Port of Dundee Expansion and Marine Aggregate Extraction

EIA Scoping Report and HRA Screening Report

Scottish Enterprise

10 June 2013
Final Report
9X5853

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CONTENTS

TABLES

ABBREVIATIONS

AA	Appropriate Assessment
AOD	Above Ordnance Datum
BAP	Biodiversity Action Plan
BCD	Below Chart Datum
BS	British Standards
BTO	British Trust for Ornithology
CAR	Controlled Activities Regulations
CD	Chart Datum
CIRIA	Construction Industry Research and Information Association
CRTN	Calculation of Road Traffic Noise
DBT	Dibutyltin
DDC	Dundee City Council
EIA	Environmental Impact Assessment
EcIA	Ecological Impact Assessment
EPS	European Protected Species
EQS	Environmental Quality Standards
ES	Environmental Statement
FC	Fife Council
FRA	Flood Risk Assessment
GDL	Gardens and Designated Landscapes
HGV	Heavy Goods Vehicle
HRA	Habitats Regulations Appraisal
HRO	Harbour Revision Order
HS	Historic Scotland
IBA	Important Bird Area
IEEM	Institute for Ecology and Environmental Management
IEMA	Institute for Environmental Management and Assessment
JNCC	Joint Nature Conservation Committee
IAQM	Institute of Air Quality Management
TLBAP	Tayside Local Biodiversity Action Plan
LCA	Landscape Character Assessment
LPA	Local Planning Authority
LWS	Local Wildlife Site
LVIA	Landscape and Visual Impact Assessment
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MNCR	Marine Nature Conservation Review
NBN	National Biodiversity Network
NNR	National Nature Reserve
N-RIP	National Renewables Infrastructure Plan
NTS	Non-technical Summary
OD	Ordnance Datum
PPG	Pollution Prevention Guidance
Ramsar	Ramsar Convention on Wetlands
RSPB	Royal Society for the Protection of Birds

ABBREVIATIONS

SAC	Special Areas of Conservation
SCOS	Special Committee on Seals
SEPA	Scottish Environment Protection Agency
SNH	Scottish Natural Heritage
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
TBT	Tributyltin
TPT	Triphenyltin
UK BAP	UK Biodiversity Action Plan
UK	United Kingdom
WeBS	Wetland Birds Survey
WFD	Water Framework Directive
WHO	World Health Organisation

1 INTRODUCTION

1.1 Project Background

The National Renewables Infrastructure Plan (N-RIP) has identified the Port of Dundee as one of the most appropriate integrated manufacturing locations critical to delivering Scotland's offshore wind market and future offshore wave and tidal market. The two main locations identified in N-RIP, Dundee and Leith, are considered as the primary opportunity sites for realising the Scottish Government's objectives for this sector, given the detailed analysis undertaken through the N-RIP process and on-going dialogue with potential developers.

In recognition of these findings, and to meet market demands Scottish Enterprise (SE) has entered into a Memorandum of Understanding with SSE, Forth Ports and Dundee City Council to progress the development of marine energy related development within Dundee. SE is working closely with Forth Ports, in investigating an expansion of the Port of Dundee, with the aim of providing facilities for the marine renewable energy industry and subsequently, other port users.

The Port is currently constrained by the availability of land and, to address this, a technical and engineering appraisal was commissioned which subsequently identified the potential of the proposed expansion site immediately to the east of the Port of Dundee at Stannergate (ARUP, 2012). The proposed scheme is the creation of 12.2ha of land for Port uses, created through land claim from the northern shore of the Firth of Tay. Figure 1.1: Site Location Plan shows the proposed location of the development.

The expansion will require consent through a Harbour Revision Order (HRO) granted by Transport Scotland on behalf of Scottish Ministers and a suite of Marine Licences from Marine Scotland (MS).

Given the scale, nature and location of the project it has been assumed that an Environmental Statement (ES) will be required to accompany these applications. A request for a screening opinion is being made to confirm the position.

Additionally the proposed expansion site is located within a Natura 2000 (European) site and it is anticipated that an Appropriate Assessment will require to be undertaken by the Competent Authority. A Habitats Regulations Appraisal (HRA) will therefore be provided to inform the Appropriate Assessment.

The Port expansion will be accomplished through land claim by infilling with marine aggregate; sourced from the Firth of Tay. Currently there are no approved marine extraction sites within Scotland and none in the UK that are within an economically feasible range of the project site. SE has therefore commissioned investigation work to identify an aggregate resource close to the Port. The results of the exploration and investigation are anticipated to be made available in early summer 2013. The marine extraction site will not be confirmed until the exploration and investigation is complete.

The Scottish Government considers that as the two developments, i.e. the Port expansion and the marine aggregate extraction, are inextricably linked it will be necessary to consider them under one EIA. The application to Marine Scotland for the marine aggregate extraction site licence will therefore, be accompanied by the same ES as that which will accompany the HRO application and suite of marine licences for the Port the expansion.

Additionally the HRA will address the potential impacts of the expansion and extraction upon Natura 2000 sites.

1.2 The Applicant

1.2.1 Scottish Enterprise

Scottish Enterprise (SE) is Scotland's main economic development agency and aims to deliver significant, lasting beneficial effect to the Scottish economy. SE supports ambitious Scottish companies to compete in the global market place and aims to help build Scotland's globally competitive sectors to attract new investment to Scotland and to help create a world-class business environment. SE is committed to working with other agencies and organisations to deliver N-RIP in support of Scottish Government policy objectives. In the context of the proposed expansion to Dundee Port, SE is working with Forth Ports to develop an effective project. SE is the sole funder of the feasibility work required to progress the project.

1.2.2 Forth Ports and Port of Dundee

The Port in Dundee has a long history spanning many centuries, it has been operated by the Town, Harbour Trustees and latterly was purchased by the then Forth Ports PLC (now Forth Ports Limited) in 1995. Dundee is the most northerly port owned by Forth Ports.

The Port of Dundee Limited is a forest product and agricultural product specialist; an oil and gas offshore support facility and handles a range of general bulk and liquid bulk cargoes.

The marine facilities provided include:

- River berths at 6 wharfs, which are:
    - King George V Wharf;
    - Caledon West Wharf;
    - Princess Alexandra, Eastern Wharf;
    - Prince Charles West Wharf; and
    - Prince Charles East Wharf.

Cargo facilities provided include:

- Common user transit sheds;
- Open storage areas;
- Quayside cranes;
- Range of mechanical handling equipment suitable for use on board ship and on quayside;
- IT linked weighbridge facilities;
- 24/7 stevedoring capability; and
- Liquid bulk transfer system for crude oil, distillate and spirit.

Additionally there are a number of companies that are tenants of, and operate from, the Port.

The Port is a Competent Harbour Authority. The key function of being a Harbour Authority is the duty to ensure safe navigation, this is delivered though maintenance of the navigational approaches and provision of navigational guidance, advice and support

through the Harbourmaster and Forth and Tay Navigation Service to users of the Firth of Tay. The Port issues Notices to Mariners and General Directions within its limits to ensure the safety of navigation within the authority area and oversees the enforcement of its Byelaws. The Harbour Authority area extends from upstream of the Tay Bridges (Balmerino) to approximately 4 miles east of Buddon Ness point (Ref: Figure 1.2: Port Jurisdiction). It is also a Pilotage, Towage and Lights Authority, and oversees these aspects through the Harbourmaster. Navigational features are also shown on Figures 1.1 and 1.2, which show the Admiralty Chart Detail. The Harbour Authority has a safety management system (compliant with the Port Marine Safety Code, which can be found on the Forth Ports website: www.forthports.co.uk), which is independently audited by a third party.

1.3 Port of Dundee History

The history of the Port is long, with early references in the 12th Century of Dundee being a Trading Port and this trading driving significant growth in the town (Barrow, 1990; Mackie, 1836). During the Industrial Revolution Dundee further grew significantly, again due to the Port, which allowed for the import of jute and the whaling industry. Over this time coastal shipping was also a significant trade with a number of lines running between Dundee and London, amongst other locations, and one such Dundee Company still survives, though no longer running a coaster service. The industrial revolution saw major expansion of the port and indeed the railway system. There was also a significant ship building industry in the Port. The commercial jute milling reduced over the 20th Century, with milling ceased by the 1980s and spinning by 1999.

Until very recently the Port was a major import point for paper and pulp, but over the last decade the number of paper mills operating in Scotland has fallen, and as a result this trade has declined. Whilst the cargos the Port trades in have changed in commodity and volume, liquid bulk transfer now being an important business line, the Port remains a relatively busy environment and a driver to the local economy.

The infrastructure of the Port itself has been continually remodelled to suit the needs of Dundee and its trades. In 1815 a Harbour Act was passed, transferring responsibility from the Town to the Harbour Trustees. There followed a phase of significant expansion through the creation of four new Docks, two of which were filled in for the Tay Road Bridge in the 1960's. Over time the main operational heart of the Port has migrated eastwards, a trend that continues to this day.

1.4 Regulatory Roles

The proposed expansion site is located within the limits of Port of Dundee (Ref: Figure 1.2). As discussed in Section 1.2 the statutory authority is the Dundee Port Authority and the Port is owned and operated by Forth Ports Limited. The proposed expansion site extends south into the Tay below Mean High Water Springs (MHWS) where foreshore and seabed ownership rests with the Crown Estate.

The Port Authority has certain permitted development rights over operational land and works related to the functioning of the Port. In this case it has been established that a HRO is required as the proposed Port expansion will increase the land area of the port and cease navigation in that specific area (albeit that the area concerned is shallow and not subject to significant navigational use).

An HRO application will be submitted to Transport Scotland: Ports and Harbours Division, which acts on behalf of the Scottish Ministers in such matters.

The Dundee City Council (DCC) City Development Department is responsible for development, management above MHWS that is not directly related to Port activity. DDC therefore has a role as a statutory consultee rather than planning authority in this instance.

As the Project activities are all within the Scottish Inshore Region (0-12nm) they fall under The Marine (Scotland) Act 2012 (MSA).

Scottish Ministers are the licensing authority and Marine Scotland Licensing Operations Team issue marine licences on their behalf.

Both the expansion site construction which includes 'deposit on the seabed', 'carrying out dredging' associated with construction and/or navigation and the marine aggregate extraction 'carrying out dredging' are licensable activities under Section 21 of the MSA.

Through pre-scoping consultation it is considered that an EIA is required to accompany both the HRO and the Marine Licence applications. The EIA and HRA will provide information towards any Appropriate Assessment. The requirements of the EIA process are set out in The Marine Works (Environmental impact Assessment) Regulations 2007 (as amended 2011) and The Harbour Works (Environmental Impact Assessment) Regulations 1999.

1.5 Need for Project

The development of the National Renewables Infrastructure Plan (N-RIP) is a key action identified in the Scottish Government's Renewables Action Plan published in June 2009. The key output of Stage 1 of N-RIP is a spatial framework of first phase sites that can act as the catalyst for the development of the offshore renewables industry around three key infrastructure needs:

- Construction/installation;
- Manufacturing – Integrated Sites and Distributed Sites; and
- Inspection, Repair and Maintenance/Operations and Maintenance.

The Port of Dundee has been identified as one of the "best fit locations" for "operations and maintenance" which should be focussed on in the immediate future as part of an approach to ensure Scotland can offer a range of key locations for the offshore wind industry (N-RIP- Identification of Priority Sites).

In parallel with N-RIP, Port of Dundee continues to attract a great deal of interest from potential inward investors seeking to establish manufacturing facilities to support the offshore renewable energy market, (i.e. offshore wind). This is clearly a growing market with significant development proposed in the North Sea, and which can be readily serviced by the Port of Dundee. Such demand currently outstrips available land within the Port and the need to facilitate the expansion of the Port has been established.

There is a need to consider marine aggregate extraction linked to the Port expansion project. An options appraisal will be produced to inform the EIA and an alternatives statement will be made within the ES with regard to the final choice of site.

Obtaining infill from the marine environment in relative proximity to the expansion site is anticipated to be the most economical and environmentally sustainable source,

assuming that a marine excavation site can be proved in terms of resource and environmental acceptability. The alternative of sourcing infill material onshore raises numerous environmental and economic issues that present a challenge.

With respect to need, this has been established by the Scottish Government in their Renewable Energy objectives. N-RIP has identified and prioritised the infrastructure required to deliver the Governments Renewable Energy objectives and thus determined the need for the Port of Dundee expansion. This determination by N-RIP is deemed to be broadly sufficient to inform the 'statement of need' for the project and this will be incorporated into the ES.

1.6 Requirement for Statutory EIA

1.6.1 EIA Screening

A pre-scoping meeting was held with regulators and statutory consultees at the end of October 2012. The meeting was attended by representatives from the N-RIP Advisory Group: Scottish Government Environment; Environmental Assessment Section, Transport Scotland, Ports and Harbours Branch, Marine Scotland, Scottish Natural Heritage (SNH) and the Scottish Environment Protection Agency (SEPA). The meeting provided an initial opportunity for those organisations present to highlight any concerns they may have regarding the proposed Port expansion.

It was agreed that a joint request for confirmation of the screening opinion would be made to Transport Scotland and Marine Scotland, accompanied by a request for a scoping opinion and a Habitats Regulations Appraisal (HRA) screening request. The requests would be accompanied by a scoping report which would include the HRA screening report.

Subsequent to discussions held, EIA and HRA screening requests (Appendix 1) have been submitted to Transport Scotland, Ports and Harbours Branch, as the relevant regulatory authority for the granting of Harbour Revision Orders in Scotland.

One of the purposes of this report is to support the request for a screening opinion under Marine Works (EIA) Regulations 2007 (as amended) to confirm whether an EIA is required for this project.

1.6.2 EIA Scoping

This Environmental Scoping Report has been produced for submission to Scottish Government, Transport Scotland: Ports and Harbours Division and Marine Scotland with request for a formal Scoping Opinion under the Marine Works (EIA) Regulations 2007 (as amended).

The environmental scoping exercise is intended to inform the EIA and the production of an Environmental Statement (ES) to support the HRO and Marine Licence applications for the Port of Dundee Expansion Project and the Marine Licence application for the Marine Aggregate Extraction. It will also aid identification of information necessary to inform the Habitats Regulations Appraisal. In addition the scoping report includes the HRA Screening Report in Appendix 1.

The scoping report has the following specific objectives:

- To review available information and identify new information required for the study area (i.e. physical, biological, human and built environment) and the project that is relevant to the EIA for the HRO and Marine Licence applications;
- To identify legislation, policy and guidance relevant to the EIA;
- In the light of above, to identify where data gaps exist and what further data collection and assessment may be necessary;
- To define the impact assessment approach and methodologies to be employed for each study area, based on current appropriate guidance;
- To identify other projects and plans that may need to be considered in combination with the proposed works (i.e. the potential for cumulative impacts).

The following items were specifically raised by the statutory consultees during the pre-scoping consultations, and will be addressed further during the EIA:

- Geology and Soils;
- Water Environment;
    - Hydrology;
    - Coastal processes including sediment processes and wave climate; and
    - Water & Sediment Quality;
- Ecology
    - Intertidal ecology;
    - Benthic ecology;
    - Marine Ecology including, among others, European interests: otters; harbour seal; grey seal; bottlenose dolphins; and Atlantic salmon;
    - Fisheries;
- Noise;
- Air quality;
- Transportation;
- Navigation;
- Landscape/ Seascape and Visual;
- Archaeology and Cultural Heritage; and
- Socio-economic effects.

The scope of the EIA will be further informed by the scoping opinion and may include further topics that may arise during the assessment process.

Certain topics may be scoped out of the assessment to ensure that the EIA is focused on likely significant impacts and is therefore an effective document designed to aid the decision making process.

1.7 HRA Requirements

The 'Habitats Directive' together with the 'Birds Directive' protects habitats and species of European nature conservation importance. Special Areas of Conservation (SAC) and Sites of Community Importance (SCI) promote the protection of flora and fauna and Special Protection Areas (SPA) protect rare, vulnerable and migratory birds. These sites combine to create a Europe wide 'Natura 2000' network of designated sites, which are referred to as 'European sites'.

The Conservation (Natural Habitats, &c.) Regulations 1994, Regulation 48, defines the procedure for assessment of the implications of plans or projects on European sites. If a proposed development is not directly connected with or necessary to the management of the site (i.e. of the SAC) and is likely to significantly affect a designated site the

statutory regulator as ‘competent authority’ must undertake an ‘Appropriate Assessment’ (AA).

The Port of Dundee expansion site is located within the Firth of Tay and Eden Estuary Marine SAC and the marine aggregate extraction sites under investigation are either within or adjacent to the SAC and also potentially within the zone of influence of other European sites. Given the location, nature and scale of the port expansion and the potential marine aggregate extraction SNH has advised the applicant that the proposed development will be required to comply with the measures set out in the ‘Habitats Directive’.

To aid the competent authority (and relevant advisors) in understanding the potential effects of the proposed port expansion and marine aggregate extraction in relation to the European site management objectives a Habitats Regulations Appraisal Screening Report has been provided and is presented in Appendix A.

1.8 Structure of the Report

This Environmental Scoping Report comprises 22 chapters.

- Following this introduction (**Chapter 1**), **Chapter 2** examines the relevant current legislation and policy context;
- **Chapter 3** describes the key features of the proposed scheme, including the construction phase and operational phase and the alternative options considered;
- **Chapter 4** describes the consultation that has been undertaken to date and that proposed;
- **Chapters 5 to 20** summarise the proposed approach to the EIA in terms of the topics, surveys and investigations required and assessment methodologies; for each environmental receptor the following are considered:
    - Overview of existing environment – a description and evaluation of the environmental receptors, presenting the data and/or information that is available for assessment purposes;
    - Identification of key issues – identification of any issues (both beneficial and adverse) that may arise as a result of the construction and operational phases of the proposed scheme including any opportunities for environmental enhancement;
    - Methodology and approach to EIA – the next steps in the process are addressed by describing the environmental work that it is believed to be necessary to produce an ES. In considering the likely environmental issues that may surround the proposed development, the ES concentrates on the potentially significant issues that need or are considered likely to need further assessment.
- **Chapter 21** describes the potential for cumulative impacts of the proposed development with other projects proposed and established in the local area;
- **Chapter 22** sets out the suggested recommendations for the EIA and the way forward.

Figures: Maps, charts and plans are provided in a number of Figures in order to identify the locations of the proposed expansion site and marine extraction sites, to provide additional information and to illustrate the text where required.

References: Provided at the end of the scoping report is document.
Abbreviations: Provided at the end of the scoping report
Appendix A: The HRA Screening Report

2 LEGISLATIVE CONTEXT

2.1 Introduction

The Dundee Port Authority is responsible for the management, maintenance and regulation of the Port. The Port of Dundee expansion project and the marine aggregate extraction are subject to the requirements of European and national legislation. The ES will present the legislative context and a review of the relevant policies and guidance operating in relation to the proposed project overall.

2.2 Relevant Legislation

The proposed expansion, which is entirely land claim from the Firth of Tay, and the marine aggregate extraction are located within the marine environment and are therefore subject to environmental and marine legislation that includes:

- Harbours Act 1964(as amended);
- UK Marine and Coastal Access Act 2009 ;
- Marine (Scotland) Act 2010;
- Water Environment and Water Services (Scotland) Act 2003 (as amended);
- Flood Risk Management (Scotland) Act 2009;
- Wildlife and Countryside Act 1981 (as amended);
- Conservation (Natural Habitats, &c.) Regulations 1994;
- Nature Conservation Scotland Act 2004; and
- Conservation of Seals Act 1970 (and associated orders).

EIA Legislation

The relevant EIA legislation for this project is the following:

- Council Directive 85/337/EEC as amended by 97/11/EEC and 2003/35/EC (The EIA Directive);
- The Marine Works (EIA) (Scotland) Regulations 2007 (as amended 2011); and
- The Harbour Works (EIA) Regulations 1999.

2.3 Consents and Permissions required

2.3.1 Harbour Revision Order

A Harbour Revision Order (HRO) is a piece of local legislation governing a port. It is made as a Scottish Statutory Instrument under the 1964 Harbours Act by Scottish Ministers. Transport Scotland: Ports and Harbours Division is the relevant authority on behalf of Scottish Ministers in Scotland for the granting of a HRO. An application shall be made for an HRO for the proposed Port expansion.

2.3.2 Marine Licence

Under Part 4 of the Marine (Scotland) Act 2010 (MSA) a Marine Licence is required for those licensable activities undertaken below Mean High Water Springs (MHWS) and within the Scottish inshore region (0-12nm). Section 21 of the MSA sets out the activities that need a Licence, including:

- • deposit any substance or object in the sea or on or under the seabed;
- • construct, alter or improve works on or over the sea or on or under the seabed;

- • remove substances or objects from the seabed; and
- • carry out dredging.

As such, Marine Works and Marine Extraction Licences will be required for the proposed construction of the extension area; any associated capital and navigational dredging operations; and any disposal of dredge spoil in the marine environment. Marine Extraction Licences will also be required for marine aggregate extraction and any associated disposal of overburden.

2.3.3 Planning Permission

The main planning law in Scotland is The Town and Country Planning Act (Scotland) 1997 Chapter 8 as amended by The Planning etc. (Scotland) Act 2006.

The operation of the site, and any associated development above MLWS, assuming it is all general port activity, will be undertaken through the HRO using the deemed planning permission facility under Section 57(2A) of the Town and Country Planning (Scotland) Act 1997. Consequently, the port development, its structures and buildings will not require a separate planning consent or EIA, that is unless there is a specific development that is deemed by the Planning Authority to require planning consent or an EIA under the EIA Regulations.

2.3.4 The Crown Estate

The Crown Estate owns much of the UK foreshore and the majority of the seabed out to the 12nm territorial limit. As the Crown Estate owns the proposed expansion site and aggregate extraction areas, a commercial seabed leasing agreement with the Crown Estate to include the construction and operation of the proposed expansion area will be negotiated.

