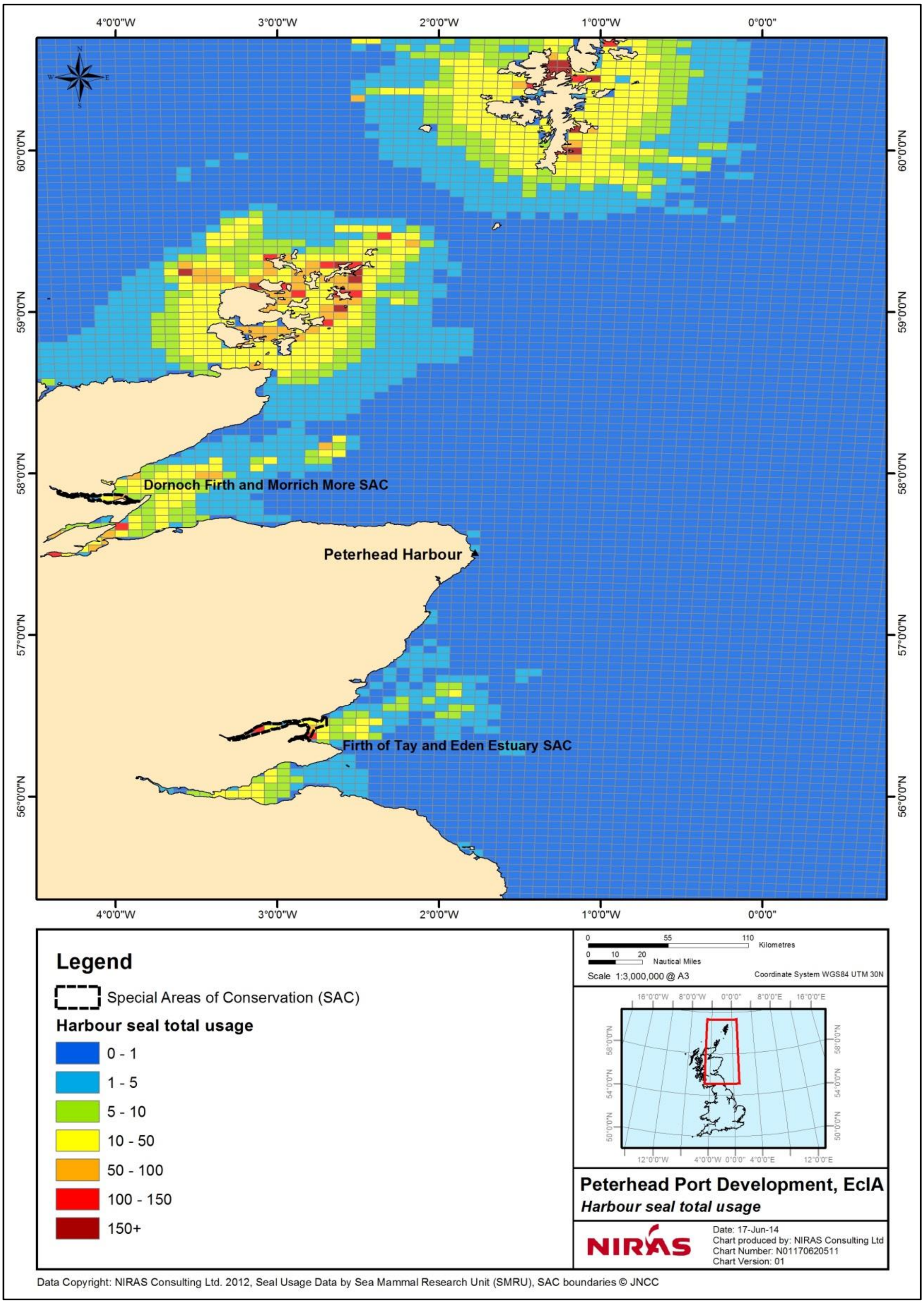


Figure 13.7: Total (at sea and hauled out) estimated densities of harbour seals in the East Coast of Scotland (Source: MSi, 2014).

Harbour porpoise

13.5.26. The distribution of harbour porpoise is restricted to temperate and sub-arctic seas of the Northern Hemisphere. In the eastern North Atlantic, the species is common and widely distributed on the continental shelf (mainly at depths of 20-200 m) from the Barents Sea and Iceland south to the coasts of France and Spain (Evans *et al.,* 2003). They are the most common cetaceans recorded in British waters, being most abundant along western and northern Scotland, east Scotland and northeast England and in some coastal areas within the Irish Sea, particularly off south-west Wales (Anderwald and Evans, 2010).

13.5.27. They generally travel in groups of between 2 to 8 individuals (Shirihai and Jarrett, 2006), and feed mainly on small shoaling fish. A wide range of species have been recorded in their diets, however in a given area they tend to feed on two to four main species. In Scottish waters these are primarily whiting and sandeels (Santos *et al*., 2003; Santos *et al*., 2004). Mating and parturition is thought to occur between May and August with gestation lasting approximately 11 months (Learmonth, 2006).

13.5.28. An indication of the distribution of this species in coastal areas off the east of Scotland (from Portnockie to St. Andrews Bay) is given in Figure 13.8 based on sightings data as presented in Anderwald and Evans (2010). Sightings corrected for survey effort (sightings/hour and individuals/hour) are presented in Figure 13.9. A shown, harbour porpoise appears to be widely distributed in the region, including coastal areas around Peterhead, with no particular area of concentration (Figure 13.8 and Figure 13.9). Further information on harbour porpoise use of coastal areas in the proximity of Peterhead is given in Figure 13.3. This shows data on harbour porpoise presence collected between June 2013 and November 2013 by acoustic loggers at a number of locations along the east coast of Scotland (MSS, 2014). The closest records to the proposed development are for moorings located off Fraserbourgh and Cruden Bay. As shown, around these areas harbour porpoises were recorded every day during the data collection period. Given the indicative distribution of porpoises around the whole Scottish coast, it is considered likely that porpoises will also present most days in coastal areas off Peterhead (MSS, pers. comm, 2014). It should be noted, however, that to date there are no records of sightings of this species within Peterhead Harbour or Peterhead Bay (PPA, 2007; PPA pers. comm., 2014).

13.5.29. The distribution of harbour porpoise in a wider context is shown in Figure 13.11 and Figure 13.12. These present densities of harbour porpoise modelled based on data collected during the SCANS 1994 and SCANS-II 2005 surveys, respectively. As shown, densities for this species in coastal areas north of Aberdeen including Peterhead and its vicinity are relatively low, with highest densities being recorded in the southern and central parts of the North Sea in the most recent survey (SCANS-II, 2006). Comparison of SCANS-II (2005) and SCANS (1994) survey results suggest a trend towards a southward shift in the distribution of this species (SCANS-II, 2006; Hammond *et. al.,* 2008).

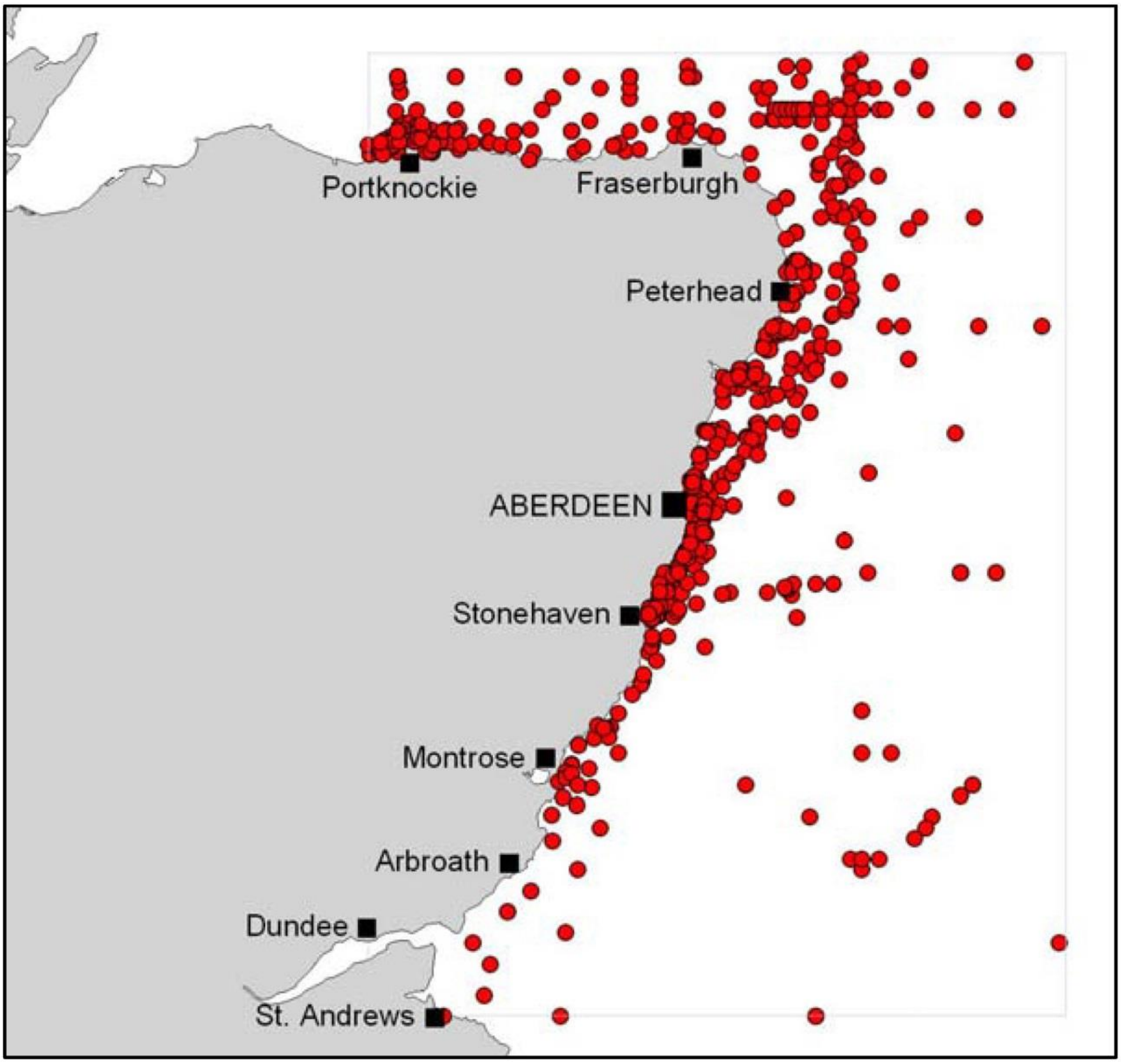


Figure 13.8: Distribution of harbour porpoise sightings in East Grampian Region (Source: Anderwald and Evans, 2010).

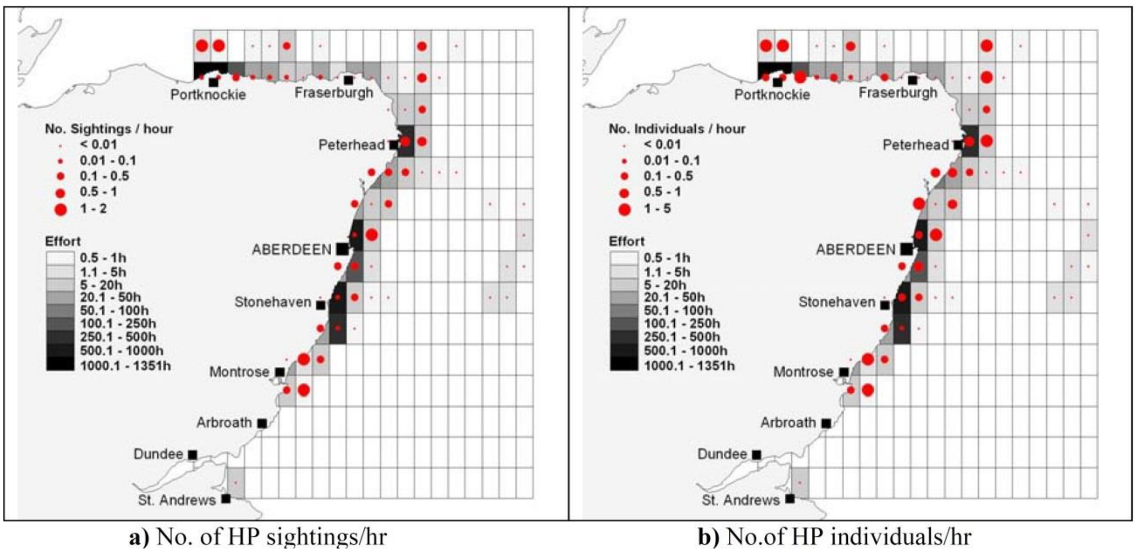


Figure 13.9: Distribution of harbour porpoise sightings corrected for effort (Source: Anderwald and Evans, 2010).

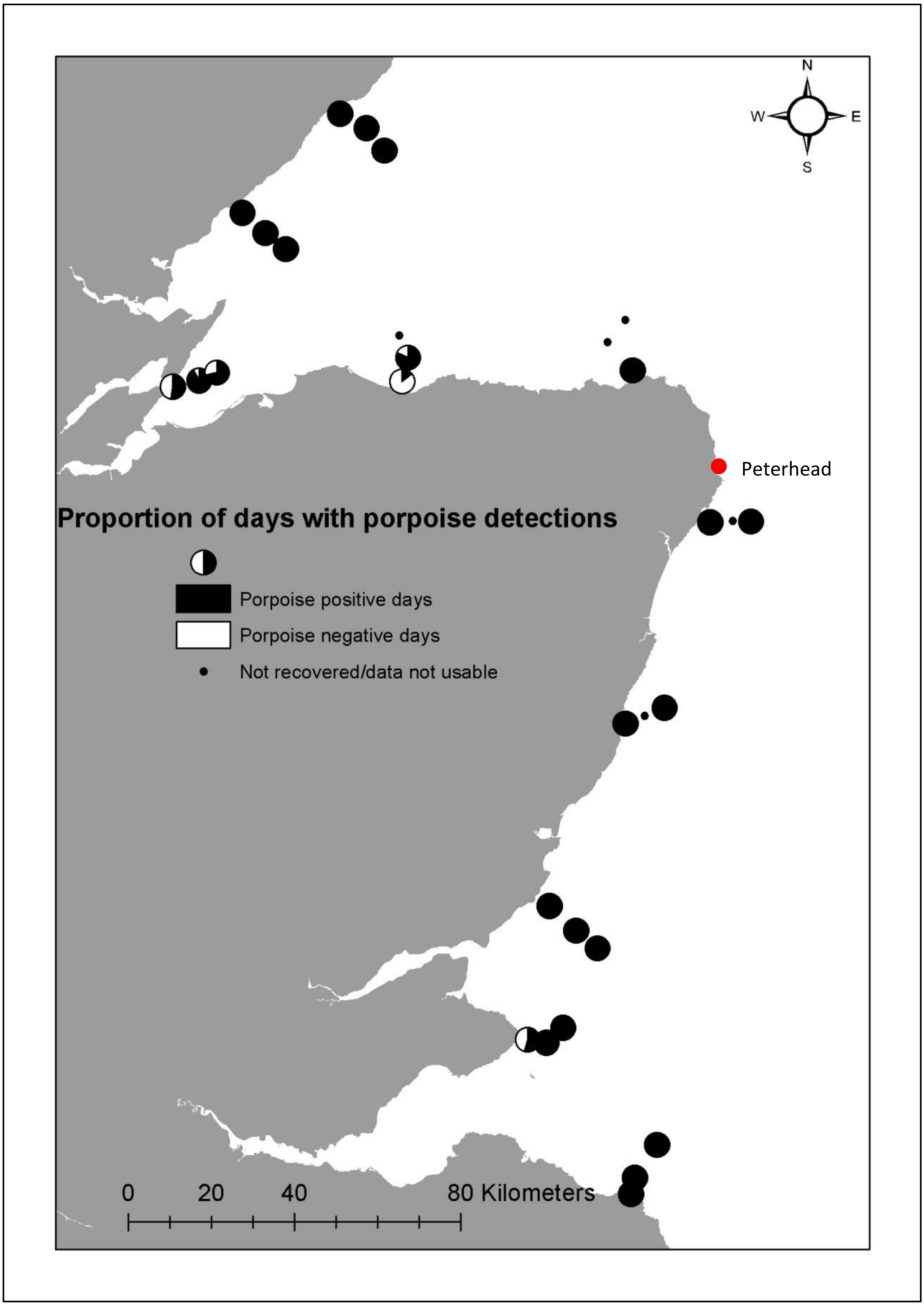


Figure 13.10 Proportion of days with harbour porpoise detections during June 2013 and November 2013 (MSS, 2014).

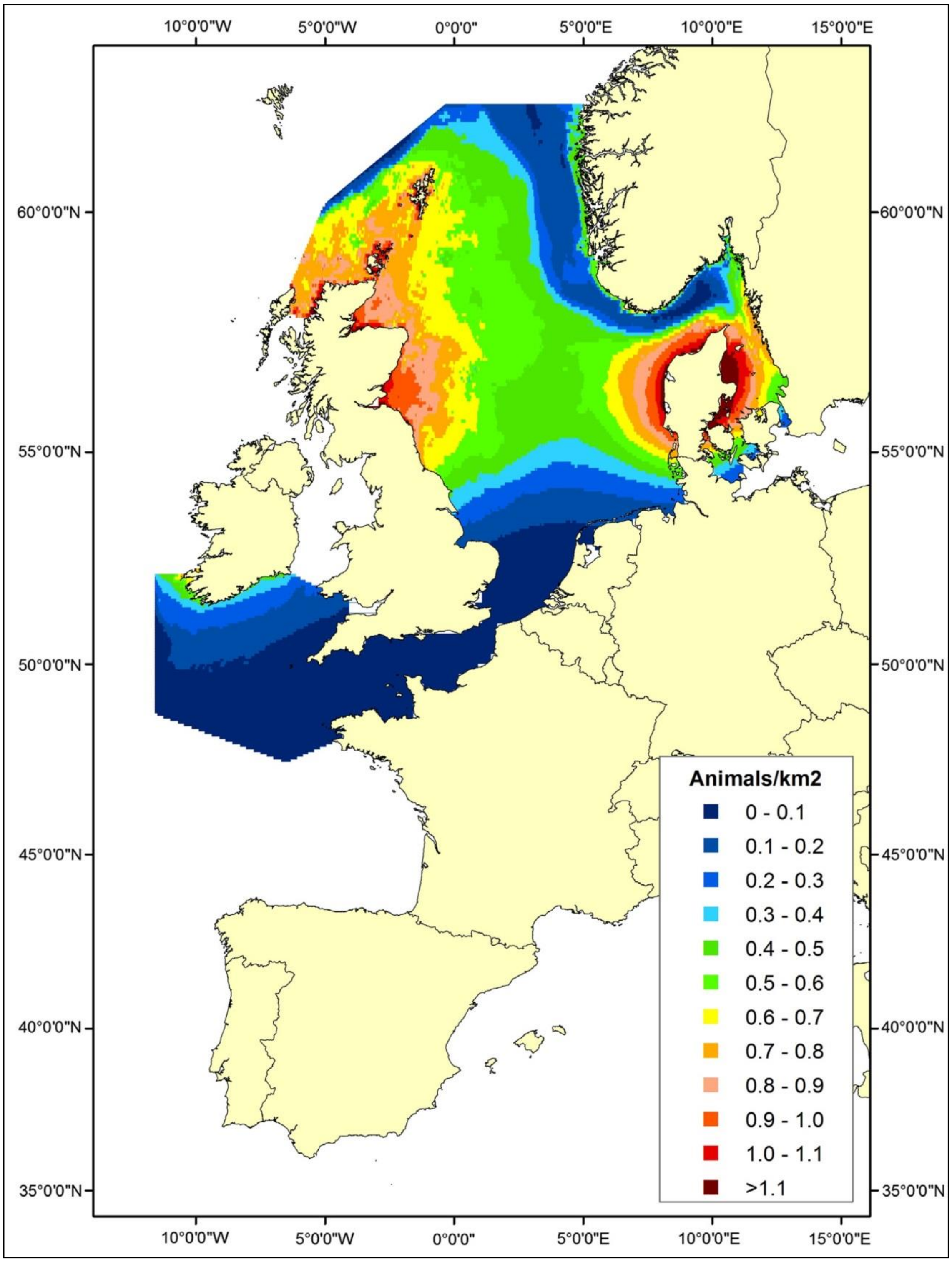


Figure 13.11: Harbour porpoise estimated density surface (animals per km^2) SCANS 1994 Survey (Source: Hammond *et al*., 2013).

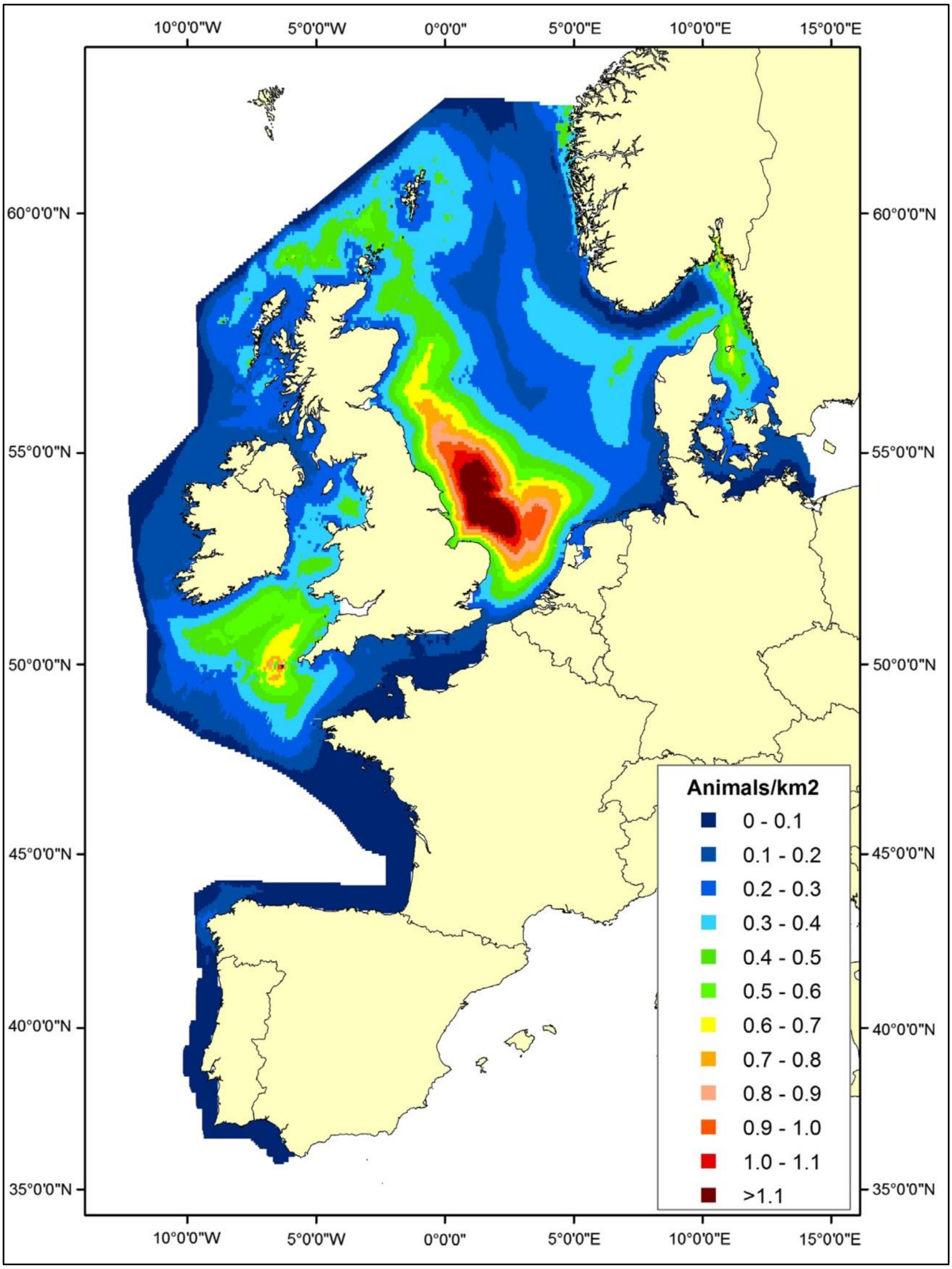


Figure 13.12: Harbour porpoise estimated density surface (animals per km^2) SCANS-II 2005 Survey (Source: Hammond *et al.,* 2013).

Bottlenose dolphin

13.5.30. Bottlenose dolphins are widely distributed, occurring in tropical and temperate seas in both hemispheres. They are found in a diverse range of habitats, from shallow estuaries and bays to the continental shelf edge and deep open oceans (Reid *et al.,* 2003).

13.5.31. In British waters they are most commonly sighted in coastal areas within 10 km of land (Anderwald and Evans, 2010). They can, however, also occur offshore, often in association with other dolphins or whales. Sightings are generally of single animals or small groups of up to 25 animals (Moray Firth SAC Management Group, 2009).They begin to breed between about 5 and 12 years of age, with females having a single calf every 2-3 years. Each calf usually stays with its mother for around 4 years (Moray Firth SAC Management Group, 2009).

13.5.32. The Moray Firth and the east coast of Scotland supports the only resident population of bottlenose dolphins in the North Sea (Hammond *et al.,* 2004). They are present throughout the year from Caithness south to the North Yorkshire coast, particularly in the Moray Firth, Grampian coast and St. Andrews Bay (Anderwald and Evans, 2010).

13.5.33. Bottlenose dolphins are listed in Annex II of the Habitats Directive and there is therefore a regulatory need to manage human activities to minimise any risk to the viability of the this species in European waters. The Inner Moray Firth is a SAC designated, in part, to protect the resident population of bottlenose dolphin. This protection is not geographically limited and follows the dolphin population wherever they go (Lusseau *et al.,* 2011). It should be noted that resident individuals of the SAC have been found as far south as St. Andrews Bay (Wilson *et al.,* 1997). In line with this, research by Cheney *et al.* (2012a) suggest that on the east coast of Scotland the bottlenose dolphin population is an interacting population between the Moray Firth and Fife.

13.5.34. Bottlenose dolphins feed on a wide range of benthic and pelagic fish as well as cephalopods and shellfish (Reid *et al*., 2003). Data from stomach contents caught around Scotland suggest their diet is primarily composed of cod, saithe and whiting (Santos *et al.,* 2001).

13.5.35. An indication of the distribution of this species in coastal areas off the east of Scotland (from Portnockie to St. Andrews Bay) is given in Figure 13.13 based on sightings data as presented in Anderwald and Evans (2010). A shown, the majority of sightings of this species in this area have been recorded between Aberdeen and Stonehaven. Whilst this likely reflects the greater survey coverage in this area,two hotspots for this species (outside the Moray Firth area) areapparent from the data: one around Aberdeen and other between Stonehaven and Montrose (Anderwald and Evans, 2010). This is further illustrated in Figure 13.14, where bottlenose dolphins sightings are presented corrected for survey effort. In line with this, results of boat based surveys carried out during the winters of 2007/2008 outside the Moray Firth SAC (Cheney *et al*., 2011), further suggest areas around Aberdeen and to the south of Aberdeen, record relatively higher bottlenose dolphin sightings.

13.5.36. Further information on bottlenose dolphins use of coastal areas around Peterhead is given in Figure 13.15. This shows data on dolphin species[31] presence collected between June 2013 and November 2013 by acoustic loggers along a number of locations off the east coast of Scotland (MSS, 2014). As shown, the areas around Fraserburgh and Cruden Bay, are the closest locations to the proposed project where data were collected, and in these areas dolphins were recorded around 20 - 25% of the days during the data collection period.

[31] Note that the data shown does not discriminate between species of dolphin.

13.5.37. The data provided in Figure 13.13 - Figure 13.15 suggest bottlenose dolphin transit coastal areas in the proximity of Peterhead. It should be noted, however, that there are to date no reported sightings of this species within Peterhead Harbour or Peterhead Bay (PPA, 2007; PPA pers comm., 2014).