2.3.5 Scottish Environment Protection Agency (SEPA)

SEPA controls water quality and discharge consents to the Firth of Tay under the Water Environment (Controlled Activities) Regulations 2011 (the 'Controlled Activities Regulations'). The CAR Regulations are used by SEPA as the primary route to ensure the requirements of both the Shellfish Waters Directive and the Water Framework Directive are met.

2.3.6 EU Water Framework Directive

The Water Framework Directive (WFD) establishes a legal framework to protect and restore clean water across Europe and to ensure its long-term sustainable use. 'Improving the quality of Scotland's water environment', The Tay Area Management Plan 2009-2015; provides a supplementary to the river basin management plan for the Scotland River Basin District. It will help to deliver the Water Framework Directive requirements. In 2008, 170 (48%) water bodies in the Tay Area Advisory Group area were classified as being at good or high ecological status. This plan aims to prevent deterioration in all water bodies and secure continuous improvement in the ecological status of water bodies that are currently less than good.

The Firth of Tay water body overall classification status 2008 was Good (SEPA 2010).

2.3.7 Shellfish Waters Directive

The EC Shellfish Waters Directive 2006/113/EC sets minimum quality standards for water quality in Firth of Tay and requires all discharges to be assessed to ensure they do not detrimentally affect the good water quality status of the estuary. SEPA is the competent authority for ensuring that waters meet the quality standards as laid down in the Directive. This Directive is scheduled to be repealed by the Water Framework Directive in 2013.

In implementing the Shellfish Waters Directive requirements within Firth of Tay SEPA will seek measures to ensure discharges into the Tay have discharge conditions set conservatively to ensure the water quality of the shellfish growing areas can be protected.

2.3.8 Regional and Local Planning Policy

The Dundee Angus Structure Plan has been replaced by the TAYplan Strategic Development Plan 2012 – 2032: Approved June 2012.

Dundee City Council is currently preparing a new Local Development Plan which will replace the Dundee Local Plan Review.

2.3.9 Additional Licences

It is recognised that a number of further consents, licences and permissions may be required in addition to the HRO and Marine Licences to allow the proposals to proceed. Such requirements are topic specific and will be highlighted in the relevant section of the ES as appropriate. For example, these could include European Protected Species Licences and CAR Licence.

2.4 Planning Context

This section of the ES will provide an overview of the planning context of the proposed developments.

Dundee Port Authority is the regulatory authority responsible for the management and development of Port of Dundee. The Port, however, functions within the geographical context of Dundee City, Angus, Perth and Kinross and Fife, therefore it is necessary to consider Regional and Local policy when undertaking EIA. This approach ensures Development policy aims and objectives are not overlooked.

The EIA will identify relevant policy and review how the expansion project accords with the stated aims of the relevant Development Plans. Common environmental objectives in the management of the Port of Dundee and coastal zone include ensuring safe navigation is maintained, consideration of recreational interests, protection of environment and natural heritage and ensuring the availability of necessary infrastructure.

3 DESCRIPTION OF THE PROJECT

3.1 Description of Site and Environs

3.1.1 Current Development at the Port of Dundee and Surrounding Area

The expansion project will be located within a developed coastline, dominated by the Port of Dundee along with the Tay Road and Tay Rail bridges. The Port of Dundee is on the northern shore of the Firth of Tay south of the City of Dundee. It occupies the foreshore between the Victoria Docks, east of the Tay Road Bridge, and the Prince Charles Wharf at Stannergate. Projecting south into the Firth of Tay, the Wharfs are built on reclaimed land in order to access the deeper water (Figure 3.1). The depth of water along the quayside is maintained at between 8m and 9.6m below chart datum.

The Firth of Tay has approximately 1.6km channel width between the Tay Road Bridge and Broughty Ferry, after which it begins to open out into the mouth of the firth.

Through the Forth Ports Group, the Port of Dundee is a member of the UK Major Ports Group. The Port of Dundee remains a busy economic driver for the Tayside area with a range of uses. The port handles liquid bulks, in particular hydrocarbons for the refinery, and a range of dry cargos are handled, including forestry products, with timber storage and a timber treatment works in the port. Transit sheds allow the storage of cargo prior to loading or following discharge from a vessel.

Agricultural products are regularly handled in the port, particularly the import and export of grains, which is supported by grain storage sheds and driers.

The port facilitates offshore mobilisation and there is a RoRo ramp on the eastern Wharf adjacent to the tidal basin. There are no scheduled services for the RoRo; though it is used for mobilisation, the vehicle trade and other uses.

The areas behind Prince Charles Wharf and Eastern Wharf, part of which was historically the Caledon Shipyard, is now occupied by a range of tenants, including chemical, metal recycling, fertiliser and fabrication companies. The quayside is used for fabrication, mobilisation and demobilisation, along with general port uses. An extension to the Prince Charles Wharf was completed in 2003.

Various projects are accommodated by the port from time to time, including the construction and mobilisation base for the recent Tay Bridge Strengthening Works and a number of drilling and oil rig projects.

Scottish Enterprise was granted Planning Permission in Principle for the ‘Core Area’ (i.e. from the current eastern boundary of the port to the Tidal Basin) in November 2012.

3.1.2 Port Expansion Site

The proposed Port expansion site is located immediately east of the Port on foreshore and seabed owned by The Crown Estate, by Stannergate, at approximate NGR: NO 436308.

The northern edge of the expansion site is bordered by the unclassified Lower Broughty Ferry Road which links to the A930 Dundee Road/Broughty Ferry Road via bridges over the railway line that forms part of the East Coast Main Line. The line runs alongside the northern boundary of the Port, more or less parallel with the main road. Lower Broughty

Ferry Road joins the A930 at Stannergate roundabout to the west; and the cross roads to the east (Dundee Road West and Margaret Crescent) and is quiet with regard to traffic, and functions as a lay-by (Ref: Figure 3.1: Expansion Site).

Stannergate Road passes through the Port linking with internal dock roads and forms a junction with Lower Broughty Ferry Road north of the existing reclaimed area (at the edge of the current Port land holding (Ref: Figure 3.1: Expansion Site). Within the Port Stannergate Road is a private road with access control.

The Sustrans Dundee to Arbroath Cycle Route, subject to security and safety restrictions, passes through the Port parallel with the railway line. This is also part of the North Sea Cycle Route. There is no pedestrian access through the Port.

Approximately two-thirds of the way along the proposed expansion area a path leads to Douglas Terrace branching off Lower Broughty Ferry Road; there is a small amenity area with seats and a small car park (12 spaces) above the foreshore at Grassy Beach.

A Scottish Water storm tank is accessed from Lower Broughty Ferry Road adjacent to an area of vacant land (between the railway line and Lower Broughty Ferry Road). Commercial buildings and car park occupy the west corner formed by the railway line and the road with a small area of open space between the buildings and the mound (bund) that screens Scottish Water property.

An established residential area to the north is set back from Dundee Road. The topography rises to the north and east and some properties overlook the Tay. Views are somewhat enclosed by buildings, boundary features and trees, particularly on the roads within the residential area, e.g. Margaret's Crescent, Chisholm Road and Primrose Bank.

Opposite the site on the south bank of the river (Fife Council area), the land rises in low hills and is largely farmland with pockets of woodland and plantation. The B946, Newport Road, follows the coast running between Newport on Tay and Tayport and there is a well-used parking lay-by across the Firth from the proposed site.

3.2 Project Description

The proposed project is the extension of the Port of Dundee through reclamation of land from the Firth of Tay by infilling, to provide 12.2ha (30acres) of land for general port activity and a possible extension of available quayside. The proposed site on the northern shore of the Firth of Tay is immediately east of the Port of Dundee, adjacent to the existing reclaimed area at Prince Charles Wharf at approximate NGR: NO436308.

At this stage it is intended that a new marine aggregate extraction site will be developed to provide the suitable infill material for the reclamation, and two potential extraction sites within the Firth of Tay were identified for exploration out of an original five sites; this is following consultation with regulators. Exploration work is also being carried out in conjunction with the proposed development of Port of Leith (Ref: Section 1.1). A feasibility study will be carried out following site investigation works which will include economic resource analysis and consideration of environmental matters.

This scoping request has been prepared based on the assumption that one of the two sites under investigation within the Firth of Tay will prove a suitable marine aggregate extraction site, but if such a site is not viable, other options will be considered.

The infill material, (sands and gravels), will be won by dredging and transported to the site by marine vessels. Given the reclamation area of 12.2ha it is anticipated that approximately 1,000,000m^3 of aggregate will be required. At this stage it is expected that the extraction site will be solely for the purpose of sourcing infill materials.

The expansion site design has not been finalised at the scoping stage, however, it has been developed to a stage where it is possible to define the 'maximum parameters' for the project. The key elements described below.

The aim of the Port expansion project is to provide a usable reclamation area of 12.2ha (30 acres), and a general rectangular site 400m long by 300m wide has been identified. The total footprint of the site will therefore be slightly larger than this allowing for construction slope stability and the construction footprint will be dependent upon the results of site investigation work and the final construction design. In order to bring the level up above the flood risk threshold it is calculated that approximately 1,000,000m^3 will be required (assuming approximately. 8m depth).

The entire infill requirement is anticipated to be met through the importation of marine won aggregate materials, which will be placed in a controlled manner to provide a platform to meet the required loading capacity when this has been confirmed.

The reclaimed land will be new quayside and will include quay wall (to the riverside) and protective edge treatment/retaining structures which have not been confirmed at present but are anticipated to include a mixture of vertical steel sheet piling and imported rock armouring (revetment/rip rap) to sloping embankments.

The finished ground level of the site will address flood risk and it is anticipated that it will be approximately +5m OD or above, dependant on the findings of the Flood Risk Assessment.

The dredged infill material will be transported from the extraction site to the expansion site by barge or through the use of a suction hopper dredger.

Onshore access can be taken from the existing port access, which is gained from the Stannergate roundabout over the rail bridge, onto dock roads and to the site via the existing laydown area located at the east end of the Port, adjacent to the site. It may also be expedient to take a temporary construction access from Lower Broughty Ferry Road, once part of the site has been infilled. No off-site works to the existing transport infrastructure in relation to the port expansion project are anticipated.

The Prince Charles Wharf is the closest quay for offloading cargoes and might be used to take delivery of construction materials.

A perimeter fence will be erected at the boundary of the reclaimed area similar to that which secures the Port at present.

Lighting will be installed, both temporary mobile lighting during construction works and permanent lighting during operation, depending on the needs for the use at those times.

The port expansion works will be controlled under the terms of the HRO and the Dundee Port Authority will be required to abide by the requirements of the existing Harbour

Empowerment Order in the operation of the port following the construction of the expansion site.

Decommissioning does not form part of this project. The port expansion is a long-term development that aims initially to serve the offshore renewable industry and in the longer term service general port activities. Decommissioning is therefore not anticipated in the foreseeable future and would be subject to the environmental legislation in force at the time of potential decommissioning or future alteration to the port.

3.2.1 Limits of Scoping Report

The limiting factors with respect to the scoping report are:

- The uncertainty with respect to design details of the port remain, for example edge treatment, although it is clear that rock armoured revetment will be used and piling will be used to form the quayside, the uncertainty lies in the amount of each and final design;
- Uncertainty with regard to the final definition of the application area, the 12.2ha of useable land is confirmed, the final application boundary will be dictated by any additional requirements;
- Uncertainty with respect to operational use of the site, however, it will have general permitted development rights, we have assumed for assessment purposes that there could be one transit shed and the rest of the area is open storage; and
- The requirement to make a decision on the preferred marine aggregate extraction site which is currently in the exploration phase.

These factors will be addressed to allow the EIA to be carried out. In order to ensure thorough scoping at this early stage each topic has been carefully considered bearing in mind the 'maximum parameters' that may occur.

Site investigation has been commissioned and the site design will continue to evolve as the necessary information becomes available. EIA is an iterative process and the commencement of assessment at this early stage ensures environmental considerations are built into the design where capable and appropriate. This includes mitigation by avoidance of impact and would relate to such things as choice of construction method, plant and materials.

3.3 Construction Activities

At this early stage, when the EIA process feeds in to the design process, a specific programme of construction works is still to be finalised. There are a number of parameters that will affect the final construction programme, which are variably dependent upon the outcome of the site investigation works and the contractors preferred method and plant selection. Additionally, the sourcing of marine aggregate will largely define the infilling programme in terms of the type and capacity of vessel used in the dredging and the distance between the expansion site and marine aggregate extraction site.

The initial options and methods envisaged as being appropriate to the expansion site construction are either the use of caissons or piling. A brief description of what each entails is given below:

Piling - this is the most likely option.

This would require the infilling to be carried out first without an encapsulating perimeter and the piling process would be carried out from the edge of the initial fill. Sheet piles would be installed to create the perimeter, toed into rock. Dredging in front of the sheet piles for ship access would then be required. Ground investigation works would be required to establish the viability of this option.

Possible activities based on piling to create a quay are as follows:

- Site Establishment;
- Dredging – for expansion site;
- Rock Bund - create perimeter from North-East of site;
- Placement of dredge material;
- Creation of working platform for piling works;
- Piling – creation of quay wall and tie up with rock bund;
- Dredging and placement – to fill remainder of site; and
- Ground Improvement.

Caissons

This would require pre-construction dredging in front of the berth position and in the footprint of the caissons. This option would allow a perimeter to be created along the western side of the south edge of the site in co-ordination with construction of the rock bund to the east, encapsulating the site prior to infilling.

Possible activities based on Caisson Quay approach are as follows:

- Site establishment – a haulage route along the north edge of the site may be required in order to create rock bund from the north east;
- Pre-construction dredging – the extent depends upon the results of site investigations;
- Perimeter construction activities - activities possibly run simultaneously or overlapping;
    - Caisson – begin south west of site;
    - Rock Bund – begin north east of site;
    - Interface detail between caisson and bund;
    - Placement of infill material – pumped via dredging vessels following encapsulation of site; and
    - Ground improvement.

General

At this stage it is intended to create an unbound surface. If this were to change during site design the necessary adjustments would be made to the EIA. The final site will be a level area for general port use, much like the existing eastern end of the port.

3.3.1 Phasing Timescales

With regard to timescales, there are many variables in addition to the variation in construction process. A key factor in dictating the construction programme will be the rate of production and delivery of infill material to site. This will be influenced by several factors including:

- location of the extraction site;
- the contractors chosen vessel depending upon specific draught requirements;

- the vessels hopper capacity;
- rate of dredging collection;
- pump output rate; and
- whether or not any infill can begin prior to completion of the perimeter of the expansion site.

This will be informed by the results of the site surveys and sampling operations and clarified through discussions with experienced dredging contractors.

As part of the EIA an outline timeline and key milestones will be presented.

3.3.2 Importation of Material

Bund Material

The core material is likely to be sourced from a local quarry and transported to the site by road. This is dependent upon the quarries ability to provide the specified grading of materials.

Rock Armour

The source of this will be dependent on the sizes required and identification of sources by the detailed design. The tidal and wave regime will dictate the size of rock armour required and in turn size will dictate whether it can be imported by sea or road, with consideration of cost included.

Importing of large rock may require a large holding vessel anchoring a distance away from the site within the estuary to store the rock for construction, and the use of support vessels to transport rock to the site when required. This would be positioned in a greater depth of water, located so as not to obstruct navigation and be under Port control.

Infill

The infill material is anticipated to be marine aggregate, transported to the site by sea.

Surfacing

The reclamation design does not include surfacing. If a surface is required following completion of the expansion it would be considered under permitted development rights or may be part of a later planning application, dependent upon any particular proposals.

Concrete

No specific concreting activities are anticipated at the site for the expansion. If caissons were used in the construction, these would be precast concrete and may arrive to site by sea or road.

Disposal Site

In terms of the disposal of dredged material from the expansion site, if this is required, there have been two sites used in recent times. In the early 1908s spoil from maintenance dredging was deposited immediately upstream of the Tay Road Bridge and from 1994 to present, the Middle Bank (Tay) spoil disposal ground has been used. The Middle Bank spoil ground is shown on the Admiralty Chart (Figure 3.2 refers) approximately 0.5km downstream of the Tay Bridge, 0.6 nautical miles to the south east of the port in a water depth ranging from 6m to 8m (ERM, 2011). . This will be explored as the disposal option for dredged material once volumes and material type are understood from the site investigation process.

Extraction Site

The choice of extraction site will be based on the outcome of the site investigations with input from relevant specialists who will consider engineering properties, coastal processes, marine mammals, ornithology, fisheries and archaeology. The choice was narrowed down to two sites; one in the Firth of Tay immediately south east of the proposed expansion site and one at the port limits which would take material from the sand bar (Ref: Figure 1.2:Port Jurisdiction). The inner Tay site is approximately 2km from expansion site and the site at the Port limit is approximately 13km distant. If either of these sites are consented, transportation will be by sea.

3.4 Description of Operational Phase

The details of the activities and operations to be undertaken during the operational phase of the development have not been finalised at this stage. It is however, recognised that the purpose of the expansion is to ensure that Dundee is in a position to serve the offshore renewables industry. The site will provide an area of open ground for general port activity and will operate under normal port permitted development. It is possible that load out activities will be carried out at the expansion site but this is not essentially the case and this decision remains to be taken prior to the EIA being carried out.

Normal port activity includes freight/cargo handling, provision of storage facilities and other commercial use. Possible scenarios are the erection of sheds, use of mobile cranes and storage.

Any development other than the general permitted development consented under the HRO would be subject to planning and, as appropriate, EIA legislation. This shall be expanded upon in the ES.

3.5 Consideration of Alternatives

3.5.1 Do-nothing Alternative

EIA guidance (PAN 58, 1999) advocates that EIAs consider the ‘do nothing’ scenario, to provide context for the assessment of the proposed development. The ‘do-nothing’ scenario is the basic option; it looks at the proposal in comparison to the likely state of the environment if the proposal is not implemented and the existing environmental processes continue into the future, effectively providing a future baseline. With respect to the expansion site there is not likely to be a change in relation to the Development Plan and given that there are no wider development proposals or local factors that would cause the character of the site to change in the absence of the port expansion, it has been assumed that the future baseline would be largely the same as it currently is.

The expansion site is located within the Firth of Tay and Eden Estuary SAC and ecological succession in response to other changes due to climate and coastal processes might be assumed as the future baseline. This will be examined within the EIA and the HRA to provide a better understanding of the role of the site in relation to the integrity of the SAC.

From the perspective of socio-economics the ‘do nothing’ scenario takes on a different level of importance as demonstrated by the major drivers for the expansion project which are outlined in the introductory section of this report and the following section 3.5.2. The expansion of the Port of Dundee is linked to European energy policy,

national renewable energy policy and opportunities for the Scottish economy, therefore it can be concluded that the do nothing scenario has the potential for likely significant effects.

This will be addressed in the ES with cross-reference to specific topics.

3.5.2 Alternative Sites

The alternatives to the proposed expansion at Port of Dundee have been the subject of detailed study. The national perspective is presented in National Renewables Infrastructure Plan: Report from Scottish Enterprise and Highlands and Islands Enterprise (N-RIP).

N-RIP records that the development of appropriate locations is critical to Scotland becoming the base for construction and assembly of wind turbines and marine devices and contributing to European energy security and renewable energy development. Suitable locations are also required to grasp the opportunity to develop operations and maintenance hubs for offshore wind farms both in Scottish waters and more remote from Scotland.

The first phase sites identified in the N-RIP spatial framework related to offshore wind, and the infrastructure needs they could support were ranked by score (N-RIP). Dundee was ranked second to Leith; as being in a position to support distributed manufacturing and operation/maintenance. Therefore Dundee is regarded as part of a first phase to establish a competitive position for Scotland in the renewable energy market (wind, wave and tidal); and strategically important to grasping this economic growth opportunity that has the potential to extend to a wider range of locations, drawing on Scotland's energy and engineering expertise.

At the existing Port of Dundee the site available to support offshore renewables development is not sufficiently large to accommodate all the elements that are required to build and install marine wind turbines. It is therefore necessary, in addition to development within the port 'Core Area' for which Planning in Principle has been granted, to expand the port eastwards through the creation of land.

Following the findings of the N-RIP report and the identification of the option for expansion of the port ARUP were engaged to undertake an initial options appraisal to identify the most appropriate expansion site. ARUP considered 18 development options, with 3 separate size options 30 acres, 40 acres and 75 acres, for an extension to the port at Stannergate. It was concluded that on the basis of commercial, operational and environmental impacts to progress the smallest size option, following the existing alignment.

The sourcing of infill material is the other major aspect of this project. At present there are a number of alternative options that are being explored, the focus being on marine aggregate sources, particularly in the Tay. Transportation is also an important parameter when considering alternative material sources and has a significant impact on the environmental, sustainability and financial viability of available options.

The ES will therefore provide a statement on the alternatives that have been considered with respect to the project. This will include alternative port expansion opportunities, the potential marine aggregate extraction sites assessed and transportation options.

The ES will provide a summary of the alternatives that have been considered for Dundee. The alternatives considered with respect to the final project design will be presented where they are considered to be of value to the EIA process.

4 CONSULTATION

4.1 General

Stakeholder engagement and consultation plays a crucial role in EIA. Through focusing on productive stakeholder engagement the EIA team will seek to:

- inform stakeholders to ensure that they properly understand the proposed development;
- be informed by stakeholders thereby seeking to ensure that information is properly available to the assessment process;
- identify sustainable strategies for optimising any conflicting interests that may arise or be perceived to arise; and
- ensure that options for mitigation are fully explored and assessed with stakeholder participation where appropriate.

A consultation log will be maintained and a consultation report provided.

4.2 Pre-Scoping Consultation Meeting

A pre-scoping meeting was held on 30th October 2012 at Scottish Enterprise Office in Stirling. The meeting was attended by representatives of National Renewables Infrastructure Project (N-RIP) advisory group, Scottish Enterprise, Forth Ports, Royal HaskoningDHV, Transport Scotland, Marine Scotland, SEPA and SNH.

The outline of the expansion project was presented and form of the scoping request and matters to be included in the scoping report were discussed.

As stated in Section 1.6 it was agreed that a joint request would be made to Transport Scotland and Marine Scotland and that one EIA would support the:

- HRO application;
- Marine extraction licence;
- Marine works licence; and
- HRA.

4.3 Proposed Future Consultation

The consultation during the scoping process will focus on reaching agreement with statutory authorities as to the scope of the EIA. The consultees will be:

- Transport Scotland;
- Marine Scotland;
- The Crown Estate;
- Scottish Environment Protection Agency (SEPA);
- Scottish Natural Heritage (SNH);
- Historic Scotland (HS);
- Dundee City Council; and
- Port of Dundee limited.

Following receipt of the scoping opinion, consultation during the EIA process and during the preparation of the ES will include both statutory and non-statutory organisations. Note the list below is not definitive, further consultation may be undertaken and equally stakeholders listed here may not wish to participate in the process.

- Scottish Water;
- Dundee City Council:
    - Environment: Contaminated Land, Noise and Air Quality;
    - Highways;
    - Engineers: Flooding, Storm and Foul Drainage;
- Community Council;
- Angus Council;
- Fife Council;
- Health and Safety Executive;
- Network Rail;
- British Telecom (BT);
- Tayside Biodiversity Officer;
- Royal Society for the Protection of Birds (RSPB);
- Scottish Wildlife Trust (SWT);
- Whale and Dolphin Conservation (WDC);
- Tay Estuary Forum,
- Dundee Airport (Highlands and Islands Airports Limited);
- Forth and Tay Navigation Service;
- Atlantic Salmon Trust;
- Perth Harbour; and
- Tay Road Bridge Joint Board.

It is anticipated that the scoping process will highlight any omissions to the above list and aid in the refinement of the consultation process.

5 GEOLOGY

5.1 Introduction

Geology and soils at the expansion site and marine aggregate site will require definition and assessment of potential impacts. The findings will provide baseline data which will feed into the assessment of hydrology and hydrogeology and coastal processes. This will be a desk based assessment.

5.2 Existing Geological Conditions

5.2.1 Bedrock Geology

The BGS mapping shows that the solid geology of the area consists of Old Red Sandstone strata and Lower Devonian extrusive basic igneous rocks. The underlying strata at the Port consist of the Dundee Flagstone Formation – considered to be fine-grained, laminated, grey, silty, sandstone (flagstone), grey siltstone and reddish brown and grey mudstone. These sedimentary rocks are considered to have formed approximately 391 to 417 million years ago in the Devonian Period. Below this sedimentary sequence is thick stratum of igneous bedrock of the Ochil volcanic formation - pyroxine andesite (Figure 5.1).

5.2.2 Superficial Geology

The BGS Superficial Map for Dundee shows the whole of the expansion site area and the coastal strip along to Brought Ferry as comprising Marine Beach Deposits - gravel, sand and silt formed in the Quaternary Period in a local environment dominated by shorelines. Immediately north are raised marine deposits of Flandrian age – clay, silt, sand and gravel, formed in a local environment dominated by shallow seas. To the north, moving inland, superficial deposits are composed of Devensian diamicton (till).

The Port is made ground, originally underlain by intertidal deposits (undifferentiated) silt and clay.

The estuarine sediment deposits are more variable with indications from earlier mapping that they may range from silt with varying amounts of sand and gravel to sandy gravel as exposed on the existing foreshore (Figure 5.2).

5.2.3 Marine Sediment Quality

The existing quality of the marine sediments in the local area, and footprint of the expansion site and the marine extraction site will be subject to investigation, including:

- installation of tidal gauge;
- bathymetric survey and data processing;
- vibrocore survey and analysis; and
- grab sampling and analysis.

The marine extraction site will be subject to bathymetric survey and site investigation to ascertain whether the resource is suitable for use as infill material. The samples will be tested for heavy metals, organotins, hydrocarbons and PCBs.

The estuary is geomorphologically complex and marine sediments within the current marine aggregate exploration area are considered to be of contemporary sediments of largely sand and gravel grade.

5.2.4 Soils

The expansion site is based entirely within the subtidal, intertidal and upper shore and there are no soils likely to be affected by the project. The site is bordered by the road and soils will not be affected by 'tie in' of the site to adjacent land.

5.3 Identification of Key Issues

No key issues have been identified with regard to bedrock, superficial geology or soils; similarly at the expansion site and there are no likely significant impacts identified with respect to geology and ground conditions. It is considered that an assessment of impacts of the port expansion on geology can be scoped out of the EIA. Geological information will however be compiled and the geology report used to inform the baseline in other assessments such as ecology, hydrology, noise and dust management.

With respect to the marine aggregate extraction site there will be a study of the coastal geomorphology and assessment of impacts. Therefore the impacts on marine geology will be addressed within that chapter.

5.4 Methodology and Approach to EIA

The geological information will be compiled from existing available sources and a statement made. This data will be of value to inform the baseline in other assessments.

The geology of the marine aggregate extraction site will be described based on the results of the site investigation and published information. The potential impacts upon the marine geology will be assessed as part of the coastal processes impact assessment and therefore there are strong links between this chapter of the ES and other chapters.

Consultation will also be undertaken with the statutory consultees: e.g. Marine Scotland, SEPA and SNH.

If during consultation likely significant impacts on geology are identified these will be assessed with reference to EIA guidelines (PAN 58, 1999).

6 WATER ENVIRONMENT

6.1 Introduction

The proposed port expansion involves the reclamation of land by infilling. This is liable to follow a period of capital dredging to provide a foundation and construction of an open development platform, including the possibility of the construction of a new quay. Infill material is anticipated to be marine aggregate, which may be sourced from a new marine extraction site. These activities have the potential to cause changes to the baseline hydrological and hydrogeological conditions locally and to affect the quality of ground water, surface run off and the estuary.

6.2 Existing Hydrological and Hydrogeological Environment

6.2.1 Hydrogeology

The BGS Hydrogeological Viewer 1:625000 shows the expansion site area to be underlain by un-named extrusive rocks, Silurian to Devonian. This is classified as a low productivity aquifer with small amounts of groundwater in near surface weathered rocks and secondary fractures. Within this feature there are rare springs yielding up to 2 litres per second. The hydraulic gradient is expected to be in a southerly direction due to local topography. The aquifer may be tidally influenced and any groundwater is likely to be in continuity with the adjacent Firth of Tay.

6.2.2 Hydrology

The surface and soil zone system comprises the surface water hydrology and the unsaturated zone. This system controls the run-off, infiltration, evapotranspiration and interflow processes. These processes determine the amount of recharge which feeds the groundwater system. Within Port of Dundee and the land north of the expansion area the surface is developed land comprising large areas of impervious surface. Engineered coastal edges, such as rock revetment, concrete and quay constructions are in place. The natural system has therefore been interrupted and an engineered/managed system is operating. The foreshore is no longer in a natural state as there are a number of engineered interventions, including seawall, outfalls and defences. It is comprised of gravels, boulders with some very limited mudflat and sand; there are no soils present.

The River Tay at 188km in length is the longest river in Scotland and the largest in the UK in terms of flow, discharging on average 198m^3s^{-1} to the Firth. The Firth of Tay is the smallest of the major Firths in Scotland and extends eastwards from the confluence of the River Earn and River Tay east of Perth, opening into the North Sea at Buddon Ness in Angus and Tentsmuir Point in Fife. In combination the River Earn and River Tay drain 6000km^2 of land and contributing 95% of the freshwater input to the estuary (SNH:2003).

The Firth has a maximum width of 5km at Invergowrie to the west of Dundee. It is crossed by the Tay Road Bridge and Tay Railway Bridge at Dundee where it is approximately 2km wide.

The Admiralty Chart 2006 shows the subtidal bed of the Firth adjacent to the expansion site to grade to between 6m and 8m below Chart Datum. From the expansion site to Broughty Ferry the centre of the channel is recorded as being deeper on average 11m to 13m BCD with small pockets reaching 16m BCD. The channel close to the expansion

site is therefore variable in depth and relatively stable. Currently the port does not require a dredged navigation channel and only the water depths in front of the wharfs are maintained by dredging, the wharfs having being built out into the river to reach deeper water. The requirement for capital or maintenance dredging at the proposed expansion site will be addressed during the design process.

The potential marine aggregate extraction site within the outer Firth is located in an area of highly mobile geomorphology.

6.2.3 Water Quality

The Firth is relatively shallow and is described as partially mixed to well-mixed. As a result of the high freshwater influence and macro tidal nature of the Firth, the residence time of water in the Firth of Tay is relatively short (2-15 days) and therefore any material discharged to the estuary is rapidly diluted and discharged to sea (CEFAS 2006).

When considering potential sources of contamination to the estuary, the main settlements are Perth at the head (and tidal limit) and Dundee at the mouth of the estuary. The existing key issues for water quality within the Firth of Tay are, however, recognised as diffuse pollution from agricultural run-off and the septic tanks which discharge treated effluent into the estuary.

Secondary treated sewage from Perth is discharged to the estuary upstream of Newburgh while sewage discharges from Dundee were removed from the estuary and taken to a new treatment works on the North Sea coast in 2002. As a result, on-going monitoring shows a significant decrease in ammonium and total nitrogen inputs. Additionally, the waters are typically well oxygenated. Diffuse pollution inputs are also recognised as a source of contamination in the catchment and as a result, the River Basin Management Plan lists this as a pressure requiring management (SEPA, 2012).

In the area local to the expansion site, there is a Scottish Water Treatment Works situated to the north- east of the Port. The Stannergate combined sewer outfall (CSO) is located towards the eastern end of the expansion site, the pipeline is routed along the foreshore evidenced by covered manholes (personal communication Scottish Water 2013).

In 2008, water bodies in the Tay area were classified under the Water Framework Directive (WFD). The *Tay area management plan 2009 – 2015* (Tay Area Advisory Group) gives groundwater and surface water classifications based on this WFD information provided by SEPA.

Additionally, chemical monitoring has been undertaken in relation to the classification of WFD water bodies which include marine coastal waters out to 3 nautical miles from the coast of Scotland. These water bodies are then assigned a status in terms of ecological and chemical quality. The water bodies located within the vicinity of the proposals are the Lower Tay transitional water body and Carnoustie to Fife Ness coastal water body.

The current condition of the surface and coastal water bodies in the relevant area are considered to be as follows:

- The Firth of Tay and surrounding coastal waters – Good;
- Streams flowing south into the Firth of Tay at Dundee – Moderate; and
- Streams flowing north into the Firth of Tay at Tayport and Tentsmuir – Poor.

The overall groundwater status north and south of the Firth of Tay is classified as Poor.

SEPA control the discharge consents and monitor the water quality of watercourses feeding into the Tay. Scottish Water provides and maintains public water, sewerage infrastructure and conducts monitoring of water quality.

SEPA is responsible for monitoring coastal water quality around Scotland. Within the local area, water quality monitoring is undertaken in order to assess compliance against the EC Bathing Waters Directive. The nearest designated bathing water to the proposed port expansion site is at Broughty Ferry 2.4 km away) which is located to the east of the City of Dundee, this bathing water is approximately 0.5km from the potential marine aggregate extraction site within the Inner Firth. The nearest bathing water to the marine aggregate extraction area at the port limit is located further east on the coast at Carnoustie approximately 3.5 km away at the potential closest point (Ref: Figure 6.1: Bathing Waters and Recreational Activities).

Monitoring is undertaken at these designated bathing waters annually; between 1st June and 15th September. An annual water quality classification is then allocated for each season based on 20 samples for the following groups of bacteria:

- Total coliforms (TC);
- Faecal coliforms (FC); and
- Faecal streptococci (FS).

The Scottish Environment Protection Agency (SEPA) has monitored the bathing water at Broughty Ferry beach since the Tay Wastewater Project was completed, commencing in 2002.

Broughty Ferry was designated as bathing water in 2006 and has passed the more stringent guideline standards every year since 2006 with the exception of the years 2007 and 2010 when it passed the mandatory standards. These dips in quality are thought to be due to higher than average summer rainfall which can lead to greater run-off from urban and arable land (diffuse pollution), and also increases the likelihood of sewage system overflows, driven by storm events. The beach retained its blue flag status and in 2012 achieved the top guideline testing level.

The bathing water at Carnoustie was designated in 1987. It has generally passed the more stringent guideline standards, the exceptions being years 2002, 2009 and 2011 where mandatory standards were achieved. The dips in quality at this bathing water are thought to be due to heavy rainfall and the location of an outfall which discharges close to the bathing water (‘Scottish Bathing Waters 2011, SEPA, 2012’).

6.2.4 Sediment

The Firth of Tay sediments are generally coarse and mobile as a result of the strong currents generated by the mixing of the large volume of freshwater with seawater in a relatively narrow estuary. The percentage organic carbon content of the intertidal sediments is generally low. Further offshore, away from the estuary mouth, sediments are anticipated to be similar in that they are predominantly coarse grain sand.

Analysis of the maintenance dredge spoil has identified small quantities of the following contaminants, consistent with the industrial and urban use of this reach of the Firth:

- heavy metals;
- tributyltin (TBT);
- polyaromatic hydrocarbons (PAHs); and
- polychlorinated biphenyls (PCBs).

The most recent sediment quality data demonstrates that concentrations of all contaminants are below Marine Scotland Action Level 1; thresholds developed in order to determine whether material is acceptable for disposal at sea (ERM, 2011). As a result, the material is not considered to be significantly contaminated and is licenced for disposal at sea.

Sediment data is not, however, currently available for the proposed expansion area or marine aggregate extraction site. A licence has been obtained from Marine Scotland for the collection of a comprehensive set of sediment samples, which will be analysed for a series of pollutants and physical parameters, in line with Marine Scotland requirements (refer Section 6.3).

6.3 Identification of Key Issues

The potential environmental impacts associated with the land reclamation operations and construction of additional quayside, have been identified as:

- Increased run-off and changes in drainage caused by increase in land area and less permeable surfaces;
- Potential changes to hydrological regime and flood risk;
- Potential impacts on Scottish Water systems, e.g. combined sewer outfalls and foul water main sewers;
- Potential pollution of surface water from fuel spills;
- Potential release of suspended solids/sediment into the Firth of Tay as a result of the reclamation process and the potential release of suspended solids within the coastal environment as a result of dredging at the extraction site (impacts on turbidity and potentially dissolved oxygen levels);
- Potential release of sediment contamination as a result of seabed disturbance during reclamation and/or extraction; and
- Potential impact on designated bathing waters as a result of reclamation and dredging of the extraction site.

During construction, any disturbance of sediments either through working in the marine environment, overspill of the infilling process or via dredging both at the aggregate extraction and infilling sites could potentially give rise to impacts on water quality. This could result in increased concentrations of suspended solids within the water column and increased concentrations of contaminants associated with the disturbed sediment. Additionally, should significant deposition be identified during the coastal processes studies, (see Chapter 7) then impacts on receiving sediments will also need to be considered.

In terms of sediment contaminants, it is not anticipated that significant sediment contamination exists in the study area (at the expansion site or proposed aggregate extraction site), however, a programme of sediment sampling and contaminant testing is underway in order to confirm this. The approach to the sediment sampling and analysis has been discussed and agreed with Marine Scotland prior to implementation through the Marine Licence application process.

During operation, impacts on water quality are more likely to relate to any maintenance dredging that is required at the berth.

The potential environmental impacts associated with the operational phase are:

- Impacts on suspended solids concentrations of the Firth as a result of the potential requirement for maintenance dredging of berth;
- Potential impacts on discharges that currently exist along the shoreline (i.e. may inhibit discharge or dilution of discharge). Again, however, the risk is deemed to be low as the existing discharges will be accommodated within the proposed reclamation design. Detailed proposals will be provided with the Environmental Statement; and
- Contaminated surface water runoff. Surface water management will be addressed in consultation with SEPA and details will be provided within the Environmental Statement;

The intention is that the expansion site will be un-surfaced. The existing discharges along the shoreline will be accommodated within the design. These include natural runoff through small pipes in the concrete walkway and engineered discharges with associated access points along the shore. Additionally, impacts on relocated outfalls in terms of restrictions to flows or dilution of the discharges could also potentially impact on receiving waters. The EIA will therefore address these issues.

6.4 Methodology and Approach to EIA

Assessment will be undertaken in accordance with current European and National legislation, guidance and best practice. The development design team will be consulted with regard to hydrological data and it is intended that there will be collaboration between hydrologists and engineers in order to develop an optimum design in consultation with SEPA. The components of the study are:

- Further consultation as required;
    - SEPA will be consulted regarding requirements to permit surface water run off / discharge consent arrangements if required;
    - SEPA and Dundee City Council with regard to flood risk assessment requirements;
- Collation of background information - the existing baseline data will be updated for hydrology and water quality with the most recent information available. This will be undertaken through consultation with SEPA, Scottish Water and Forth Ports;
- General meteorological appraisal (rainfall data, run-off and evaporation data for catchments associated with the site and new land reclamation);
- Review of baseline water quality conditions, water abstraction data, discharge data and water flow data including flood risk;
    - In order to inform the baseline, a summary of compliance of the Firth of Tay with the various water quality Environmental Quality Standards (EQS') will be provided;
- Reporting of existing baseline conditions to assess the impact of the proposal with supporting plans.

Sediment data collected as a result of the site investigation will be analysed and compared to Marine Scotland's 'Guidance for the Sampling and Analysis of Sediment and Dredge Material' and agreed through consultation with Marine Scotland.

The main components of the ES will consist of:

- Existing baseline conditions;
- Construction and operational phase considerations;
    - Assessment of the likely impact of the proposed scheme (for impacts on physical parameters such as suspended solid concentrations of the water column during dredging, information provided in the coastal processes chapter (Chapter 7) of the Environmental Statement will be used).
- Where a significant impact is predicted, recommendations for management and mitigation measures to reduce potential impacts of the project on the water environment, and the residual risk resulting from the implementation of these measures will be assessed;
- Where control measures are included as part of the design, the impact or risk to the environment with these control measures in place, will be assessed

As the proposed expansion site reclamation will be designed to meet SEPA's requirements with regard to flood risk it is anticipated that no further Flood Risk Assessment (FRA) will be required. This will be confirmed in further consultation with SEPA.

7 COASTAL PROCESSES

7.1 Introduction

The Port expansion works involve land reclamation and hard engineering which will have the potential to locally impact the natural coastal processes. In addition to the potential impacts of the Port development the potential impacts arising from any new aggregate extraction sites in the marine environment for purposes of providing construction materials will be considered.

The quality and quantity of the resource, its location with respect to the expansion area and economic viability need to be considered. Furthermore, the marine ecological issues and the potential effects on the condition of the Natura 2000 sites, along with any significant geomorphological aspects will be assessed.

The two potential aggregate extraction sites considered, are shown Figure 1.2.

This chapter of the Scoping Report presents the proposed approach to the assessment of the impacts on the physical processes and morphology of the firth and adjacent coastlines. The port expansion project and one marine aggregate extraction site shall be assessed in the EIA.

7.2 Existing Environment

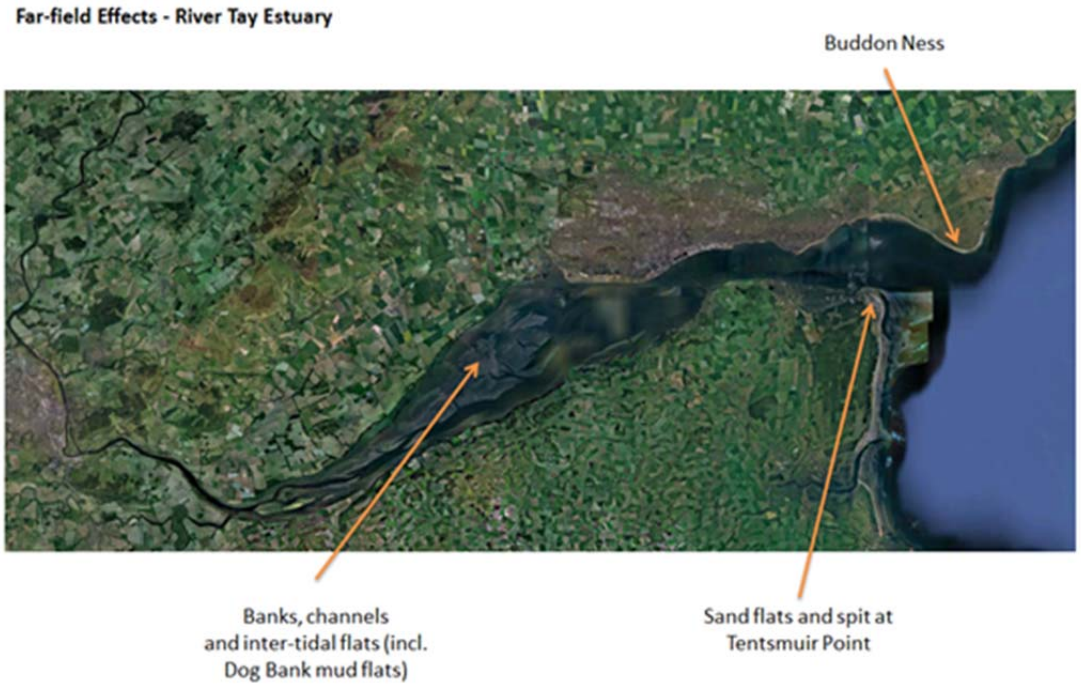
Immediately to the west of the expansion site, the coastline has been changed by land reclamation and the development of quays and use of vertical steel sheet piling and rock armouring over a long period. The expansion site, though having a more natural foreshore has also been impacted by hard engineering which includes the Port's rock armouring along the western boundary and stone walls and concrete defences on the northern boundary.

As in any coastal or estuarine environment, the hydrodynamic conditions within the Firth of Tay are influenced through complex interaction between tidal systems, waves and bathymetry. This interaction results in complex circulation patterns and variations in current strengths at different tidal states. The mean tidal range at Dundee is 5m for spring tides and 2.2m for neap tides and tidal current strength and direction are heavily influenced by the large shallow sandflats and sandbanks.