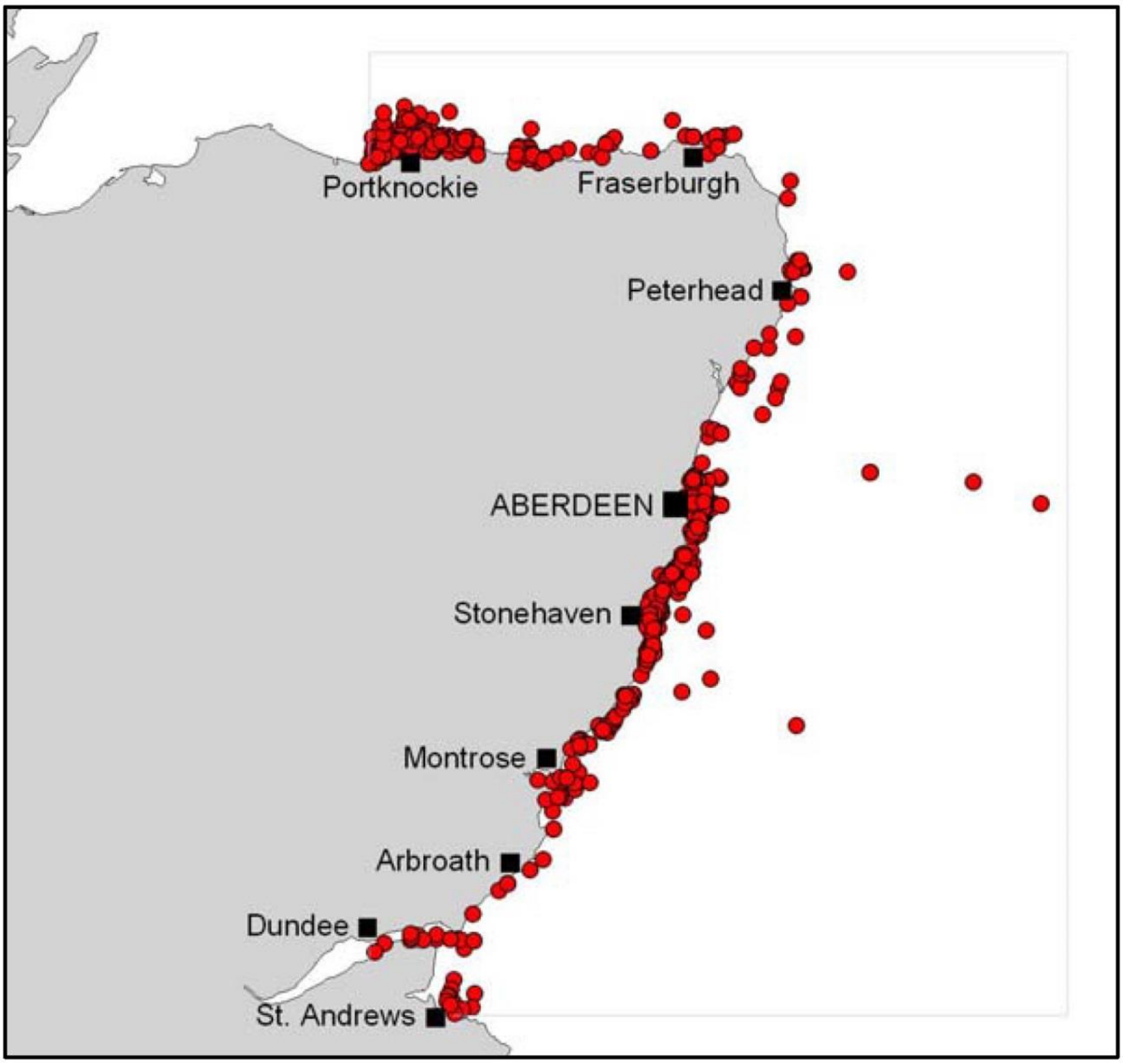


Figure 13.13: Distribution of Bottlenose Dolphin sightings in East Grampian Region (Source: Anderwald and Evans, 2010).

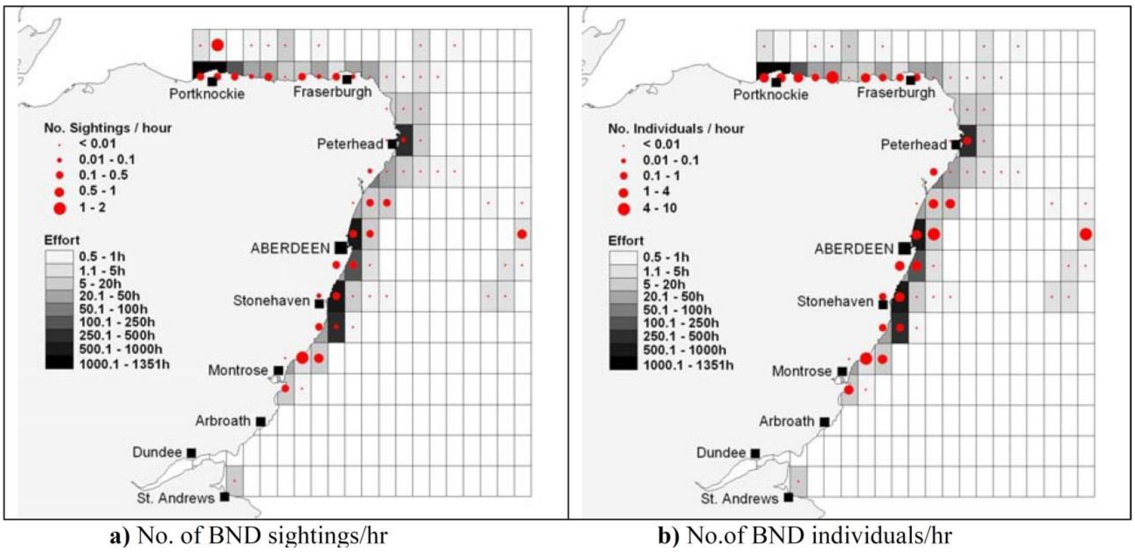


Figure 13.14: Distribution of bottlenose dolphin sightings corrected for effort (Source: Anderwald and Evans, 2010).

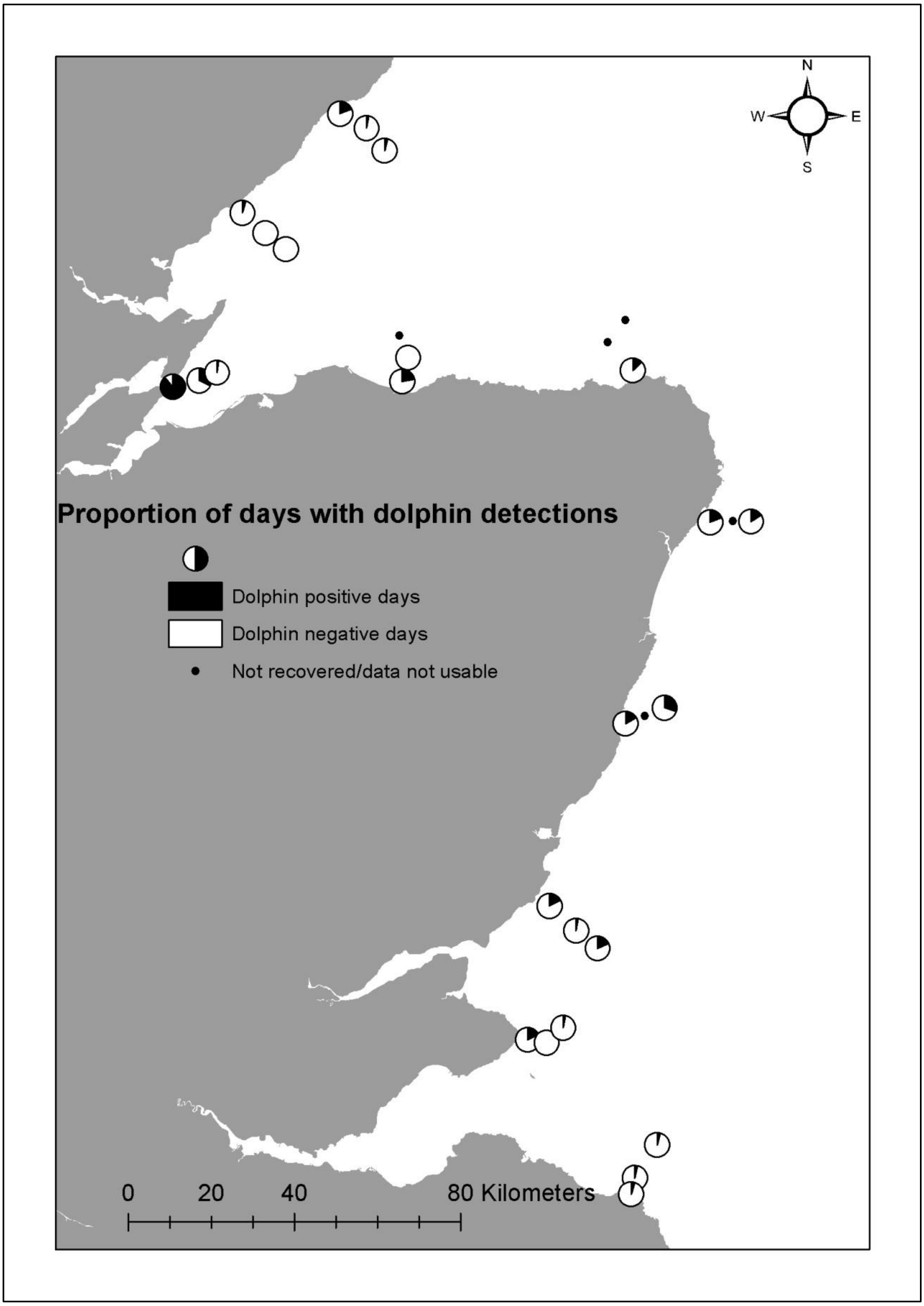


Figure 13.15 Proportion of days with dolphins detections during June 2013 and November 2013 (MSS, 2014).

White-beaked dolphin

13.5.38. White-beaked dolphins are endemic to the North Atlantic and are usually found over the continental shelf in waters of 50-100 m depth (Reid and Evans, 2003). They are present in Scottish waters throughout the year. The UK population accounts for a significant proportion of the worldwide population of this species. Approximately 80% of the European population is in UK waters and primarily in waters around Scotland and off northeast England (Calderan *et al.,* 2013).

13.5.39. In the northern North Sea they typically occur offshore an in late summer between June and September (peaking in August) are rarely reported between November and April (Weir *et al*., 2007; Anderwald and Evans, 2010). Mating occurs during the warmer months, with calving during the summer between June and September (Hammond *et al.,* 2013). It is unclear where birthing occurs as there is evidence to suggest that it can occur both inshore and offshore (Canning *et al.,* 2008; Weir *et al.,* 2007).

13.5.40. Their diet consist of a variety of fish including mackerel, herring, cod, capelin, whiting, haddock, hake, scad, snow crab and various other species. They also feed on cephalopods, particularly octopus (Reid and Evans, 2003). Stomach contents analysis of individuals stranded on the east coast of Scotland, however, indicate that whiting and haddock are the predominant fish species being taken by this species (Canning *et al*., 2008).

13.5.41. An indication of the distribution of this species in coastal areas off the east coast of Scotland (from Portnockie to St. Andrews Bay) is given in Figure 13.16 based on sightings data as presented in Anderwald and Evans (2010). Sightings corrected for survey effort (sightings/hour and individuals/hour) are presented in Figure 13.17.

13.5.42. As indicated in Figure 13.16 and Figure 13.17, in this region, white-beaked dolphins have been seen regularly over wide areas both nearshore and offshore. It is apparent from the data that the highest densities of sightings in this area of Scotland concentrate between Aberdeen and Stonehaven with areas immediately around Peterhead recording relatively lower sightings densities.

13.5.43. It should also be noted, that as for the remaining key species of cetaceans included in this assessment, there are to date no records of white-beaked dolphins within Peterhead Harbour itself or Peterhead Bay (PPA 2007; PPA pers. comm, 2014).

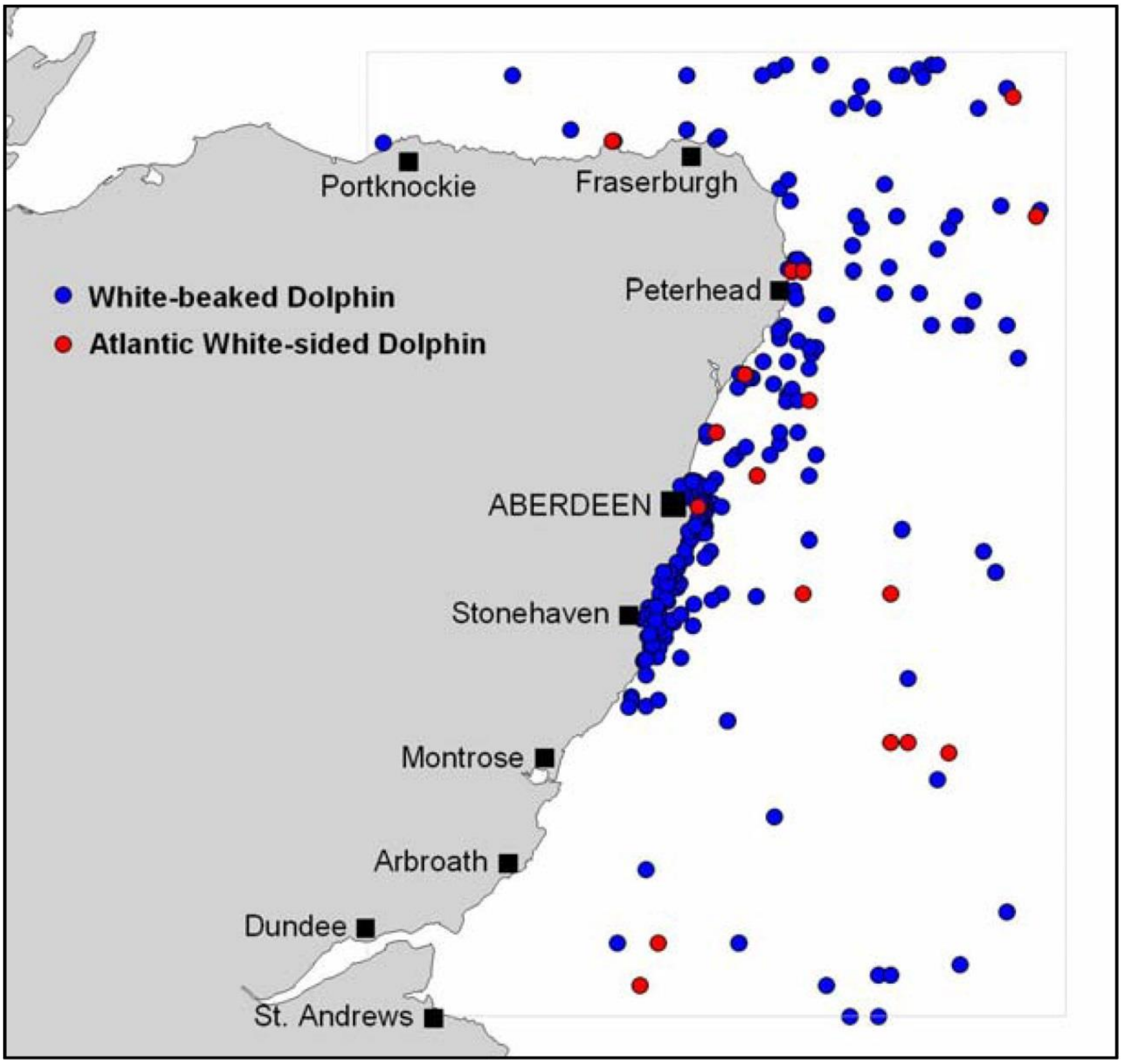
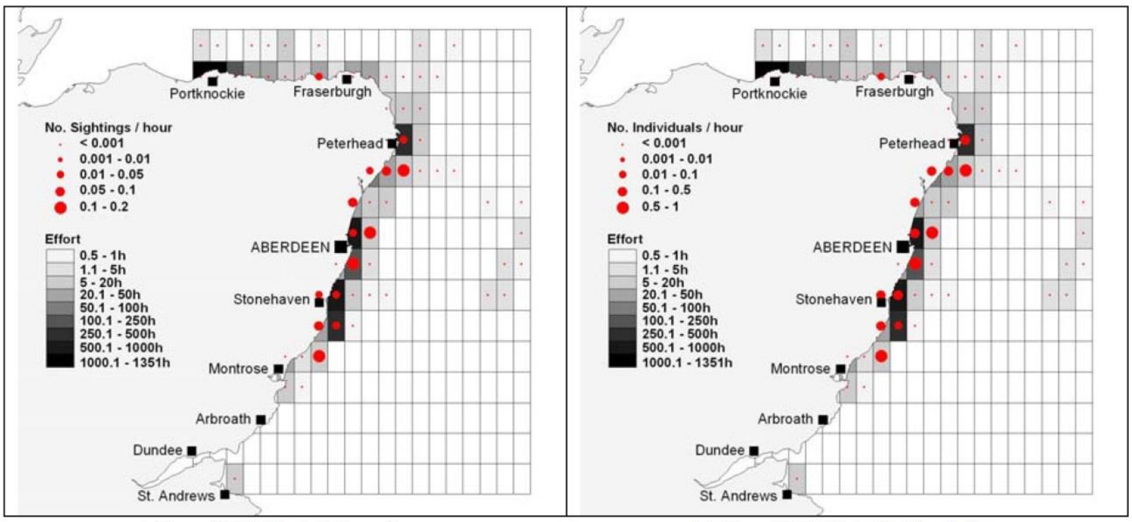


Figure 13.16: Distribution of white-beaked dolphin (blue dots) in East Grampian Region (Source: Anderwald and Evans, 2010).



a) No. of WBD sightings/hr **b)** No.of WBD individuals/hr

Figure 13.17: Distribution of white-beaked dolphin sightings corrected for effort (Source: Anderwald and Evans, 2010).

Minke whale (Balaenoptera acutorostrata)

13.5.44. Minke whales have a wide distribution around the world, being sub-divided into three distinct populations: Southern Hemisphere, Northern Pacific and North Atlantic. In the North Atlantic, the International Whaling Commission recognises three stocks for management purposes: NE Atlantic, west Greenland and Canadian east coast. Minke whales in the east coast of Scotland area are part of the NE Atlantic stock (Hammond *et al*., 2004).

13.5.45. In UK waters, minke whales are distributed mainly around Scotland and in the northern and central North Sea regularly south to the Yorkshire coast, with small numbers also in the Irish Sea and western English Channel (Evans *et al*., 2003; Reid *et al.,* 2003). The majority of sightings within continental shelf waters occur between May and September, with peak numbers from July to September, depending on the region (Evans *et al*., 2003). They are found generally singly although in some occasions they may be seen in groups of more than two (Reilly *et al.,* 2008).

13.5.46. An indication of the distribution of this species in coastal areas off the east of Scotland (from Portnockie to St. Andrews Bay) is given in Figure 13.18 and Figure 13.19 based on sightings data as presented in Anderwald and Evans (2010). A shown, minke whale sightings are widely distributed within the region, occurring more often close to the coast, particularly between Stonehaven and Aberdeen. This is in line with studies carried out off the Aberdeenshire coast (Weir *et al*., 2007) which recorded highest concentrations of sightings in the immediate vicinity of Aberdeen and to a lesser extent the south towards coastal areas off Stonehaven.

13.5.47. As presented in Figure 13.18 and Figure 13.19, this species has also been recorded in coastal areas in the proximity of Peterhead, in comparatively lower numbers. Further, to date there are no records of this species within Peterhead Harbour or Peterhead Bay (PPA 2007; PPA pers. comm, 2014).

13.5.48. It should be noted that minke whales are protected features in the proposed Southern Trench MPA proposal(SNH, 2014), which is located in the proximity of Peterhead. An indication of the distribution of this species in the Southern Trench is given in Figure 13.20 and Figure 13.21 . In line with data shown in Figure 13.18 and Figure 13.19, areas in the immediate proximity of Peterhead appear to record this species in relatively lower numbers.

13.5.49. A wider indication of the estimated densities of minke whale around the UK and Ireland is provided in Figure 13.22 as derived from the SCANS-II survey (SCANS-II, 2006) data. As shown, in this wider context, coastal areas around Peterhead present comparatively low densities for this species.

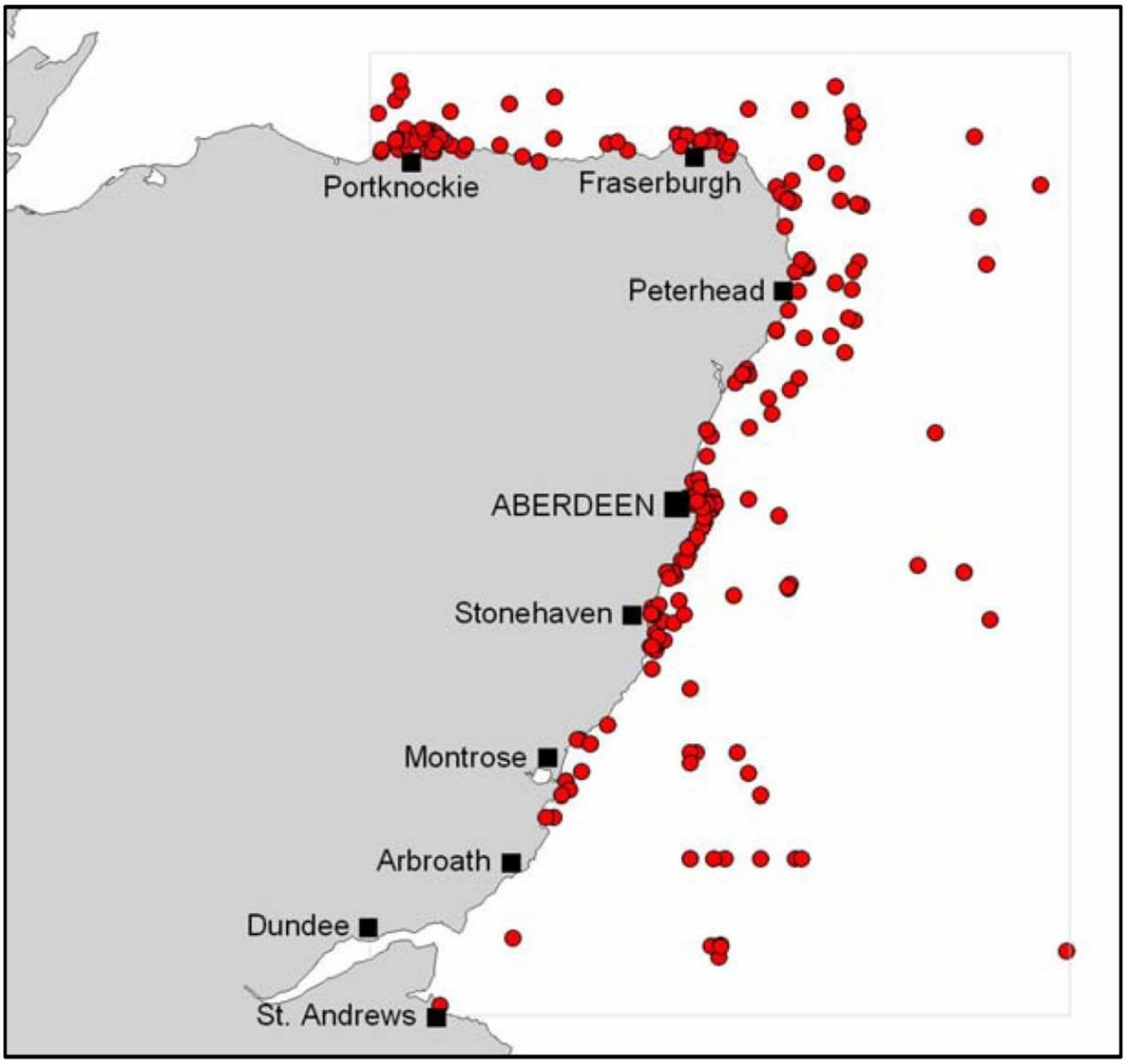


Figure 13.18: Distribution of minke whale in East Grampian Region (Source: Anderwald and Evans, 2010)

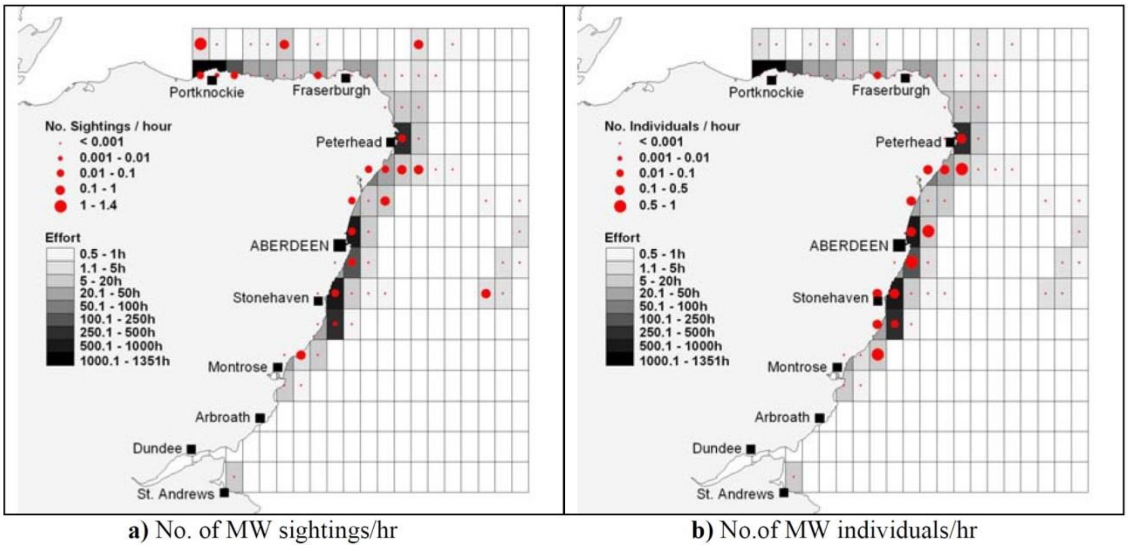


Figure 13.19: Distribution of minke whale sightings corrected for effort (Source: Anderwald and Evans, 2010).

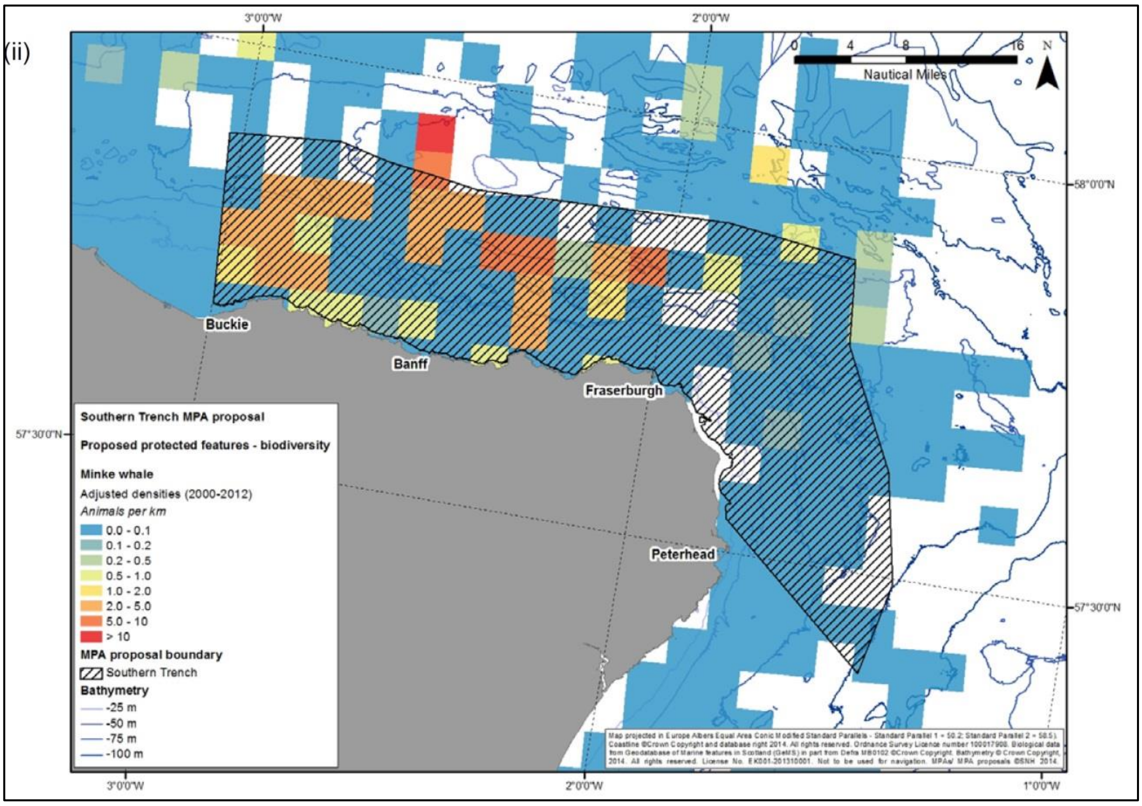


Figure 13.20: Minke whale adjusted densities (2000 -2012) (Source: SNH, 2014)

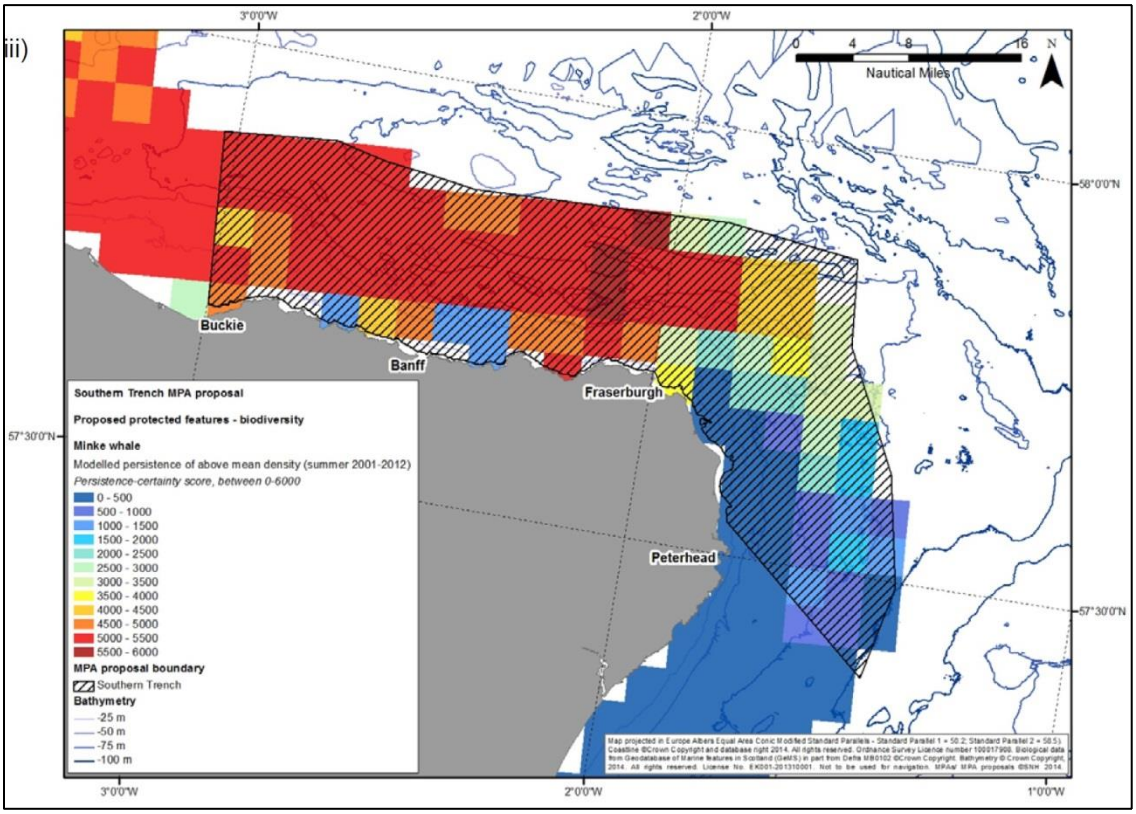


Figure 13.21: Modelled persistence of minke whale of above mean density (summer 2001-) in the Southern Trench MPA proposal (Source: SNH, 2014).