7.3 Identification of Key Issues

The Firth of Tay is an environment in which significant changes to the physical processes may affect the geomorphology, nature conservation features, navigation interests and flood risk. These changes may remain 'local' to the expansion or extraction site (near-field), but potentially could extend further afield, having wider-reaching implications (i.e. far-field).

Some of the key potential receptors to any changes to physical processes or morphology as a direct or indirect consequence of the proposed development are shown below for far-field and near-field effects, respectively.



Changes in the tidal or wave regimes due to the proposed development may result in alterations to existing sediment transport rates or pathways within the estuary, which could have knock-on far-field effects in terms of existing processes of accretion or erosion within the estuary. Of particular concern would be any changes leading to erosion of the complex mosaic of banks, channels and inter-tidal flats within the estuary or the geomorphological features at the mouth.

On the north bank, Buddon Ness is a cuspate foreland upon which active and mature sand dunes are present. On the south bank, there are broad, extensive inter-tidal sand flats at Headwell Sands with outcrops of Scalps and at Tentsmuir Point there is a spit (known as 'the elbow') which sweeps westwards into the estuary mouth.

With reference to the expansion at the Port, reduction in the width of the outer estuary at a site adjacent to its narrowest point may result in either:

- changes to the water levels further upstream, which could affect the extent of inter-tidal area; or
- increases in flow velocity through the outer estuary reach, leading to changes in patterns of erosion and deposition across the banks and channels elsewhere in the estuary.

With reference to the marine aggregate extraction, the removal of approximately 1,000,000m^3 of sandy sediment from the firth may have a number of potential impacts which will require investigation within the EIA process.

These potential impacts include:

- Impact on available sediment and sediment distribution within the Firth of Tay and its associated European Sites;
- Direct loss of habitat In the Firth of Tay and its associated European Sites;
- Changes in the morphology of the estuary; and

- Changes in wave exposure regime.

7.3.1 Port Expansion

At the near-field scale, the principal potential changes to the physical process and morphology arising from the proposed development are:

Construction phase:

- Release of sediments into the water column during land claim works, creating a plume in the water column; and
- Deposition of sediments transported in a plume on the estuary bed, potentially causing unwanted deposition or accretion in other estuary areas (e.g. smothering of bird feeding areas, siltation adjacent to intakes or outfalls, smothering of the Scalps, etc.).

Currently, it has been assumed that industry best practice will be used to minimise sediment plume effects during construction of the proposed land claim. As such, a qualitative assessment approach will be adopted.

Operation phase:

The new shore alignment and position following the land claim will effectively extend the section of the narrowest point of the outer estuary. The potential consequences of this permanent change to the estuary on the far-field scale have already been discussed. There may also be local changes to the flow and wave regimes which may affect erosion or deposition processes at the following locations relatively close to the proposed development:

- Abutments of the Tay Road Bridge, potentially leading to increased bridge scour or deposition;
- Existing ports, harbours and berths, potentially leading to increased or reduced maintenance dredging;
- Along the foreshore fronting Newport-on-Tay, Tayport and Dundee, potentially leading to changes in flood risk; and
- The estuary deep-water channel, potentially leading to changes in the depth, width or morphology and the channel and hence potentially creating maintenance dredging requirements. No approaches are currently dredged.

7.4 Methodology and Approach to EIA

The coastal processes chapter will describe the background physical processes and morphology of the Firth of Tay and assess how the proposed development (i.e. the land claim required to extend the Port of Dundee further eastwards along the north bank and the extraction of marine aggregate by dredging from the Firth of Tay will affect the physical environment during construction and operational phases. It is not anticipated that decommissioning will take place and the use of the extraction site will be solely to service the Port expansion.

This baseline section will be produced following a review of available data and existing literature, including:

- Bathymetric survey data covering the Firth of Tay, with particular focus in the area of the Port expansion area and the area of the aggregate extraction;
- Any available field data (e.g. digital files) relating to hydrodynamics (tidal currents, water levels, wave conditions) and wind conditions; and
- Any available interpretation (e.g. reports) of field data relating to sediments and geology (grab samples, water samples, geotechnical investigations, geophysical surveys).

This data will be considered using specific project information:

- Location, dimensions, alignment, levels and outline design of the preferred Port development;
- Construction methods, sequencing and programme for the preferred Port development;
- Location, quantities and depths of aggregate dredging; and
- Dredging methods and rates.

It should be noted that some of the above parameters are closely linked and will determine the overall programme.

This baseline work can also be informed by numerical modelling of (initially) tidal currents, water levels and wave processes (see below). It is proposed that these potential changes across both the far-field and near-field are investigated using firstly a 2-D hydrodynamic model developed by HR Wallingford using TELEMAC2-D flow software. This will be set-up, calibrated and run for the existing case to characterise the baseline tidal current pathways and velocities, associated bed-shear stresses and water levels throughout the estuary system.

The proposed reclamation will then be added to the model to investigate the magnitude and spatial extent of changes in these parameters.

This process will be repeated to determine the magnitude and extent of any changes in wave climate using Royal HaskoningDHV's existing SWAN model of the Firth of Tay. Royal HaskoningDHV has obtained permission from SEPA, for the purposes of the Port of Dundee studies, to use the SWAN wave model developed for SEPA on its' Firths of Forth and Tay Flood Forecasting Improvement project. The 'Inner Tay' model will provide a suitable basis for the wave assessments, subject to some modifications to its seaward boundary to ensure that the potential aggregate dredging site on the bar is covered by the model domain.

Royal HaskoningDHV's coastal geomorphologists will interpret the results of changes in water level, current speed and direction, bed shear stress and wave heights across the far-field and near-field regimes. Should any significant changes be identified, then there may be the need to undertake sediment transport modelling to determine how the changes in tidal hydrodynamics and/or wave regime translate into morphological change (advection and deposition of sediment plumes, erosion/accretion of sediment on the estuary bed, etc.).

This phased approach allows the potential changes in hydrodynamic and wave regime to be robustly tested, but offers the ability to stop the assessments at that stage without the need for sediment modelling should no significant changes to the hydrodynamics and wave regime be identified.

7.4.1 Marine Aggregate Extraction

The principal potential changes to physical process and morphology arising from the proposed marine aggregate extraction area are considered at this stage to comprise:

Construction Phase (i.e. marine extraction by dredging)

- Release of sediments into the water column during extraction, creating a plume in the water column; and
- Deposition of sediments transported in a plume on the sea bed.

In contrast to the port expansion works, the sediment-related issues during excavation of sand from the Firth or will be assessed using numerical modelling techniques. The modelling software SEDPLUME-RW will be used for this purpose.

Operation Phase

The new alignment and elevation of the bed or bar (depending on which site is chosen) following aggregate extraction has the potential to affect the flow and wave regimes which, in turn, may affect erosion or deposition processes within the estuary or along the shore. These potential impacts will need to be considered using the following numerical modelling tools:

- Changes in hydrodynamics – using TELEMAC 2-D flow model with and without the aggregate extraction having taken place;
- Changes in waves – using SWAN wav model with and without the aggregate extraction having taken place; and
- Changes in sediment erosion/deposition patterns – using the SISYPHE sediment transport model with and without the aggregate extraction having taken place.

Relevant technical reports covering the hydrodynamic modelling wave modelling and if required sediment modelling will be produced and appended to the ES.

8 TERRESTRIAL ECOLOGY

8.1 Introduction

The expansion project is located within a coastline that has already been extensively developed for industrial and commercial activity. The coastline and marine environment includes habitat of conservation value in terms of scientific interest and also in supporting species of international conservation interest. There is the potential for environmental impact upon the ecological systems of the area, which includes the terrestrial, estuarine and marine habitats and species and the linkages between them. This section focuses on terrestrial ecology.

In addition to the complex inter-linkages of habitats and species there is a complex amount of legislation that is relevant and will apply to different aspects of the assessment (Ref: Chapter 2).

8.2 Existing Environment

In order to understand the existing environment and allow an informed scope to be developed for the ecological impact assessment (EcIA) two initial 'Phase 1' surveys have been carried out by Royal HaskoningDHV:

- Phase 1 Habitat Survey (following Phase 1 Habitat Survey JNCC 2010); and
- Otter Survey (SNH guidance: Scottish Wildlife Series: Otters and Development).

These surveys relate to the expansion site and focus on the terrestrial environment, which with reference to otter includes the seashore and foreshore environment. An intertidal survey was also carried out and is reported in Chapter 9 that deals with benthic and intertidal ecology.

The outline summaries of the three surveys are provided in this document; the full reports will be included in the Technical Appendices that will accompany the ES.

In addition to these coastal surveys, marine mammals and fisheries are discussed in Chapters 10 and 11 respectively.

There are a number of designated sites to be considered in relation to the Port expansion and marine extraction sites. These are listed here and the Natura 2000 sites are fully discussed in the HRA Screening Report that forms Appendix A.

8.2.1 Designated Sites

The designated Natura Sites are detailed in the HRA screening report, all the relevant conservation sites are listed here:

- Firth of Tay and Eden Estuary SAC, SPA and Ramsar site;
- Isle of May SAC;
- Berwickshire and Northumberland Coast SAC;
- Moray Firth SAC;
- River Tay SAC
- Faray and Holm of Faray SAC;
- Inner Tay Estuary SSSI and NNR;
- Tayport-Tentsmuir Coast SSSI;
- Tentsmuir NNR;

- Monifieth Bay SSSI; and
- Barry Links SSSI.

These sites will all be considered within the ECIA as appropriate to the topic area. Designated sites are shown on Figure 8.1: Nature Conservation Designations.

8.2.2 Phase 1 habitat Survey

The phase 1 habitat survey (RHDHV September 2012) identified that the majority of the terrestrial environment was bare ground in the form of tarmac/concrete or other form of hardstanding. Ephemeral and short perennial species were noted to be growing at the side of the road and pavement and tall ruderal habitat and scrub was noted to be established on the rip rap at the edge of the Port, and beside the railway line. Coastal grassland was recorded as the most interesting habitat and of local conservation value; a very small remnant remains to the north of the proposed expansion site and a little more to the east. The survey identified potential habitat for otters within the expansion site and subsequently an initial otter walkover survey was carried out. The records of the phase I habitat survey are shown on Figure 8.2: Phase I Habitat Map.

8.2.3 Otter Survey

The otter survey was undertaken by two Royal HaskoningDHV ecologists' on 16th October 2012 with the purpose of mapping otter activity within and near to the Port of Dundee expansion site (RHDHV October 2012).

Prior to the field survey a desk study of the area and its surrounds was carried out, drawing on a number of sources. The survey aimed to record field signs for otter, as well as any suitable habitat present within the study area, make recommendations with regard to the planned work and identify any further surveys that may be necessary.

The survey identified the study area and environs as currently providing habitat of some value to otter for shelter, possible lye-ups and a source of freshwater.

The report makes recommendations for further surveys at appropriate stages in the development to ensure protection of otter.

8.3 Identification of Key Issues

The Port expansion site is proposed within the Firth of Tay & Eden Estuary SAC; clearly, maintenance of the integrity of the SAC will be an important consideration in the EcIA.

Overall the site is located within the supratidal, intertidal and subtidal zone and the true terrestrial habitat is outside the boundary. It has been concluded that the terrestrial habitat will not be subject to likely significant impacts.

Within this context the main issue for the terrestrial EcIA is the identification and protection of European Protected Species (EPS), in this case the otter. The principal terrestrial EcIA concern from the port expansion is the potential for disturbance to otter.

8.4 Methodology and Approach to EcIA

A desk study will be undertaken, part of which will include consultation with the relevant government and non-government organisations. Importantly consultation shall be carried out with SNH and Marine Scotland in order to ensure that the EcIA meets agreed

standards. The desk study will review the data obtained from the phase 1 surveys undertaken to inform the scoping report, this will feed into the baseline reporting.. It is expected that the terrestrial EcIA will focus on the otter.

The EcIA would follow Guidelines for Ecological Impact Assessment in the United Kingdom; Institute of Ecology and Environmental Management February 2006. The conservation value of the habitats identified will be evaluated and the survey area and component habitats placed in a bio-geographical context, with reference to legislation and the UK Biodiversity Action Plan and Tayside Local Biodiversity Action Plan.

Potential impacts related to the proposed development and the resultant likely changes will be identified, in liaison with the design team. In line with the standard approach, impact assessment will be based on scientific principles, taking a quantitative approach as far as possible with the application of professional judgement to achieve an assessment of the impact on valued resources. Potentially positive effects would also be identified at this time.

Where required, mitigation will be identified, assessed and developed to inform long-term management. This will be undertaken in consultation with the client and design team.

9 SUBTIDAL AND INTERTIDAL ECOLOGY

9.1 Introduction

The proposed Port expansion site is situated within the Firth of Tay and Eden Estuary Special Area of Conservation (SAC). The location of the marine aggregate extraction site has not been defined at this stage. This chapter of the EIA will address intertidal ecology at the expansion site and benthic ecology at both the expansion site and the potential marine aggregate extraction sites.

9.2 Existing Environment

With respect to benthos the qualifying habitats for which the SAC is designated are as follows:

- Estuaries (Primary designation);
- Mudflats and sandflats not covered by seawater at low tide; and
- Sandbanks which are slightly covered by sea water all the time.

Designated features relating to marine mammals and birds are discussed in Chapters 10 and 12 respectively.

The proposed marine aggregate extraction site(s) relies on archive data for description of the subtidal benthic community and site specific data will be gathered as deemed appropriate when the location of the site(s) has been decided.

In order to understand the existing intertidal environment a field survey was carried out by Royal HaskoningDHV:

- Intertidal Survey (following CCW Handbook for marine intertidal Phase 1 mapping' (Wyn et al., 2000) and the 'Marine Nature Conservation Review: Rationale and methods' (Hiscock, 1996)).

The description of the existing environment with respect to benthic ecology is based on previous work undertaken which includes:

- Bates, C.R., Moore, C.G., Malthus, T., Mair, J.M., and Karpouzli, E. (2004). Broad scale mapping of habitats in the Firth of Tay and Eden Estuary, Scotland. Scottish Natural Heritage Commissioned report No. 007 (ROAME No. F01AA401D).

A description of sediments types are provided in Chapter 5 Geology.

The Firth of Tay & Eden Estuary encompasses two high-quality estuarine areas. The Tay is the least-modified of the large east coast estuaries in Scotland, while the Eden Estuary represents a smaller, 'pocket' estuary to the south of the Tay. The inner parts of the estuaries are largely sheltered from wave action, while outer areas, particularly of the Tay, are more exposed giving rise to a complex pattern of erosion and deposition of the sandbanks at the mouth of the Firth (JNCC[1]).

The sediments within the site support biotopes that reflect the gradients of exposure and salinity, and are typical of estuaries on the east coast of the UK. The abundance,

[1] http://jncc.defra.gov.uk/protectedsites/sacselection/sac.asp?EUcode=UK0030311

distribution and composition of the associated plant and animal communities are ecologically representative of northern North Sea estuaries.

In the middle Tay (from Invergowrie / Balermino to Brought Ferry / Tayport), within which the expansion area is situated), Bates et al (2004) recorded subtidal sediments of predominately highly mobile medium and coarse sands with an impoverished fauna of a small crustaceans (*Gastrosaccus spinifer, Eurydice pulchra, Haustorius arenarius*). Sampling revealed a scattered epifauna of *Carcinus maenas* and several fish, including the smelt, *Osmerus eperlanus*, the greater pipe-fish, *Syngnathus acus* and juvenile gobies, *Pomatoschistus sp*., and the lesser sand eel, *Ammodytes tobianus*.

Just off the northern and southern shores, out of the path of the strongest currents, Bates et al, (2004) recorded the sediments to become basically muddy sands with a much richer fauna dominated by tubificid oligochaetes and polychaetes such as *Scoloplos armiger*, *Pygospio elegans* and *capitellids* (IMU.Tub). Mussels, *Mytilus edulis*, were also recorded scattered throughout this area and forming beds (IMX.MytV) on both northern and southern margins Ref: Figure 9.1: Blue mussel beds. However, the spatial extent of living mussel beds is difficult to determine due to the widespread presence of dead shells and pebbles, which fail to produce a distinctively different signature for remote sensing techniques. Mussels were recorded during the intertidal survey footprint of the proposed expansion area (Royal HaskoningDHV, 2012) opportunistically on rocky substrates in the lower shore, however, not in significant density to class as a bed in the intertidal region.

Along the northern shoreline the muddy sand flats of Invergowrie Bay, west of the proposed expansion area, Bates et al, (2004) recorded the intertidal mud biotope (IMU.HedMac), with sediment becoming progressively sandier eastwards alongside the airport.

The lower shore sediments off the airport and the Dundee riverfront to the road bridge are backed by a stone seawall, often with cobbles and boulders at the base, which, support a sequence of narrow bands of lichen and fucoid biotopes (LR.YG, SLR.Pel, SLR.Fspi, SLR.Asc and SLR.AscVS).

Between the Tay Road Bridge and Stannergate, immediately west of the proposed expansion site, natural shores are completely replaced by the vertical wharfs of Dundee docks. Beyond Stannergate to Broughty Ferry (including the footprint of the proposed expansion site) beaches return and are composed largely of pebbles and cobbles, overlying finer sediments. An upper band of shingle (LGS.Tal and LGS.Ol) is followed by a belt of *Enteromorpha* sp. and *Porphyra* sp. on cobbles and pebbles (SLR.EphX).

On the lower shore *Fucus vesiculosus* is present on pebbles, cobbles and small boulders over muddy and sandy sediments (SLR.FvesX). Patches of sand are also present there (LGS.AEur, LMS.MacAre).

9.2.1 Intertidal Survey

An intertidal survey was carried out by two RHDHV ecologists in September 2012 and identified two biotopes of conservation importance within the intertidal study area at the Port expansion site. These were where muddy sands and small mudflats occurred in the lower shore and in the north west corner of the site between the existing port edge and sea wall, where accumulation appears to have occurred as an effect of the previous land reclamation at the Port.

These habitats are also Annex 1 features of the Firth of Tay and Eden Estuary SAC (i.e. present as qualifying features but not the primary reason for selection). Although it is assumed polychaetes and bivalves will be present, the lack of evidence found during survey suggests these small scale, limited and localised sediment areas may be impoverished, and consequently, of less importance to birds in the area. No marine flora or fauna species of conservation importance were recorded during the survey. The intertidal survey results are shown on Figure 9.2: Intertidal Survey Map.

9.3 Identification of Key Issues

The key issues are the likely impacts that may arise during the: marine aggregate extraction and transport to the infill site; expansion site preparation (possible dredging) and construction phase; and the Port operation phase.

Potential impacts during the marine extraction and port construction phase include:

- Direct habitat loss through construction in the intertidal zone, including loss of a small area of intertidal mudflat. These two biotopes – muddy sands and mudflats are Annex 1 features of the Firth of Tay and Eden Estuary SAC (present as qualifying features but not the primary reason for selection).
- Changes in the coastal processes, potentially creating different intertidal conditions for the species and biotopes present.
- Substratum/habitat loss or damage;
- Increased suspended sediment and turbidity from extraction and construction activities in inshore waters;
- Smothering of benthic species as a result of potential sediment plume settlement; and
- Potential disturbance of contaminated sediments.

Potential impacts during construction and operation of the expansion area include:

- Damage to habitat or species due to pollution from routine and accidental discharges; and
- Introduction of marine non-native species.

9.4 Methodology and Approach to EcIA

9.4.1 Baseline Characteristics

It is proposed that baseline conditions regarding marine ecology can be further defined to sufficient detail by completing the tasks outlined below:

Data collation:

- habitats, species and contaminants recorded within the study area.

Data sources:

- Grab and vibro-core sampling survey to ascertain ecology and contaminants present at potential marine aggregate extraction site and proposed Port expansion area; and
- Further consultation with SNH, SEPA and MS.

The Marine and Coastal EIA will be carried out following IEEM guidance; Guidelines for Ecological Impact Assessment in Britain and Ireland Marine and Coastal, IEEM 2010.

It is proposed that the impact assessment strategy presented in Table 9-1 is applied to address the potentially significant impacts identified and those impacts for which the potential level of significance is unknown.

Table 9-1: Impact Assessment Strategy

Potential impact	Assessment topics	Assessment method	Relevant research
Substratum / habitat loss / damage from extraction site and expansion site.	Determine the presence and extent of habitats and species within the study area, including rare, sensitive or protected species	Site specific survey and desk based research	Moore 2009; Moore and Robertson 2011. NBN (National Biodiversity Network), MNCR reports. MESH (Mapping European Seabed Habitats), UK Biodiversity Action Plan.
Increased suspended sediment and turbidity from extraction and construction activities in inshore waters			
Disturbance of contaminated sediments	Identification of contaminant present in areas to be disturbed	Site specific survey and desk based research	Marine Life Information Network
Introduction of marine non-natives.	Identification of relevant species and potential for opportunities	Desk based research	SAMS research, Oil and gas guidance (OGP/ IPIECA, 2010)
Smothering of benthic species	Extent of any seabed footprint, recovery rates	Desk based calculation backed up by recovery experiment if appropriate	Observations of zones of effect from other seabed facilities

Mitigation and monitoring measures will be considered and assessed during the EcIA.

The results of surveys will inform the project design and approach to the avoidance and management of potential impacts.

For benthic species the potential for cumulative impacts exist from other activities occurring in the local area. These will be considered within the EcIA where information is available.

10 MARINE MAMMALS

10.1 Introduction

The Firth of Tay supports a number of marine mammal populations and is anticipated to require EcIA.

10.2 Existing Environment

The description of the existing environment with respect to marine mammals is based on existing information on species occurrence and reference to populations considered to be appropriate for the assessment.

Previous work undertaken includes The Stannergate Site Formation and Marine Licence EIA and HRA Process Report (MacLeod Consulting 2012). The report identified:

- Grey seal (*Halichoerus grypus)* to be in significant numbers at haul out sites on the Abertay Sands and at Tentsmuir Point, with limited use made of the development site;
- Harbour seals (*Phoca vitulina*) were identified as numerous in the Middle Tay, and have not been observed at Stannergate but have preferred haul-outs in Invergowrie Bay, My Lords Bank, Naughton Bank and Middle Bank. The total numbers observed at low tide have been in excess of 100 individuals with a peak of 58 recorded on the Naughton Bank.

The local Firth of Tay and Eden Estuary SAC harbour seal population is currently in rapid decline (Lonergan and Thompson, 2012).

In summer months, bottlenose dolphin (*Tursiops truncatus)* frequents the outer estuary around Broughty Ferry and can be observed in the outer Tay and St Andrews Bay.

All marine mammals are protected species and there are a number of legislative requirements and internal agreements that must be met to ensure their protection:

- Grey seals, harbour seals, bottlenose dolphins and harbour porpoise (*Phocoena phocoena*) are protected under European legislation (Annex II of the European Habitats Directive);
- All cetaceans are also listed under Appendix II of the Bern Convention and are European Protected Species (EPS): listed on Annex IV of the European Habitats Directive;
- Small cetaceans are covered by the terms of the international agreement ASCOBANS (Agreement on Conservation of Small Cetaceans of the Baltic and North Seas);
- All cetaceans are further protected under Wildlife and Countryside Act 1981 (as amended) and it is an offence to intentionally kill, injure or take cetaceans; and to cause damage or destruction to certain areas used by cetaceans for shelter and protection, or to intentionally disturb animals occupying such areas; and
- All seals are protected under the Marine (Scotland) Act 2010.

10.2.1 Cetaceans

The following cetacean is commonly found in the Tay area:

- Bottlenose dolphin, including individuals from the Moray Firth SAC population (Cheney *et al.* 2013).

In addition, the following cetaceans have been recorded in the Firth of Tay (Anderwald and Evans, 2010):

- Harbour porpoise *Phocoena phocoena*
- Killer Whale *Orcinus orca*; and
- Short-beaked Common Dolphin *Delphinus delphis*.

Other cetacean species occur in the wider area, namely:

- White-beaked dolphin *Lagenorhynchus albirostris*;
- Atlantic white-sided dolphin *Lagenorhynchus acutus*; and
- Minke whale *Balaenoptera acutorostrata*.

As bottlenose dolphin is the only species of cetacean to commonly occur within the vicinity of the development they are the only species of cetacean that will be taken forward in the assessment.

Bottlenose dolphin is the qualifying feature for the Moray Firth SAC. The bottlenose dolphins using the Tay area are considered to be individuals from the Moray Firth SAC population: there is high connectivity between the two areas (Cheney *et al*, 2013). On the east coast, the most recent population estimate (from 2006) was approximately 195 (95% HPDI 162-253, Cheney *et al.,* 2013). Individuals from the Moray Firth are known to frequently range south to Aberdeen and Fife, as well as occasionally further south. There are clear individual differences in ranging behaviour and site fidelity (Cheney et al., 2013). The east coast population of dolphins should be considered as a single unit for management purposes. The population is currently believed to be stable, with the conservation status of the Moray Firth SAC most recently assessed in 2004 as unfavourable, recovering (SNH 2004)

10.2.2 Pinnipeds

Both grey seal and harbour seal occur in the Firth of Tay, which lies within the Scottish East Coast Management Area, ranging from the England/Scotland border north to Fraserburgh.

Recent work conducted on behalf of the Scottish Government, in response to the Marine (Scotland) Act 2010 (the Act), has identified possible seal haul-out sites for protection across Scotland (Scottish Government, 2011). Abertay Sands are important as a major haul-out site for both grey seals (summer) and breeding harbour seals (JNCC, 2012).

10.2.3 Harbour seal

Harbour seal are a primary reason for the selection of the Tay and Eden Estuary SAC (as an Annex II species under the 'Habitats Directive'. The proposed development lies within this SAC.

Harbour seal numbers in this SAC have been declining since the early 2000s by approximately 18% per annum (95% Confidence Interval (CI) 14.9– 21.2%), (Lonergan & Thompson, 2012). Continued decline at this rate would lead to the effective loss of this species from the SAC within the next 20 years (Lonergan & Thompson, 2012). Declines have also been occurring in other harbour seal populations across Scotland (in

Orkney and Shetland) while other sub-populations around the UK have had variable rates of change; the east coast of England population increasing, and the Moray Firth and West Highlands remaining stable (SCOS, 2011; Lonergan et al., 2007). The causes of the declines are largely unknown but possible causes include; disease, competition with grey seals, declines in important prey species and anthropogenic mortality. Investigations into some of these factors are continuing (SCOS, 2011) but it is likely that the declines are multi-factorial and that the causes might be different in different areas.

The most recent minimum estimate (based on haul out counts during the annual moult in August) for harbour seals in the Scottish East Coast Management Area was 341 in 2011 (SCOS, 2011). The most recent estimate of the minimum size of the SAC population in 2011 was 77 seals. Although the SAC population has been declining rapidly, the number of seals counted in the rest of the management area appears to be more stable, with evidence of a small (non-significant) decline with an annual rate of change -0.24 to +0.03% (Lonergan & Thompson, 2012).

Harbour seal breed in the summer (June and July) and moult in August. During these times the largest numbers of harbour seal can be counted ashore at haul out sites. They have a varied diet, although Sandeel have been found as the dominant prey species in this region, salmon are also common prey during spring and summer and on sea trout during the autumn (Sharples et al., 2009).

Specific threats to harbour seals in the Tay area include corkscrew injuries from vessels with ducted or cowled propellers (Thompson et al., 2010) and Phocine Distemper Virus (PDV). In the UK, since 2008, harbour and juvenile grey seal carcasses have been found with corkscrew like injuries. These injuries are consistent with animals having encountered a single, rotating right-angled blade, which are thought to be caused by the seals being drawn through ducted propellers (Thompson et al., 2010, Bexton et al., 2012). A large proportion of carcases found on beaches in eastern Scotland have been in the Firth of Tay and Eden Estuary. However, due to the possibility of carcases not being washed ashore, or being found, there is the potential for a larger (unquantifiable) number of seals to be injured or killed by the same mechanism.

The most recent status of the Firth of Tay and Eden Estuary SAC harbour seal population was assessed in 2009 as unfavourable declining (SNH, 2009)

10.2.4 Grey seal

Grey seal are a primary reason for site selection of the Isle of May SAC and Berwickshire and North Northumberland Coast SAC. Grey seals breed in the October to December when they form large aggregations at these colonies. Thompson et al., (1996) reported a foraging range of up to 145 km for grey seal and so these SACs are considered in the context of the proposed development. . During the summer months large numbers of grey seal also haul out at sandbanks in the mouth of the Tay (Abertay Sands).

Grey seal are surveyed during their breeding season (in the autumn) by estimating pup production. Numbers ashore are also counted during the summer (August) harbour seal surveys. The 2010 estimate of pup production at North Sea grey seal colonies was 8,314; including Isle of May, Fast Castle, Farne Islands, Donna Nook, Blakeney and East Anglia). The Scottish East Coast Management Areas colonies at the Isle of May, Fast Castle (part of the Berwickshire and North Northumberland SAC) and Inchkeith &

Craigleith colonies constitute approximately half of these, at 4,249. Pup production at these colonies is increasing (SCOS, 2011).

As is the case for harbour seal, sandeel are an important part of grey seal diet in the region (Hammond & Grellier, 2006).

The current status (2007) of the Isle of May SAC is favourable maintained (SNH, 2007). The current status (2009) of the Berwickshire and North Northumberland SAC is favourable maintained (SNH, 2009).

10.3 Identification of Key Issues

Potential impacts during the construction and port operation phase are outlined below; they include impacts from marine aggregate extraction and transport; site preparation dredging and pile driving. Firstly, those identified impacts with a potential 'likely significance' (where the significance of impact is currently unknown) are listed. These will form part of the EIA scope. Secondly, those potential impacts considered to be unlikely or not of 'likely significance' are also listed. These should be scoped out of the EIA.

Potential 'likely significant' impacts include:

- Injury or disturbance to marine mammals from underwater noise generated by dredging, and from vessels, rock dumping and/or piling activity during construction. Effects of underwater noise include potential for: injury and disturbance; effects on behaviour and barrier to movement;
- Marine mammal collision / interaction with dredging vessels and vessels associated with construction works will also be considered during the EcIA. . Increased vessel traffic during construction or operation may increase the risk of collision with ducted or cowled propellers (in the case of seals) or vessel hulls in the case of bottlenose dolphin;
- Indirect impacts from changes in food resource availability for marine mammals, through habitat loss or disturbance of prey species. Bottlenose dolphin feed in the Tay area, whereas seals forage more offshore. Potentially for a significant effect will depend on the range of impacts for prey species;
- Air borne noise at seal haul-outs. There is potential for disturbance of seal haul outs sites, where noisy activities occur in close proximity. The potential for this to occur will require further consultation with SNH; and
- Increase in suspended particles. This leads to the potential for visibility issues due to suspended sediment and potential re-suspension of contaminants and requires further consideration and reference to the findings of other parts of the overall EIA such as water and sediment quality and coastal processes.

Potential impacts that are unlikely to be significant and can be scoped out of the EIA include:

- Accidental contamination to marine mammals from vessels or devices. Industry best practice will be followed and this will be assessed under the water and sediment quality chapter of the EIA. The risk of contamination originating from project works creating a significant impact upon marine mammals is considered to be unlikely; and
- Loss of habitat. As work will not take place at a seal haul-out site or at key dolphin habitat this is not a likely significant impact. Indirect affects due to loss

of habitat for prey species will be assessed in other chapters of the EIA and findings will feed into the marine mammal assessment.

10.4 Methodology and Approach to EcIA

The marine mammal assessment will consider cetaceans (whales and dolphins) and pinnipeds (seals). Otters will be included in the terrestrial coastline and terrestrial ecology assessment.

The Marine and Coastal EcIA will be carried out following IEEM guidance (2010). Consultation will be carried out with both Marine Scotland and SNH.

10.4.1 Baseline Characterisation

The baseline conditions regarding marine mammals will be defined. In order to determine the species present within the vicinity of the extraction site and the proposed marine extraction area there will be a review of existing data.

Example data sources include:

- Fife Ranger SAC counts (Eden Estuary);
- Special Committee on Seals (SCOS);
- Existing telemetry data and marine usage for seals (will be available via Marine Scotland);
- SNH survey reports for distributions of cetaceans and seals in the Tay area;
- Local biodiversity records;
- JNCC Atlas and JCP database;
- SCANS I, II; and
- Data on existing noise /vessel traffic levels in the vicinity of the development.

10.4.2 Impact Assessment

It is proposed that the impact assessment strategy as presented in Table 10-1 is applied to address the potentially significant impacts identified and those impacts for which the potential level of significance is unknown: The assessment will follow IEEM coastal and marine guidance, as stated above.

Table 10-1: Impact Assessment Strategy

Potential Impact	Assessment Method
Auditory injury or disturbance from underwater noise generated by construction vessels, rock dumping, drilling or piling activity	Conduct a desk-based assessment investigating the vessels likely to be used in construction. Investigate the noise signatures of drilling / piling activity through desk review or noise propagation modelling as appropriate
Disturbance from vessel noise generated during operation	Conduct a desk-based assessment investigating the vessels likely to be used in operation
Collision / interaction with construction vessels	Marine mammal observation of behaviour within the study area, desk based review of collision incidents with vessels
Change in availability of food resource	Analysis of impact on marine mammal prey species in relation to diet
Disturbance from air borne noise at seal haul-outs	Desk based assessment of distance between noisy activities and haul out sites. Investigation of noise propagation by desk based review or modelling if required.
Increase in suspended particles	Analysis of proposed construction activity and methods used. Analysis from sediment quality ad coastal processes assessment.

10.4.3 Mitigation and Monitoring

Following identification of any significant impacts, possible mitigation measures and monitoring will be developed through the engineering design process, with the intention of avoiding and reducing the potential for impacts to occur.

Standard mitigation, which is regularly employed, will be considered where appropriate, and will be agreed during consultation.

10.4.4 Cumulative Impacts

Potential for cumulative impacts exist for all species of marine mammal with projects including the following offshore wind farm developments: Firth of Forth, Neart na Gaoithe and Inch Cape. Other developments to be included in the cumulative assessment will be agreed during consultation. The range over which projects will be considered will be based on the receptor species and connectivity between reference populations and other projects or plans. Timing of the proposed expansion development at Dundee will also be a factor as to the significance of the potential cumulative impacts.

11 FISHERIES

11.1 Introduction

The fisheries assessment will consider both commercial fisheries and the ecology of fish and shellfish species. The fish ecology component will consider marine fish, marine shellfish and anadromous fish[2]. It will not consider other aspects of marine ecology as they are considered within Chapter 10, however, this chapter is inherently linked with the marine ecology chapter and links will be highlighted accordingly.

SNH is ultimately responsible for ensuring that the rare and endangered fish and shellfish populations are maintained within Scottish waters, however, licensing of commercial fishing activities and the maintenance of a healthy marine environment is the responsibility of Marine Scotland. Both Marine Scotland and SNH have been consulted in a pre-scoping meeting regarding the potential impacts of this proposed development and further consultation will take place through the scoping and EIA phases.

11.2 Existing Environment

11.2.1 Commercial Fisheries

Commercial fishing activity within the vicinity of the proposed development is limited. The key commercial interest lies with Atlantic salmon *Salmo salar*, which use the River Tay at two points in their life-cycle, seaward migration as smolts and on return as adults to breed. Passage is likely to be rapid and fish do not appear to feed at this time. A net salmon fishery is in existence at Usan which is located over 30km along the coast in a north-easterly direction from the proposed port expansion site on the North Sea coast. Valuable upstream rod fisheries do also exist for this species and will be considered within the EIA.

Historically, there has been a small smelt *Osmerus eperlanus* (sometime known as sparling) fishery which supported low catches, normally caught using nets in the main channel immediately up stream of the Tay Rail Bridge. The last boat was recently decommissioned and the fishing has been temporarily abandoned.

The main features in the outer estuary, within which the proposed port expansion and the possible marine aggregate extraction sites lie, include intertidal sand flats and a sand spit with outcrops of scalps. This area lies within ICES rectangle 41E7 and the latest landing statistics from Marine Scotland indicate that from the rectangle 2118 tonnes of fish and shellfish were landed in 2011 with a combined value of £7.4 million. Of this the shellfish contributed approximately 2058 tonnes with a landed value of around £7.3 million (97% of total catch). This demonstrates the importance of the shellfish sector to the area although the proposed expansion site and extraction area cover only a small area of the ICES rectangle and catch rates within a rectangle are not uniform.

Nephrops *Nephrops norvegicus* are the most landed species from the area followed by scallops *Pecten maximus*, crab *Cancer pagurus* and lobster *Homarus gammarus* (Ref Table 11-1).

[2] Anadromous fish are those which migrate up rivers from the sea to breed/ and or spawn.

More recently in 2011, lobster and crab have become more prevalent in the landings data as scallop landings have decreased considerably. Nephrops have the largest catch by value (nearly 60%), followed by lobster (over 20%). The main fishing methods (by value) are otter trawls, pots and nephrops trawls and over 80% of the total catch value is caught by under 15m vessels (over 45% by vessels under 10m). Despite this, the commercial fishery for the area around the possible extraction site is classified as low (Marine Scotland 2011).

Table 11-1: Landings by live weight of species from ICES rectangle 41E7 between 2006 and 2011 (Includes only species for which more than 100 tonne was landed)

Species	Live Weight (tonnes)
Nephrops (Norway Lobster)	9254
Scallops	1539
Crabs (*Cancer pagurus*.mixed sexes)	1096
Lobsters	1068
Crabs - Velvet (Swim)	670
Surf Clams	399
Squid	379
Razor Clam	332

11.2.2 Fish Ecology

A total of 37 freshwater and marine species of fish are known to be present within the Firth of Tay in which the Dundee port expansion project is located. Of these 14 are known to be of conservation importance (McLeod Consulting, 2012). These species include: Atlantic salmon *Salmo salar*, sparling (smelt) *Osmerus eperlanus*, river lamprey *Lampetra fluviatilis*, sea lamprey *Petromyzon marinus*, allis shad *Alosa alosa* and twaite shad *Alosa fallax*. Furthermore, the report identifies fish that potentially provide prey for species of birds and seals such as flounder *Platichthys flesus*, pogge *Agonus cataphractus*, sandeel *Ammodytes* spp., sea trout *Salmo trutta* and sprat *Sprattus sprattus* are present in the firth close to the expansion site. The main species of commercial importance is the Atlantic salmon, which are found as smolts (seaward migration) and adults (freshwater migration) at sites in the Firth of Tay south of the proposed development. .

The MacLeod report (2012) identified that angling for sea trout and flounders, occurs locally and that both species are frequently caught from the Dundee Waterfront, west of Discovery Point and close to the Rail Bridge.

A population of the nationally rare fish the smelt or sparling *Osmerus eperlanus* occurs within the Tay (Bates et.al. 2003). The former eel fishery is noted as no longer operating from Flisk (Macleod Consulting, 2012).

Data provided by Cefas (Ellis *et al*., 2010 and Coull *et al*., 1998) as well as the associated report by Ellis *et al*., (2012) illustrate a selection of important marine fish spawning and nursery grounds. Table 11-2 summarises those species which have been identified as having spawning and/or nursery grounds within the vicinity of the port expansion project.

The estuary is known to be a low intensity nursery area for lemon sole *Microstomus kitt*, nephrops and plaice *Pleuronectes platessa*. Herring *Clupea harengus*, lemon sole, nephrops, plaice, saithe *Pollachius virens*, sand eel, whiting *Merlangius merlangus*, cod *Gadus morhua*, sprat *Sprattus sprattus*, angler fish *Lophiidae spp*., blue whiting *Micromesistius poutassou*, ling *Molva molva*, spurdog, *Squalus acanthias* , tope shark *Galeorhinus galeus* and whiting are also known to use the wider area for nursery grounds. Of the latter species cod and whiting have high intensity grounds in the project area.

Table 11-2 gives the location of spawning and nursery grounds in relation to the Port of Dundee expansion site and extraction area. All distances provided are by sea. Those highlighted in green are from Ellis *et. al*., (2010) data, and those in orange are from the Coull *et al*., (1998) data.

Table 11-2: Location of spawning and nursery rounds in relation to Port of Dundee

Species	Spawning ground distance (km)	Nursery ground distance (km)
Herring	48 to the south east**	0*** (Coull et al., 1998 show it as 61 to the South)
Lemon Sole	0**	0**
Nephrops	0**	0**
Plaice	0*	0*
Saithe		0**
Sand eel	25 to the east *** (Coull et al 1998) have the spawning ground at 10.8km to the east)	0 * (Coull et al. 1998 show it as 10.8 to the east**)
Whiting	16.5 to the east and north east*(Coull et al 1998) have the spawning ground 80 to the east**)	0**
Cod	25 to the east ***	0***
Sprat		0**
Anglerfish		0*
Blue whiting		0*
Common Skate		31 to the north east*
European Hake		24 to the east*
Ling		0*
Mackerel		24* to the east
Spotted Ray		55 to the east*
Spurdog		0*
Tope Shark		0*
Whiting		0***

Intensity: *Low; ** unknown; *** High. Green is taken from Ellis et al., 2010 data and orange is Coull et al., 1998 data

11.2.3 Environmental Protection Status

The River Tay SAC includes the upper estuary and reaches of the River Tay and is located approximately 25km up river from the Port of Dundee expansion project study area (Ref. Figure 11.1: Special Areas of Conservation). Atlantic salmon is the Annex II species which is primary reason for the selection of this river system as an SAC. Sea,

brook and River lamprey are Annex II species present within the Tay and are qualifying features but not primary reason for designating the SAC. All three species are listed on Annex IV of the Habitats Directive (EU Council Directive 92/43/EEC), are listed under the Bern convention and Annex V of the OSPAR convention. They are known as European Protected Species (EPS) making it an offence to knowingly injure, kill or disturb them.

Atlantic salmon, river lamprey and sea lamprey associated with the River Tay SAC will pass through the firth on migration to and from offshore feeding grounds. Little is known about the migration patterns of these species once the open sea is reached.

UK Biodiversity Action Plan (UK BAP)
A number of species have been identified as present within the vicinity of the project which are listed on the UK Biodiversity Action Plan (UK BAP) as well as the Species Action Framework for Scotland and in the Tayside Habitat Action Plan (Tayside Biodiversity Partnership, *undated*). The primary aim of the UK BAP is to "address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society". Although the UK BAP is not underpinned by any legislation, it will be considered during EIA process.

11.3 Identification of Key Issues

The possible impacts related to expansion site construction and operation and the activities associated with the proposed marine extraction site include the following:

11.3.1 Suspended sediments

Increased suspended sediments or sediment plumes generated through construction of the expansion area or dredging (capital or maintenance) or marine excavation activities have potential to affect migration patterns, or impair biological functions such as respiration or reproduction, especially in fish and shellfish species .

Other stages of development which are most likely to be affected by increased suspended solids include juveniles or larvae which have limited ability to avoid adverse environments. The level of increased suspended solids and the nature of the sediment that could occur due to construction or marine sediment extraction will need to be ascertained before the level of impact can be assessed.

There is also potential for contaminants to be released through sediment processes during site construction or marine aggregate extraction. This is further considered in Chapter 6 Water Environment.

11.3.2 Sediment Deposition

The potential for significant deposition will be identified through coastal process studies and modelling, see Chapter 7. Deposited material has the potential to affect sessile and semi-sessile species as well as species utilising the seabed for spawning such as herring and sandeel.

11.3.3 Noise

Underwater noise as a result of construction, dredging activity and aggregate extraction may have an impact on behaviour of species considered to be sensitive to underwater noise. In particular this may affect spawning and feeding behaviour.