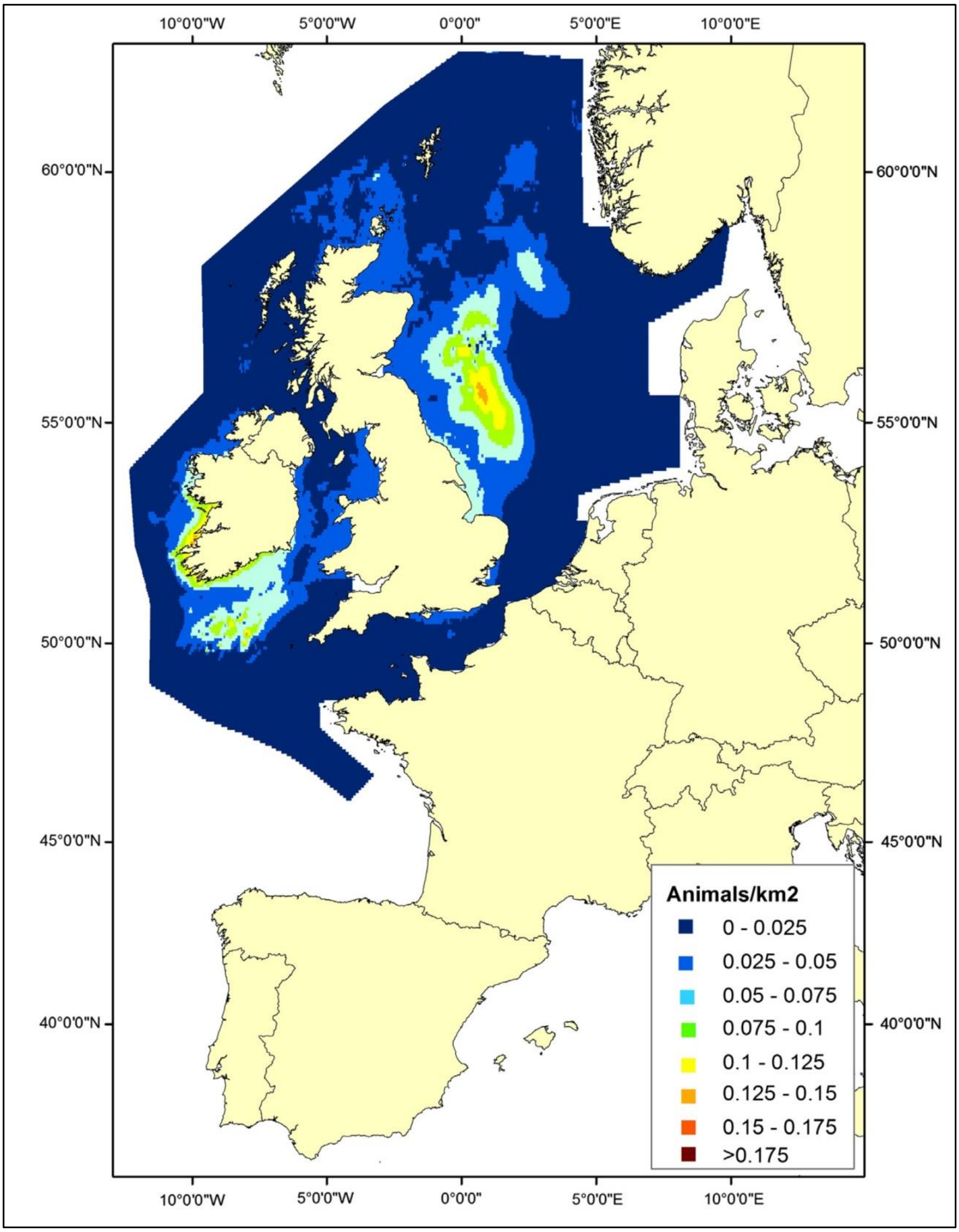


Figure 13.22: Minke whale estimated density surface (animals per km^2) in SCANS-II 2005 Survey (Source: Hammond *et al.,* 2013)

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Project Title	Underwater Noise Impact calculations in respect of underwater blasting at Peterhead Harbour
Project Number	E490
Client	Niras Fraenkel Ltd
Investigator	T I Mason
Company	Subacoustech Environmental Ltd
Report Number	E490IR0103
Date	4th November 2014

Introduction

The Inner Harbour Deepening and New Fishmarket development at Peterhead Harbour, Aberdeenshire, will require a selection of subsea works that will introduce varying degrees of noise to the local environment. These potentially include underwater blasting to break up bedrock for subsequent dredging, and coring into the substrate. Blast can generate substantial subsea pressure which is readily transmitted through the water and substrate, but it is transient. Coring produces much lower noise levels but these will persist for a much greater period of time. This brief report provides basic calculations which will provide an indication of the noise levels for works and its transmission through the water column and substrate to Peterhead Harbour entry.

Location

Deepening works are proposed to occur from Merchants Quay through to the North Harbour. Figure 1 below shows a plan of the harbour with the approximate locations and details of the works. The entrance to Peterhead Bay is approximately 500 metres south of the quay wall at the end of Albert Quay, opposite Smith Quay.

The substrate is fractured granite. It is assumed that blasting and coring works could occur anywhere within the shaded area on the plan, although clearly the locations will be known precisely at the time of works. As a worst case it is assumed that works will be undertaken at the most south-westerly point on the hatched area, nearest to the entry to the harbour and West Quay, between Merchants Quay and Smith Quay.

There is no direct line of sight between the works area in front of Merchants Quay and the entrance to Peterhead Bay to the south, and open water. Only a small portion of the works site in front of Merchants Quay has line of sight to any location within Peterhead Bay, with the majority blocked by quay walls and the breakwater.

Criteria and guidelines

With respect to the risk of injury and disturbance to marine mammals and fish, research is ongoing. There are a series of interim criteria in common use internationally, although it should be noted that the confidence in numerical criteria especially for disturbance is low and based on a small number of studies and individuals. There is likely to be variation within the reactions of individuals within the species dependent on context and so assessments with respect to the noise disturbance or behavioural reactions of aquatic life should not be considered definitive.

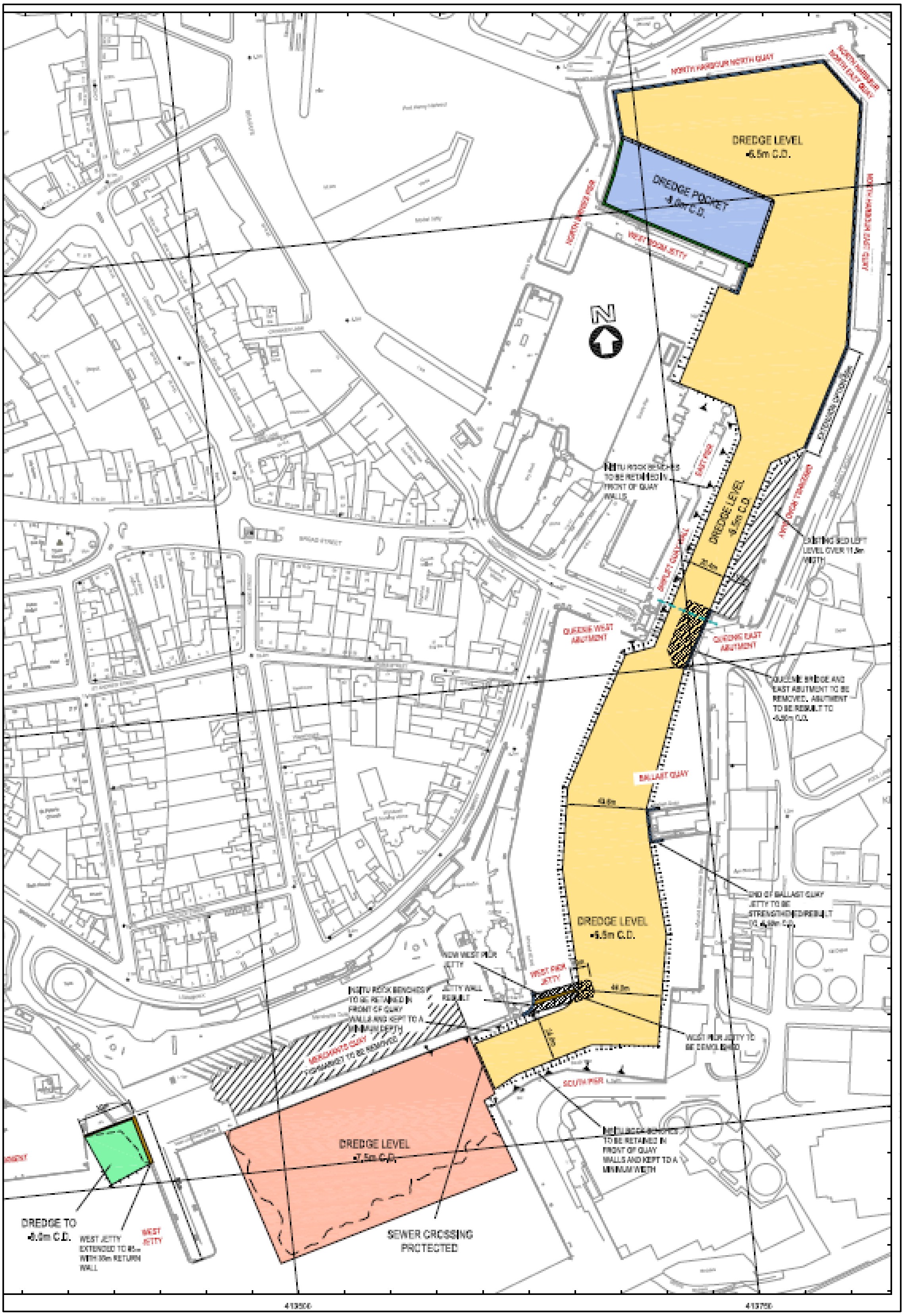

Figure 1 – Peterhead Harbour with construction locations noted (extracted from RPS drawing number IBM0559-WIP-24 Rev A)

The following precautionary criteria have been applied in this study for levels of noise considered likely to cause physical effects (Parvin *et al*. (2007)), based on the data presented herein, and the data summarised in the studies of Yelverton (1975), Turnpenny *et al*. (1994) and Hastings and Popper (2005):

- Lethal effect may occur where peak levels exceed 240 dB re 1 µPa, or an impulse of 100 Pa.s; and
- Physical injury may occur where peak levels exceed 220 dB re 1 µPa, or an impulse of 35 Pa.s.

It should be noted that injury may occur where either of the peak or impulse limits are exceeded, rather than both.

Similar risk levels are provided as guidelines in Popper *et al* (2014), where levels of 229 to 234 dB SPL_{peak} are suggested to cause mortality or potential mortal injury in fish.

With respect to behavioural avoidance, there is little conclusive consensus on the noise levels that will cause a significant reaction in different species of fish and marine mammals. It is likely that the noise level will be dependent on context and conditions and vary between populations and individuals within a population. In the absence of detail, a level of 168 dB re 1 µPa SPL_{peak}[1] corresponds to work undertaken by Lucke (2009) for marine mammals (specifically harbour porpoises) and by McCauley *et al* (2000) for fish, albeit species of Australian fish. While these studies are not ideal for the species present in Peterhead Bay, they represent good and useful data that have international acceptance and are frequently cited in studies such as this. These studies were undertaken with respect to impulsive noise and so are deemed relevant for the blasting. Risk of avoidance is expected to be much lower for drilling as the continuous nature of the noise should lead to habituation.

Noise levels defined by the metric 'Sound Exposure Level' (SEL) are also used to estimate disturbance, although Southall *et al* (2007) suggests that SPL is preferable to SEL based on data available. However, criteria for aversive behaviour based on the SEL metric have been suggested in published research. Southall *et* al do reference avoidance criteria for both SPL and SEL metrics of 224 dB re 1 µPa SPL_{peak} and 183 dB re 1 μPa^2s SEL for cetaceans, and 224 dB re 1 µPa SPL_{peak} and 183 dB re 1 μPa^2s SEL for pinnipeds in water. However more recently TSG Noise (2013) for the Marine Strategy Framework Directive recommends the use of 164 dB re 1 μPa^2s SEL[2] for single event transient noise that may result in aversive behaviour. Thompson *et al* (2013) noted evidence of a group response by harbour porpoises to noise levels with an SEL range of 145 to 151 dB re 1 μPa^2s. This noise and behaviour was noting during repeated airgun blasts from a seismic survey and as a consequence, a higher threshold of 164 dB re 1 μPa^2s SEL seems more relevant for a single blast, in line with the recommendations of TSG Noise (2013).

Therefore, impacts in this assessment will be based on the following criteria:

Lethality:	240 dB re 1 µPa SPL_{peak} or 100 Pa.s impulse
Physical traumatic injury:	220 dB re 1 µPa SPL_{peak} or 35 Pa.s impulse

[1] Noise level converted from $SPL_{peak\text{-}to\text{-}peak}$ assuming symmetrical waveform

[2] After Lucke *et al* (2009)

Avoidance behaviour: 168 dB re 1 µPa SPL_{peak} or 164 dB re 1 $\mu Pa^2 s$ SEL

Estimation of blast levels and effect range

It has been assumed that charges of a maximum size of between 25 kg and 35 kilograms per delay of standard commercial packaged emulsion explosive are being used. All charges will be embedded underwater. Figure 2 below shows a sample waveform captured during embedded charge blasting in a harbour. A small spike can be seen immediately prior to the onset of the main pressure wave. These are termed here as the ‘head wave’ and the ‘full wave’.

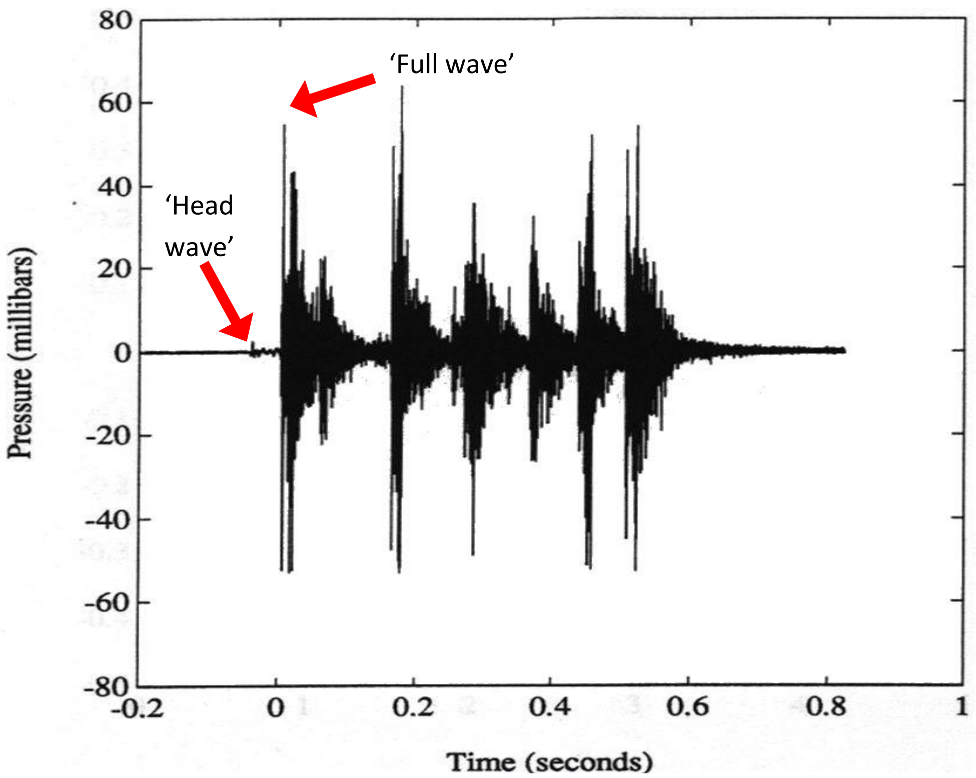

Figure 2 – Sample waveform from blast using embedded charges

Where line of sight is significantly blocked by a structure such as a concrete quay wall, the full wave will be substantially reduced in water.

Reanalysis of Subacoustech data[3] under similar circumstances shows an approximately 15-20 dB difference between SPL_{peak} and SEL for embedded charges. While SPL and SEL should not normally be directly compared, for the purposes of these basic calculations a conversion factor of 15 dB provides a reasonable estimation.

The calculated ranges of effect are given in the table below. The 5% to 15% correction factors refer to the effect of the head wave as a consequence of transmission through the substrate only. This percentage range is based on measurements undertaken by Subacoustech[3] and an assumption that, as a consequence of the barrier effect from the quay walls, the head wave will be the most significant with respect to transmitted noise to most of Peterhead Bay. The 100% correction assumes direct or nearly direct line of sight.

Although every effort has been made to consider a scenario as close to the one in Peterhead as possible, the estimates are based on a number of assumptions including ground and substrate conditions, sound speeds, water depths and temperatures, and detailed modelling has not been undertaken. Therefore the results should be treated as indicative only.

25 kg charge per delay		Peak SPL range		Impulse range	
Correction factor	Description	240 dB (Lethal)	220 dB (Injury)	100 Pa.s (Lethal)	35 Pa.s (Injury)
5%	Head wave only	< 1 m	<5 m	10 m	30 m
15%	Head wave only	1 m	5-10 m	30 m	100 m
100%	Full wave	< 5 m	40 m	275 m	850 m

Table 1 – Estimated lethal and injurious ranges of effect from blasting using various correction factors (25 kg charge weight)

35 kg charge per delay		Peak SPL range		Impulse range	
Correction factor	Description	240 dB (Lethal)	220 dB (Injury)	100 Pa.s (Lethal)	35 Pa.s (Injury)
5%	Head wave only	< 1 m	<5 m	15 m	40 m
15%	Head wave only	1 m	5-10 m	40 m	130 m
100%	Full wave	5-10 m	50 m	350 m	1000 m

Table 2 – Estimated lethal and injurious ranges of effect from blasting using various correction factors (35 kg charge weight)

The closest straight-line distance of blast to the entry to Peterhead Bay is approximately 500 m. As line of sight is completely broken at that location, it is reasonable to assume that only the head (substrate-borne) wave can reach this point. Using an upper estimate of the 15% correction factor, the following noise level is calculated at 500 m for the two charge weights:

	25 kg charge per delay	**35 kg charge per delay**
Noise level, re 1 µPa	178.0 dB SPL_{peak}	178.8 dB SPL_{peak}
Impulse	8.1 Pa.s	10.0 Pa.s
SEL	163 dB re 1 $\mu Pa^2 s$	164 dB re 1 $\mu Pa^2 s$

Table 3 – Unweighted noise level at entry to Peterhead Bay

[3] Measurement and assessment of peak pressure during underwater borehole blasting operations near an existing pipeline, Subacoustech report number 779R0105, January 2009. Blasting undertaken in Singapore in water depths typically 5-15m.

It is expected that the results of calculations using the 100% correction factor represent the maximum or upper limit of the effects from the underwater marine blast. In the rest of Peterhead Bay, processes of underwater reflection and refraction will mean that, even where line of sight to the blast location is broken, some waterborne pressure wave will remain although moving further off line of sight to the blast location will lead to diminishing pressures and noise levels.

Based on an avoidance level of 168 dB re 1 µPa SPL_{peak}, this level will be reached at approximately 150 metres throughout the surrounding waters *without* line of sight, for both 25 kg and 35 kg charges. 168 dB re 1 µPa SPL_{peak} will be exceeded anywhere where there is line of sight to the blast.

Coring

Noise emission during drilling work within Peterhead Harbour has been assessed using Subacoustech's SPEAR model, which provides an estimation of the transmission of a variety of underwater construction noise sources. The nearest location for drilling to Peterhead Bay is the south end of South Harbour. This distance is approximately 350 metres.

Although the exact drill to be used is not yet finalised, calculations of machinery capable of drilling the 1500 mm pile are based on the Reverse Circulation Rock Drill manufactured by Xuzhou Hercules Machine Manufacture Co., Ltd[4]. The noise level expected at the entrance to the harbour (Smith Quay) is 120 dB SPL_{RMS} re 1 µPa.

A noise level of approximately 118 dB SPL_{RMS} re 1 µPa is estimated at 500 metres from the drill. This assumes a direct line of sight; with no line of sight the drilling would be substantially less than this, noting that this level of noise is of the order of background noise levels (less than 120 dB re 1 µPa). SEL noise levels will be well below any disturbance criteria.

The noise level during coring is not expected to reach levels where any significant avoidance would be expected, except the immediate vicinity of the drill.

Conclusions

This preliminary study has found that the noise level from the blasting is anticipated to fall to a level below the point at which it will cause injury to marine mammals at the entrance to Peterhead Bay. This is based on the injury criteria from Parvin *et al.* (2007), fish injury based on Popper *et al* (2014) and avoidance reactions based on McCauley *et al* (2000) and Lucke (2009). There may be a temporary avoidance reaction from all species at 150 metres in a straight line from blasting or wherever there is line of sight to the blast location.

Based on SEL avoidance behaviour criteria, the noise level estimated at the entrance to Peterhead Bay is approximately 164 dB re 1 µPa^{2}s for the largest charge per delay, which is on the limit of the level recommended by TSG Noise (2013) for single impulsive noise events.

[4] http://hglscheng.en.made-in-china.com/product/ibOJtxMEXdWv/China-Reverse-Circulation-Rock-Drill.html

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NIRAS FRAENKEL

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Peterhead Port Development – Inner Harbour deepening and new fish market development
Draft Marine Mammal Mitigation Plan

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Contents

1. Introduction

1.1.1. This Marine Mammal Mitigation Plan (MMMP) has been prepared in support of the proposed Peterhead inner harbour deepening and fish market development (the “Development”). The aim of the MMMP is to ensure that potential impacts on marine mammals arising from the construction and operational phases of the development are appropriately managed, coordinated and controlled to avoid unnecessary disturbance and potential harm to marine mammals.

1.1.2. It should be noted that this is a Draft document. Further detailed information on the implementation of the proposed mitigation measures will be finalised in consultation with relevant stakeholders (i.e. SNH, MS) post-application.

1.1.3. The potential impacts associated with the construction and operational phases of the proposed development on marine mammals are described in detail within the Environmental Impact Assessment (EIA) undertaken for the project (see Ecological Impact Assessment, Section 8: Marine Mammals). Taking into account the potential impacts identified in the EIA, the MMMP provides detail on the monitoring and mitigation measures proposed. It is anticipated that these will be further refined and agreed in consultation with relevant stakeholders, namely Scottish Natural Heritage (SNH), the Joint Nature Conservation Committee (JNCC) and Marine Scotland Science (MSS).

2. Guidance

2.1.1. The key guidance documents used to inform the MMMP are as follows:

- JNCC guidelines for minimising the risk of injury to marine mammals from using explosives (JNCC, 2010);
- Guidance for staff advising on the potential risk of seal corkscrew injuries (JNCC, 2012); and
- Guidance for Scottish Inshore Waters on the protection of Marine European Protected Species from injury and disturbance (Marine Scotland, 2014).

3. The development

3.1.1. Peterhead is located in the north east of Scotland, just over 30 miles north of Aberdeen. The main focus of its activity is the port, which is administered by Peterhead Port Authority (PPA).

3.1.2. The port has one of the busiest fish markets in Europe and also acts as a major logistics supply base for the offshore oil and gas industry in the North Sea. In order to allow for expansion of its activity, PPA has proposed to modernise the existing port provision with respect to fishing, together with works to bring facilities in line with current and anticipated vessel and market standards and demands. The works proposed by PPA encompass the deepening of the inner harbour as well as the development of a new fish market.

3.1.3. The project consists of a number of associated elements, including:

- Deepening of the North and South Harbours by 3.3 m;
- Strengthening of the dock walls at deepened areas;
- Deepening at the Merchant’s Quay by 2.0 m;
- Removal of restrictions on the navigation route into the South Harbour (i.e. the small jetty adjacent to the Port office);
- Removal of the Queenie bridge and widening of navigation channel from 10.5 m to 25.0 m;
- Extension of West Quay at the north end to provide a 78.0 m berth;
- Associated services/utilities diversions;
- Formation of reclamation west of the Smith Embankment against the existing sea wall;

- Demolition of the west section of the former Greenhill Fish market;
- Construction of a new fish market at Greenhill, together with refurbishment of the existing east section; and
- Demolition of the existing fish market at Merchant's Quay.

4. Marine Mammals

4.1.1. There are 6 species of marine mammals known or likely to occur in and around the Peterhead Harbour area. They are all identified as species of international importance (see Ecological Impact Assessment, Section 8: Marine Mammals).These are:

- Grey seal (*Halichoerus grypus);*
- Harbour (common) seal (*Phoca vitulina*);
- Harbour porpoise (*Phocoena phocoena*);
- Bottlenose dolphin (*Tursiops truncatus*);
- White-beaked dolphin (*Lagenorhynchus albirostris)*; and
- Minke whale (*Balaenoptera acutorostrata)*.

4.1.2. There is potential for seals to be present in the proximity of construction works at Peterhead Harbour. As identified in the EIA, grey seals were observed during the ornithology survey undertaken on 4^{th} and 5^{th} March 2014 within the harbour. However, in the case of cetaceans, whilst they may transit and/or forage in areas in the vicinity of Peterhead, there are no records of sightings of these species within the harbour or Peterhead Bay to date.