11.3.4 Loss of habitat

The potential loss of habitat due to construction activities, infill works and marine aggregate extraction may reduce the areas available, in particular for benthic species which are considered in detail in the Benthic and Intertidal Ecology Chapter 9.

11.3.5 Increased vessel movements

Increased vessel movements related to construction activities, the movement of aggregate for infill and dredging works may displace commercial fishing vessels within the estuary or inshore areas.

Table 11-3: Summary of potential impacts from construction and operation phases and from marine sediment extraction

Potential impact	Phase	Justification
Disturbance of migration patterns	Construction and Operation/maintenance. Marine aggregate extraction	A number of protected species such as salmon and lamprey are known to migrate through the Firth of Tay. These may be sensitive to activities associated with the proposed expansion and the proposed marine extraction works.
Impact to fish and shellfish spawning grounds	Construction and Operation/maintenance. Marine aggregate extraction activities	Three species of fish and shellfish have spawning grounds that overlap with the project study area. In the outer estuary the marine extraction area may overlap with spawning or nursery grounds.
Impact to fish and shellfish nursery grounds	Construction and Operation/maintenance. Marine aggregate extraction	Twelve species have nursery grounds that overlap with the study area.
Changes to Species targeted by commercial fishermen and anglers	Construction and Operation/maintenance. Marine aggregate extraction	Changes to the population of any species targeted by commercial fishermen or anglers may result in changes to their catches and/or area of fishing.
Reduction of food resource	Construction and Operation/maintenance. Marine aggregate extraction	The prey species for fish and shellfish may be impacted by the development and will require further consideration.
Accidental contamination to fish and shellfish	Construction and Operation/maintenance dredging and marine aggregate extraction	Industry best practice will be followed (see Chapter 6 Water Environment). Risk of contamination is not deemed to be significant but requires confirmation.
Loss of habitat	Construction and Operation/maintenance dredging and marine aggregate extraction	The project may reduce the available habitat for some species either, directly or indirectly and permanently or temporarily
Displacement of commercial fisheries vessels	Construction and marine aggregate extraction	Increased vessel movements during construction and marine extraction may affect areas traditionally used for fishing.

11.4 Methodology and Approach to EIA

The assessment will be undertaken in accordance with national and EU legislation, best practice and guidance. In order to identify receptors relevant to the EIA, local and regional study areas will be determined. The study area for the majority of receptors is likely to include the majority of the Firth of Tay; however, for the more mobile and migratory species such as salmon a regional study area will be defined.

The report will include a description of the existing environment and social (baseline) conditions in the context of fisheries. A desk based study will identify the species that are likely to be present within the study areas. Data sources used to identify these species include:

- Published and grey literature;
- Landings statistics, VMS and other data relating to the commercial fisheries industry (Provided by Marine Scotland);
- Spawning and nursery ground data (provided by Cefas);
- Consultation with local fishermen and anglers; and
- The results of the benthic grab survey.

Species of importance to the study area will then be identified in terms of commercial value, spawning and nursery activity, habitat suitability and sensitivity to potential impacts (this will also be informed by the benthic survey, see Chapter 9 above).

The impact assessment will then identify the potential effects of the construction and operation phases of the proposed scheme and will assess the significance of impacts in terms of the sensitivity of the receptor and the magnitude of the effect taking into consideration the many other parameters. Where a significant impact is anticipated, mitigation measures will be proposed and the residual impact, as a result of implementing the mitigation measures, will be determined. Further to this recommendations with regards to future monitoring (if appropriate) will be made.

12 ORNITHOLOGY

12.1 Introduction

This chapter of the scoping report considers the ornithological issues that are relevant to the proposed Dundee Port Extension project and associated marine aggregate extraction. It briefly describes the bird interests (species receptor populations) that would potentially be affected and the range of impacts that these would potentially experience. The chapter also considers what information is currently available to inform environmental impact studies and assessment and whether additional information is likely to be required to enable a formal EcIA of the project. The question of whether the proposal might impact on sites designated for their bird populations is also touched upon, but this is considered in greater detail in the separate HRA Screening Report (Appendix A).

12.2 Legislation

In addition to planning and EIA legislation there is legislation of particular relevance to birds which the developer will need to comply with, namely:

- Directive 2009/147/EC on the Conservation of Wild Birds (Birds Directive);
- Directive on Conservation of Natural Habitats and of Wild Flora and Fauna 92/43/EEC (Habitats Directive);
- The Wildlife and Countryside Act 1981 (as amended) (WCA);
- The Conservation (Natural Habitats &c.) Regulations 1994 (as amended); (The Habitats Regulations;
- The Nature Conservation (Scotland) Act 2004 (as amended) ;
- Marine Scotland Act 2010;
- Wildlife and Natural Environment (Scotland) Act 2011.

EU Birds Directive

Species listed on Annex 1 of the EU Birds Directive receive special protection under the EU Birds Directive. EU member states are obliged to take special measures for these species. These include the designation of sites (see Designated Sites) and measures to avoid the destruction and deterioration of important habitat. Several Annex 1 species are known to use the areas potentially affected by the proposal. These include three species of tern, red-throated diver, Slavonian grebe and little gull.

Wildlife and Countryside Act

Species listed on WCA Schedule 1 receive a higher level of protection under the Wildlife and Countryside Act 1981 (as amended). In all cases these are species with relatively small national breeding populations and are of high conservation value. WCA Schedule 1 species receive special protection during the breeding season, for example breeding adults, their nests and dependent young must not be disturbed except under licence. The desk study has identified no Schedule 1 species likely to breed within or immediately adjacent to the areas affected by the proposal.

12.3 Existing Environment

12.3.1 Bird Receptors

Receptor population definitions

In bird environmental impact studies, the impact receptors are usually defined as bird populations (as opposed to just the individuals using the proposal site). Bird receptor

populations need to be defined appropriately. Typically, for an EIA a species is referred to in terms of its local, regional or national population, with most relevance to a proposal placed on the regional population. For birds, SNH advise (for wind farms) the use of Natural Heritage Zones (NHZs) for defining regional bird populations, at least for terrestrial projects. In this case, the appropriate NHZ is Eastern Lowlands of Scotland (NHZ16) (SNH 2001). This includes the coast from Berwick-upon Tweed to Aberdeenshire. For the great majority of bird species using the areas potentially affected by the proposal NHZ16 appears to be a suitable definition for the region as it has ecologically sensible boundaries relevant to the behaviour of the species. For some species that range long distances to feed, notably gannet, it may be appropriate to define the regional population for a wider geographic area. SNH will be consulted on this matter.

For migratory bird species it is often appropriate for the time of year to further define a receptor population, for example different populations might be defined corresponding to the breeding season, wintering period and migration stop-over periods.

When considering assessment of potential impacts on a designated site the receptor is the population of birds hosted by the site (see HRA Screening Report).

Species potentially affected

When considering which birds might be affected by the various potential impacts identified it is useful to broadly categorise the species and species groups according to whether they use the open-sea or inter-tidal ground and their feeding behaviour. For this scoping exercise the following categories were identified:

<u>At-sea surface and mid-water feeding species</u>

- Shearwater species
- Gull species,
- Tern species,
- Auk species,
- Gannet,
- Diver species,
- Grebe species, and
- Sawbill duck species.

<u>At-sea benthic feeders</u>

- Cormorant and shag (feeding on mainly demersal fish); and
- Sea duck species (feeding on mainly bivalve molluscs).

<u>Shore and inter-tidal land benthic feeders</u>

- Wader species; and
- Gull species.

<u>Shore roosting</u>

- Wader species;
- Gulls and tern species;
- Cormorant; and
- Sea duck species (eider only).

12.4 Identification of Key Issues

12.4.1 Potential Impacts

Four types of potential impact on birds have been identified:

Displacement and disturbance
Disturbance of various types may displace birds from habitats. This amounts to indirect habitat loss because birds are effectively prevented from using areas of habitat that they would otherwise choose to use. Many types of disturbance caused by human activity are transitory in nature, approximately lasting only for the duration of the activity. Other forms of disturbance may be more permanent in their nature, for example birds responding to permanent structures or electric lighting. The types of disturbance expected from the proposed development can be usefully sub-divided as follows:

- Shore-based disturbance (e.g. noise and movement);
- Vessel-based disturbance (e.g. noise and movement); and
- Lighting

Direct habitat loss
Direct habitat loss occurs where the development work results in the wholesale loss of existing habitat, and its replacement by a different habitat. With regard to the proposed development, direct habitat loss will result from the reclamation of intertidal soft sediments at Stannergate and its replacement by terra firma industrial dockland habitat.

Direct habitat change
Direct habitat change occurs where the habitat is modified to some extent but the overall habitat type remains the same. The extraction of marine aggregates is likely to result in direct habitat change to some areas of sea bed (see below).

Indirect habitat change
Indirect habit loss occurs where the development has no direct effects on a habitat but an area of habitat (usually some distance away) is affected indirectly by the activities occurring elsewhere. For example marine aggregate extraction is likely to cause re-suspension of fine sediments and through the action of water currents this may affect water turbidity over a wide downstream area. The removal of sediments from extraction sites also affects the potential for those sediments to be transported elsewhere (Ref: Coastal Processes Chapter).

12.4.2 Specific Effects

Vessel disturbance
The movements of vessels associated with marine aggregate extraction may potentially lead to disturbance of seabirds (including divers, grebes and sea duck species). This can result in birds being excluded from feeding areas and reduced feeding time. The subject of vessels disturbing seabirds and how this impact can be mitigated is relatively well understood. For example, see review by Schwemmer et al. (2010).

Shore-based disturbance
The shore-based activities associated with land reclamation at Stannergate may potentially cause disturbance to birds using the shore and sea in the vicinity. This subject is relatively well understood. Of particular concern is the potential to disturb any nearby roosts of shorebirds and waterfowl.

The reports by Bell (2011 and 2012) on the use by shorebirds and wildfowl of the stretch of coast that is potentially affected by additional disturbance shows that this area currently experiences relatively high levels of human disturbance from various sources. These reports also show that the area is of relatively low importance for roosting birds.

Sediment removal and disturbance

Marine aggregate extraction can impact on birds in a number of ways. For example, see reviews by Cook et al. 2010 and Tillin et al. 2011. A concern that will require to be addressed is whether aggregate extraction could temporarily destroy the feeding grounds of seaduck species that feed on bivalve molluscs buried in soft sediments. In particular those seaduck species that are qualifying features of the Firth of Tay and Eden Estuary SPA (namely: eider, common scoter, velvet scoter and long-tailed duck).
If there was potential for mollusc beds to be destroyed, then the question of how quickly these areas are likely to be recolonized and become suitable feeding areas for seaduck would be assessed. A precursory examination of the data available suggests that some seaduck species do at times feed in the candidate aggregate extraction areas. There is limited generic information available of mollusc recolonisation and recovery. Generally speaking these studies show that recovery is likely within the medium-term (several years) provided the sediment type is suitable. This will be addressed further in the EcIA.

Water clarity

Aggregate extraction may cause a decrease in downstream water clarity (i.e., increased turbidity) due to an increased load of fine sediment. This in turn can affect habitat quality, for example impairing the foraging efficiency of seabirds that use visual cues to find prey (Cook et al. 2010, Tillin et al. 2011). Such effects are likely to be relatively localised and short-medium term in duration. Estuarine environments typically have relatively low levels of water clarity due to the natural sediment load of rivers, especially following periods of high rainfall or snow melt. As a consequence many of the bird species using the area are likely to have a relatively high tolerance to increased turbidity. Indeed to some estuarine diving bird species have evolved to use tactile cues to locate their prey, notably cormorant (Grémillet et al. 1998) and mollusc-feeding seaduck species (Cramp and Simmons 1977).

12.4.3 Key Impacts to be considered include

Loss of intertidal habitat

Some shorebird species require intertidal soft-substrates for feeding. The proposed reclamation of inter-tidal ground at Stannergate would inevitably destroy feeding habitat used by certain overwintering and migrant shorebird species. The recent surveys undertaken of this area (Bell 2011 and Bell 2012) indicate that redshank and oystercatcher are the species that feed in greatest numbers in the area potentially affected.

The impacts on birds of reclaiming intertidal land have been subject to extensive study at many estuaries in the UK and as a result this subject matter is well understood. This will be addressed in the EcIA.

Night-time lighting

The artificial illumination of areas of inter-tidal and marine habitat is likely to affect their use by birds and as such can be thought of as a type of potential disturbance. The effects of lighting are likely to be positive for some species (for example it can extend the potential foraging period, Dwyer et al. 2012) and potentially adverse on others. The proposed reclamation area at Stannergate currently experiences a degree of artificial

lighting from the street and the port. Although the impacts of additional lighting on birds caused by the development will need to be assessed, from the information assembled so far, it seems that this issue is likely to be of relatively low importance.

12.5 Methodology and Approach to EIA

12.5.1 Nature of impacts

Impact assessment studies will characterise predicted impacts in terms of their nature, magnitude and duration. A potential impact can be adverse, neutral or beneficial for the species population under consideration. EIA focusses on adverse impacts as these may raise concerns for a species' conservation status or for legislation compliance. However, EIA should also identify neutral and beneficial impacts (if there are any) so that a balanced overview of a project is presented.

Magnitude
Impact magnitude (spatial magnitude), describes how large an impact is in terms of the change it might make to a receptor's population. This can be expressed in various ways as appropriate, for example, the proportion of individuals affected, the changes to demographic parameters such as mortality and productivity, and proportion of an overall resource (such as habitat or food supply) lost.

Duration
Impact duration (temporal magnitude), describes how long a potential impact will last for, for example short, medium or long term. Such categories will be defined, and it is recommended that this is done on a scale relevant to the species under consideration, rather than with reference to human time scales.

Species sensitivity
Considering the sensitivity of a species to a potential impact is an important part of the EIA. Bird species populations differ greatly in their sensitivity to human activities for a wide variety of reasons. In general, most of the seabird and shorebird species known to use the areas potentially affected by the development show relatively high levels of tolerance to a wide range of human activities. The sensitivity of seabird species to marine developments, in particular to renewable energy developments, has been examined and indices of sensitivity developed (Garthe and Hüppop 2004, Furness et al. 2012). Although these reviews have not specifically addressed reclamation and aggregate extraction they nevertheless give much useful information on species sensitivity. For some species, the results of detailed ecological studies and habitat modelling will also provide valuable information on sensitivity e.g. the studies on shag by Wanless et al. 1997.

12.5.2 Information Sources

In order to predict the impacts of the proposed development project on bird populations, baseline information that allows the ornithological importance value of the areas potentially affected will be acquired, where available. This will include information on the seasonal abundance, distribution and behaviour of each species in the areas potentially affected.

Regional and national reviews
The bird populations of the Firth of Tay, Firth of Forth and wider region have a long history of ornithological survey work and bird ecology studies. This information is generally readily accessible and will be important for characterisation of the ornithology

and identifying sensitivities. There are also useful reviews of the regional and national ornithology (for example Wanless et al. 2002, Barton and Pollock 2004a and 2004b, DTI 2004, Mitchell et al 2004, Camphusen 2005, Forrester and Andrews 2007) that provide a wealth of relevant summary information. Nevertheless bird populations and their use of an area change with time and so some historical information is likely to be too old to be reliable to usefully inform environmental impact studies of the proposed development. Generally speaking, survey information collected within the last five years can be considered to be up-to date, and information older than 20 years is likely to be of little or no value to the project.

Surveys covering the Stannergate expansion (reclamation) area

Forth Ports Limited, commissioned baseline ornithological surveys of the proposed Stannergate dock development area and adjacent foreshore as far as Broughty Ferry (Bell 2011, Bell 2012). This shore-based survey work covered the period October 2010 to March 2011 (Bell 2011) and April 2012 to September 2012 (Bell 2012). It appears from the methods described in the two reports that although this survey work has recorded bird data in adequate detail the reports do not present the results in the level of spatial detail required. Further reporting of the results can be undertaken using the 'raw' count and map data that have been retained.

The Tay and Eden estuaries are covered by the national Wetland and Estuary Birds Survey (WEBS) organised by the British Trust for Ornithology (Thaxter et al. 2010, Hammond et al. 2012). As such bird numbers along these estuary shores are routinely counted several times a year every year. The WEBS surveys results give up-to-date information on the populations of shorebirds using these estuaries and will provide valuable context data. Although these surveys count birds seen on the sea (such as seaduck, divers and grebes), they are generally ineffective at recording birds that are more than about 500m offshore, and therefore are unlikely to give reliable information on birds using candidate aggregate extraction areas.

Subject to the existing 'raw' data being available for further analysis, it is considered unlikely that further baseline survey data for proposed reclamation area is required for environmental impact studies.

Seabird surveys covering aggregate extraction sites

JNCC have undertaken aerial bird surveys on several occasions to determine the at-sea distribution and abundance of wintering seaduck, diver and grebe species using the Firth of Tay and Firth of Forth (Dean et al. 2003, Dean et al. 2004, Wilson et al. 2006, Söhle 2007, Dawson et al. 2008). These surveys provide the best information currently available on the winter time ornithological value of the areas that would be potentially affected by aggregate extraction.

These JNCC aerial surveys do not cover the breeding season (a period of the year when largely different species are present to those present in winter). The importance of the outer Firth of Tay, including the candidate aggregate extraction site(s), as a foraging area for breeding seabirds is thus not well documented by existing survey work. However, for several of the breeding seabird species of interest (notably, gannet, guillemot, razorbill, kittiwake and shag) there have been recent, satellite tagging studies conducted at Isle of May, Bass Rock and Fowlsheugh colonies. The results of these tracking studies (largely unpublished as yet) go a long way towards establishing the importance of the outer Firth of Tay for seabird foraging in the breeding season. This will be referenced in the EIA.

The most recent aerial winter surveys are now more than five years old, it is considered that new winter survey data, covering the proposed aggregate extraction site(s) is likely to be valuable for informing environmental impact studies. Survey work covering the breeding season would also be valuable as it would fill the current temporal gap in coverage. New survey work could be undertaken from a suitable survey vessel or from a light aircraft, and would not necessarily need to cover the whole of the outer Firth of Tay area. There is no specific guidance concerning bird survey design and methods for marine aggregate sites however the draft SNH guidance for surveys to inform marine renewable development (Jackson and Whitfield 2011) is likely to be appropriate. SNH will be consulted over whether new survey work is required and if so over what area and time period.

Designated Sites

The HRA Screening Report examines in detail which SPAs could potentially be affected by the proposed development. Here consideration is primarily given to the Firth of Tay and Eden Estuary SPA as this appears to have greater potential to be affected by the proposal than other SPAs.

The area proposed for reclamation at Stannergate is wholly outside areas designated for bird populations. Nevertheless this area is situated between the western and eastern parts of the Firth of Tay and Eden Estuary SPA (also designated as SSSI and as a Ramsar site) and some individual birds using the proposed reclamation area are also likely to use this SPA (i.e. there is likely to be connectivity between the development site and the SPA). This is particularly so for certain sea duck and shorebird species such as eider, oystercatcher and redshank.

The two candidate aggregate extraction sites are situated outside the boundary of the Firth of Tay and Eden Estuary SPA. However these areas are all sufficiently close (within a few kilometres) to the boundary that it is likely that some of the SPA qualifying bird species also make use of these areas, in particular, red-throated diver, eider, common scoter and long-tailed duck, i.e. connectivity is likely. There may also be connectivity between these areas and the Firth of Forth SPA for seaduck and diver species.

There are a number of breeding seabird SPAs (most notably Forth Islands SPA and Fowlsheugh SPA) that are sufficiently near for it to be likely that individuals of some qualifying species (notably gannet, kittiwake, razorbill, puffin and guillemot) will at times forage in the candidate aggregate extraction areas. This matter is addressed in greater detail in the HRA Screening Report.

13 NAVIGATION

13.1 Introduction

The Dundee Port Authority controls activity within the Port limits as shown on Figure 1.2 Port Jurisdiction. Beyond the Port limits international maritime law prevails. The Port expansion project is within the Port limits whereas the marine aggregate extraction site may be located in open coastal waters. Navigation will be examined within the ES.

13.2 Existing Environment

The Port of Dundee on the River Tay provides a commercial maritime facility and harbour. The current commercial activities operate well within the capacity of the Port and the estuary which at its peak played a critical role in the industrial and commercial development of Scotland and in particular Dundee

The Dundee Port Authority, owned by Forth Ports, has authority over navigation within the Port limits (Ref: Figure 1.2: Port Jurisdiction). The port extends approximately 17km seawards and 9km upstream to a line between Invergowrie and Balmerino.

In recent years two or three ships per day called at the port, however, in 2012 the number of calls averaged one per day. The total commercial vessels calls per annum in recent years are provided in Table 15-1. It can be seen that the Port has significant capacity to service the offshore renewables industry.

Table 13-1: Number of Vessel Calls per annum

Year	Port of Dundee	Perth	Total calls	Total movements
2002	508	117	625	1250
2003	435	104	539	1078
2004	429	124	553	1106
2005	444	108	552	1104
2006	436	110	546	1092
2007	353	100	453	906
2008	321	96	417	834
2009	270	81	351	702
2010	330	72	402	804
2011	316	61	377	754
2012	313	44	357	714

It should be noted that these figures relate to vessels calls and must be doubled to show actual movements of vessels in and out of the Port. Additionally some vessels have a rapid turn-around time whilst others may spend longer in port.

In addition to the commercial ships visiting the port there are tugs, barges, pilots, small work boats, recreational vessels and private fishing boats and drilling rigs are brought up to Dundee for maintenance and repairs.

The RNLI have a lifeboat station at Broughty Ferry and there are sailing clubs at Broughty Ferry and Tayport.

There are two bridges that cross the River upstream of the proposed expansion site; the Tay Road Bridge and the Railway Bridge. The bridges create height restrictions and constrain the size of vessels that can pass up river. The Road Bridge has undergone significant enhancement comprising fendering and structural support to protect the bridge piers from any vessel impact. Currently up to 50 vessels a year travel up to Perth.