5. Impacts on Marine Mammals

5.1.1. The EIA (see Ecological Impact Assessment, Section 8: Marine Mammals) has identified the following potential effects on marine mammals, associated with the construction and operational phases of the proposed development:

- Blasting: Potentially 20% of the area in the North Harbour and 30% of the area in the South Harbour may need controlled small blasting charges to loosen the rock. This may result in lethal/injurious and behavioural impacts on marine mammals associated with increased levels of underwater noise. It is anticipated that blasting will consist of multiple charges to be applied every 2 or 3 days over a period of up to 3 months, and will be undertaken in daylight hours within the normal working day;
- Pile installation by drilling and socketing may be required for wall stabilisation in the North Harbour (over a period of up to 6 months). Further, pile installation may be required in a number of pinch points in the South Harbour. This has potential to result in behavioural disturbance to marine mammals associated with underwater noise;
- Dredging activity (over a period of up to 6 months) at the North Harbour, South Harbour and Merchant's Quay may result in behavioural disturbance to marine mammals as a result of both underwater noise and increased suspended sediment concentrations related effects;
- Both during construction and operation, there is potential effects on marine mammals associated with accidental pollution events; and
- In the particular case of seals (harbour and grey seal), it is considered that there may be a link between the use of vessels with ducted propellers (DP) during construction, and corkscrew injuries.

6. Marine Mammal Mitigation Plan

6.1.1. The following sections detail the proposed monitoring and mitigation measures for each of the activities/potential impacts detailed in Section 5, as well as procedures for reporting and recording of marine mammals sightings.

6.2. Blasting Activity

6.2.1. At the North and South Harbour areas, detonation of small blasting charges will be required to loosen the rock and facilitate dredging operations. This will involve the insertion of small explosive charges into holes drilled to twice the depth below seabed of the material to be removed. It is anticipated that charges of up to 20 -25 kg with a 25 millisecond delay will be used. The blasting regime is assessed to be one blast with multiple charges only every 2 or 3 days, over a period of up to 3 months, and will be undertaken in daylight hours within the normal working day.

6.2.2. In line with JNCC (2010) guidelines on the use of explosives, which reflect current best practice for operators to follow during the planning, operational and reporting stages, the following mitigation measures will be implemented for the proposed development at Peterhead Harbour.

Implementation of a Mitigation Zone

6.2.3. A Mitigation Zone, defined as the area where a Marine Mammal Observer keeps watch for marine mammals (and delays the start of activity should any marine mammals be detected) of 1 km will be implemented (See Appendix 1 for further information on the definition of the Mitigation Zone).

6.2.4. Trained Marine Mammals Observers (MMOs) (and potentially Passive Acoustic Monitoring (PAM) operatives) will implement best practice procedures within the Mitigation Zone, as follows:

- Pre-detonation search for marine mammals: At least 1 hour before any type of detonation, a visual watch and, if required, acoustic monitoring should be carried out in the Mitigation Zone. The pre-detonation search should continue until the MMO advises that the Mitigation Zone is clear of marine mammals, and the detonation can start;
- Delay detonations if marine mammals are detected within the Mitigation Zone: Explosive detonations should not be undertaken within 20 minutes of a marine mammal being detected within the Mitigation Zone;
- If a marine mammal is observed, or acoustically detected, within the Mitigation Zone, it should be monitored and tracked until it moves out of range. The MMO should notify the relevant chain of command of the detection, and advise that the operation should be delayed. If the marine mammal is not detected again within 20 minutes, it can be assumed that it has left the area and the detonation may commence;
- If an animal has been detected acoustically, the PAM operative should use a range indication and their judgement to determine whether the marine mammal is within the Mitigation Zone;
- If the MMO or PAM operative is uncertain whether marine mammals are present within the Mitigation Zone, they should advise that the activity should be delayed as a precaution until they are certain that no animals are present;
- Post-detonation search: The MMO should maintain a post-detonation search within the Mitigation Zone for at least 15 minutes after the last detonation, to look for any evidence of injury to marine life, including fish kills. Any unusual observations should be noted in the report; and
- Communication: It is vital that clear communication channels exist between MMO(s) / PAM operators and personnel detonating the explosives. As each explosive use is likely to be different, it is recommended that communication channels are established and in place before the activity commences, and ideally these matters should be discussed and agreed at a pre-

mobilisation meeting. For example, the MMO or PAM operator might communicate directly with the engineers detonating the explosives, or via another member of the crew.

Visual Monitoring (MMO)

6.2.5. The MMO should be on board the vessel that provides the best viewing platform, allowing 360 degree cover, and is likely to be closest to the explosive activities. In the case of the Peterhead harbour work, it is likely that the most appropriate MMO station may be on shore. The positioning of the MMO will be discussed and agreed with the relevant stakeholders prior to construction activity.

6.2.6. Since the Mitigation Zone has been established at the default distance of 1 km, measured from the explosive source and with a circular coverage of 360 degrees, the selected MMO viewing platform will be required to ensure that the entire Mitigation Zone can be observed. The MMO should also:

- Concentrate their efforts before, during and after detonation; and
- Be suitably equipped with binoculars and Marine Mammal Reporting forms, which should contain information on 'Operations', 'Efforts' and 'Sightings', and be capable of determining the extent of the Mitigation Zone in relation to their viewing platform (see Appendix 3).

Passive Acoustic Monitoring

6.2.7. PAM may be applied during periods of darkness or poor visibility (such as fog), or during periods when the sea state is not conducive to visual mitigation, as marine mammals in the vicinity of explosive sources cannot be detected by eye under such circumstances.

6.2.8. PAM systems consist of hydrophones that are deployed into the water column, and the detected sounds are processed using specialised software. PAM operatives are needed to set up and deploy the equipment and interpret the detected sounds.

6.2.9. The PAM hydrophones should be situated as close as possible to the site of detonation, and sacrificial hydrophones may therefore be required.

Detonation Procedure

6.2.10. Mitigation measures proposed in relation to the detonation process include the following:

- The quantity of explosive used will be proportionate to the activity;
- Sequencing of the explosive charges: A progressive increase in charge size (generally referred to as "soft-start") will be applied, reducing the risk of injury by allowing time for marine mammals to move away from the area. Where practical, the sequence of detonations should start with the smaller charges and leave the larger charges (i.e. max of 25 kg) until last;
- Explosive detonations will only commence during the hours of daylight and good visibility, ensuring that MMOs are able to monitor the full extent of the Mitigation Zone; and
- Seasonal considerations will be taken into account when programming detonations, including periods of migration, breeding, calving or pupping.

Use of Acoustic Deterrent Devices

6.2.11. The use of Acoustic Deterrent Devices (ADDs) that have potential to exclude animals from the Mitigation Zone will be considered if animals do not move from the area on their own. A protocol for use of ADDs shall be developed in agreement with SNH and Marine Scotland (MS).

6.2.12. If ADDs are required, they will be used in conjunction with visual and/or acoustic monitoring and for as short period as necessary to minimise the introduction of additional noise.

6.2.13. ADDs will be positioned in the water (within the harbour walls) in close proximity to the explosive source installed. ADDs should be switched on for a pre-determined number of emissions during the pre-detonation search and turned off immediately once the detonations have commenced.

6.3. Pile Installation by Drilling and Socketing

6.3.1. With respect to pile installation by drilling and socketing, the suggested mitigation measures are as follows:

- During transit, construction vessels will be informed and guided, as necessary, by the Environmental Clerk of Works (ECoW) on the potential for marine mammal activity;
- Pile installation via drilling and socketing during the seal breeding season (June – August, inclusive for grey seal; October – December, inclusive for harbour seal) will require the deployment of suitably qualified MMOs to monitor seal activity at the haul sites in the vicinity of Peterhead Harbour;
- A marine mammal Mitigation Zone of at least 200 m will be maintained around construction vessels during transit to and from Peterhead Harbour and throughout the drilling/socketing operations;
- Pile installation will not commence whilst marine mammals are within 200 m of construction vessels;
- MMO teams based on the construction vessels[1], and supported by the ECoW, will maintain lookout for the occurrence of marine mammals;
- The occurrence of marine mammals in the proximity of the construction vessels will be monitored and recorded, with vessels appropriately managed to ensure unnecessary disturbance or possible harm is avoided, as follows:
    - Whilst transiting within Peterhead Harbour, construction vessels should maintain vigilant lookout for marine mammals, together with maintaining a 200 m (marine mammal) Mitigation Zone around the vessel. Where marine mammals penetrate this Mitigation Zone, vessels should reduce speeds to less than 6 knots and maintain the current direction of travel until marine mammals have exited the Mitigation Zone and moved away from the vessel; and
    - The MMO will advise construction vessels approaching or leaving Peterhead Harbour of the occurrence and area of activity of marine mammals.

6.4. Dredging Activity

6.4.1. With respect to dredging operations, the suggested mitigation measures are as described in Section 6.3 above in relation to pile installation by drilling and socketing.

6.5. Accidental Pollution Events

6.5.1. Measures will be implemented following accordance with published guidelines and best working practice for the prevention of pollution events during both the construction and operational

[1] In the case of the Peterhead harbour work, it is likely that the most appropriate MMO station would be on shore. The positioning of the MMO will be discussed and agreed with the relevant stakeholders prior to construction activity.

phases of the proposed development. Further, an emergency plan will be put in place and in the unlikely event of an incident occurring this will be strictly controlled.

6.5.2. Further detailed information on mitigation measures in relation to accidental pollution events will be provided in the Construction Environmental Management Plan (CEMP).

6.6. Corkscrew injuries

6.6.1. There is a potential link between ducted propeller vessels and corkscrew injuries in seals. In order to minimise the potential for such injuries, the recommendations included in SNH guidance to this respect (JNCC, 2012) will be followed. These include:

- The principal contractor will identify all vessels employing propulsion thrusters in advance of arrival at Peterhead Harbour.
- The use of propulsion systems will be restricted to the confines of the area of the construction works only;
- The management and operation of vessels will be in agreement with the regulatory requirements of PPA and the established operational procedures of NIRAS Fraenkel Ltd.
- The movement of vessels using propulsion thrusters in the proximity of the south quayside will be supervised, with MMOs strategically positioned to observe and monitor for the occurrence of marine mammals. In addition, MMOs will also observe the wash of these vessels for the presence of marine mammals;
- During the construction phase, where commercially viable alternatives to using vessels with ducted propellers are available, these are to be used;
- Vessel start- up and movement is to be managed by the ECoW and informed by data recovered from the deployed MMO teams (and the PAM systems, if required).

6.6.2. In addition, PPA will maintain contact with the relevant statutory (e.g. SNH, Marine Scotland, Transport Scotland) and research organisations (e.g. SMRU) with respect to new developments associated with the link between propulsion thrusters and corkscrew injuries, including potential for further mitigation options.

6.7. Keeping and maintaining records

6.7.1. All marine sightings and interactions should be appropriately logged and recorded in line with JNCC guidelines, with the required minimum details. An example is provided in Appendix 3.

6.7.2. JNCC guidance (JNCC, 2012) will be followed, together with reporting the shoreline searches and associated findings in accordance with the Scottish Marine Animal Stranding Scheme (SMASS).

6.7.3. The Principal Contractor and ECoW, will keep and maintain sufficiently detailed daily records of construction activities, programme, weather and tidal conditions, pertinent events and incidents, as wells as other matters appropriate and relevant to the safe execution of the construction works.

6.8. Monitoring/Supervision

6.8.1. Client management staff supported by the Environmental Management, Project Manager and ECoW will ensure that the Principal Contractor keep and maintain sufficiently detailed daily records of construction activities, programme, weather and tidal conditions, pertinent events and incidents, as well as other matters appropriate and relevant to the safe execution of the construction works, including the CEMP.

7. Summary

7.1.1. This MMMP details the proposed measures intended to mitigate the potential effects of construction and operational activities on marine mammals in the vicinity of the development. This document has been developed in accordance with relevant active project documents. These documents combine to provide a robust basis for the MMMP.

7.1.2. This MMMP is also informed by UK best practice procedures, as outlined by JNCC (2009; 2012), as well as standard maritime practice and regulations required by PPA, and operating procedures developed by NIRAS to manage vessel movements.

8. References

JNCC. 2010. Guidelines for minimising the risk of injury to marine mammals from using explosives.

JNCC. 2012. Guidance for staff advising on the potential risk of seal corkscrew injuries.

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9. Appendices

9.1. Appendix 1- Mitigation Area for detonation of explosive charges during construction works.

9.1.1. The default Mitigation Zone for marine mammal observation has been defined at 1 kilometre, measured from the explosive source and with a circular coverage of 360 degrees.

9.1.2. The EIA, supported by underwater noise modelling, suggests that injury due to blasting in only likely to happen within a short distance from the blast site. Disturbance may occur up to 1 km from the blast site, but it is unlikely to extend outside the entrance of Peterhead Harbour, and it is unlikely that species other than grey seals will be in the wider Peterhead Bay.

9.1.3. Whilst there is limited information available to date to allow for accurate estimates of safe zones associated with explosions be made, the information provided in the EIA, supported by the findings of noise modelling undertaken by Subacoustech Environmental Ltd (see Annex A: Underwater Noise Impact Calculation Report) suggests that a safe zone of 1 km would be appropriate at Peterhead Harbour during blasting activity, provided charges up to a maximum of 25 to 35 kg are used. This is in line with the safe distance suggested by JNCC in their "*Guidelines for minimising the risk of disturbance and injury to marine mammals whilst using explosives"* (JNCC, 2009). Further, the use of acoustic deterrent devices (ADD) to scare seals away will be explored and if deemed necessary its implementation defined in consultation with relevant stakeholders.

9.2. Appendix 2- Marine Mammal Corkscrew Injury Assessment

9.2.1. The mitigation measures proposed in relation to potential seal corkscrew injures have followed JNCC *Advice Note for Staff Advising on the Potential Risk of Seal Corkscrew Injuri*es (JNCC, 2012), which clarifies the current agreed recommendations to regulators and industry of the statutory nature conservation agencies (SNCAs) with regards to understanding and minimising the risk of corkscrew injury to seals.

9.2.2. This advice note outlines a method to assess the potential level of risk of corkscrew injury with regards to SACs, recommending mitigation actions based on the distance from activities to SACs as described in Table 9.1.

Table 9.1: Seal Corkscrew Injury Risk levels. Source: JNCC, 2012.

RISK	RECOMMENDATIONS
High	
Activity proposed to take place within 4 nautical miles of a harbour seal SAC and areas where the harbour seal population is in significant decline[2]	*- Consider alternatives to using ducted propellers or,* *- Avoid the breeding season* *-(If avoiding the breeding season or using alternatives to ducted propellers are not possible then a Seal Corkscrew Injury Monitoring Scheme should be considered)*
Medium	
Activity proposed to take place between 4 and 30 nautical miles of a harbour seal SAC and not covered above	*- Consider alternatives to using ducted propellers* *- Avoid the breeding season if possible*
Activity proposed to take place within 4 nautical miles of a grey seal SAC	*- Consider alternatives to using ducted propellers* *- Avoid the breeding season if possible*
Low	
Activity proposed to take place beyond 30 nm distance from a harbour seal SAC	- None
Activity proposed to take place beyond 4nm distance from a grey seal SAC	- None

9.2.3. Following the JNCC corkscrew injury risk levels described in Table 9.1 and taking account of the distance from Peterhead Harbour to SACs where seals are qualifying features (the closest being the Forth of Tay and Eden SAC, located approximately 126 km away from Peterhead), the risk of corkscrew injury is considered low. As such no specific recommendation/mitigation measures would apply (Table 9.1).

9.2.4. Given that seals are anticipated to be found within and in the vicinity of Peterhead Harbour, and that potential for connectivity between the proposed project and the Isle of May SAC and the Dornoch Firth and Morrich More SAC could not be excluded during the screening exercise undertaken as part of the Habitats Regulations Appraisal (HRA) (see Ecological Impact Assessment, Section 8: Marine Mammals), it is however recommended that, where possible, the contractor considers alternatives to the use of vessels with ducted propellers, whilst maintaining Marine Mammal Observers (MMOs) in situ for monitoring.

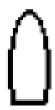
9.2.5. Once the contractor can provide clarity on the type of workboats and vessels that will be used, the contractor will commit to ensure that operational procedures are put in place to minimise the effects on seals in line with the suggested measures set out in the MMMP.

9.3. Appendix 3 Marine mammal recording form - record of sighting

(Example)

Options in italics should be circled or underlined as appropriate

<table>
<tr><td>Date</td><td>Time (GMT)</td><td>DTI Ref No.</td><td>Sighting no.</td></tr>
<tr><td colspan="4">How did this sighting occur? (please tick box)
-While you were keeping a continuous watch for marine mammals
-Spotted incidentally by you or someone else
-Other (please specify)</td></tr>
<tr><td colspan="2">Ship</td><td colspan="2">Observer</td></tr>
<tr><td colspan="2">Ship's position (latitude and longitude)</td><td colspan="2">Water depth (m)</td></tr>
<tr><td colspan="2">Species</td><td colspan="2">Certainty of identification
Definite/probable/possible</td></tr>
<tr><td colspan="2">Total number</td><td colspan="2">Number of Adults

Number of Juveniles</td></tr>
<tr><td colspan="2" rowspan="2">Description (include features such as overall size; shape of head; colour and pattern; size, shape and position of dorsal fin; height, direction and shape of blow)</td><td colspan="2">Photograph or video taken
Yes/No</td></tr>
<tr><td colspan="2">Direction of travel of animals in relation to ship (draw arrow)
</td></tr>
<tr><td colspan="2">Behaviour</td><td colspan="2">Direction of travel of animals (compass points)</td></tr>
<tr><td colspan="2">Activity of ship</td><td colspan="2">Closes distance of animals from airguns (m) (Record even if not firing)</td></tr>
</table>

APPENDIX IV – SOCIO-ECONOMIC IMPACT ASSESSMENT

BiGGAR Economics

Economic Impact of Peterhead Port

A report to
Scottish Enterprise, Aberdeenshire Council and Peterhead Port Authority

5th March 2014

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1 EXECUTIVE SUMMARY

In 2012 more than 156,000 tonnes of fish were landed at Peterhead Port with a value of more than £148 million, making Peterhead the largest fishing port in the UK and amongst the largest in Europe. The Port is also an important centre for the Scottish oil and gas sector, welcoming more than 2,600 oil and gas supply ships, survey and sub-sea vessels.

The Port is managed by the Peterhead Port Authority (PPA), which is committed to supporting the future development of the Port, for the benefit of the local community and Scotland as a whole. As part of this commitment, the PPA is considering investing £40 million in a project that would involve developing a deep-water fishing hub containing a new fish market with the capacity for 5,500 fish boxes. The project would also involve constructing a new deep-water berth at the site of the existing fish market, which is expected to enable the Port to secure new oil and gas related activity.

This report considers the potential economic impact of this project. It does this by comparing how the economic impact of Peterhead Port might change over the next 20 years if the project goes ahead to how the economic impact of the Port might develop if the project does not happen. **The key finding of the report is that by 2032 the project could help to deliver £203 million net additional Gross Value Added (GVA) for the Scottish economy and support around 2,525 net additional jobs.**

1.1 Current Impact of Peterhead Port

It was estimated that in 2012 Peterhead Port contributed £0.8 billion GVA to the Scottish economy and supported more than 9,400 jobs. This comprised of:

- **£54 million GVA and 620 jobs from port operations.** This included the direct employment and turnover of the two main on-site operators (the PPA and Asco) as well as the supply chain impact arising from purchases made by these companies and by their employees;
- **£103 million GVA and 980 fishing related jobs.** This included the direct employment and turnover of fishing boats operating out of Peterhead as well as the purchases made by these boats and the fishermen that work on them;
- **£181 million GVA and 4,320 fish processing related jobs.** This included the direct employment and turnover of fish processing companies in Scotland that can be attributed to Peterhead Port as well as the (non-fish) supplies purchased by these companies and the expenditure of their employees;
- **£476 million GVA and 3,460 jobs in the oil and gas sector.** This included direct on-site employment in the oil and gas sector and the turnover related to these jobs as well as a proportion of the oil and gas supply chain in the north east and the expenditure of employees who work in the sector; and
- **£2 million GVA and 35 jobs from the transportation of agricultural products**. This included the direct employment and turnover generated by the transportation of agricultural products and the expenditure of employees involved in this activity.

1.2 Future Impact

Without the new fish market and deep-water berths that would be created by the PPA investment, it is estimated that the economic impact of Peterhead Port would fall to £628 million GVA by 2032 and that the number of jobs supported by the Port would fall to around 7,920. If the project does go ahead however, it is expected that by 2032 Peterhead Port would be generating £831 million GVA and supporting almost 10,450 jobs. This represents a net additional benefit of £203 million GVA and 2,525 jobs compared to the reference case under which the project does not go ahead. This impact is a combination of effects on different areas of activity currently undertaken at the Port.

1.2.1 Future Impact on Port Operations

A significant proportion of current port operations are related to the oil and gas sector. It is expected that over time this activity is likely to consolidate around Aberdeen, which would lead to a reduction in current levels of oil and gas related activity at Peterhead.

The investment proposed by PPA would help to mitigate against this by enabling the PPA to attract new oil and gas related activity to the Port. If the project goes ahead then it is likely that total oil and gas related activity at the Port will still fall over the next 20 years but that this fall would be in line with overall levels of activity in the sector as a whole. If the project does not go ahead however, it is likely that this fall would be disproportionate, resulting in a greater decline in Peterhead than in other parts of Scotland.

By 2032 the project is expected to enable the Port to safeguard £29 million GVA per year for the Scottish economy and around 333 jobs.

1.2.2 Future Impact on the Fishing Industry

White fish landings at Peterhead Port have improved over the past few years and there is an expectation amongst many of those working in the industry that this will continue. The existing fish market is now operating close to capacity and beyond on many occasions. The investment proposed by the PPA will therefore be necessary in order for Peterhead Port to maintain its position and gain full advantage of this growth.

Without the investment then, although it is likely that the volume of fish landed at Peterhead Port will increase slightly over the next few years (until the fish market reaches capacity), this increase will have a detrimental impact on the quality of the fish landed and therefore of the price realised. If the new fish market is developed then it is expected that the volume of fish landed will increase significantly.

By 2032 this is expected to create or safeguard £24 million GVA per year for the Scottish economy and around 150 jobs in the Scottish fishing industry.

1.2.3 Future Impact on the Fish Processing Sector

Around 3,500 people are currently employed in the fish-processing sector in Aberdeen and Grampian. As the UK’s largest fishing port, a significant proportion of this employment is attributable to Peterhead. Future changes in the sector will therefore be closely linked to investments made to support the fishing industry.

The development of a new fish market at Peterhead is expected to enable fish landings at Peterhead to increase significantly, which will have a knock on effect on the fish-processing sector.

The development of a new fish market at Peterhead is also expected to have an effect on the quality of processed fish because all fish entering the Port could be processed on the same day without the need for "layover" due to current capacity issues. This effect would be twofold – firstly because an increase in the availability of fresh fish would lead processors to substitute of fresh for frozen fish and secondly because the quality of fresh fish from the Peterhead market would improve. Improvements in the quality of fish could help to improve the competitiveness of fish processors, which may result in an expansion of operations over and above that due to the increase in landings.

By 2032 this is expected to contribute an additional £59 million GVA per year to the Scottish economy and support the creation of around 1,420 jobs in the Scottish fish processing industry.

1.2.4 Future Impact on Oil and Gas Activity

The oil and gas related activity undertaken at Peterhead Port has led to the development of a significant local supply chain. The future scale of this supply chain will be closely connected to future changes that might occur in the level of oil and gas related activity at the Port.

The investment proposed by the PPA is expected to enable the Port to attract new oil and gas related activity to Scotland. This would help to mitigate any reduction in activity that might otherwise be expected due to anticipated changes in future levels of activity across Scotland.

By 2032 this is expected to safeguard £90 million GVA per year for the Scottish economy and around 620 jobs.

1.2.5 Future Impact on Agricultural Products

Peterhead Port handles between 67,000 and 120,000 tonnes of agricultural products each year. This activity generates wealth and supports employment in the Scottish haulage and cargo handling sectors. The new facilities proposed by the PPA are expected to increase the Port's ability to accommodate future increases in vessel movements.

This is expected to support around 7 additional Scottish jobs by 2032 and contribute a small amount of additional GVA.

1.3 Conclusions

It is expected that the investment proposed by the PPA would generate a substantial net additional benefit for the Scottish economy in terms of jobs and GVA. The main GVA impact is expected to arise as a result of new oil and gas related activity that the new deep-water berths would enable the Port to attract and the activity that could be safeguarded as a result of investing in the new facilities.

The majority of the employment impact is however expected to be as a result of an increase in the volume of fish that could be landed at the new fish market and the knock on effect that this would have on the local fish-processing sector. By enabling fish processors to substitute fresh fish for frozen imports, this is also expected to have a positive impact on Scotland's balance of trade with the rest of the world. The PPA investment is also expected to lead to improvements in the quality of fish landed and processed in Scotland, which should help to support the development of the Scottish food and drink sector.

2 INTRODUCTION

This document is an economic impact assessment of Peterhead Port by BiGGAR Economics Limited to Scottish Enterprise, Aberdeenshire Council and Peterhead Port Authority (PPA).

2.1 Background

Peterhead Port is one of the UK's most versatile ports, providing exceptional all weather deep-water berthing facilities. The port plays a critical role in servicing the UKCS oil and gas sector as well as serving a broad range of industries including fishing, renewables, subsea and leisure. Peterhead Port intends to build on the Port's key activities within these sectors whilst continuing to explore other market opportunities and plan for expansion and diversification. A strategy and masterplan is currently being developed to build on the port's current position.

PPA has invested in the Port over the years and in 2010 completed the £31.5 million Smith Quay expansion to provide additional berthing facilities for the fishing subsea, renewable energy and decommissioning sectors. Further infrastructure investment of around £40 million is planned for the future to provide new and upgraded facilities. This will allow PPA to attract new business, target previously untapped markets and harness new opportunities by significantly expanding the range of projects that can be completed and handled at the port.

There is a strong case for growth in order to better accommodate current and emerging demands in the fishing and energy sectors. Current forecasts that predict an increase in cargo and major investments in the UKCS, announced recently, ensure continued support activity up to and beyond 2040. In the future new business streams in the emerging markets of decommissioning, carbon capture and storage and offshore renewables will provide further opportunities for growth.

Scottish Enterprise has commissioned an economic impact assessment of Peterhead Port to examine both the existing impact of the Port on the economy, in particular the Oil and Gas industry and also the likely impact of proposed plans to incorporate further new facilities (including a new fish market and expansion of facilities at Merchant Quay) at the Port.

2.2 Structure

The remainder of this report is structured as follows:

- Chapter 3 considers the current status and operations of Peterhead Port and its role in Scotland's economy, with particular emphasis on the contribution it makes to Scotland's fishing industry;
- Chapter 4 discusses the policy and market context and where Peterhead Port can contribute;
- Chapter 5 describes the sources of economic impact that come from the operations of Peterhead Port and how the value of these impacts has been estimated;
- Chapter 6 quantifies the current economic impact of port operations and considers how this could change in the future;

- Chapter 7 quantifies the current impact of the fishing industry operating out of Peterhead Port and describes how this could change in the future;
- Chapter 8 quantifies the current impact of fish processing activity in Scotland that can be attributed to Peterhead Port and describes how this could change in the future;
- Chapter 9 quantifies the current impact of oil and gas activity attributable to Peterhead Port and describes how this could change in the future;
- Chapter 10 quantifies the current impact arising from the handling and transportation of agricultural products at Peterhead Port and describes how this could change in the future;
- Chapter 11 summarises the current and potential future impacts associated with Peterhead Port if the PPA's masterplan proposals are implemented and if they are not and presents the conclusions of the study; and
- Appendix A provides summary information about the berths available at Peterhead Port.

3 PETERHEAD PORT

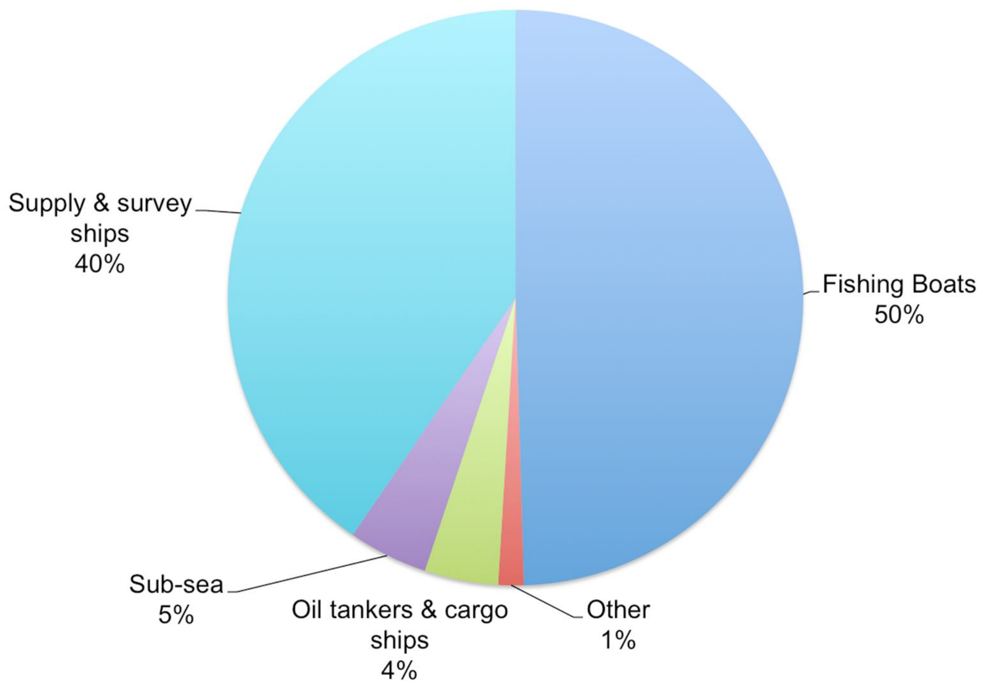
This section describes Peterhead Port and the proposed investment that would be undertaken as part of the PPA's masterplan.