The Port operates with two pilot stations where vessels can pick up a pilot. There are rules concerning which station is used dependent upon the vessel concerned.

The Port of Dundee is a highly managed environment. The river is controlled from Forth and Tay Navigation Service, the control desk being manned 24hours a day. The Port of Dundee retains its Harbour Master and associated local support. All operations are carried out following the Marine Safety Code (see www.forthports.co.uk). The Firth is covered by radar, monitored by FTNS in Grangemouth.

Notices to Mariners are issued regularly to all marine users. Any works that are carried out in the Port, such as the work carried out on the road bridge, are managed through the establishment of a series of protocols within the scope of the port marine safety code; all activities are planned and co-ordinated in advance.

The Port of Dundee requires very little dredging; the most easterly berths are generally self-maintaining. As is standard, navigation lights and buoys mark the channel, the Fairway buoy is located approximately 4nm off Budden Ness.

13.3 Identification of Key Issues

The Port operates within the Marine Safety Code and as a result all activities are subject to risk assessment.

The key factor which will affect the construction work vessel movements will of course be the location of the marine extraction site; as this will dictate the distance that vessels need to travel and in turn the distribution of activity. If the extraction is close to the expansion site the activity will be more focused, whereas if it is at a distance, i.e. further out in the firth, the potential for congestion may be reduced.

The key risks are collision, congestion and delay.

13.4 Methodology and Approach to EIA

Any works carried out, either during construction or operation, will be booked in advance and controlled by the Port Authority under the established system of navigation management.

The ES will therefore provide details of the Port shipping and navigation environment, including assessment of numbers and types of vessels during construction and operation to allow impact to be assessed and a statement made as to how the construction vessel movements will be managed. Given the capacity available at the Port, it is considered that significant impacts are unlikely.

14 TRANSPORT

14.1 Introduction

The Port expansion will generate traffic associated with construction works and operation which will require consideration in the EIA.

14.2 Existing Environment

The proposed Port expansion site is located immediately east of the Port of Dundee, adjacent to the existing reclaimed area at Stannergate.

The Port of Dundee Expansion Site will be accessed via the Lower Broughty Ferry Road that extends from the A930 Broughty Ferry Road to the west (at Stannergate Roundabout) and links back into the A930 Dundee Road to the east. The Lower Broughty Ferry Road is an undesignated road only used for access to the small car park and amenity site at Douglas Terrace.

To the west, the A930 Broughty Ferry Road joins the A92 and continues to and across the Tay Bridge. To the east, the A930 Dundee Road continues to Broughty Ferry and further to Carnoustie.

In the vicinity of the site there are a number of local roads and also a number of Trunk Roads, including A90, A92 and A972.

14.3 Identification of Key Issues

14.3.1 Potential Impacts during Construction

During the construction period, the impact of development related traffic will be assessed. Details will include the preferred route options and access arrangements for the movement of heavy goods vehicles and staff trips. Vehicle trip generation associated with the site and an indication of distribution / assignment of trips will also be assessed and compared with the level of existing background traffic. The infill material will come in by sea from the marine aggregate extraction site. Some of the bulk material, such as stone and concrete, will be transported to the site by HGV. It is not possible to provide details at this stage; refer to Chapter 3 for a general project description.

Potential traffic and transport related environmental impacts associated with severance, accidents and road safety, driver delay and pedestrian amenity will be assessed.

14.4 Methodology and Approach to EIA

The scope of the assessment will be agreed with Transport Scotland and with Dundee City Council.

Construction phase and operational phase impacts will be assessed following the Institute of Environmental Management and Assessment (IEMA) and Transport Scotland's guidance documents.

Data Requirements
To facilitate the impact assessment, the following data will be required:

1. Baseline traffic conditions during a weekday morning and evening peak period within the study area;
2. Accident statistics within the study area;
3. Existing pedestrian routes within the study area;
4. Construction programme;
5. Proposed parking provision during construction and operational phases; and
6. Trip generation, including number of heavy goods vehicles and staff trips, associated with construction phase;

The following criteria of the construction phase and operational phase will be used to assess significance.

Table 14-1: Significance criteria (increase in traffic flow)

Significance Rating	Description of Significance
Major	Where the impact leads to serious and lasting disruption (e.g. a 90% increase in baseline traffic) and permanent mitigation measures are required.
Moderate	Where the impact is of a temporary nature, leading to disruption (e.g. a 60% increase in baseline traffic) and short term mitigation measures are required.
Slight	Where the impact exceeds industry standard design thresholds or the traffic increase is above 30%, but does not lead to disruption. No mitigation measures are required.
Insignificant	No perceivable impact. No mitigation measures are required.
Positive	Where the proposals result in an improvement to current conditions.

Existing baseline, construction traffic and operational traffic data will be assessed to determine whether construction or operational traffic would result in a detrimental adverse impact on the existing road network during peak periods. Mitigation measures will be proposed where it has been demonstrated that the traffic impact associated with the construction or operational phase would have a detrimental adverse impact on the existing road network.

15 AIR QUALITY

15.1 Introduction

The Port expansion project has some potential to affect air quality in the local area and this will be considered within the EIA.

15.2 Existing Environment

The proposed Port expansion site is located immediately east of the Port of Dundee, adjacent to the existing reclaimed area at Stannergate. There are a number of protected areas in proximity to the site which may be considered sensitive because of their ecological importance and which may be affected by gaseous and particulate pollutants and by the deposition of those pollutants onto surfaces. The nearest existing human receptors are located less than 100m from the site in a residential development north of Dundee Road West.

15.2.1 Local Air Quality Management

The site is situated within an Air Quality Management Area (AQMA) designated by Dundee City Council (DCC) due to existing exceedences of the Government's prescribed objectives for annual mean Nitrogen Dioxide (NO_2) and PM_{10} particulates (the fraction of airborne particles of mean aerodynamic diameter less than ten micrometres) across Dundee. The AQMA encompasses the whole of the city of Dundee.

The 2011 Air Quality Progress Report, published by DCC in 2011, concluded that the respective air quality objectives were likely to be achieved within the Council area in respect of all pollutants except NO_2, PM_{10} and Sulphur Dioxide (SO_2). 2010 monitoring results from sites in proximity to the expansion site are described below and presented in Table 17-1.

Annual mean concentrations of NO_2 were the same as the air quality objective in 2010 at a diffusion tube monitoring site at Stannergate Junction on Broughty Ferry Road (0.3 km to the west of the site). Annual mean NO_2 concentrations have increased at this site since 2006. Daily and annual mean concentrations of PM_{10} recorded in 2010 at two automatic monitoring sites on Broughty Ferry Road (1.6km to the west of the site) were below the air quality objectives. There were no exceedences of the SO_2 objectives recorded in 2010 at the Broughty Ferry Road monitoring site.

Table 15-1: **NO_2 and PM_{10} 2010 monitoring results for sites in proximity to the expansion site (Dundee City Council 2011)**

Pollutant	Monitoring Site	2010 Annual Mean ($\mu g.m^3$)
NO_2	Broughty Ferry Road Diffusion Tube	40
PM_{10}	Broughty Ferry Partisol	14
	Broughty Ferry TEOM	14

Additional air quality monitoring was carried out as part of the EIA for the Forth Energy Renewable Energy Plant at Dundee. This data will be reviewed as part of the Air Quality Assessment for the Port of Dundee expansion EIA.

15.2.2 Existing Sources of Atmospheric Pollution

Existing sources of air pollution in the study area include industrial installations located within the Port of Dundee, (Dundee City Council 2011), road transport, rail transport, and marine vessels. The main pollutants of concern from these emission sources are likely to be those relating to fuel combustion, such as NO_2, SO_2, Carbon Monoxide (CO) and PM_{10}.

The majority of larger particulate and dust in the study area is likely to be formed through mechanical generation, for example from wear of vehicle tyres and brakes, and re-suspension of settled materials due to road transport. In coastal locations, a proportion of airborne particles is typically from sea salt.

An application for a biomass combustion facility (the Dundee Renewable Energy Plant) submitted by Forth Energy is currently being determined. The potential cumulative impacts of this installation and the Port Expansion project will be considered.

15.3 Identification of Key Issues

15.3.1 Potential Impacts during Construction

Construction of the proposed development will involve the reclamation of land by infilling to provide 12.2ha (30 acres) of useable space. The entire land claim is anticipated to be through the importation of infill materials such as dredged sand, which will be protected by a retaining structure. Reclamation activities will take place at sea (dredging and sand filling of reclamation area) and on land (construction of the sea defence), therefore potential emission sources may be marine or land based.

Engine exhaust emissions from marine vessels involved in dredging and construction works have the potential to affect local air quality; sources include both propulsion engines and auxiliary power which is particularly significant for dredging vessels. Engine exhaust emissions from Non-Road Mobile Machinery (NRMM)[3] such as excavators, bulldozers, front loaders, back loaders, compressors etc., and on-road vehicles including lorries and cars, also have the potential to affect local air quality. The main pollutants of concern from these emission sources are likely to be those relating to fuel combustion (such as NO_2, SO_2, CO and PM_{10}), although vehicle diesel fuel has a different specification to marine diesel and any vessels operating within the port are required to use distillate fuels, therefore the quantity and proportion of constituent pollutants will vary.

Fugitive particulate and aerosol emissions may occur from construction activities, for example during placement of dredged material and rock stockpiling. These emissions have the potential to cause nuisance to, and soiling of, sensitive receptors. The potential for sensitive receptors to be impacted will vary depending on where within the application site the activity takes place, the nature of the activity and controls, and meteorological dispersion conditions.

[3] Non-Road Mobile Machinery is defined as any mobile machinery, transportable industrial equipment or vehicle fitted with an internal combustion engine not intended for passenger or goods transport by road. Explanatory Memorandum to the UK Non Road Mobile Machinery (Emissions of Gaseous & Particulate Pollutants) (Amendment) Regulations 2006.

15.3.2 Potential Impacts during Operation

The planned port expansion area may be occupied by a variety of general port activities. Therefore it is anticipated that during the operational phase the main additional sources of air pollutant emissions in relation to the development would be exhaust releases from on-site landside plant (including cargo handling equipment) and site traffic movements.

15.4 Methodology and Approach to EIA

The assessment will consider potential air quality impacts from construction and operation of the expansion site including dust, dredging exhaust emissions, marine vessel, landside plant and vehicle activities, and the potential effects of road traffic generation. If potentially significant adverse air quality effects are identified, appropriate mitigation measures will be recommended.

The scope of the assessment will be agreed with DCC, including such considerations as sensitive receptor locations, background air quality, meteorological data and baseline traffic assumptions.

Construction phase impacts (including, earthworks, construction and trackout activities) will be assessed following the Institute of Air Quality Management (IAQM) best practice guidance document (2012). The risk category of the construction phase will be assessed and used to specify the level of mitigation required.

Existing baseline, construction traffic (if available), and operational traffic data will be screened to determine whether construction and operational traffic will result in increased congestion, significant changes in traffic volumes (for example 5% Annual Average Daily Traffic (AADT) or peak), vehicle speed (+/- 10kph), or significant changes in traffic composition. Should such significant changes be considered likely an approach to air quality impact assessment will be discussed and agreed with DCC

Potential impacts from marine vessels associated with the Expansion Site, during the construction and operational phases, will be assessed qualitatively within the context of existing onshore air quality at sensitive receptor locations.

16 NOISE AND VIBRATION

16.1 Introduction

There is the potential for noise and vibration impacts to be associated with the proposed Port expansion project and these will be considered within the EIA.

16.2 Existing Environment

The principal sources of noise and vibration within the study area, and of relevance to the assessment, are from road traffic on the public roads outside the Port, train movements on the East Coast Main railway line that runs parallel with the main Dundee Road (A930), from dock roads in the Port and from general shore-based port activities.

The Port is an industrial and commercial zone and not a sensitive noise environment. The closest noise sensitive receptors are the residential properties to the north of the railway line and Dundee Road (A930) and to the east of the proposed expansion area. There is a small amenity area with seats and car parking on the Broughty Ferry Road immediately north of the site, the users of which may be regarded as sensitive receptors to noise impacts when present.

16.3 Identification of Key Issues

There is potential for a change in the noise environment at the Port and environs as a result of the proposed expansion. These are most likely to be associated with the construction period which is of temporary duration and there may also be some changes related to port operation when the expansion works are complete and the extension area comes into operation. Noise will be generated by both on-site activities (construction and operation) and off-site activities (traffic movement).

Construction noise sources are likely to include:

- Initial dredging operations;
- Road and marine traffic and plant associated with retaining bund construction and rock armouring;
- Marine traffic and plant associated with infill operations;
- Piling operations;
- Potential traffic and plant associated with importation additional materials; and
- Traffic associated with staff entering and leaving the site.

Operational noise sources are likely to include:

- Traffic associated with staff entering and leaving the site;
- Plant operating on the site, such as mobile cranes and loaders;
- Traffic movements associated with movement of materials into and out of the port;
- Marine traffic – loading and unloading operations, should there be a new quay.

It should be noted that the expansion site operational noise assessment will be based on the assumption that it will operate under General Permitted Development, as such the likely maximum nose parameters will be estimated from other known or similar operations and used to assess the potential noise impact from the operational phase of the project.

16.4 Methodology and Approach to EIA

Consultation with Dundee City Council Environmental Health Department shall be undertaken, to present the precise scope and methodology for the survey and assessment, we will seek to agree a suitable number of noise survey locations.

16.4.1 Baseline Survey

The noise survey will be carried out in accordance with current best practice including BS 7445 'Description and Measurement of Environmental Noise' parts 1 and 2; and BS 4142: 1997 'Method for Rating Industrial Noise affecting Mixed Residential and Industrial areas'. The noise monitoring and predictive modelling will quantify the ambient noise and the development generated noise at representative receptor locations close to the proposed expansion area. These levels of noise will be used as a baseline for the impact assessment of the proposed expansion.

16.4.2 Construction Noise

A desk based assessment will be undertaken to assess potential noise impacts on human receptors from the construction operations related to the scheme. Guidance contained in BS5228-1: 2009 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise' will be used when carrying out the assessment of potential operational noise generated by the site. The noise levels arising from marine and terrestrial Construction operations will be calculated using the described calculation methodology and datasets contained within this standard.

16.4.3 Operational Noise

To indicate the noise levels from the proposed Port expansion predictive modelling is proposed. The modelling will use Sound Plan noise prediction modelling software which directly implements common national and international calculation standards. The noise levels generated by the traffic associated with the expansion project and the portside activity will be calculated at the identified sensitive noise receptors.

Noise levels will be calculated in accordance with the methodology in Calculation of Road Traffic Noise (DTWO 1988) and ISO 9613-2. The results of the predictive modelling will enable comparisons to be made to the existing baseline situation to quantify the level of impact. For the impact of the road traffic associated noise sources the criteria will be considered from Design manual for Roads and Bridges (DMRB) Volume 11, Part 3, Section 7 (HA 2011). For the impact of portside activity the criteria within BS4142: 1997 will be considered, together with any other relevant criteria (e.g. to BS 8233 'Sound Insulation and Noise Reduction for Buildings', the World Health Organisation (WHO) Guidelines for community noise.

The assessment will follow the standard method for the qualitative description of impact magnitude and significance, supplemented by quantitative assessment according to relative changes in noise level or exceedence of defined noise limits. Thresholds of significance shall be taken from guidance, as noted above, and agreed with the authorities and where significant impacts are predicted, appropriate methods for controlling or mitigating noise and vibration will be recommended. Where appropriate, mitigation by design shall seek to reduce potential noise impacts to acceptable levels.

The assessment will follow the standard method for the qualitative description of impact magnitude and significance, supplemented by quantitative assessment according to

relative changes in noise level or exceedences of defined noise limits. Thresholds of significance shall be taken from guidance and agreed with the authorities and where significant impacts are predicted, appropriate methods for controlling or mitigating noise and vibration will be recommended. Where appropriate, mitigation by design shall seek to reduce potential noise impacts to acceptable levels.

17 AVIATION AND TELECOMMUNICATIONS

17.1 Existing Environment

Dundee City Airport is situated 6km to the west of the expansion site, as the crow flies, and RAF Leuchars is 10km to the south east. The potential aggregate extraction site within the Firth south east of the expansion site is approximately 8km east of the Dundee City airport. The potential extraction site at the port limit is a significant distance from the Dundee City Airport (approximately 23km) but closer to RAF Leuchars which is approximately 13km to the south west. The RAF is, however, withdrawing from Leuchars in the near future.

17.2 Identification of Key Issues

The potential for significant impacts on aviation and telecommunications as a result of the project is considered to be unlikely. No significant impacts are predicted within the construction phase.

No key issues are predicted.

17.3 Methodology and Approach to EIA

During scoping the EIA consultation will be undertaken with Dundee Airport (Highland and Islands Airports Ltd.) and RAF Leuchars to explain the port expansion project and facilitate information sharing. Given that general port activities are currently undertaken at Port of Dundee without significant impact on aviation or telecommunications, the expansion site is not expected to have a potentially significant impact.

The results of the scoping consultation process will inform the level of assessment required. It is anticipated that this topic can be managed through direct consultation with Dundee Airport and that it is likely to be scoped out of the EIA.

18 LANDSCAPE AND VISUAL

18.1 Introduction

A Seascape, Landscape and Visual Impact Assessment (SLVIA) will be undertaken to identify and assess potential impacts from the construction and operation of the Dundee Port Expansion Project on landscape and seascape resources, character and visual amenity, with reference to established methodology and guidance (see Section 18.4). The SLVIA will inform modifications and refinements to the detailed design by the identification of appropriate mitigation measures to reduce potential impacts.

The SLVIA will specifically refer to both 'landscape' and 'seascape' to reflect the context of the proposed development. The interface between the Firth of Tay and the urban environment of Dundee necessitates that the assessment identifies and carefully considers impacts upon the townscape, the coast, and upon adjacent areas of sea and the landscape to the south of the firth. These elements are inherently interrelated, however for the purposes of the assessment, townscape will be considered as a component of 'landscape', and the coast will be considered as a component of 'seascape'.

The SLVIA will be undertaken by professional landscape architects at LUC.

18.2 Existing Environment

A desk based review of the main landscape and seascape designations and information from relevant character assessments has been undertaken. The results of this and the key visual receptors are described below.

18.2.1 Landscape and Seascape Baseline

The City of Dundee forms an almost continuously developed coastal edge along the length of the Tay between Kingoodie and Monifieth. This strongly developed edge is relatively low-lying within the urban areas. Beyond Broughty Ferry, to the east of the existing port, the Firth opens out with larger areas of intertidal sands. Outside of the developed areas, the hinterland is primarily agricultural, rising towards the Sidlaw Hills.

The key characteristics of the coastal edge to the north of the Firth of Tay include the settled coastal fringe centred on the urban developments in and around the City of Dundee. To the south, the coastal edge of Fife is less developed, and more rural in character, with smaller settlements, farms, woodland and forest.

The landscape character of the area and within 5km of the site is described in the following landscape character assessments (LCAs):

- Land Use Consultants (1999) *Tayside Landscape Character Assessment*, for SNH; and
- David Tyldesley and Associates (1999) *Fife Landscape Character Assessment*, for SNH.

LUC Figure 1: Landscape Character Areas illustrates Landscape Character Types within the study area, as detailed in the above publications.

A high level description of National Seascape Character Types within the 5km radius study area is provided the following document:

- Scottish Natural Heritage (2004) *An assessment of the Sensitivity and Capacity of the Scottish Seascape to in Relation to Windfarms*.

Consideration will be given to local landscape character within landscape character areas or types, and to more detailed seascape character types and areas, to provide more specific detail on local variations in character. LUC Figure 1: Landscape Character Areas, provides an illustration of character areas.

There are a number of cultural heritage designations within the study area, including Garden and Designed Landscape (GDL), Conservation Areas, Scheduled Monuments and Listed Buildings. Consideration of these designations will be made in association with cultural heritage specialists. Key designations for consideration include:

- Baxter Park GDL, 1.7km west;
- West Ferry and Broughty Ferry Conservation Areas, east of the site; and
- Dundee Law and Broughty Castle Scheduled Monuments.

There is unlikely to be visibility from Baxter Park GDL due to the presence of surrounding buildings and mature vegetation.

Areas of local landscape importance are designated by Fife Council within St Andrews and East Fife Local Plan, and are referred to as Local Landscape Areas. Part of the area, between Newport-on-Tay and Tayport, is a Local Landscape Area. LUC Figure 2: Landscape Designations illustrates designations within the study area.

18.2.2 Visual Baseline

The expansion of Port of Dundee will take place within the context of the existing port, which lies immediately to the west of the proposed expansion site. Urban developments and infrastructure form focal points seen in views around the Firth of Tay, particularly, the rail and road bridges across the firth but also various residential tower blocks throughout the city. There is the visible presence of industry, such as the railway, airport, and larger scale infrastructure around the port, associated with, for example Oil and Gas Offshore Support activities.

Views along the coast and the wider area are largely focussed on the Firth of Tay, but also inland to the city skyline and the Sidlaw Hills beyond. The Tay Bridge forms an important entry point into Dundee. From the bridge, a panorama across the city is seen, with views to the east overlooking the existing port.

The seascape is primarily experienced from busy coastal routes and well-used beaches and promenades. The coast and the Firth of Tay itself are relatively well used for recreation, particularly the beaches around Broughty Ferry. The National Cycle Network Route 1 and the long distance walking route, the Fife Coastal Path, follow the more elevated coastal edge between Tayport and Newport of Tay to the south.

An initial zone of theoretical visibility has been prepared (Ref: LUC Figure 3), based on a development height of 6mAOD, and was used in the selection of assessment viewpoints.

It is anticipated that photomontages will be prepared for five locations, with viewpoints being selected in consultation with statutory consultees. They are likely to be chosen from the following list of key viewpoints, and others which will be identified as part of the EIA.