3.1 Peterhead Port

Peterhead has been a centre for fishing in the North Sea for over 400 years. The breakwaters were constructed during the first half of the 20th century using labour from the Peterhead prison. The Port is managed by the PPA, which was established as a trust port and independent statutory body in 2006 after a merger between the Peterhead Bay Authority and the Peterhead Harbour Trust.

Peterhead Port supports a number of industries as well as leisure boating. In 2013 50% of the 5,680 vessels that used Peterhead Port were fishing boats and a further 45% of vessels that used the Port were either oil and gas supply or survey ships or undertaking sub-sea work.

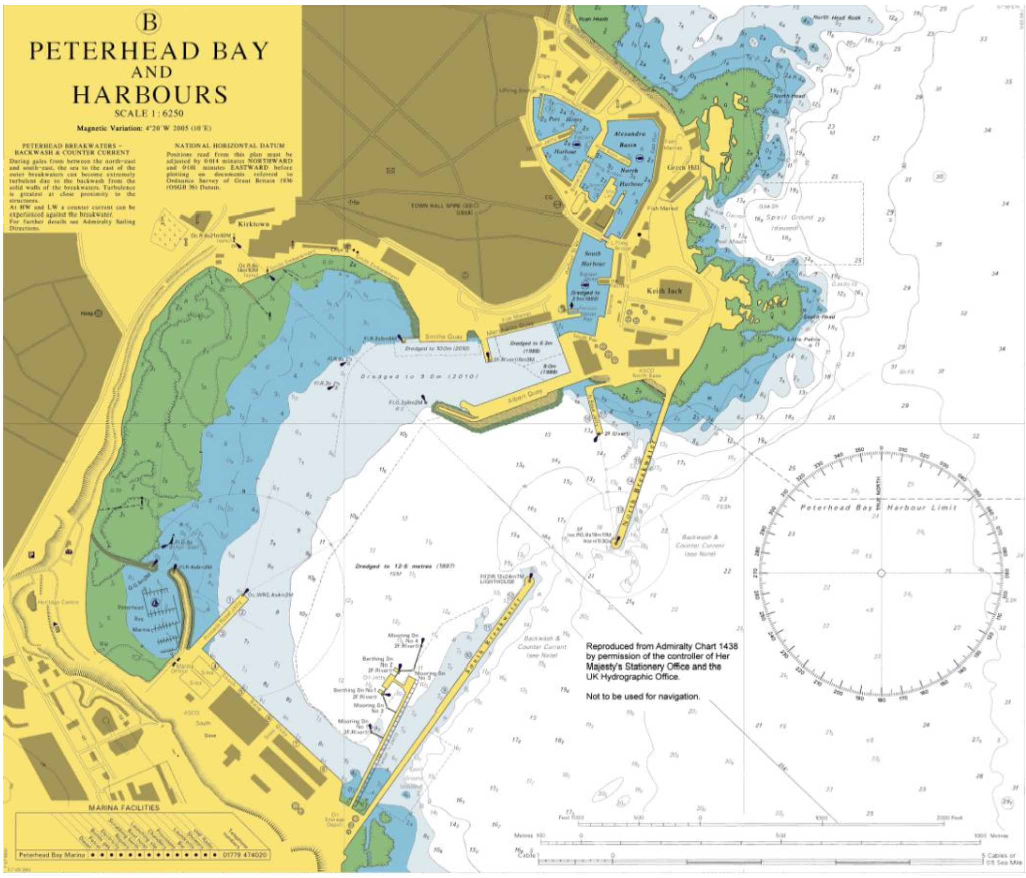
Figure 3-1: Number of vessel arrivals in 2013 in Peterhead Port



Source: Peterhead Port Authority

There are 18 berths at Peterhead Port and four quays that are used for loading and unloading. A description of each of the berths is given in Appendix A – Current Berths. Two thirds of the berths are located on the south side of the port. The largest berth is 397 meters long by 17 meters wide. There is also a tanker jetty that gives Peterhead the capacity to accommodate larger tankers than any other port in the North East of Scotland. The largest ship to be berthed in Peterhead Port to date was the 264m long, 127,000 GRT tanker, the Kitty Knutsen.

Figure 3-2: Chart of Peterhead Port



Source: Reproduced from Admiralty Chart 1438 by permission of the controller of Her Majesty's Stationary Office and the UK Hydrographic Office.

3.2 Main Areas of Activity

Peterhead Port has diversified over the years to take advantage of new industries that have presented opportunities to the area. The main areas of activity at Peterhead Port currently include fishing, oil and gas, agricultural products, ship repair and leisure.

3.2.1 Fishing

Peterhead Port is the largest port for whitefish and pelagic fish in the UK and amongst the largest in Europe. The value of the fish landed in Peterhead Port in 2012 was £148 million (Table 3-1). The fish landed in Peterhead represents 46% of the total quantity and 34% of the total value of all fish landed in Scotland[1].

Landings of white fish in particular have improved in recent years, increasing by around 22% from around 39,000 tonnes in 2008 to around 50,000 tonnes in 2012.

[1] Scottish Government, Scottish sea fisheries statistics, 2012 landings tables.

Table 3-1: Peterhead Port Fish Landings, 2012

	Tonnage	Value (£m)
White	50,473	74.3
Shellfish	4,014	8.6
Mackerel	44,219	39.6
Herring & Others	57,367	25.7
Total	**156,073**	**148.1**

Source: Peterhead Port Authority, Fish Landings Report, 2013

3.2.2 Oil and Gas

ASCO operates the oil and gas service facility on the South Base of the port and undertakes the majority of the oil and gas operations that happen in the port. ASCO is an international oilfield support services business that is headquartered in Aberdeen. The company has had a presence in the North Sea oil and gas industry since 1967, when the industry was in its infancy. ASCO has two bases in Peterhead and also operates the Offshore Supply Base that is located in Peterhead Port. From this base, ASCO offers a range of services to the offshore oil and gas industry including:

- warehousing;
- transport;
- materials management;
- quayside services and shore based management;
- fuels and lubricants supply;
- marine and ships agency services;
- freight management;
- environmental services; and
- safety training and advisory.

ASCO is one of the major employers in Peterhead and has 460 members of staff. The company process 550,000 tonnes of deck cargo, equivalent to 2,500 ships, each year. This is approximately one third of the total tonnage processed by ASCO in the UK but this proportion has declined significantly over the past decade as the company has developed new facilities at other ports.

3.2.3 Agricultural Products

In 2012 Peterhead Port handled a total of 67,600 tonnes of agricultural products and there is potential for the Port to handle more of these products in the future. This plays an important role in supporting the farming industry in the north east of Scotland.

There are facilities for handling agricultural products at both the Princess Royal Jetty and at Albert Quay. Both of these sites have a weighbridge, a grain sampling gantry and portacabins to support the trade. There are also experienced stevedores, William Whyte Cargo Handlers and Euroline, on site. In addition to this, there are other grain storage facilities in and around Peterhead that enables the smooth operation of this trade.

Peterhead Port also handles timber products and in 2012 the port handled 4,500 tonnes of timber for export. This is an area of industry that is expected to increase in the coming years as the forests planted in the 1970's and 1980's in Aberdeenshire reach maturity.

3.2.4 Ship Repair

Peterhead Port has a range of facilities for the maintenance and repair of ships. The repair facilities are owned by Peterhead Port Authority and are used by repair and maintenance contractors. The repair and maintenance facilities include:

- a shiplift facility that can lift vessels weighing up to 2,000 tonnes, which is suitable for dealing with the largest ships in the UK whitefish fleet;
- four slipway cradles, which can accommodate ships up to 27.4m long and 7.2 wide and up to 360 tonnes in weight; and
- a dry dock that can accommodate ships up to 57.9m long and 10.6 wide. The dry dock facility is also used for testing underwater equipment.

The ship repair and maintenance facilities are one of the major assets of Peterhead Port. Peterhead has centuries of tradition of ship maintenance and highly skilled and experienced tradesmen, this helps to attract customers and inward investment into the town.

3.2.5 Leisure

The Peterhead Bay marina is located in the south-west corner of the Port and provides 150 berths for leisure craft. The berths are equipped with fresh water and electricity and there are showers, toilets and changing facilities available in the marina service building. Twenty of the berths are reserved for visiting boats and the marina records over 1,000 visitor nights each year. Often visitors to the marina are stopping over to or from Scandinavia or as a stopover for visitors heading through the Caledonian Canal to the west coast of Scotland.

Peterhead Port also welcomes larger commercial cruise liners. The cruises include specialty golf tours, which are anticipated to increase with the opening of the Trump International golf Links at Balmedie. The Port has received between three and six cruise liners each season with up to 1,000 visitors per ship.

3.2.6 Summary

Peterhead Port is a multipurpose facility that services a range of industries and businesses. It is Scotland's leading fishing port and forms a significant part of Scotland's oil and gas and ship maintenance infrastructure. In 2012:

- more than 156,000 tonnes of fish were landed at Peterhead Port with a total value of more than £148 million;
- more than 2,500 ships servicing the oil and gas sector berthed at Peterhead Port in 2012 and these ships carried around 550,000 tonnes of deck cargo; and
- around 67,600 tonnes of agricultural products went through Peterhead Port including rapeseed, grain and timber.

3.3 Project Description

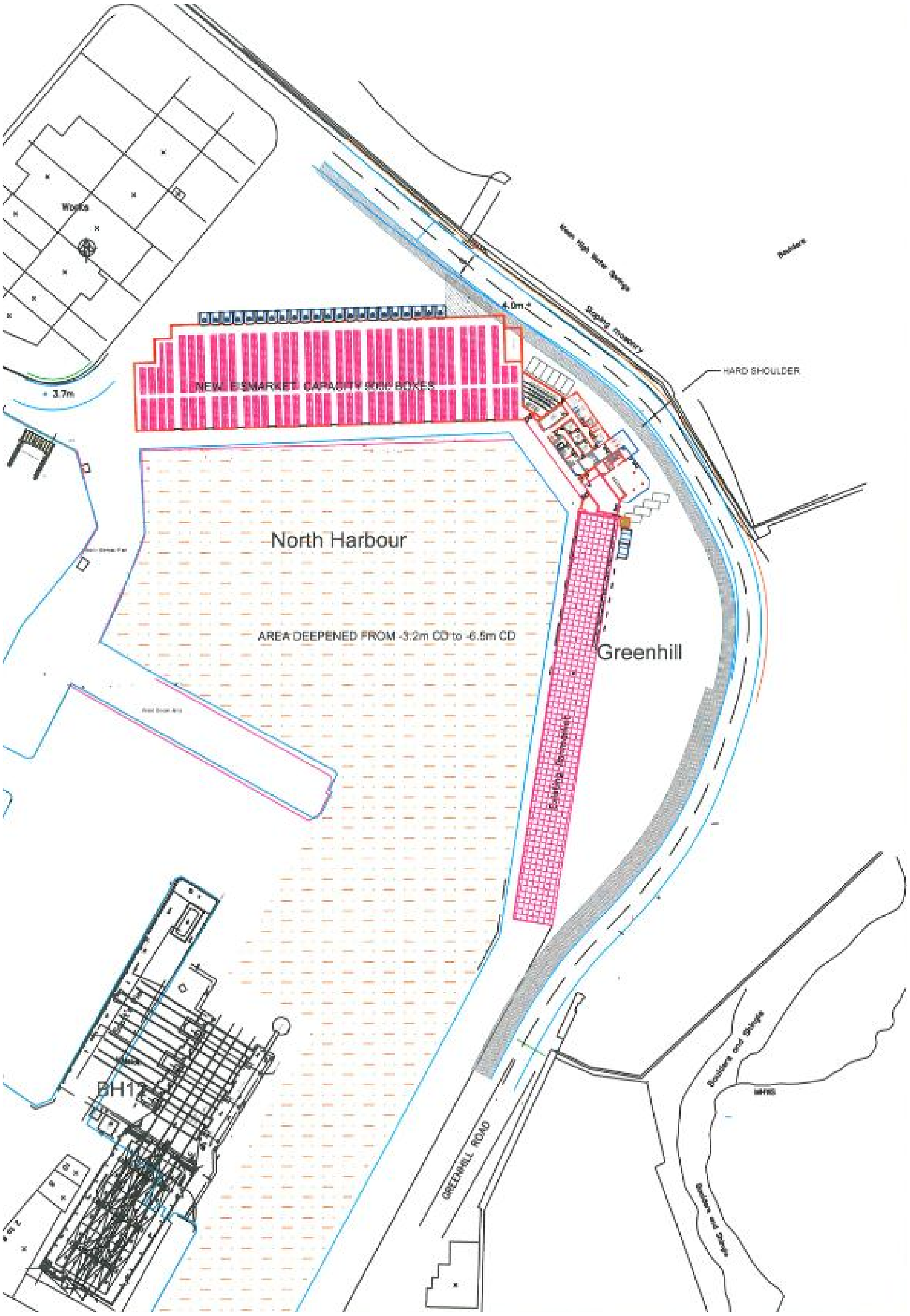
Peterhead Port has plans to invest £40 million in the infrastructure of the Port. This investment will secure Peterhead's position as one of the leading fishing ports in Europe and is expected to enable the PPA to attract new oil and gas related activity to the Port. The four main aspects of the infrastructure investment plan are:

- increase inner harbours' water depth from 3.5m to 6.5m;
- build a large modern fish market on the quayside;
- develop a new commercial facility for oil and gas activity; and
- enable future development of ship repair facilities.

3.3.1 Inner Harbours

The North Harbour Area and the Merchants Quay area are those that are targeted for deepening and rejuvenation. The north harbour area is accessed through a narrow canal from the south harbour area, it is therefore restricted to vessels with a 10.5m beam or lower. This is also the area in which the proposed new fishmarket will be constructed. The water depth is currently between 2.7 meters and 3.0 meters. The proposed development will deepen this to 6.5 meters. A layout of the proposed plan is given in Figure 3-3.

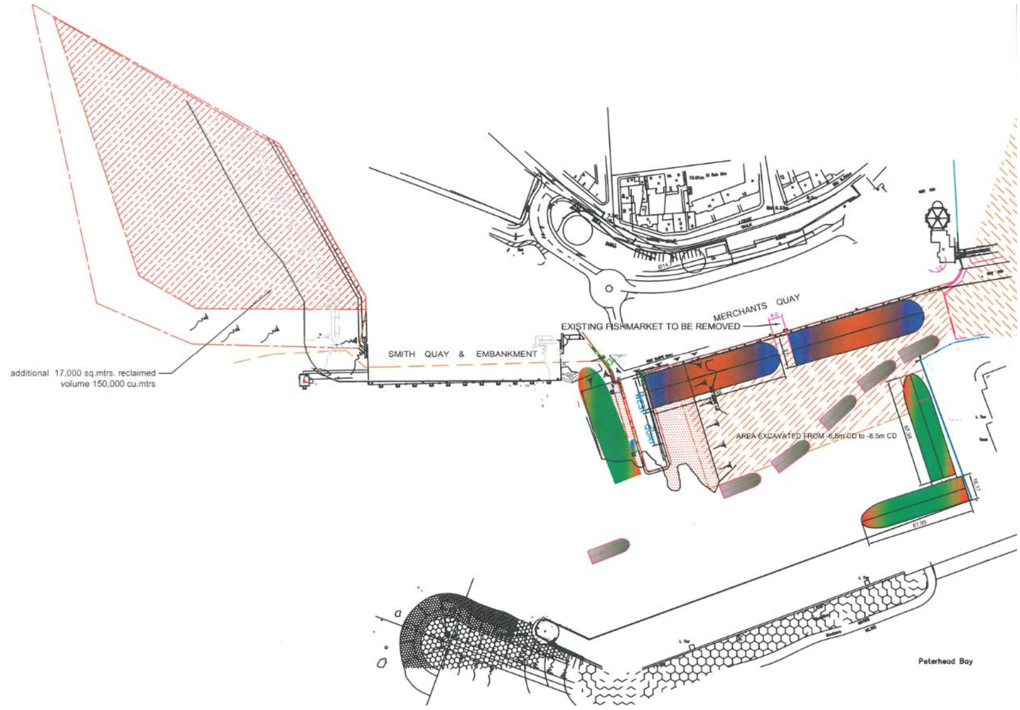
Figure 3-3: Development at North Harbour Area



Source: Peterhead Port Authority

The Merchants Quay is located north of the harbour entrance. The water depth at the quay is 6.2 meters. The proposed infrastructure development would increase the depth at the Quay to a minimum of 8.5 meters. The proposal also includes plans to reclaim 20,000m^2 of ground at the adjacent Smith Quay.

Figure 3-4: Development at Merchants Quay



Source: Peterhead Port Authority

The work on the inner harbours is expected to commence in the winter/spring of 2015 and be completed by the summer of 2016.

3.3.2 Fish Market

Currently the fish market at Peterhead does not have the capacity to handle existing demand or support future growth in the fishing industry. There is currently space for 3,200 boxes on the flat, which requires some product to be left on vessels overnight and postpones the sale of the catch. This delay reduces the sale value of the fish.

The new fishmarket proposal would increase the capacity of the market to 5,500 boxes on the flat. The new fishmarket would also incorporate a private landing area that will exclusively handle fish landings, offices and an electronic auction room. The new market will be energy efficient and utilise environmentally efficient methods to cool the facility and harvest rain water.

The construction of the new fishmarket would start in September 2015 and be completed by February 2016.

3.3.3 Oil and Gas Commercial Facility

As part of the development proposal a 185 meter deep-water berth will also be developed at the location of the current Merchants Quay fish market.

4 POLICY AND MARKET CONTEXT

This section describes the policy and market context within which the new development will take place.

4.1 Policy Context

4.1.1 Scottish Government Economic Development Strategy

The economic priorities and actions of the Scottish Government are guided by the Government Economic Strategy (GES), which was published in 2011[2]. The GES discusses the potential for different industries to grow and take advantage of particular opportunities. The GES identifies seven Growth Sectors that the Government believes have the greatest potential for growth.

One of the priority sectors identified by the GES is the food and drink sector and one of the main opportunities for growth in this sector is the high quality export market. The food and drink sector covers both agriculture and fisheries, both of which are supported by Peterhead Port. By enhancing facilities for these tow important components of the sector the proposed development would therefore be supporting the Scottish food and drink sector. Peterhead Port's proposed development would also contribute to this priority by improving the quality of the fish landed at the port, which would help to increase its potential export value.

One of the other growth sectors that is identified in the GES is the energy sector. The expansion of Peterhead Port's capacity would also generate opportunities for growth for both the Oil and Gas Sectors and the Offshore Renewables Sector.

4.1.2 Food and Drink

The food and drink industry in Scotland is one of the key sectors targeted for growth by the Scottish Government. There is a strategy for growth for the industry that was published by the industry body Scotland Food and Drink. This strategy notes that, although the food and drink industry in Scotland has a strong reputation and prospects for growth, there is work to be done to realise the full potential of the industry.

Peterhead is the largest fishing port in Scotland and the fishing industry plays an important role in the food and drink strategy. Scottish fish is identified as one of the industries where there is export potential. Although it is not a product that is dealt with at Peterhead Port, Scottish salmon is highlighted as one of the products that has an international reputation for quality and has been successfully marketed overseas. Scotland's other seafood products are also able to loudly 'trumpet their providence' and can learn from industries such as whisky about exploiting their Scottish credentials to increase export sales.

There are ten tasks that are identified in the strategy that are necessary to meet the industry target of being a £12.5 billion industry with a global reputation by 2017. Three of these tasks are applicable to the aims of the Peterhead Port project, these are:

- add more value to our primary products;
- ensure that more businesses throughout the whole industry become economically and environmentally sustainable; and

[2] Scottish Government, *The Government Economic Strategy,* September 2011

- encourage people to collaborate more, especially in the supply chain.

The proposed development at Peterhead Port is designed to increase the quality, and therefore value, of the fish landed and to increase the potential for growth. These objectives contribute directly towards the industry strategy.

4.1.3 Marine Scotland

Marine Scotland is the Scottish Government body responsible for the integrated management of Scotland's sea resources. These responsibilities include renewable energy, sea fisheries, aquaculture and freshwater fisheries. The strategy of Marine Scotland is set out in its Strategic Plan 2010 – 2013[3].

The three key aims of the strategy in relation to sea fisheries are to:

- ensure sea fisheries are managed sustainably, promote value-added activity and to achieve maximum sustainable economic returns to Scotland;
- support and sustain Scottish fisheries-dependent communities; and
- manage the use of marine space, ensuring an appropriate balance between the interests of fisheries and other marine industries/uses and the marine environment.

The value added activity within the fisheries sector is captured between the ship and the plate.

4.1.4 Oil and Gas

The Scottish oil and gas industry strategy[4] describes the priority actions and vision for the sector in Scotland. The vision for the industry in Scotland is for one that is increasingly integral to the Scottish economy but outward looking, with Scottish expertise and products in high demand in the global export market.

One of the key issues highlighted in the strategy is the presence of adequate and effective infrastructure. It is seen as a priority to invest in improvements in Aberdeen City and Shire to ensure that Scotland remains competitive. It is only through investments in infrastructure that Scotland will continue to be an attractive long-term investment location. The development of transport infrastructure in the North East of Scotland is seen as vital to ensure connectivity between the sector in Scotland and markets in Europe and further afield.

4.1.5 Renewable Energy

The renewable energy sector is expected play an increasingly important role in Scotland's economy in the future as the country takes advantage of its natural resources. In order to support the development of this sector Scottish Enterprise has developed a National Renewables Infrastructure Plan. Peterhead is one of the Port's that have been identified as a resource that will form part of Scotland's renewables infrastructure. Peterhead Port's potential in the offshore renewables industry will build on the existing subsea and supply chain operations that are undertaken by ASCO. There is also potential for distributed manufacturing at the South Base and the Upperton industrial estate to the south of the town that has been identified in the plan.

[3] Scottish Government, *Marine Scotland Strategic Plan 2010 – 2013,* April 2010
[4] Scottish Enterprise, *Oil and Gas Strategy 2012 – 2020,* May 2012

Peterhead Port's potential role in the growing renewable energy sector is illustrated by its support of the Energetica initiative. Energetica is a 25 year plan, led by Scottish Enterprise, Aberdeen City Council and Aberdeenshire Council to create a global showcase for energy technology development and energy efficiency.

Energetica covers a 30 mile stretch that extends from Bridge of Don, North to Peterhead and West to Aberdeen International Airport. Peterhead port sits at the north end of the 30-mile Energetica corridor and is fully committed to attracting business from the emerging renewables sector and to working with strategic partners involved in the project in order to deliver an outstanding service to the sector.

4.2 Market Context

4.2.1 Fishing

In 2012 more than 331,000 tonnes of fish were landed at Scottish harbours worth more than £0.4 billion. Of this, approximately 46% by volume and 34% by value was landed in Peterhead. The fish landed in Peterhead in 2012 represented around 85% of all fish landed in the north east of Scotland[5].

Table 4-1: Total fish landings in Scotland in 2012 by UK and foreign vessels

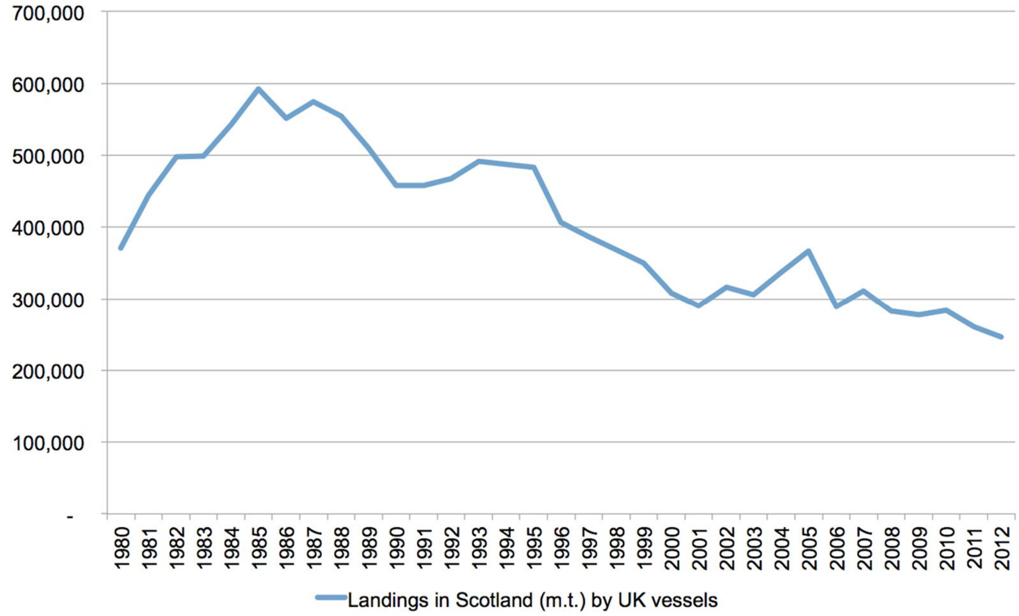
	Tonnes	Peterhead % by volume	Value (£m)	Peterhead % by value
Demersal (white fish)	104,239	45%	160.2	39%
Pelagic (Mackerel, herring, whiting, etc)	169,737	60%	114.8	61%
Shellfish	57,030	5%	144.2	7%
Total	**331,006**	**46%**	**419.2**	**34%**

Source: Scottish Sea Fisheries Statistics, 2012 landings tables

The fishing industry in Scotland has seen a reduction in activity since the mid 1980s. In 1985 UK registered vessels landed 593,000 tonnes of fish in Scottish ports, however by 2012 this had dropped by 58% to 247,000 tonnes. The decline in landings by Scottish boats was however partially offset by an increase in landings by foreign owned boats.

[5] The fish landed on the north east of Scotland is assumed to include the fish landed at Aberdeen, Peterhead Fraserburgh and Buckie.

Figure 4-2: Landings in Scotland (m.t.) by UK vessels

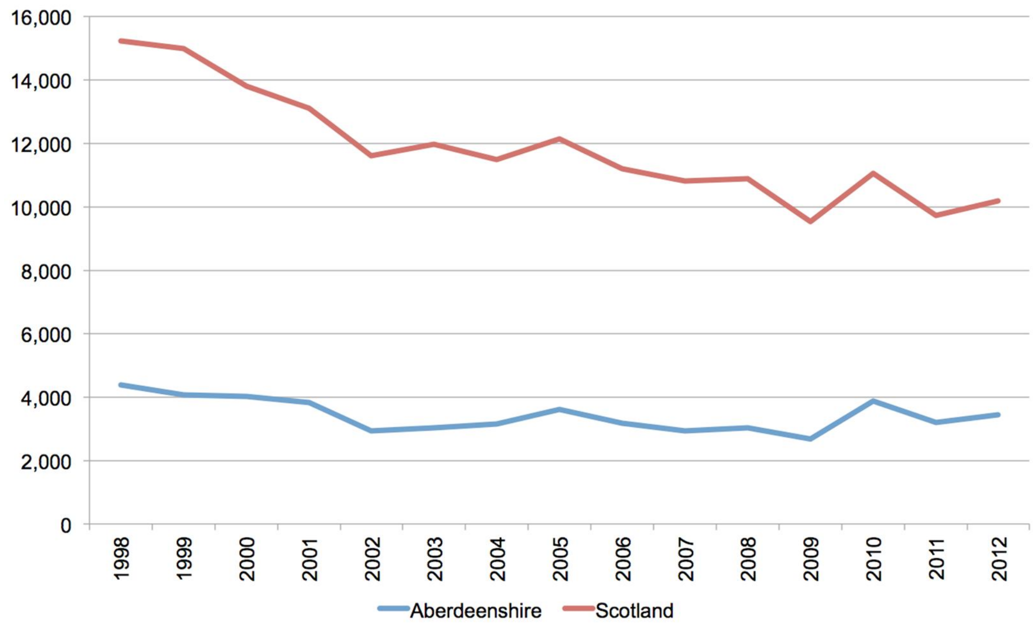


Source: Scottish Government, Scottish Sea Fisheries Statistical Tables, 1980 – 2012

The fishing industry has seen a decline in the employment levels in Scotland since 1998. Employment in fishing and fish processing went from 17,200 in Scotland in 1998 to 10,200 in 2012, a drop of 31%. Although the fishing industry in Aberdeenshire has been slightly more robust employment has still fallen by 22% over this period from 4,400 to 3,400.

Recent years has seen a change in the fortunes and employment of the fishing industry. Between 2009 and 2012 employment has grown in both Scotland and Aberdeenshire. In Aberdeenshire employment has increased by 28% and in Scotland employment in the fishing industry has increased by 7%.

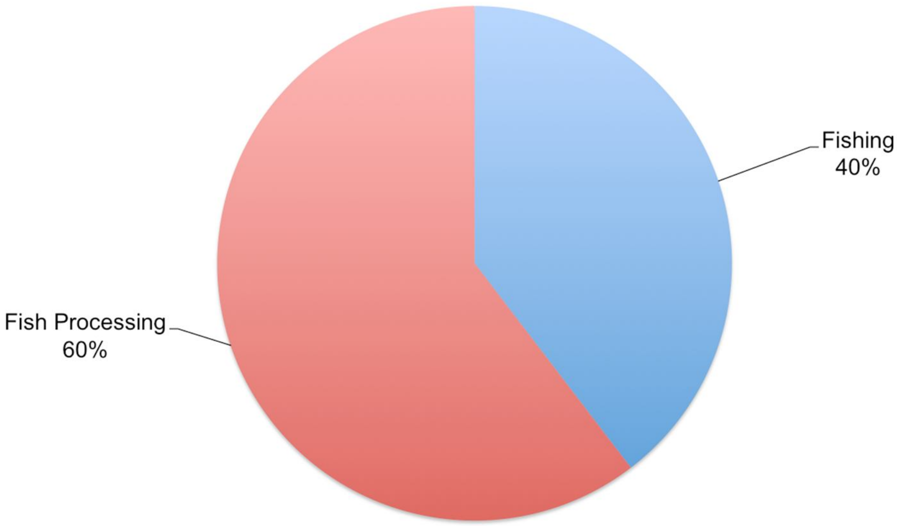
Figure 4-3: Fishing industry employment – including fishing and fish processing



Source: ONS, Business Register and Employment Survey, 2013

The majority of people who are employed in the fishing industry work in fish processing (60%) compared to those who work directly in fishing (40%). These proportions have not changed significantly since 1998.

Figure 4-4: Employment in the fishing industry in Aberdeenshire 2012



Employment in the fishing industry is dependent on the level of fish stocks, the market for fish products and the technologies used in catching, landing and processing fish. Fish stocks in the North Sea are managed through the European Union's Common Fisheries policy. This is designed to ensure that the fish population of any particular species in an area is able to withstand the level of fishing in that area in order to ensure that fish stocks are maintained at sustainable levels.

4.2.2 Oil and Gas

The oil and gas sector is a vital industry to Aberdeen City and Shire and Peterhead Port. Ships servicing the industry in the North Sea account for 38% of the traffic in and out of the port. The majority of the vessels involved with the oil and gas industry are service vessels, that service and bring supplies to the rigs. The Port is also used by subsea vessels, which carry out engineering works associated with oil and gas (along with offshore renewable energy)

Oil and Gas has had a huge impact on Aberdeen City and Shire in the past four decades. Since the discovery of North Sea oil and gas in the 1960s over 41 billion barrels of oil equivalents (boe) have been extracted from the UK share of these North Sea resources. Although most analysts agree that the majority of the North Sea resources have been extracted the amount remaining is unknown due to difficulties associated with projecting future discoveries. Oil and Gas UK, the industry body for the oil and gas sector estimate that there are between 15 billion and 24 billion barrels of oil equivalent still to be extracted from the North Sea. This implies that between 27% and 37% of the original resource remains to be extracted.

Table 4-1: Estimates of recovrable oil (billion boe)

	Low estimate	High estimate
UKCS Reserves and Resources	15	24

Source: Oil and Gas UK, Economic Report, 2012

Until recently virtually all of the oil and gas activity undertaken at Peterhead Port was undertaken by ASCO. Consultation with ASCO suggests that this level of activity is expected to fall in the coming years due to the lack of a spot market for ships and poor investment and infrastructure in the area. Since the turn of the century the proportion of ASCO's UK activity that is undertaken at Peterhead has fallen from 50% to 33%, partially as a result of ASCO developing new facilities elsewhere. Over the same period, the amount of oil and gas related activity undertaken by PPA has also been increasing.

4.2.3 Summary

The two main industries that Peterhead Port depends on, namely fishing and oil and gas, have both seen declines in production in recent decades. Despite this both industries still have potential to provide the Port with increasing business in the coming decades. The decline in the fishing industry has how halted due to fleet decommissioning and restructuring of available fish quotas. The development of export markets will result in growth opportunities in the future. The oil and gas industry has seen large investment in the past few years and there are expected to be opportunities for oil and gas companies to work in subsea, decommissioning and offshore renewable energy projects in the North Sea from the Port in the future.

5 SOURCES OF IMPACT

This report considers five main sources of economic impact, these are:

- port operations
- fishing
- fish Processing
- oil and Gas activity
- impact of handling agricultural products

5.1 Types of Impact

For each source of impact this report estimates three types of impact:

- direct impacts – the employment and GVA directly generated by the business or group of businesses being considered. For example, the direct impact of fishing industry would be the number of fishermen working out of Peterhead Port and the value added to the economy by the fish they land;
- supplier impacts – impacts generated elsewhere in the supply chain as a result of purchases made by these businesses. For example, for the fishing industry this would include the jobs supported in businesses that supply goods and services to the fishing boats operating out of Peterhead Port; and
- employee spending impacts – the effect of employees whose jobs are supported by this activity spending their wages. For example for the fishing industry this would be the impact of fishermen spending their wages and the impact of people who work for businesses that are supported by the expenditure of fishing boats spending their wages.

For each source of impact the process for estimating direct, supply chain and employee spending effects is the same.

5.1.1 Direct Impacts

The starting point for assessing the direct impact of each activity was either the number of people it employs or the turnover it generates. Turnover was converted into GVA by subtracting expenditure on supplies. Where turnover or expenditure on supplies was not available then GVA was estimated by multiplying the number of direct employees by an estimate of GVA/employee in relevant sectors.

5.1.2 Supply Chain Impacts

The starting point for estimating supplier impacts was the amount spent by an organisation or group of businesses on supplies. The employment impact of this expenditure was estimated by dividing total expenditure by turnover/employee in relevant sector(s). The GVA by these employees was then estimated by multiplying the number of jobs supported by an estimate of GVA/employee in relevant sector(s). Multiplier effects were then captured by applying GVA and employment multipliers for the appropriate sectors.

5.1.3 Employee Spending Impacts

The starting point for estimating employee spending impacts was the amount of money paid to staff who work in the area of activity being considered. In order to estimate how much of the impact of this expenditure occurs within Peterhead and within Aberdeen City and Shire it was then necessary to make assumptions about how much employees spend in each of the study areas.

The amount staff spend in Aberdeen City and Shire will vary depending on where staff live but it was assumed that all staff spend around 70% of their wages somewhere in Scotland (i.e. leakage at the national level is 30%). A summary of these assumptions is provided in Table 5-1.

Table 5-1 – Staff spending assumptions

	Staff Spending			
Staff Location	Peterhead	Rest of Aberdeen C&S	Rest of Scotland	Scotland (total)
Peterhead	25%	30%	15%	70%
Aberdeen C&S	10%	40%	20%	70%
Rest Scotland	5%	20%	45%	70%

Source: BiGGAR Economics

To estimate the impact of this expenditure it is first necessary to estimate how much staff spend in Aberdeen City and Shire and how much they spend in Scotland. This expenditure was then divided by average turnover per employee in the relevant area to determine how many jobs it supports. The GVA of this expenditure was then estimated by multiplying the number of jobs supported by average GVA/employee in the Scottish (or Aberdeen City and Shire or Peterhead) economy. Average employment and GVA multipliers covering all sectors of the economy were then applied to capture multiplier effects.

5.1.4 Sources

The turnover/GVA ratios and estimates of GVA/employee used in this report were all derived from the 2011 Annual Business Survey published by the Office for National Statistics. The effects of subsequent spending rounds were captured using type II GVA and employment multipliers. These are published in the Scottish Government's input-output tables.

6 PORT OPERATIONS

Port operations include the day-to-day operational tasks required in order for Peterhead Port to function as a harbour. This includes the activity of both the PPA, which is responsible for managing the Port and ASCO, which undertakes most of the logistics and cargo handling.

6.1 Current Impact of Port Operations

The current impact of Port Operations includes the direct employment supported and wealth created by the two primary port operators, the PPA and ASCO. It also includes the impact of these companies expenditure on supplies (the supplier impact) and the impact of the people they employ spending their wages in the Scottish economy (employee spending impact). Each of these impacts is quantified below.

6.1.1 Direct Impact of Port Operations

Taken together the PPA and ASCO employ 528 people in Peterhead.

The GVA of the PPA was estimated by subtracting expenditure on supplies (£3.9 million) from total turnover (£9.3 million) in 2012. The GVA of ASCO was estimated by multiplying the number of ASCO employees by an estimate of GVA per employee in the sector. In this way it can be estimated that the direct GVA of harbour operations amounted to £44.9 million in 2012.

6.1.2 Port Operations Supplier Impact

The supplier impact associated with harbour operations includes the employment supported and wealth generated as a result of the PPAs expenditure on goods and services. As the supplies purchased by ASCO predominantly relate to the oil and gas sector, the impact of ASCO's supply chain is considered as part of the oil and gas sector supply chain impact quantified in section 9.1.

The PPA spent £3.9 million on supplies in 2012. The supplies purchased by Peterhead Port are likely to be similar to those purchased by the Aberdeen Harbour Board so assumptions about the types of goods and services purchased were based on similar research undertaken in 2013 about Aberdeen Harbour[6]. Based on this research it was 70% of this expenditure was retained within Aberdeen City and Shire and 90% was retained in Scotland.

In addition to Aberdeen City and Shire this report also considers the local impact within the Peterhead travel to work area. In order to estimate this impact it was assumed that 25% of expenditure was retained within Peterhead,

Based on this expenditure it was estimated that the supply chain impact associated with the operation of Peterhead Port contributed £2.1 million GVA to the Scottish economy in 2012 and supported 25 jobs. This is summarised in Table 6-1.

[6] BiGGAR Economics (November 2013), Economic impact of Aberdeen Harbour.

Table 6-1 – Supply chain impact associated with port operations

Impact	Peterhead	Aberdeen C&S	Scotland
Supply chain impact (jobs)	3	9	12
Supply chain impact + multiplier effect (jobs)	4	13	25
Supply chain impact (£m GVA)	0.3	0.8	1.0
Supply chain + multiplier effect (£m GVA)	0.3	1.1	2.1

Source: BiGGAR Economics economic impact model

6.1.3 Port Operations Employee Spending Impact

The starting point for estimating the spending impact of people employed by the PPA and ASCO in Peterhead was the total wages paid to these employees in 2012. Financial accounts for the PPA show that employee wages amounted to £1.9 million in 2012. Information about ASCO's staff costs was not available so it was assumed that average wages within the two organisations were similar. ASCO's expenditure on staff wages was then estimated by applying the average wage of PPA employees to the number of ASCO employees in Peterhead.

Consultation with ASCO and the PPA suggest that virtually all employees working in Peterhead live within about 15 miles of the town so it was assumed that 95% of employees live in Peterhead and the remaining 5% live elsewhere in Aberdeen City and Shire. The amount spent in each study area was then estimated by applying assumptions about where employees spend their money (see Table 5-1).

Based on this expenditure it was estimated that the employees of the PPA and ASCO in Peterhead generated £6.5 million GVA to the Scottish economy in 2012 and supported 66 jobs. This is summarised in Table 6-2.

Table 6-2 – Employee spending impact associated with port operations

Impact	Peterhead	Aberdeen C&S	Scotland
Employee expenditure (£m)	3.5	7.9	10.1
Employee spending impact (jobs)	13	30	45
Employee spending impact + multiplier effect (jobs)	15	37	66
Employee spending impact (£m GVA)	1.8	4.1	5.0
Employee spending impact + multiplier effect (£m GVA)	2.0	5.0	6.5

Source: BiGGAR Economics economic impact model

6.1.4 Summary Port Operations

It was estimated that the total impact of port operations in Peterhead supported more than 630 jobs in Scotland in 2012 and contributed £53.5 million GVA to the Scottish economy. A breakdown of these impacts is provided in Table 6-3 and Table 6-4.

Table 6-3 – Total employment impact associated with port operations

Impact	Peterhead	Aberdeen C&S	Scotland
Direct impact (jobs)	528	528	528
Supply chain impact (jobs)	4	13	25
Employee spending impact (jobs)	15	37	66
Total jobs supported by port operations	546	578	619

Source: BiGGAR Economics economic impact model

Table 6-4 – Total GVA impact associated with port operations (£m)

Impact	Peterhead	Aberdeen C&S	Scotland
Direct impact	44.9	44.9	44.9
Supply chain impact	0.3	1.1	2.1
Employee spending impact	2.0	5.0	6.5
Total GVA generated by port operations	47.2	50.9	53.5

Source: BiGGAR Economics economic impact model

6.2 Future of Port Operations

The current impact of Port operations is driven by the turnover and number of people employed by the two principle operators at the Port - the PPA and ASCO. Future levels of activity at the Port will drive the future turnover and employment of these organisations.

The turnover generated and employment supported by the PPA is driven by a number of different activities but primarily fishing, oil and gas and the movement of agricultural products. In order to estimate the future turnover and employment of the PPA it was therefore necessary to consider how each of these activities might change in the future.

The development of the fishing industry is discussed in section 7.2. This section estimates what the future turnover of the fishing industry might be both if the project goes ahead and if it doesn't. At present the PPA charges 2.5 pence per £1 on fish landed at the Port. By assuming that this charge remains constant over time it was possible to estimate the total income generated by fish landings over the next 20 years.

The development of agricultural products is discussed in section 10.2. This section estimates the total volume of agricultural products that might pass through the Port in 20 years time. The PPA currently charge 79 pence per tonne on agricultural products. By assuming that this charge remains constant over time it was possible to estimate the total income generated from the transportation of agricultural products over the next 20 years.

The factors that are expected to influence future levels of activity in the oil and gas sector are discussed in section 9.2. This suggests that if the project does not go ahead then oil and gas related activity at the Port might fall by around a third over the next 20 years but that if the project does happen, current levels of activity could be maintained. It was therefore assumed that the turnover and employment currently supported by oil and gas activity at the Port would reflect this.

It was assumed that all other areas of activity – for example income from the transportation of other goods and passengers would remain constant over time.

Using these assumptions it was estimated that if the project goes ahead then in 20 years time the activities currently undertaken by the PPA could be generating around £9.9 million of revenue and supporting 72 jobs and the activities currently undertaken by ASCO could be generating £158 million turnover and supporting 460 jobs.

If the project does not go ahead then it was estimated that in 20 years time the activities currently undertaken by the PPA could be generating around £9.1 million of revenue and supporting 66 jobs and the activities currently undertaken by ASCO could be generating £58.9 million turnover and supporting 172 jobs.

This implies that if the PPA masterplan goes ahead, the total number of people employed by the two operators will increase very slightly (from 528 in 2013 to 532 by 2032) but if the masterplan proposals do not go ahead, total employment in both organisations will fall to 238 by 2032.

6.2.1 Displacement and Substitution

This impact was estimated based on the future impact of the fishing industry and the oil and gas sector. Displacement and substitution were taken into account when estimating these impacts so it is not necessary to account for them separately here.

6.3 Future Impact of Port Operations

The future impact of Port Operations was estimated by applying the methodology described in section 6.1 to the employment estimates described in section 6.2. In this way it was estimated that if the PPA masterplan proposals are implemented, in 20 years time harbour operations would support a total of around 625 jobs and generate £54 million GVA for the Scottish economy. This represents a small increase of almost 10 jobs and £1 million GVA on the current impact.

If the PPA master plan proposals are not implemented it is expected that by 2020 port operations will support around 300 Scottish jobs and contribute £25 million GVA to the Scottish economy. This represents a significant reduction from current levels of activity of around £29 million GVA and almost 330 jobs.

This implies that the PPA masterplan proposals could help to maintain levels of activity at the Port, which would safeguard £29 million GVA for the Scottish economy and around 330 new jobs in 20 years time through Port operations alone. These impacts are summarised in Table 6-5.

Table 6-5: Future impact of port operations in Year 20

	Peterhead		Aberdeen City & Shire		Scotland	
	Jobs	GVA (£m)	Jobs	GVA (£m)	Jobs	GVA (£m)
Reference case	248	21	267	23	292	25
Intervention case	551	48	583	51	625	54
Difference	**303**	**26**	**316**	**28**	**333**	**29**

Source: BiGGAR Economics, totals may not sum due to rounding

6.4 Project Construction Impact

The PPA expect that constructing the new fish market and developing a new deep-water berth at the site of the existing fish market would cost in the region of £40 million. This expenditure would make a significant contribution to the Scottish construction sector. In accordance with Scottish Enterprise economic impact guidance this impact has not been included as part of the operational impacts considered above; however, in the interests of completeness it is presented below.

The first step in estimating the construction impact of the project was to estimate how much of the project expenditure might occur in each of the study areas. The scale of the project and the specialist skills involved in undertaking it means that it is likely to attract bids from contractors from across the UK and potentially even outside the UK. For these reasons it was assumed that around two thirds of project expenditure would be retained within Scotland and 10% would be retained within Aberdeen City and Shire. These assumptions are consistent with analysis of construction related expenditure made by Aberdeen Harbour undertaken by BiGGAR Economics[7].

The scale of the Peterhead economy in relation to the project means that the proportion of expenditure likely to be retained locally is likely to be relatively small. For this reason, it was assumed that 5% of project expenditure (£2.0 million) would be retained within the Peterhead travel to work area.

The employment supported by this expenditure was estimated by dividing total expenditure in each area by GVA/employee in sectors related to marine construction published by the Scottish Government. The GVA impact of the project was then estimated by multiplying the number of jobs supported by GVA/employee in these sectors. Appropriate multipliers were then applied to capture the effects of subsequent spending rounds.

In this way it was estimated that the project would generate £11.1 million GVA for the Scottish economy of which £1.1 million would be retained within Aberdeen City and Shire and £0.4 million would be retained within Peterhead. It was also estimated that the project would support 186 years of construction related employment in Scotland, of which 18 would be in Aberdeen City and Shire and 7 would be in Peterhead. These impacts are summarised in Table 6-6.

[7] BiGGAR Economics (December 2013), Economic Impact of Aberdeen Harbour.

Table 6-6 – Temporary project construction impact

Impact	Peterhead	Aberdeen C&S	Scotland
Project expenditure (£m)	2.0	4.0	26.7
Direct construction impact (job years)	7	14	90
Total impact - including multiplier effect (jobs)	7	18	186
Direct construction impact (£m GVA)	0.4	0.8	5.5
Total impact - including multiplier effect (£m GVA)	0.4	1.1	11.1

Source: BiGGAR Economics economic impact model

7 THE FISHING INDUSTRY

This section considers the role that Peterhead Port plays in supporting the Scottish fishing industry and the role that it could play in the future.

7.1 Current Impact of the Fishing Industry

The impact of this includes the fishermen who work on the boats that land at the Port (direct impact). It also includes all the jobs supported in the various businesses that supply goods and services to the fishing industry (supplier impact) and those who work in businesses where fishermen spend their wages (employee spending impact). These impacts are all considered below.

7.1.1 Direct Impact of the Fishing Industry

Consultation with industry suggests that there are currently around 65 fishing boats operating mainly out of Peterhead Port. Based consultations with the industry it was estimated that around 350 fishermen work on these boats.

In 2012 the PPA reported that the total value of fish landed at Peterhead (i.e. the total turnover of boats landing at the Port) was £148.1 million. Consultation with industry suggests that on average fishing boats spend around 40% of their gross turnover on supplies, including replacing and repairing gear and approximately 20% of turnover on purchasing quota. This implies that in 2012 approximately 60% of the total turnover of fishing boats (i.e. £91.8 million) was spent on supplies.

The direct GVA impact of an industry is measured by subtracting expenditure on supplies from turnover. It was therefore estimated that the fishing industry in Peterhead directly contributed £56.3 million GVA to the Scottish economy in 2012 (i.e. £148.1 million - £91.8 million).

7.1.2 Fishing Boat Supplier Impact

The supplier impact of the fishing industry includes the jobs supported in businesses that provide fishing boats with good and services. In order to estimate this impact it was first necessary to make assumptions about the types of goods and services purchased by fishing boats. This was done through consultation with fishermen and fish sales agents based in Peterhead.

These consultations suggested that the main categories of expenditure incurred by fishing boats are:

- **fuel** – this was estimated to account for around 25% of gross turnover;
- **quota** - a payment made in return for the right to land particular species. This was estimated to account for around 20% of total turnover;
- **repairs** – “the boat share” used to pay for essential repairs and to replace damaged or lost equipment; this was estimated to account for around 12% of total turnover;
- **stores** – mainly food for the crew while away on fishing trips. This was estimated to account for around 3% of total turnover; and
- **other costs** – such as agent fees. This was estimated to account for around 3% of total turnover.

These proportions were then applied to the gross turnover of the fishing fleet operating out of Peterhead in order to estimate the total expenditure in each of the main categories. In this way it was estimated that fishing boats operating out of Peterhead purchase supplies and quota worth £91.8 million each year.

In order to estimate the impact of the remaining expenditure in each of the study areas it was then necessary to make assumptions about the proportion of the expenditure that occurred in each study area. This was done based on consultations with industry that suggested that around three quarters of supplies are purchased in Peterhead and around 90% are purchased within Aberdeen City and Shire or elsewhere in Scotland.

In this way it was estimated that the expenditure of fishing boats based in Peterhead on supplies directly supported around 250 jobs in Peterhead. These jobs include a variety of businesses located in and around the Port, that exist primarily to provide services to the fishing industry. Information provided by the PPA suggests that around 180 of these jobs are based in the Port its self, these include around:

- 100 people who work in a variety of engineering and electrical businesses that specialise in providing services to fishing boats;
- 35 people employed as fish sales agents;
- 6 people who work at the ice factory;
- 6 people who work in the box compound;
- (some of the) 22 people who work in the oil storage depot; and
- 20 people who work in various organisations such as the Scottish Fishermen's Organisation and the Scottish Fisheries Protection Agency.

The effect of subsequent spending rounds was then captured by applying appropriate multipliers. Based on this expenditure it was estimated that the supply chain impact associated with fishing boats operating out of Peterhead Port contributed £33.4 million GVA to the Scottish economy in 2012 and supported 500 jobs. This is summarised in Table 6-1.

Table 7-1 – Supply chain impact associated with fishing boats operating out of Peterhead

Impact	Peterhead	Aberdeen C&S	Scotland
Supply chain impact (jobs)	251	302	302
Supply chain impact + multiplier effect (jobs)	268	367	500
Supply chain impact (£m GVA)	16.3	19.6	19.6
Supply chain + multiplier effect (£m GVA)	17.5	24.2	33.4

Source: BiGGAR Economics economic impact model

7.1.3 Fishing Crew Spending Impact

The employee spending impact associated with the fishing industry is generated when fishermen spend their wages in the Scottish economy. The starting point for estimating this impact was to estimate how much fishermen who work out of Peterhead receive in wages each year.

This was done based on consultations with industry, which suggested that the "crew share", i.e. the wages paid to crew is typically half of what is left of the gross turnover after all expenses and supplies for the boat have been paid. Based on this assumption it was estimated that the total amount of wages paid to the crew of fishing boats operating out of Peterhead in 2012 amounted to £28.1 million.

Consultation with industry also suggested that virtually everyone working on fishing boats out of Peterhead lives in Peterhead so it is assumed that 75% of fishing crews live within the Peterhead travel to work area and the remaining 25% live elsewhere in Aberdeen City and Shire.

Several of the fishing boats operating out of Peterhead employ crew members from overseas who often send part of their pay home. This effect is accounted for by the assumption that only 70% of crew wages are retained within Scotland.

Using these assumptions it can be estimated that the expenditure of fishing crews working out of Peterhead generated £12.8 million GVA for the Scottish economy in 2012 and supported 132 jobs. A breakdown of this impact by study area is provided in

Table 7-2 – Crew spending impact of fishing boat crews

Impact	Peterhead	Aberdeen C&S	Scotland
Crew expenditure (£m)	6.0	15.1	19.7
Crew spending impact (jobs)	23	58	87
Crew spending impact + multiplier effect (jobs)	25	72	132
Crew spending impact (£m GVA)	3.1	7.9	9.6
Crew spending impact + multiplier effect (£m GVA)	3.4	9.6	12.8

Source: BiGGAR Economics economic impact model

7.1.4 Summary Fishing Impact

It was estimated that fishing boats operating out of Peterhead supported around 980 jobs in Scotland in 2012 and contributed £102.6 million GVA to the Scottish economy. A breakdown of these impacts is provided in Table 7-3 and Table 7-4.

Table 7-3 – Total employment impact associated with the fishing industry

Impact	Peterhead	Aberdeen C&S	Scotland
Direct impact (jobs)	263	350	350
Supply chain impact (jobs)	268	367	500
Crew spending impact (jobs)	25	72	132
Total jobs supported by the fishing industry	**556**	**789**	**981**

Table 7-4 – Total GVA impact associated with the fishing industry (£m)

Impact	Peterhead	Aberdeen C&S	Scotland
Direct impact	56.3	56.3	56.3
Supply chain impact	17.5	24.2	33.4
Crew spending impact	3.4	9.6	12.8
Total GVA generated by the fishing industry	**77.2**	**90.0**	**102.6**

Source: BiGGAR Economics economic impact model

7.2 Development of the Fishing Industry

The main objective of the project being proposed by the PPA is to create a bigger fish market with better facilities. The rational behind the project is that the existing fish market is operating at or near capacity so additional space will be required to accommodate seasonal fluctuations and any future growth in activity. It is also expected that increasing the capacity and improving the facilities of the market will enhance the quality of fish sold at the market by enabling the fish to be better displayed, providing more space and eliminating the need for fish to be "laid over" until the next sale. This should help to improve sales prices and ultimately increase the economic impact of the sector.

The economic impact of the fishing boats operating out of Peterhead is driven by two main factors:

- the volume of fish landed at Peterhead; and
- the price realised for fish sold at the Peterhead fish market.

The new fish market proposed by the PPA is expected to affect both of these factors.

7.2.1 Volume of Fish Landed

In 2012 more than 156,000 tonnes of fish were landed at Peterhead Port. This included around 50,000 tonnes of white fish, approximately 102,000 tonnes of pelagic fish and about 4,000 tonnes of shellfish. Pelagic fish is sold direct to buyers before being landed at Peterhead so this fish does not go through the fish market. For this reason, it is assumed that the proposed project will have no impact on the volume of pelagic fish landed at Peterhead. It could however have a significant impact on the volume of white fish landed.

The volume of fish landed is largely determined by the amount of catch allowable under the current quota system, which is in turn heavily dependent on fish stocks. Predicting what might happen to fish stocks over the next 20 years is outside the scope of this study but there is a widespread belief within the industry that stocks of white fish have recovered significantly in recent years and will continue to do so in the year ahead.

One experienced fisherman consulted for this study for example commented that the *"fishing had never been so good*" and expected this to lead to quotas for white fish being significantly increased over the coming years. If this were to occur then it would result in a significant increase in demand from the industry to land white fish at Peterhead Port.

The new fish market proposed as part of the PPA's plans would increase the capacity of the existing fish market by 50%. Consultation with industry suggests that it is expected that the volume of fish landed at Peterhead could substantially increase in the future, particularly if the new facilities help to attract boats operating in the North Sea that do not currently land their catch in Scotland.

It has therefore been assumed that if a new fish market is built the volume of white fish landed at Peterhead would increase by 50% between 2016, when the new market will be completed and 2032. This would mean that by 2032 around 76,000 tonnes of white fish would be landed at Peterhead Port each year.

Adding this to the current volume of pelagic fish and shellfish landed at Peterhead each year suggests that the total volume of fish landed at Peterhead could reach around 181,000 tonnes by 2032. Although proportionately this is a significant increase, in absolute terms it is relatively small compared to historic landings.

If a new fish market is not built however, it will not be possible to accommodate all of this increased demand in Peterhead. It is assumed that, as there is still some spare capacity at the existing fish market, the volume of white fish landed will increase by around 10% over the next five years but after this the fish market will be operating at full capacity and no more increases will be possible. This means that there would be more "lay over" days when fish landed one day would have to be held until the next day's sale, which would have a negative impact on price.

7.2.2 Price of Fish Landed

The new fish market proposed by the PPA could also have an impact on the price realised for fish landed at Peterhead. It is expected to do this by helping to improve the quality (real and perceived) of fish sold at the market.

The quality of fish sold is expected to increase because the new market will eliminate the need for fish to be held over until the next day because there is no space in the market to present it. At present, there are many days, particularly in the busy summer season, when so much fish is landed at Peterhead that it is not possible to present it for sale at one auction.

On these occasions the boxes must either be held over until the next day or stacked up on top of each other. Fish that is held over deteriorates fast so will generally be of a lower quality and consequently fetch a lower price than freshly landed fish. Similarly, when fish is stacked in boxes it is more difficult for buyers to see what they are getting. This affects their perception of the quality of the fish, which usually results in a lower price because of the greater perceived risk of buying fish "unseen".

Consultation with fishermen currently working out of Peterhead Port confirms that the capacity of the existing fish market is already having a negative effect on prices. One fisherman estimated that this effect could be as much as 5%-15%. Although capacity is not always a constraint, it is believed that the number of days when landings exceed capacity is increasing. In part this is attributed to an increase in fish stocks, which mean that boats are able to catch more fish in a shorter space of time and therefore need to land more frequently.

If the volume of fish landed at Peterhead continues to increase, as is expected by many in the industry, then this problem will be exacerbated. In order to model this it was therefore assumed that if a new fish market is not constructed, the price realised for fish landed at Peterhead will fall by around 10% in real terms over the next five years.

This does not necessarily mean that if the new fish market is constructed the price realised for white fish landed at Peterhead will increase but the new facilities should help to limit the effect of seasonal price fluctuations. These occur because at when fish stocks are particularly plentiful this creates a temporary glut in supply, which has the effect of temporarily depressing price.

If the new facilities are developed then this should result in a significant and consistent increase in the volume of fish landed at Peterhead. This would enable fish processors to reduce their dependence on imported fish, which would ensure a consistent level of demand for fish throughout the year. This should not only help to reduce the severity of seasonal price fluctuations throughout the year but also help to improve Scotland's balance of trade with the rest of the world).

7.2.3 Fishing Employment

Although the volume of fish landed at Peterhead is expected to increase over the next few years this increase will not necessarily be reflected in the number of fishermen working out of the town. Rather than new boats entering the market it is more likely that existing boats operating out of the town will simply catch more fish. This means that while the direct GVA of the sector will increase, the direct employment will not.

Although direct employment is not expected to increase, expenditure on supplies and the wages paid to fishermen will, which means that the indirect impact of the fishing industry would increase.

7.2.4 Displacement and Substitution

Displacement could occur if, as a result of the new fish market, vessel owners decided to start landing fish at Peterhead Port instead of an alternative Scottish Port. The way that the fishing industry currently works in Scotland means that this is not expected to occur

This is because Peterhead Port mainly caters for fish that are caught by "clean net" or dedicated white fish vessels, which is purchased by specialised fish merchants. In order to secure their supplies, these fish merchants pay a deposit, or "security bond", which makes it efficient for them to then try and secure as much of their supply as possible from the same market.

Most of these merchants already secure their supplies from Peterhead and fishing vessel operators are aware of this. This means that vessel owners know that landing at Peterhead is the most reliable way of securing the best price for their catch.

As a result of this, Peterhead has long been established as the main market for white fish in Scotland. This means that any increase in the volume of fish landed at Peterhead is expected to occur as a result of an increase in the amount of fish being caught by boats that already land at the Port. It is not expected that the new facilities will encourage fishing boats that are currently using other Scottish Ports to change their behaviour so displacement is not expected to occur.

The volume and value of fish landed is not influenced by public sector spending decisions so substitution is not an issue.

7.2.5 Summary Fishing Industry Assumptions

The assumptions used to model the future impact of the fishing industry are summarised in Table 7-5. It is assumed that the current fish market will reach full capacity by 2017 so changes in the reference case will occur between 2013 and 2018. If a new fish market is built then this will not be an issue so the changes will occur over the full 20-year period.

Table 7-5 – Future fishing industry assumptions

Impact	Reference Case (2013-2018)	Intervention Case (2013-2032)
Increase in fish landed	+10%	+50%
Change in average price of fish landed	-10%	0%
Displacement	n/a	0%
Substitution	n/a	n/a

Source: BiGGAR Economics

7.3 Future Impact of the fishing Industry

The assumptions described above were applied in order to estimate the future impact of the fishing sector in Peterhead. In this way it was estimated that if the PPA masterplan proposals are implemented, in 20 years time the sector will support around 1,080 jobs and generate £119 million GVA for the Scottish economy. This represents an increase of more than 100 jobs and £17 million GVA compared to the current impact of the Port.

If the PPA master plan proposals are not implemented it is expected that the impact of the sector will still increase because of expected increases in allowable catches under the quota system but that capacity constraints at the Port will prevent Peterhead from taking full advantage of this. If the proposals are not implemented then by 2020 it is estimated that the sector will support around 940 Scottish jobs and contribute £95 million GVA to the Scottish economy. This represents a fall of around 45 jobs and £7.0 million GVA compared to the current impact. This fall would occur because the additional revenue generated by increased fish landings would be more than offset by reductions in prices caused by the effect on fish quality of the lack of capacity at the existing fish market.

This implies that the PPA masterplan proposals could help to generate an additional £24 million GVA for the Scottish economy and support almost 150 new jobs in 20 years time. These impacts are summarised in Table 7-6.

Table 7-6: Future impact of fishing industry in Year 20

	Peterhead		Aberdeen City & Shire		Scotland	
	Jobs	GVA (£m)	Jobs	GVA (£m)	Jobs	GVA (£m)
Reference case	623	72	758	84	937	95
Intervention case	691	90	861	105	1,084	119
Difference	**68**	**18**	**103**	**21**	**147**	**24**

Source: BiGGAR Economics, totals may not sum due to rounding

8 FISH PROCESSING

In 2012 it was estimated that there were 4,900 people working in the sea fish processing industry in Scotland, 71% of whom worked in the Grampian region[8]. Peterhead Port is the main reason why the industry is so heavily concentrated in this region so it is appropriate to include some of the impact of the sector in this assessment.

8.1 Current Impact of Fish Processing

The direct impact of the fish-processing sector includes all of the fish processors in Scotland whose jobs are attributable to Peterhead Port. Fish processing companies generate further economic impact by purchasing supplies from other Scottish companies (fish-processing supplier impact). Fish-processors also generate impact by spending their wages in the Scottish economy. This section considers each of these impacts in turn.

8.1.1 Direct Impact of Fish Processing

The direct impact of the fish-processing sector was estimated by multiplying total employment in the sector in Scotland by the proportion of the sector that can be attributed to Peterhead Port. Statistics published by the Scottish Government suggest that Peterhead Port currently accounts for around 46% of all fish landed in Scotland each year and around 85% of the fish landed in the north east of Scotland[9]. As the fish-processing sector is dependant on fish landings, it is therefore appropriate to attribute 85% of employment in the sector in the north-east of Scotland and 46% of employment in the rest of Scotland to Peterhead Port.

The direct GVA of the sector was then estimated by multiplying the number of jobs that can be attributable to the Port in each study area by an estimate of the GVA/employee in the sector. In this way it was estimated that fish-processing activity that is attributable to Peterhead Port directly contributed £129.7 million GVA to the Scottish economy in 2012.

8.1.2 Fish-Processing Supplier Impact

Like all businesses the fish-processing sector will generate an economic impact as a result of the supplies it purchases; however, the vast majority of these supplies will be fish, much of which will be purchased from boats landing at Peterhead Port. The impact of this fish has already been counted as part of the direct impact of the fishing sector so it must be excluded here to avoid double counting.

The Annual Business Survey suggests that the UK fish-processing sector spends 81% of turnover on supplies. Consultation with one of the main fish processors in Peterhead suggests that in 2012 the value of fish purchased represented 78% of sales. This suggests that fish-processors might spend around 3% of their annual turnover on other, non-fish supplies.

The turnover of the fish-processing sector was estimated by multiplying the number of jobs that can be attributable to the Port in each study area by an estimate of turnover/employee in the fish-processing sector. It was then assumed

[8] Seafish (2012), Survey of the UK fish processing industry.
[9] Scottish Government (2012), Sea Fisheries Statistics - 2012 landings tables

that 3% of this was spent on non-fish supplies. It was also assumed that 75% of these purchases were from businesses in Peterhead and 90% were from businesses in Aberdeen City and Shire.

In this way it was estimated that the (non-fish) supplier impact of fish processing activity attributable to Peterhead Port contributed £12.7 million GVA to the Scottish economy in 2012 and supported around 233 jobs. It should be noted that this impact relates only to the purchase of non-fish supplies by fish processors. This impact is broken-down by study area in Table 8-1.

Table 8-1 – Supply chain impact associated with fish-processing activity attributable to Peterhead Port (excluding expenditure on fish)

Impact	Peterhead	Aberdeen C&S	Scotland
Supply chain impact (jobs)	10	51	115
Supply chain impact + multiplier effect (jobs)	11	68	233
Supply chain impact (£m GVA)	1.4	7.0	6.8
Supply chain + multiplier effect (£m GVA)	1.5	9.0	12.7

Source: BiGGAR Economics economic impact model

8.1.3 Fish-Processing Employee Spending Impact

When fish-processors spend their wages this generates further economic impact. To estimate this impact it is first of all necessary to estimate the total amount of money paid in wages to relevant fish-processors. This was done by multiplying the number of fish-processing jobs attributable to Peterhead Port by an estimate of the average wage of fish-processing workers. According to the Annual Survey of Hours and Earnings (ASHE), the average (mean) wage of fish-processing workers in the UK was £22,400.

Although concentrated heavily in the north-east of Scotland, the fish-processing industry supports employment in other parts of Scotland as well. This means that many of the jobs attributable to Peterhead Port are not located within the Peterhead travel to work area or even within Aberdeen City and Shire. For this reason it was necessary to make alternative assumptions about where these employees spend their wages. These assumptions were applied in exactly the same way described in section 5.1.3 and are provided in Table 8-2.

Table 8-2 – Fish-processing staff spending assumptions

	Staff Spending			
Staff Location	Peterhead	Rest of Aberdeen C&S	Rest of Scotland	Scotland (total)
Peterhead	25%	15%	30%	70%
Aberdeen C&S	5%	45%	20%	70%
Rest Scotland	0%	5%	65%	70%

Source: BiGGAR Economics

Using these assumptions it was estimated that the expenditure of fish-processing employees whose jobs are attributable to Peterhead Port contributed £38.5 million

GVA to the Scottish economy and supported almost 475 jobs. A break-down of this impact is provided in Table 8-3.

Table 8-3 – Employee spending impact of fish-processors supported by Peterhead Port

Impact	Peterhead	Aberdeen C&S	Scotland
Employee expenditure (£m)	6.5	32.4	56.7
Employee spending impact (jobs)	25	124	280
Employee spending impact + multiplier effect (jobs)	27	160	475
Employee spending impact (£m GVA)	3.4	17.0	26.1
Employee spending impact + multiplier effect (£m GVA)	3.7	21.3	38.5

Source: BiGGAR Economics economic impact model

8.1.4 Summary Fish-Processing Impact

It was estimated that fish-processing activity attributable to Peterhead Port supported more than 4,320 jobs in Scotland in 2012 and contributed £180.9 million GVA to the Scottish economy. This implies that every fisherman working out of Peterhead supports a further 14 shore-based jobs somewhere in Scotland (either in the fishing supply chain, the fish processing sector or in industries that benefit from the expenditure of workers in these sectors). A breakdown of these impacts is provided in Table 7-3 and Table 7-4.

Table 8-4 – Total employment impact associated with the fish-processing industry

Impact	Peterhead	Aberdeen C&S	Scotland
Direct impact (jobs)	700	2,971	3,615
Supply chain impact (jobs)	11	68	233
Employee spending impact (jobs)	27	160	475
Total jobs supported by the fish-processing industry	**738**	**3,199**	**4,323**

Source: BiGGAR Economics economic impact model

Table 8-5 – Total GVA impact associated with the fish-processing industry (£m)

Impact	Peterhead	Aberdeen C&S	Scotland
Direct impact	25.1	106.6	129.7
Supply chain impact	1.5	9.0	12.7
Employee spending impact	3.7	21.3	38.5
Total GVA generated by the fish-processing industry	**30.3**	**136.9**	**180.9**

Source: BiGGAR Economics economic impact model

8.2 Development of the Fish Processing Sector

The future impact of the fish-processing sector will be driven by the number of people employed in the sector. This will be driven by the amount of fish that the sector processes, which is directly related to the volume of fish landed at Peterhead.

If more fish is landed at Peterhead then it is likely that fish processors in the north east will substitute imported fish supplies for locally caught fish, which will have a positive impact on Scotland's balance of trade with the rest of the world. The use of fresh fish over frozen imports is also likely to have a positive impact on the quality of processed fish.

For the reasons discussed in section 7.2.2, the quality of fresh fish landed at Peterhead Port is also likely to increase if a new fish market is developed. This means that the development of a new fish market at Peterhead would have a twofold effect on the quality of processed fish sold by Scottish producers – firstly because an increase in the availability of fresh fish would lead processors to substitute fresh for frozen fish and secondly because the quality of fresh fish from the Peterhead market would improve.

Evidence of the quality of fresh fish over frozen imports can be obtained by comparing the quality of fresh fish landed at Peterhead to that of frozen imports landed at Grimsby. Consultation with PPA confirms that all fresh fish landed at Peterhead is assessed as "grade A". In contrast, the quality of frozen Icelandic imports of cod to Grimsby are assessed as "grade B", because of the increased length of time between fish being capture and being sold at auction.

8.2.1 Estimating Future Employment in the Fish Processing Sector

As discussed elsewhere in this report, the fish market at Peterhead Port mainly caters for the sale of white fish. Processing white fish is a much more labour intensive process than processing shellfish because much of the shellfish landed in Scotland is exported. This means that the project proposed by the PPA could have a disproportionate impact on employment in the fish-processing sector.

In order to estimate this impact, it was first of all necessary to to consider how much of the fish processing employment in Scotland is associated with shellfish and pelagic species. A survey of UK fish processors undertaken in 2012[10] suggests that 28% of employment in the sector is in processing units that only deal with either shellfish or pelagic species. It was therefore assumed that 28% of current employment in the sector would be unaffected by the proposed development.

The next step was to estimate the effect on fish processing employment in the rest of the sector. In order to do this it was first necessary to establish the current ratio between the amount of employment supported in white fish processing and the volume of white fish processed – i.e. how much employment is currently supported for each tonne of white fish landed at Peterhead Port.

Improvements in the quality of fish could help to improve the competitiveness of processors in the area, which may result in an expansion of operations. This was modelled by assuming that the current ratio between the amount of employment supported by each tonne of raw fish processed would increase by 5% if the new fish market is developed. If the new fish market is not developed then the quality

[10] Seafish (2012), Survey of the UK Fish Processing Industry

of fish sold at the Peterhead market would not improve (and could actually fall) so it was assumed that the current ratio between the amount of employment supported by each tonne of raw fish processed would not change if the new fish market is not developed.

These ratios were then applied to the future volume of white fish expected to be landed at Peterhead Port in order to generate an estimate of the amount of employment that would be supported in the white fish processing sector. This was then added to current employment associated with pelagic species and shellfish (which will not change) in order to estimate total future employment in the sector.

In this way it was estimated that the construction of a new fish market at Peterhead Port could lead to the creation of around 1,300 additional fish-processing jobs in Scotland. If a new fish market is not developed however, the increase was estimated to be around 120 jobs.

8.2.2 Displacement and Substitution

Displacement in the fish-processing sector could occur if, as a result of the proposed development, fish processing activity in and around Peterhead increased at the expense of fish processing activity elsewhere in Scotland. Proximity of fish supplies is an important driver for fish processors so this could occur if the new fish market at Peterhead Port meant that in future fish processors could secure fish supplies at Peterhead that they currently obtain from other Scottish ports.

As discussed in section 7.2.4, Peterhead is already the main market for white fish in Scotland. This means that it is already the most important source of white fish for the fish processing industry so this scenario would not occur. This implies that there would therefore be no displacement of fish processing activity.

The decisions of the fish-processing sector are not expected to be influenced by decisions taken by Scottish Enterprise so substitution is also not expected to be an issue.

8.2.3 Summary Fish-Processing Assumptions

The assumptions used to model the future impact of fish-processing attributable to Peterhead Port are summarised in Table 8-6.

Table 8-6 – Future fish processing assumptions

Impact	Reference Case	Intervention Case
Increase in fish processing employment	117	1,301
Displacement	n/a	0%
Substitution	n/a	n/a

Source: BiGGAR Economics economic impact model

8.3 Future Impact of Fish Processing

The assumptions described above were applied in order to estimate the future impact of the fish-processing sector that can be attributed to Peterhead Port. In this way it was estimated that if the PPA masterplan proposals are implemented, in 20 years time the sector would support almost 5,880 jobs and generate £246 million GVA for the Scottish economy. This represents an increase of around 1,560 jobs and £65 million GVA compared to the impact of the Port in 2012.

If the PPA master plan proposals are not implemented it is expected that the impact of the sector will still increase because the amount of fish landed at Peterhead is still expected to increase but this increase will be much less than it would if the masterplan proposals were implemented. If the proposals are not implemented then by 2020 it is estimated that the sector will support around 4,460 Scottish jobs and contribute £187 million GVA to the Scottish economy. This represents an increase of around 140 jobs and £6 million GVA.

This implies that the PPA masterplan proposals could help to generate an additional £59 million GVA for the Scottish economy and support around 1,420 new jobs in 20 years time. These impacts are summarised in Table 8-7.

Table 8-7: Future impact of fish processing in Year 20

	Peterhead		Aberdeen City & Shire		Scotland	
	Jobs	GVA (£m)	Jobs	GVA (£m)	Jobs	GVA (£m)
Reference case	762	31	3,303	141	4,463	187
Intervention case	1,004	41	4,351	186	5,879	246
Difference	**242**	**10**	**1,408**	**45**	**1,416**	**59**

Source: BiGGAR Economics, totals may not sum due to rounding

9 OIL AND GAS ACTIVITY

The other major source of activity at Peterhead Port is the Oil and Gas sector. Much of this activity is currently focused around the ASCO base at the southern side of the Port. In addition to this direct employment, the Port also helps to support activity in the oil and gas supply chain. Evidence of this can be found in the surrounding industrial estates, which are home to a variety of oil and gas related businesses.

9.1 Current Impact of Oil and Gas Activity

The oil and gas sector activity that is undertaken at Peterhead Port directly supports employment in the industry. In addition to this, the Port also helps to support the extensive oil and gas supply chain that exists in Aberdeenshire (oil and gas supplier impacts). Oil and gas sector employees working at Peterhead Port also generate further economic impact by spending their wages in the Scottish economy.

9.1.1 Direct Impact of the Oil and Gas Sector

Consultations undertaken to support this study suggest that around 400 people currently work in oil and gas related businesses located at Peterhead Port. Based on these consultations it was assumed that 80% of these people live in Peterhead, 15% of them live elsewhere in Aberdeen City and Shire and the remainder live elsewhere in Scotland.

The GVA impact of these jobs was estimated by multiplying them by an estimate of GVA/employee in the oil and gas support sector. In this way it was estimated that in 2012 oil and gas related activity at Peterhead Port contributed £58.8 million GVA to the Scottish economy.

9.1.2 Oil and Gas Supplier Impact

Detailed information about the nature and value of supplies purchased by oil and gas related businesses in Peterhead was not available so it was necessary to use an alternative source to estimate the impact of this expenditure.

Using data published by Oil and Gas UK it was estimated that almost 60,000 people work in the oil and gas supply chain in Aberdeen City and Shire. It is of course impossible to accurately assess how much oil and gas sector employment there might be in Aberdeen City and Shire if Peterhead Port did not exist but it is reasonable to assume that the Port has made a contribution.

The starting point for assessing the extent of the contribution made by Peterhead Port was an analysis undertaken to inform an economic impact study undertaken of Aberdeen Harbour[11] in 2013, which found that it was reasonable to attribute 10% of oil and gas sector employment in Scotland to Aberdeen Harbour. This assessment was based on consideration of the role the Harbour played in the initial development of the sector and in its continuing success. It was also based on an assessment of the Harbours relative importance to the development of the sector compared to other important regional assets such as Aberdeen Airport and the local labour supply.

The scale of oil and gas activity at Peterhead relative to Aberdeen Harbour suggests that the Port's contribution to the sector is likely to be less than

[11] BiGGAR Economics (December 2013), Economic impact of Aberdeen Harbour.

Aberdeen Harbour's. Consultation with Asco suggests that the oil and gas related shipping tonnage going through Aberdeen Harbour is around 1.5 times higher than the tonnage going through Peterhead Harbour. In addition to this, the extent of oil and gas related support services, such as shipping agents, is significantly higher in and around Aberdeen Harbour than at Peterhead Harbour.

For these reasons it was assumed that the contribution made by Peterhead Harbour to the sector was around a quarter of the contribution made by Aberdeen Harbour. This implies that 2.5% of the employment in the sector can be attributed to Peterhead Port.

Using this assumption it can be estimated that almost 1,500 jobs in the oil and gas supply chain can be attributed to Peterhead Port. Based on consultation with industry it was estimated that around 30% of these jobs are located within Peterhead. This implies that there are around 450 people working in the oil and gas supply chain in Peterhead, in addition to those employed at the Port.

Consultation with industry in Peterhead suggests that much of this employment is likely to be associated with the sub-sea supply chain. For example, Dales Engineering, which undertakes high-end steel fabrication work for the oil and gas sector, employs around 110 people at the Dales Industrial Estate. Other companies operating in this sector include Aquatic, which manufactures and hires out equipment used for laying cable on the sea-bed and employs around 50 people in Peterhead.

The GVA impact of this employment was estimated by multiplying the number of jobs supported in the supply chain by an estimate of the average GVA/employee. In this way it was estimated that the oil and gas supply chain activity supported by Peterhead Port in 2012 contributed £412 million GVA to the Scottish economy. A break-down of this impact by study area is provided in Table 9-1.

Table 9-1 – Supply chain impact of oil and gas activity attributable to Peterhead Port

Impact	Peterhead	Aberdeen C&S	Scotland
Supply chain impact (jobs)	446	1,412	1,486
Supply chain impact + multiplier effect (jobs)	491	1,887	3,002
Supply chain impact (£m GVA)	65.5	207.6	218.5
Supply chain + multiplier effect (£m GVA)	71.3	268.1	411.7

Source: BiGGAR Economics economic impact model

9.1.3 Oil and Gas Employee Spending Impact

The oil and gas sector workers whose jobs are supported by Peterhead Port will generate a further economic impact by spending their wages in the Scottish economy. In order to estimate this impact it was first necessary to estimate the value of wages paid to these workers. This was done by multiplying the number of oil and gas sector workers directly supported by Peterhead Port by an estimate of gross annual pay in Aberdeenshire, from Annual Survey of Hours and Earnings.

Using these assumptions it was estimated that workers in the oil and gas sector whose jobs are attributable to Peterhead Port spent £8.7 million in the Scottish economy in 2012. It was also estimated that this expenditure contributed £5.6 million GVA to the Scottish economy and supported almost 60 jobs. A break-down of this impact is provided in Table 9-2.

Table 9-2 – Employee spending impact of oil and gas activity supported by Peterhead Port

Impact	Peterhead	Aberdeen C&S	Scotland
Employee expenditure (£m)	2.7	6.5	8.7
Employee spending impact (jobs)	10	25	39
Employee spending impact + multiplier effect (jobs)	11	31	59
Employee spending impact (£m GVA)	1.4	3.4	4.2
Employee spending impact + multiplier effect (£m GVA)	1.5	4.1	5.6

Source: BiGGAR Economics economic impact model

9.1.4 Summary Oil and Gas Impact

It was estimated that oil and gas activity attributable to Peterhead Port supported around 3,460 jobs in Scotland in 2012 and contributed £476.1 million GVA to the Scottish economy. A break-down of these impacts is provided in Table 9-3 and Table 9-4.

Table 9-3 – Total employment impact associated with the oil and gas sector

Impact	Peterhead	Aberdeen C&S	Scotland
Direct impact (jobs)	320	380	400
Supply chain impact (jobs)	491	1,887	3,002
Employee spending impact (jobs)	11	31	59
Total jobs supported by the oil and gas sector	**823**	**2,298**	**3,461**

Source: BiGGAR Economics economic impact model

Table 9-4 – Total GVA impact associated with the oil and gas sector (£m)

Impact	Peterhead	Aberdeen C&S	Scotland
Direct impact	47.1	55.9	58.8
Supply chain impact	71.3	268.1	411.7
Employee spending impact	1.5	4.1	5.6
Total GVA generated by the oil and gas sector	**119.9**	**328.1**	**476.1**

Source: BiGGAR Economics economic impact model

9.2 Development of Oil and Gas Activity in Peterhead

The PPA's masterplan also includes proposals to dredge the area around Merchant's Quay and clear and resurface the Quayside in order to develop a new commercial facility targeted at the oil and gas sector. If this new facility is created it could enable the PPA to encourage new customers in the oil and gas sector to use Peterhead Port. This section considers what this might mean for the future economic impact of the Port.

At present, the oil and gas companies that use Peterhead can be split into two main groups, those that are primarily engaged in top-side activity and those that mainly undertake sub-sea activity. The first group includes companies that operate the ships that supply off-shore installations with equipment and stores and the second group includes companies responsible for undertaking installation and maintenance work on the sea-bed.

Each of these sectors has particular needs that will influence the extent to which they might be attracted to use Peterhead Port. These are explored below.

9.2.1 Oil and Gas Supply Ships

Consultation with industry undertaken to inform this study suggested that demand for space at Peterhead Port from supply ship operators is likely to decline in the future. There were a number of reasons for this, including the Port's perceived vulnerability to bad weather.

Vulnerability to bad weather is a problem for agents who operate supply ships because supply ships are often hired on a spot market, which means they must be available in port when an oil and gas company requires them. Agents naturally prefer to berth the ships they are responsible for in harbours that are relatively sheltered from the weather (such as Aberdeen) so as to avoid the risk of damage while the ship is awaiting hire.

Other reasons why demand from this part of the sector is expected to decline in the future relate to characteristics of the oil and gas sector. In particular, the oil and gas supply chain is also heavily concentrated around Aberdeen, which means that goods and equipment being sent out on supply ships from Peterhead first need to be transported by road from one of around 40 warehouses in and around Aberdeen. Poor road connections between Peterhead and Aberdeen makes this an unattractive option for many potential customers.

There was a strong view from those consulted that as oil and gas related activity in the North Sea declines over the next 20 years, the industry will seek to consolidate around Aberdeen and demand from this segment of the sector for space at Peterhead will fall. This could be mitigated to some extent by Peterhead Port's proximity to off-shore oil fields and the development of a new all weather facility on the site of the existing fish market.

9.2.2 Sub-Sea Activity

Consultation with the companies operating in the Sub-sea sector in Peterhead suggest that this is likely to be a much more important source of potential demand for the new facilities proposed by the PPA. Some of the companies consulted indicated that Peterhead is already the preferred location for many oil and gas companies engaged in sub-sea work and expected demand for space at the Port to increase in the future.

The main reason for this is that there is a lot of quay-side space available at Peterhead Port. This is very important for operators in this part of sector because they are often dealing with extremely large pieces of equipment, which sometimes need to be stored at the quayside. Peterhead Port is also popular with operators in this part of the sector because it is relatively easy to transport large pieces of equipment from industrial estates around Peterhead to the Port. These characteristics were compared favourably to Aberdeen Harbour for example where quayside space is limited and transportation to the Harbour complicated by its city centre location.

For these reasons, there was an expectation amongst those operating in this part of the sector that demand for space at Peterhead Port from companies operating in the sub-sea sector will increase in the future. In the short-term this demand is likely to come from the oil and gas sector but in the longer-term demand may also come from the off-shore renewable sector.

9.2.3 Future Demand from the Oil and Gas Sector

If the PPA masterplan proposals do not go ahead then it is assumed that oil and gas related activity at the Port will gradually decline over the coming 20 years as supply boat operators continue to consolidate around Aberdeen. This decline has been modelled by assuming that direct employment in the industry will fall by 34%. This is consistent with the recent experience of ASCO and their expectations of future development.

If the new facilities are developed however then the PPA would be able to target new customers in the industry, which could mitigate this decline. This is modelled by assuming that if the new facilities are developed direct employment in the industry could be maintained at its current level.

Recent research undertaken by BiGGAR Economics on behalf of Scottish Enterprise[12] suggests that employment in the oil and gas sector in 20 years' time is likely to be around 80% of current levels. This implies that by year 20 the oil and gas supply chain will employ around 47,600 people in Aberdeen City and Shire.

At present it is assumed that 2.5% of this employment is attributable to Peterhead Port. If the new facilities are developed then it is assumed that the Port will maintain it's current importance to the oil and gas supply chain. If the new facilities are not developed however it is assumed that the Port's importance to the supply chain will decline to 2%.

9.2.4 Displacement and Substitution

The new facilities for the oil and gas sector could result in displacement if they attracted vessels that would otherwise use other Scottish harbours. Consultation with the PPA suggests that the target market for new oil and gas activity will be companies that do not currently operate in Scotland. The PPA is also seeking to retain existing activity at the Port, which might otherwise be displaced by developments at other competitor locations. For this reason it is assumed that displacement will be zero.

Investment decisions in the oil and gas sector are driven by oil prices and will not be influenced by public sector investment decisions so there will also be no substitution effect.

9.2.5 Summary Oil and Gas Assumptions

The assumptions used to model the future impact of oil and gas activity at Peterhead Port are summarised in Table 9-5.

[12] BiGGAR Economics and Optimat (August 2013), Research and Development in the oil and gas sector: economic and exchequer impacts – update report.

Table 9-5 – Future oil and gas sector assumptions

Assumption	Reference Case	Intervention Case
Direct oil and gas related employment in 20 years	264	400
Proportion of oil and gas supply chain employment in Aberdeen C&S attributable to Peterhead Port in 20 years	2%	2.5%
Displacement	n/a	n/a
Substitution	n/a	n/a

Source: BiGGAR Economics economic impact model

9.3 Future Impact of Oil and Gas Activity

These assumptions were applied in order to estimate the future impact of the oil and gas sector that can be attributed to Peterhead Port. In this way it was estimated that if the PPA masterplan is implemented, in 20 years time the impact of the sector that can be attributed to the Port would fall to £409 million GVA and 2,813 jobs. This represents a reduction of around 627 jobs and £67 million GVA. This reduction is attributable to an overall reduction in the size of the oil and gas supply chain that is expected to occur over the next 20 years but it is expected that this reduction would be much greater if the PPA masterplan proposals are not implemented.

If the PPA masterplan proposals are not implemented, it was estimated that in 20 years time the impact of the sector that can be attributed to the Port would fall to £319 million GVA and 2,193 jobs. This represents a reduction of almost 1,248 jobs and £157 million GVA.

This implies that the new facilities proposed as part of the PPA masterplan would safeguard £90 million GVA for the Scottish economy and around 620 jobs in the oil and gas sector that would otherwise be lost. These impacts are summarised in Table 9-6.

Table 9-6: Future impact of oil and gas activity in Year 20

	Peterhead		Aberdeen City & Shire		Scotland	
	Jobs	GVA (£m)	Jobs	GVA (£m)	Jobs	GVA (£m)
Reference case	557	81	1,175	171	2,193	319
Intervention case	768	112	1,541	224	2,813	409
Difference	**211**	**31**	**366**	**53**	**621**	**90**

Source: BiGGAR Economics, totals may not sum due to rounding

10 AGRICULTURAL PRODUCTS

Although the vast majority of activity at Peterhead Port is related either to the oil and gas sector or the fishing industry, the Port also plays an important role in supporting the Scottish farming sector by enabling producers to export their goods. This activity supports employment in the cargo handling and transportation sectors. This impact is quantified below.

10.1 Current Impact of Agricultural Products

The cargo that goes through Peterhead Port directly supports employment in companies that specialise in cargo handling and transportation. In turn these companies generate further economic impact as a result of their expenditure on supplies (supplier impact). The people employed in these companies also generate economic impact by spending their wages in the Scottish economy (employee spending impact).

10.1.1 Direct Impact of Agricultural Products

The volume of agricultural products going through Peterhead Port varies considerably from year to year. In 2012 the Port handled around 67,000 of agricultural products but the year before it handled around 120,000 tonnes. In order to gain a true picture of the annual impact of this activity, an average was therefore taken of these two years.

The cargo that goes through Peterhead Port directly supports employment in companies that specialise in cargo handling and transportation.

The vast majority of agricultural produce that goes through Peterhead Port is handled by William Whyte Cargo Handling. Consultation with the company suggests that this activity directly supports around 16 cargo-handling jobs in Peterhead.

Transportation of agricultural products is undertaken by a number of different companies but consultation with industry suggests that on average lorries carry around 30 tonnes of produce. Using this assumption it was estimated that around 16 further jobs were supported in the transportation sector.

Taken together it was therefore estimated that the handling and transportation of agricultural products that went through Peterhead Port in 2012 directly supported 32 jobs. The GVA impact associated with these jobs was estimated by multiplying the number of jobs supported by an estimate of the GVA/employee in the road freight transport and cargo handling sectors. In this way it was estimated that these jobs generated £1.7 million GVA for the Scottish economy in 2012.

10.1.2 Supplier Impact of Agricultural Products

Relevant companies consulted for this study were unwilling to disclose information that would enable the supply chain impact of this activity to be estimated. It is however reasonable to assume that fuel will be one of the most significant purchases made by businesses engaged in the handling and transportation of cargo.

The cost of fuel means that turnover/employee in this sector is extremely high compared to other sectors. This means that the amount of employment supported by this expenditure is likely to be very low. This impact is therefore considered to be negligible.

10.1.3 Employee Spending Impact of Agricultural Products

The starting point for estimating the employee spending associated with handling and transporting agricultural products was to estimate how much the employees engaged in this activity were paid. This was done by multiplying the total number of jobs directly supported by an estimate of the average salary paid to these type of workers.

The ASHE shows that the average salary paid to road transport workers in 2012 was £20,268. Consultation with industry suggests that only around 10% of these workers live in Peterhead, a further 65% live elsewhere in Aberdeen City and Shire and the remaining 25% live elsewhere in Scotland.

Applying these assumptions suggests that these workers spend almost £0.5 million in the Scottish economy in 2012. It is estimated that this expenditure generated around £0.3 million GVA for the Scottish economy and supported around 4 jobs. A break-down of this impact by study are is presented in Table 10-1.

Table 10-1 – Employee spending impact associated with handling agricultural products

Impact	Peterhead	Aberdeen C&S	Scotland
Employee expenditure (£m)	<0.1	0.3	0.5
Employee spending impact (jobs)	0	1	2
Employee spending impact + multiplier effect (jobs)	0	1	4
Employee spending impact (£m GVA)	<0.1	0.2	0.2
Employee spending impact + multiplier effect (£m GVA)	<0.1	0.2	0.3

Source: BiGGAR Economics economic impact model

10.1.4 Summary Agricultural Products Impact

It was estimated that the handling and transportation of agricultural products that went through Peterhead Port in 2012 supported around 35 jobs in Scotland in 2012 and contributed £2.0 million GVA to the Scottish economy. A break-down of these impacts is provided in Table 10-2 and Table 10-3.

Table 10-2 – Total employment impact associated with the handling and transportation of agricultural products

Impact	Peterhead	Aberdeen C&S	Scotland
Direct impact (jobs)	3	24	32
Supply chain impact (jobs)	n/a	n/a	n/a
Employee spending impact (jobs)	<1	1	2
Total jobs supported by agricultural products	3	25	34

Source: BiGGAR Economics economic impact model

Table 10-3 – Total GVA impact associated with the oil and gas sector (£m)

Impact	Peterhead	Aberdeen C&S	Scotland
Direct impact	0.2	1.3	1.7
Supply chain impact	n/a	n/a	n/a
Employee spending impact	<0.1	0.2	0.3
Total GVA generated by the oil and gas sector	0.2	1.5	2.0

Source: BiGGAR Economics economic impact model

10.2 Development of Agricultural Products Sector

The impact of agricultural products that go through Peterhead Port is driven by the volume of products handled and transported. This is driven by a number of different factors that are outside the control of the PPA, not least of which is the weather and the impact this has on the Scottish harvest.

That said, consultations with industry indicate that future growth in the volume of produce that could go through the Port is expected. For example, it is expected that the volume of timber exported from Scotland over the coming years will increase as forests planted two or three decades ago begin to mature. It is assumed that this increase could be up to 1% per year.

The new facilities proposed by the PPA are expected to increase the Port's ability to accommodate this increase in vessel movements. Without the new facilities increasing demand for space from other sectors (particularly oil and gas) could make this impossible. It is therefore assumed that if the project goes ahead, the volume of cargo going through Peterhead Port each year will increase by 1% each year for the next 20 years, reaching almost 126,000 tonnes by 2032. If the project does not go ahead it is assumed that this growth will not occur and the average amount of cargo handled each year will remain at around 105,000 tones. These assumptions are summarised in Table 10-4.

10.2.1 Displacement and Substitution

It is expected that any increase in the volume of cargo going through Peterhead Port in the future would be as a result of increased agricultural production (e.g. timber) rather than as a result of companies choosing to use Peterhead Port rather than alternative Scottish Ports. This implies that displacement would be negligible. As the volume of agricultural products imported and exported is not related to decisions made by Scottish Enterprise, substitution is also not relevant.

10.2.2 Summary Agricultural Products Assumptions

The assumptions used to model the future impact of cargo going through Peterhead Port are summarised in Table 10-4.

Table 10-4 – Future agricultural products assumptions

Impact	Reference Case	Intervention Case
Increase in cargo handled/year	0%	+1%
Tonnes of cargo handled by 2032	104,275	125,976
Displacement	n/a	0%
Substitution	n/a	n/a

Source: BiGGAR Economics economic impact model

10.3 Future Impact of Agricultural Products Activity

Using the assumptions described above it was estimated that the PPA masterplan proposals would have a very small but positive effect on the impact of the handling and transportation of agricultural products. This will be because the Port will have greater capacity to accommodate cargo vessels, particularly at times of peak demand.

The net impact of this (i.e. the intervention case less the reference case) is expected to result in an increase of 7 jobs across Scotland but the GVA impact is expected to be negligible. A breakdown of these impacts is provided in Table 10-5.

Table 10-5: Future impact of agricultural products activity in Year 20

	Peterhead		Aberdeen City & Shire		Scotland	
	Jobs	GVA (£m)	Jobs	GVA (£m)	Jobs	GVA (£m)
Reference case	3	<1	24	1	36	2
Intervention case	4	<1	31	2	43	2
Difference	1	0	7	0	7	0

Source: BiGGAR Economics, totals may not sum due to rounding

11 SUMMARY AND CONCLUSIONS

This section summarises the current and potential future impact of Peterhead Port if the project happens and if it doesn't.

11.1 Summary Current Impact

It is estimated that in 2012 Peterhead Port contributed £815 million GVA to the Scottish economy and supported almost 9,420 jobs. A breakdown of the number of jobs supported in each study area is provided in Table 11-1 and a breakdown of the GVA generated in each study area is provided in Table 11-2.

Table 11-1 – Current impact of Peterhead Port (2012) - jobs

Impact	Peterhead	Aberdeen C&S	Scotland
Port operations	546	578	619
Fishing	556	789	981
Fish processing	738	3,199	4,323
Oil and gas	823	2,298	3,461
Agricultural products	3	25	34
Total	**2,667**	**6,889**	**9,418**

Source: BiGGAR Economics, totals may not sum due to rounding

Table 11-2 – Current impact of Peterhead Port (2012) – GVA (£m)

Impact	Peterhead	Aberdeen C&S	Scotland
Port operations	47	51	54
Fishing	77	90	103
Fish processing	30	137	181
Oil and gas	120	328	476
Agricultural products	<£1	2	2
Total	**275**	**607**	**815**

Source: BiGGAR Economics, totals may not sum due to rounding

11.2 Summary Reference Case Impact

It is estimated that if the proposed project does not happen then by 2032 Peterhead Port will be contributing £628 million GVA to the Scottish economy and around 7,920 jobs. This represents a reduction of almost 1,500 jobs and £187 million GVA. This reduction is due to a decline in oil and gas activity expected to occur at the Port if the new facilities are not developed and the failure to capture growth in the fishing sector. A breakdown of the jobs supported in each study area is provided in Table 11-3 and a breakdown of the GVA generated in each study area is provided in Table 11-4 and the GVA over time is shown in Figure 11-1.

Table 11-3 – Future impact of Peterhead Port (2032) if project does not happen - jobs

Impact	Peterhead	Aberdeen C&S	Scotland
Port operations	248	267	292
Fishing	623	758	937
Fish processing	762	3,303	4,463
Oil and gas	557	1,175	2,193
Agricultural products	3	24	36
Total	**2,193**	**5,527**	**7,920**

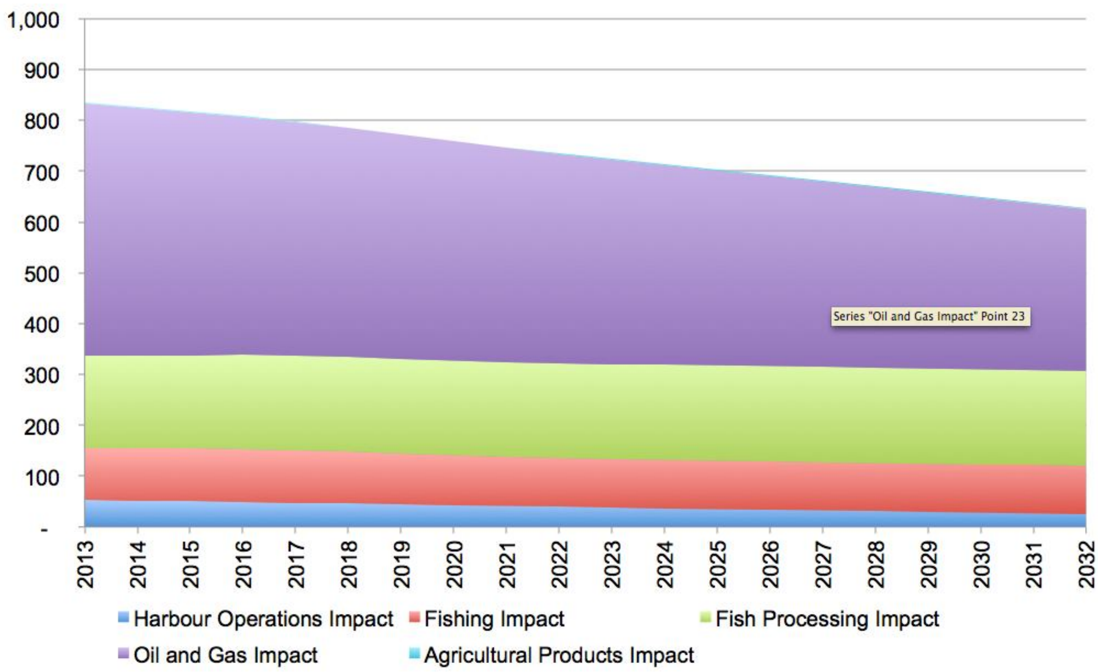
Source: BiGGAR Economics, totals may not sum due to rounding

Table 11-4 – Future impact of Peterhead Port (2032) if project does not happen, GVA (£m)

Impact	Peterhead	Aberdeen C&S	Scotland
Port operations	21	23	25
Fishing	72	84	95
Fish processing	31	141	187
Oil and gas	81	171	319
Agricultural products	<£1	1	2
Total	**206**	**421**	**628**

Source: BiGGAR Economics, totals may not sum due to rounding

Figure 11-1: Future impact of Peterhead Port if project does not happen, GVA (£m)



11.3 Summary Intervention Case Impact

It is estimated that if the proposed project goes ahead then by 2032 Peterhead Port will be contributing £831 million GVA to the Scottish economy and supporting around 10,450 jobs. This represents an increase of around 1,030 jobs and an increase of around £16 million GVA compared to the current impact. (The relatively small increase in GVA is due to a reduction in oil and gas sector activity, which has a particularly high GVA/employee.) A breakdown of the jobs supported in each study area is provided in Table 11-5 and a breakdown of the GVA generated in each study area is provided in Table 11-6 and the GVA over time is shown in Figure 11-2.

Table 11-5 – Future impact of Peterhead Port (2032) if project goes ahead - jobs

Impact	Peterhead	Aberdeen C&S	Scotland
Port operations	551	583	625
Fishing	691	861	1,084
Fish processing	1,004	4,351	5,879
Oil and gas	768	1,541	2,813
Agricultural products	4	31	43
Total	**3,018**	**7,367**	**10,444**

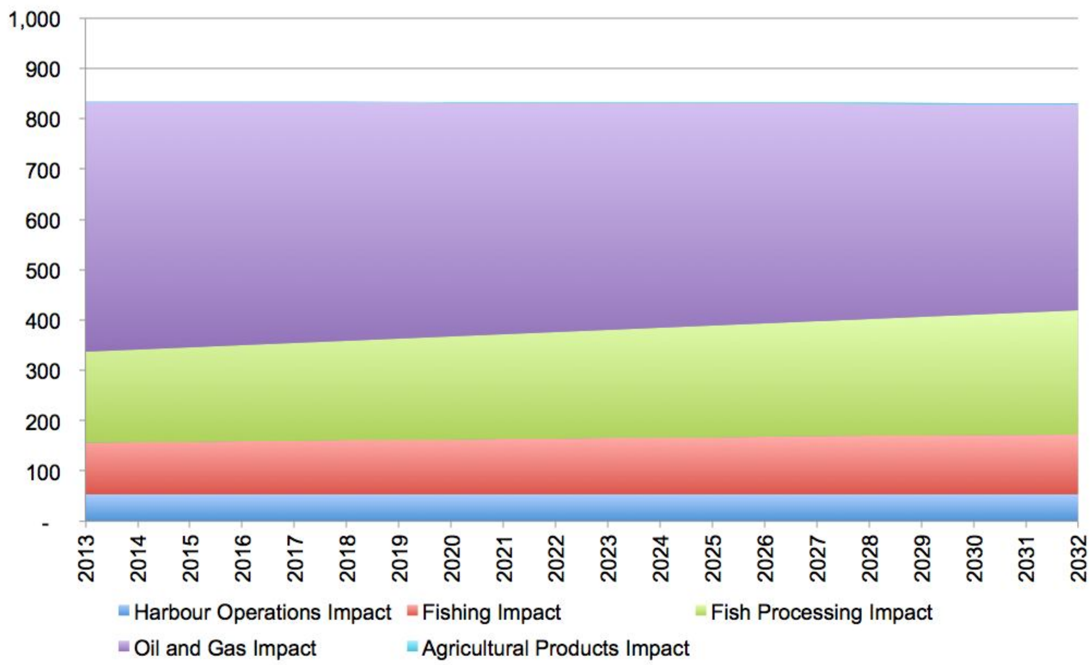
Source: BiGGAR Economics, totals may not sum due to rounding

Table 11-6 – Future impact of Peterhead Port (2032) if project goes ahead – GVA (£m)

Impact	Peterhead	Aberdeen C&S	Scotland
Port operations	48	51	54
Fishing	90	105	119
Fish processing	41	186	246
Oil and gas	112	224	409
Agricultural products	<1	2	2
Total	**291**	**568**	**831**

Source: BiGGAR Economics, totals may not sum due to rounding

Figure 11-2: Future impact of Peterhead Port if project goes ahead – GVA (£m)



11.4 Impact of Project

This study has estimated that if the PPA masterplan proposals are implemented, in 20 years time Peterhead Port will be contributing £831 million GVA to the Scottish economy and supporting almost 10,450 jobs. This represents an increase of around 1,030 jobs and £16 million GVA compared to the 2012 impact. The relatively small increase in GVA is because of the overall reduction in oil and gas related activity expected to occur across Scotland over that period and the relatively high GVA/employee of this activity.

If the PPA masterplan proposals are not implemented then it is estimated that in 20 years time, Peterhead Port will be contributing £628 million GVA to the Scottish economy and supporting around 7,920 jobs. This would be almost 1,500 fewer jobs and £187 million GVA less than the Port supported in 2012.

The impact of the proposals has therefore been estimated at £203 million GVA and almost 2,530 jobs (i.e. the difference between the reference case and the intervention case). These impacts are summarised in Table 11-7 and Table 11-8.

Table 11-7 – Impact of project in 2032 – GVA (£m)

Impact	Peterhead	Aberdeen C&S	Scotland
Reference case	206	421	628
Intervention case	291	568	831
Difference	**85**	**148**	**203**

Source: BiGGAR Economics, totals may not sum due to rounding

Table 11-8 – Impact of project in 2032 - Jobs

Impact	Peterhead	Aberdeen C&S	Scotland
Reference case	2,193	5,527	7,920
Intervention case	3,018	7,367	10,444
Difference	**825**	**1,840**	**2,524**

Source: BiGGAR Economics, totals may not sum due to rounding

11.4.1 Breakdown of Project Impact

To illustrate how this impact is generated, a breakdown of the source of the net additional GVA impact of the project is provided in Table 11-9.

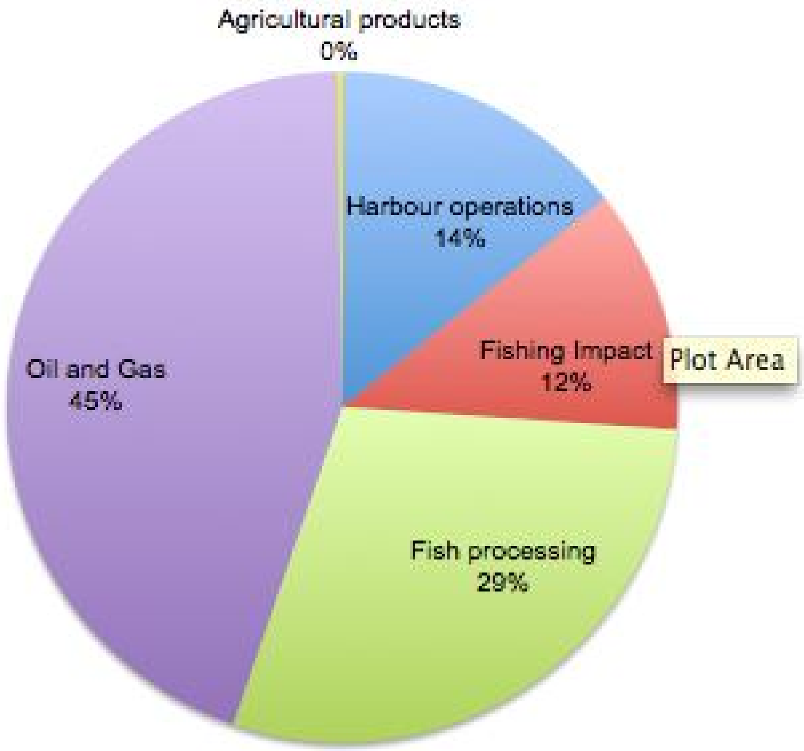
Table 11-9 – Net additional benefit of project by 2032 by area of activity – GVA (£m)

Impact	Peterhead	Aberdeen C&S	Scotland
Port operations	26	28	29
Fishing	18	21	24
Fish processing	10	45	59
Oil and gas	31	53	90
Agricultural products	<1	<1	<1
Total	**85**	**148**	**203**

Source: BiGGAR Economics, totals may not sum due to rounding

The net additional GVA impact of the project on each area of Port related activity is illustrated in Figure 11-3. This illustrates that the single largest component of the additional GVA impact of the project is attributable to new and safeguarded activity within the oil and gas sector.

Figure 11-3: Net additional Scottish GVA impact in 2032 by area of activity



A breakdown of the net additional employment supported by the proposed investment is provided in Table 11-10.

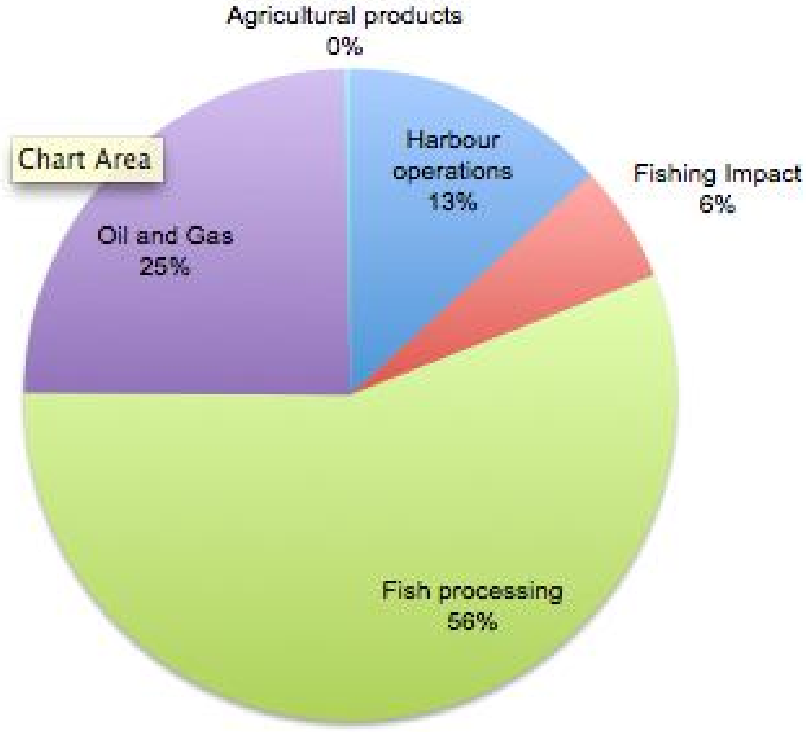
Table 11-10 – Net additional benefit of project by 2032 by area of activity – jobs

Impact	Peterhead	Aberdeen C&S	Scotland
Port operations	303	316	333
Fishing	68	103	147
Fish processing	242	1,048	1,416
Oil and gas	211	366	621
Agricultural products	1	7	7
Total	**825**	**1,841**	**2,524**

Source: BiGGAR Economics, totals may not sum due to rounding

The net additional employment impact of the project on each area of Port related activity is illustrated in Figure 11-4. This illustrates that the majority of the additional employment impact of the project is attributable to new jobs that would be created within the fish-processing sector. The difference between the proportions summarised is Figure 11-3 and Figure 11-4 is because the GVA/employee in the oil and gas sector is significantly higher than GVA/employee in other sectors.

Figure 11-4: Net additional Scottish employment impact in 2032 by area of activity



11.4.2 Present Value of Future Impacts

This section presents the present value of the two scenarios and the net additional benefit of the project in 5, 10 and 20 years time.

Table 11-11 – Present value of net GVA impacts of Peterhead Port development (year 5)

Impact (£m)	Year 5		
	Peterhead	Aberdeen C&S	Scotland
Reference case	1,237	2,414	3,692
Intervention case	1,269	2,470	3,770
Net additional benefit	**32**	**56**	**78**

Source: BiGGAR Economics, totals may not sum due to rounding

Table 11-12 – Present value of net GVA impacts of Peterhead Port development (year 10)

Impact (£m)	Year 10		
	Peterhead	Aberdeen C&S	Scotland
Reference case	2,195	4,316	6,587
Intervention case	2,349	4,574	6,939
Net additional benefit	**153**	**257**	**353**

Source: BiGGAR Economics, totals may not sum due to rounding

Table 11-13 – Present value of net GVA impacts of Peterhead Port development (year 20)

Impact (£m)	Year 20		
	Peterhead	Aberdeen C&S	Scotland
Reference case	3,511	6,977	10,594
Intervention case	4,047	7,889	11,845
Net additional benefit	**536**	**912**	**1,250**

Source: BiGGAR Economics, totals may not sum due to rounding

12 APPENDIX A – CURRENT BERTHS

The details of the berths available to vessels at Peterhead Port are given in Table 12-1

Table 12-1: Curent Berths

	Length	Depth
Albert Quay – West Section	n/a	9.0m
Albert Quay – East Section	n/a	8.5m
Smith Quay	200m	10m
Princess Royal Jetty – 1	95m	6.0m
Princess Royal Jetty – 2	87m	6.8m
Princess Royal Jetty – 3	86m	6.8m
ASCO South Base – 4	98m	6.6m
ASCO South Base – 5	96m	6.0m
ASCO South Base – 6	97m	6.4m
ASCO South Base – 7	94m	6.0m
ASCO South Base – 8	101m	6.0m
South Breakwater – 9	94m	5.8m
South Breakwater – 10	101m	6.7m
South Breakwater – 11	101m	6.7m
South Breakwater – 12	101m	6.7m
North Breakwater – 13	85m	9.6m
North Breakwater – 14	85m	13.9m
North Breakwater – 15	85m	10.8m
North Base Jetty – 17	106m	4.4m
North Base Jetty – 18	122m	6.0m
Tanker Jetty	40m	11.1m
Merchants Quay – Main Quay	166m	6.5m
Merchants Quay – Finger Jetty	60m	9.0m
West Pier	53m	3.5m
Mitchells	41m	6.0m

Source: Peterhead Port, Map & Berth Details