Viewpoint	OS Grid Ref.	Reason for selection	Receptors
Dundee Road, A930	343605, 731085	Representative of south-facing views from elevated properties on Lavender Street.	Residents
Dundee Road, A930	344481, 731089	Elevated west-facing views towards Port of Dundee, for road users and pedestrians. Representative of views from nearby properties.	Road users, pedestrians, residents
Fife Coastal Path, Tayport	345402, 729246	Coastal north-facing views towards Dundee from Fife Costal Path and National Cycle Network Route 1. Representative of nearby properties on Commonty Road.	Tourists / visitors, cyclists, residents
Broughty Ferry Harbour	346330, 730499	Representative of views from Broughty Ferry seafront, Broughty Castle Museum and National Cycle Network Route 1.	Tourists / visitors, residents, road users and cyclists
Tay Bridge	342406, 728813	Elevated view from Tay Bridge, between traffic lanes, from National Cycle Network Route 1.	Road users, pedestrians, cyclists
Dundee Law	339157, 731273	Most prominent viewpoint in Dundee, a popular recreational location with large numbers of visitors. Long views down the Firth of Tay.	Tourists / visitors

18.3 Identification of Key Issues

18.3.1 Potential Impacts

The port expansion will be approximately 12.2 ha in size and is likely to comprise a flat, in-filled laydown area, contained by vertical sheet piling and a rock armour revetment, however, the protective edge treatment/retaining structures have not been confirmed at present. A project description is provided in Chapter 3. The operational activity of the port will be general port activity similar to that present at Port of Dundee, and will be considered as part of the assessment.

The expansion of the port, and associated construction activities at the proposed location is likely to lead to the loss of an area of stony beach and associated intertidal area between Stannergate and West Ferry (part of the Firth of Tay and Eden Estuary SAC), and the introduction of a new raised area of hard standing and associated fencing and lighting, extending the existing Port of Dundee to the east of Prince Charles Wharf.

Exploration is currently underway to identify whether there is the possibility of establishing a marine aggregate extraction site to supply infill to the expansion project as it is anticipated that the construction will involve large-scale infilling works. Currently it is envisaged that infill material will be transported to the site by sea), and other surfacing, piling and revetment materials for the project arriving by sea or road. The operation of the port will include storage, use of mobile cranes and associated lighting.

Any future proposed operational activity that was not a permitted port activity would require further consent and be subject to separate assessment.

The long-term impacts of the new port area on landscape and seascape may include the removal of existing coastal features, including the intertidal area.

The proposed port expansion will give rise to changes in views of the site. The new port area is likely to be seen in the context of the existing wharfs and associated activity at the Port of Dundee, and as such is unlikely to be regarded as a major change in views from the area. Locally, receptors of views in the residential area directly to the north to the site, (e.g. Primrose Bank, Margaret Crescent) as well as other visual receptors in close proximity to the site, are likely to experience higher degrees of change in their views.

Cumulative landscape and visual impacts may arise in combination with associated dredging works, and other projects within the 5km radius study area will be considered where appropriate.

18.4 Methodology and Approach to EIA

The SLVIA will consider the direct and indirect impacts of the proposed development on landscape and seascape resources and character. It will also examine the nature and extent of impacts on visual amenity.

The assessment will consider impacts on landscape, seascape and on visual amenity as a result of construction and operation (direct, indirect, intermittent, continuous, long or short term impacts).

18.4.1 Guidance

The scope of work will seek to establish the full extent of the landscape, seascape and visual impacts arising from the proposed port expansion and identify their potential significance. The assessment will draw upon the following best practice guidance (in the absence of Scottish guidance English guidance is referred to.)

- Landscape Institute and the Institute of Environmental Management and Assessment (2002) *Guidelines for Landscape and Visual Impact Assessment*: Second Edition;
- Countryside Council for Wales, Brady Shipman Martin, University College Dublin (2001) *Guide to Best Practice in Seascape Assessment*. Maritime Ireland / Wales INTERREG Report No. 5;
- Landscape Institute (2011) Advice Note 01/11 *Use of Photography and Photomontage in Landscape and Visual Assessment*;
- Natural England (2012) *An Approach to Seascape Character Assessment*;
- Scottish Natural Heritage (March 2012) *Offshore Renewables – guidance on assessing the impact on coastal landscape and seascape* (for offshore renewables but with applicability);
- Scottish Natural Heritage (March 2012) *Assessing the Cumulative Impact of Onshore Wind Energy Developments* (for wind farms but with applicability);
- Scottish Natural Heritage and Marine Scotland (2011) *Advice Note: Offshore Wind Farm Landscape/Seascape, Visual and Cumulative Assessment: Recommended Outputs* (for wind farms but with applicability);
- Scottish Natural Heritage and Envision (2006) *Visual Representation of Wind Farms: Good Practice Guidance* (for wind farms but with applicability);

- Natural Heritage Management, Scottish Natural Heritage (2008) *Guidance on Landscape/Seascape Capacity for Aquaculture* (for aquaculture but with applicability);
- Scottish Natural Heritage and the Countryside Agency (2002) *Landscape Character Assessment: Guidance for England and Scotland*; and
- Scottish Natural Heritage (2004) *An assessment of the Sensitivity and Capacity of the Scottish Seascape to in Relation to Windfarms* (for wind farms but with applicability).

Although some of this guidance relates to wind energy developments, much of the general guidance contained within these documents is of relevance to Seascape, Landscape, and Visual Impact Assessment, and will therefore be referred to, where relevant and appropriate. The term SLVIA is effectively used to describe an LVIA which incorporates the coast and sea. The accepted methodology underpinning SLVIA is that of LVIA.

18.4.2 Consultation

During the early part of the SLVIA process, Scottish Natural Heritage (SNH) and relevant local authorities (Dundee City Council and Fife Council) will be consulted in order to agree appropriate methodology and representative viewpoints from which to undertake the assessment and to prepare photomontages.

18.4.3 Study Area

The assessment will be based on a 5km radius study area which is considered appropriate given the low-lying nature of the proposed works, and hence the limited distance from which it will be potentially visible. The SLVIA will focus on landscape, seascape and visual sensitivities which may result in significant impacts and which are considered unlikely to arise beyond 5km from the site of the expansion project. Preliminary assessment will be undertaken to check this and the extent of the study area and assessment viewpoints will be agreed through consultation with statutory consultees, as referred to in Section 18.4.2 above.

The study will include consideration of cumulative impacts arising in combination with potential dredging works associated with the expansion of the Port of Dundee, in the Firth of Tay. Other unrelated projects within the 5km radius study area will also be considered as part of the cumulative assessment, where appropriate.

In summary the SLVIA will include the following:

- consultation with key stakeholders, including SNH and local authorities to define the relevant valued landscape resources and seek agreement on the location of key assessment viewpoints to be used in the assessment;
- modelling of the zone of theoretical visibility (ZTV) for the port expansion to help in understanding and examination of potential visibility, to a suggested radius of 5km from the site;
- production of visualisations of the port expansion (from in the order of five viewpoints);
- assessment of the sensitivity of key landscape and seascape resources, character and visual receptors to the project;
- identification of the potential and residual impacts of the project on landscape and seascape resources, character and visual receptors during the construction and operation phases of the project;

- provision of advice on proposed mitigation; and
- assessment of the significance of residual impacts upon the landscape, seascape and views.

The principal objectives of the assessment will be:

- to describe, classify and evaluate the existing landscape and seascape likely to be affected by the port expansion during the construction and operational phases;
- to identify visual receptors with views of the site;
- to assess the significance of the impacts on landscape and seascape character and visual resources, taking into account the measures proposed to mitigate any of the impacts identified; and
- to undertake a focussed and appropriate level of assessment of the impacts of expansion of the Port of Dundee upon landscape and seascape character and upon visual amenity, including consideration of cumulative impacts.

18.4.4 Potential Mitigation

Landscape and visual considerations will play a key role in the detailed design of the port expansion, with mitigation measures developed to minimise the impact of the development during both the construction and operation phases. A set of design objectives will be established at an early stage of the development, and will consider the following:

- Use of colour, materials and lighting;
- Use of temporary screening measures; and
- Boundary treatments.

19 ARCHAEOLOGY AND CULTURAL HERITAGE

19.1 Introduction

This chapter provides scoping input relating to the historic environment; identifying the primary archaeological and cultural heritage issues within and surrounding the proposed Port of Dundee expansion site (the Site) as described in detail in Chapter 3 and the proposed marine aggregate extraction site, the location of which remains to be confirmed.

This scoping assessment provides a rapid assessment of the existing baseline environment; key issues identified in relation to cultural heritage; and the approach and methodology in relation to the EIA. The ES will address the onshore and offshore archaeology and cultural heritage separately, bearing in mind that the marine and terrestrial planning jurisdictions overlap across the intertidal zone. Joint consideration will be taken as appropriate.

The aim of the Archaeology and Cultural Heritage EIA and ES Chapter will be to identify the known archaeological and cultural heritage assets which may be affected by the proposed development and examine the potential, where possible, for unknown assets to be encountered within the vicinity of the proposed development.

19.2 Study Area

Data has been collected for a 1km Archaeological Study Area (ASA); to establish both the potential for direct impacts on archaeological and cultural heritage assets within close proximity of the proposed development, and to assess potential impacts to the setting of cultural heritage assets.

19.3 Legislation & Guidance

19.3.1 Policy, Legislation and Guidance in relation to Cultural Heritage

The archaeological and cultural heritage assessment will compiled in line with International and Domestic Legislation and Policy, international agreements and relevant historic environment guidance. These will include:

- Valetta Convention
- ICOMOS;
- UNESCO;
- Marine (Scotland) Act 2010;
- Protection of Wrecks Act 1973;
- The Protection of Military Remains Act 1986;
- Merchant Shipping Act 1995;
- Ancient Monuments and Archaeological Areas Act 1979;
- Scottish Planning Policy (2010);
- The Scottish Historic Environment Policy (SHEP);
- Listed Buildings and Conservation Areas (Scotland) Act 1997;
- Planning Advice Note 2/2011;
- COWRIE Historic Environment Guidance for the Offshore Renewable Energy Sector: and
- Marine Aggregate Dredging and the Historic Environment: Assessing, evaluating, mitigating and monitoring the archaeological effects of marine aggregate dredging, Guidance Note. BMAPA and English Heritage 2003,

Wessex Archaeology; http://www.wessexarch.co.uk/files/projects/BMAPA-Protocol/BMAPA-EH-Guidance-Note-April-2003.pdf
- Institute for Archaeologists (IfA) guidelines: Standard & Guidance for Archaeological Desk Based Assessment (2012);
- The Code of Practice for Seabed Development (The Joint Nautical Archaeology Policy Committee, 2008);
- the COWRIE Guidance for Assessment of Cumulative Impact on the Historic Environment from Offshore Renewable Energy (Oxford Archaeology, 2008);
- Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (Leather & Gribble/COWRIE 2011); and
- Managing Change in the Historic Environment: Setting (HS, 2010).

Although some of this guidance relates to wind energy developments, much of the general guidance contained within these documents is of relevance to an offshore heritage assessment and will therefore be referred to, where appropriate and relevant.

19.4 Existing Environment

In support of this scoping document the known cultural heritage assets within the ASA are discussed below. This section provides a rapid assessment of the existing baseline environment to establish the nature of the known and potential cultural heritage resource associated with the proposed development.

19.4.1 Data Sources

Information for this archaeological and cultural heritage scoping report drew upon the following resources:

- Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS) National Monuments Record (NMR); and
- Historic Scotland data for designated sites and monuments (http://www.historic-scotland.gov.uk/).

For the full baseline, information will also be collated from sources including:

- Cultural heritage sites, monuments and landscape features with statutory designations held by Historic Scotland
- Scottish National Monuments Record held with RCAHMS;
- Local Historic Environment Record (HER);
- UK Hydrographic Office wrecks database; and
- Oceanwise datasets[4].

19.4.2 Cultural Heritage Baseline - terrestrial environment

Designated Cultural Heritage Assets

There are designated cultural heritage assets within the scoping study area consisting of 9 listed buildings (Table 21-1). These comprise:

- one category A-listed structure;
- eight category B-listed structures; and

[4] Oceanwise is a registered company specialising in marine data acquisition

- one category C(S)-listed structure

Table 19-1: Listed Buildings

Historic Buildings Number	Details	Address	Category
25947	Council: Dundee, City Of Parish/Burgh: Dundee Item No: 713	West Ferry, 6 Ralston Road, 1-6 (inclusive nos.) beachtower, including gatepiers and boundary walls (Dundee, West Ferry, 4 Ralston Road, beachtower)	A
25902	Council: Dundee, City Of Parish/Burgh: Dundee Item No: 668	West Ferry, 5 Albany Road and 36 Strathern Road, The Croft, including wall and gatepiers (Dundee, 5-5a Albany Road, The Croft)	B
25916	Council: Dundee, City Of Parish/Burgh: Dundee Item No: 682	West Ferry, Craigiebarn Road, Netherton Of Craigie including garden wall (Dundee, Craigiebarn Road, Netherton Of Craigie)	B
25917	Council: Dundee, City Of Parish/Burgh: Dundee Item No: 683	West Ferry, Craigiebarn Road, Craigiebarn, including garden walls (Dundee, Craigiebarn Road, Craigiebarn, Royal Observer Corps)	B
25923	Council: Dundee, City Of Parish/Burgh: Dundee Item No: 689	West Ferry, 69 Dundee Road, The Lodge, including wall and gatepiers (Dundee, West Ferry, Dundee Road, Fern Hall Lodge)	B
25915	Council: Dundee, City Of Parish/Burgh: Dundee Item No: 681	West Ferry, 43 Craigie Drive, the Wyck, including wall and gatepiers, garage and garden shed (Dundee, Craigie Drive, the Wyck, garage and garden shed)	B
25946	Council: Dundee, City Of Parish/Burgh: Dundee Item No: 712	West Ferry,1 Ralston Road, Sunningdale, including enclosing walls and garage (Dundee, West Ferry, 1 Ralston Road, Sunningdale)	B
25918	Council: Dundee, City Of Parish/Burgh: Dundee Item No: 684	West Ferry, Craigiebarn Road, Stirling House, including wall in garden (Dundee, Craigiebarn Road, Stirling House)	B
25912	Council: Dundee, City Of Parish/Burgh: Dundee Item No: 678	West Ferry, 1 Belsize Road and 2 Strathern Road, Belsize House, including lamp standard and gatepiers (Dundee, West Ferry, 1 Belsize Road, Belsize House)	C(S)

Undesignated Archaeological and Cultural Heritage Assets

An online search of the National Monuments Record of Scotland showed 21 undesignated assets to be located within the ASA. The records are listed in Table21.2. These do not lie within the footprint of the Site.

Table 19-2: Undesignated Archaeological and Cultural Heritage Assets

Site Name	Site Number	Site Type	Period
Stannergate	NO43SW 162	Coastal Battery	World War Two
HMS Condor II	NO43SW 88	Seaplane Base	World War Two
Seaplane BASE	NO43SW 88.01	Pillbox	World War Two
Port of Dundee	NO43SW 995	Well	19th Century
Craigie Avenue, Road Block	NO43SW 1018	Road Block	World War Two
Broughty Ferry Road	NO43SW 1016	Pillbox	World War Two

Site Name	Site Number	Site Type	Period
Craigie Road Pillbox	NO43SW 1017	Pillbox	World War Two
Broughty Ferry Road Oil Mill	NO43SW 725	Oil Mill	Modern
Christian Road	NO43SW 34	Cist(s) and iron brooch find spot	Iron Age
Stannergate Station	NO43SW 325	Railway Station	Modern
Northern College of Education	NO43SW 997	College	Modern
43 Albany Road Earth Closet	NO43SW 909	Toilet	Post- Medieval
Caledon East Wharf	NO43SW 64	Wharf	Post- Medieval
Caledon Shipyard	NO43W 114	Shipyard	Post- Medieval
Cist	NO43SW 64	Cist; midden; stone axehead; and food vessel	Mesolithic- Early Medieval
Craft	NO43sw 8020	Wreckage	19th Century (Possible)
Craigiebarn Road, Stirling House	NO43SW 751	Stable	19th Century
Craigiebarn Road, Netherton of Craigie	NO43SW 637	Villa	20th Century
Craigiebarn Road, Royal Observer Corps	NO43SW 145	Observation Post	World War Two
Arbroath Road	NO43SW 729	Pillbox	World War Two
Greendykes Road	NO43SW 727	Road Block	World War Two

The undesignated assets predominantly reflect the areas industrial growth as a port and its role during World War Two. The remains of defensive and observation structures are recorded including Royal Observer observation post on Craigiebarn Road and four pillbox sites. The site of a seaplane base to the west of the proposed development illustrates the interesting and varied activities which took place near the Dundee waterfront during wartime. Modern industrial features including a shipyard and oil mill reflect the industrialisation of Dundee.

There are, however, two sites that show evidence of ancient human activity and allude to settlement long before the industrialisation of the area. These comprise the sites of two burial cists dated to the Mesolithic and the Iron Age. The first site (ID NO43SW34) is located off Dundee Road and Margaret Crescent immediately north of the proposed expansion site. The site comprised a long cist, containing a full-length skeleton and a penannular brooch, was found on 16 April 1902 by workmen making a new road. The brooch, greatly corroded, but apparently of iron, measured 5cm in diameter. Many long and short cists have been found in this area over the years.

The second site comprised a Mesolithic kitchen midden overlain at a height of approximately 2m by a cist cemetery which was discovered in 1878 on Stannergate Promontory (site ID NO43SW 64) and can be seen on the 1879 OS 6" map, (Forfarshire, 2nd ed.) during the extension of Dundee Harbour. The midden produced flints, charcoal, worked bone and a small finely polished celt of flinty slate. The cists included at least eight long and four short cists, but many more were destroyed before they could be examined. All contained bones and in one a food vessel was found. Cists were found a few metres north of this site around 1833 when the railway was being constructed.

Material found in the vicinity of the cists including an iron brooch, a stone axehead, food vessel and midden site have been dated to different periods from the Mesolithic to the early medieval, indicating the potential for multi-period settlement activity in the area.

19.4.3 Cultural Heritage Baseline - marine environment

A desk based review of the main offshore heritage features has been undertaken; the results of which are described below. No designated sites were identified within the marine environment.

Oceanwise datasets relating to charted wreck sites were mapped to highlight the known maritime cultural heritage within the ASA.

Charted obstructions listed by Oceanwise and the NMR were used to provide a summary of the possible cultural heritage assets within the ASA. The purpose of this is to highlight sites where the archaeological nature is not fully understood.

There are four known wrecks recorded within the Oceanwise data for the proposed extraction area study boundaries that do not have statutory protection (Ref: Figure 19.1). These wrecks are marked as either a known wreck or as an obstruction/foul ground and comprise a total of six potential wreck sites as in one case the wreck is believed to have broken up over two areas.

The following Table 21-3 details the known wrecks and obstructions identified within the study areas around the extraction boundaries.

Table 19-3: Known wrecks and obstructions within the marine extraction zone study areas

Identifying Number	Type	Name	Details	Position
28	Foul area	N/A	Foul ground over which inner Tay extraction site sits.	2º53’24.001”W 56º27’29.995”N
268	Dangerous wreck	Moor	A steam lighter (flat-bottomed barge) sunk in 1917.	2º40’0.169”W 56º26’23.766”N
270	Foul Ground	Clan Shaw	Possibly part of the Clan Shaw, a steamship lost in 1917. Its length was 109.7m with a tonnage of 3943.	2º38’51.545”W 56º26’31.492”N
272	Dangerous wreck	Clan Shaw	Possibly part of the Clan Shaw, a steamship lost in 1917. Its length was 109.7m with a tonnage of 3943.	2º38’43.274”W 56º26’27.938”N
273	Foul ground	Isla May	Fishing vessel sunk in 1988. Length 9.8m.	2º38’38.93”W 56º26’27.938”N
334	Undefined wreck	Piper PA30	Light aircraft designated G-ATSE lost in 1978.	2º53’59.81”W 56º27’29.783”N
335	Foul ground	Swamped mooring		2º53’24.001”W 56º27’29.909”N
337	Undefined obstruction	N/A	Undefined obstruction lying at unknown depth.	2º52’20.076”W 56º27’11.364”N

Additionally, a further two areas were identified as obstructions/foul ground (non-wreck), the first lying directly within the inner-estuary extraction area and the second approximately 660m to the south-east of the inner estuary extraction area (Ref: Figure 19.1).

19.5 Potential for Unrecorded Cultural Heritage and Archaeology

There is a potential for encountering unknown cultural heritage and archaeology within the footprint of the expansion site. A more detailed baseline assessment in support of EIA will reveal the potential for buried deposits and recommend mitigation to reduce impacts. The rapid review of the undesignated onshore assets has shown evidence activity from the prehistoric through to the early medieval.

19.5.1 Wrecks

There is a potential for impacts to buried archaeology within the footprint of the development. Archaeological wreck evidence is possible from as early as the Mesolithic; though no known wrecks have been identified to this period. The earliest example of prehistoric boats found within the Tay Estuary dates to the Bronze Age. A log boat discovered in 2001 was radiocarbon-dated to the later Bronze Age, between about 1130-970 BC.

The hollowed-out boat remains where it was found, partly-embedded in mud and reeds in an intertidal zone of the Tay estuary near Newburgh. It is the second-oldest dated log boat in Scotland. Altogether about 150 log boats have been found in Scotland, and the majority of those dated were found to be medieval (British Archaeology 2002).

There is also the potential for unknown aircraft crash sites, most notably dating to World War Two (http://archaeologydataservice.ac.uk/archives/view/aircraft_eh_2008/index.cfm). The Port of Dundee played an active role during the War including hosting a seaplane hangar so unrecorded losses could lie within the vicinity of the Port.

19.5.2 Submerged Prehistory

The course of the Tay Estuary shows areas of stable channel over gravels and partially compacted clays and areas of unstable loose, coarse to fine sands. This is overlain by moraines, outwash gravels and finally laminated silts deposited during ice retreat following the Last Glacial Maximum, c. 22,000 years ago. Subsequently, these deposits have been deeply eroded to form the valley of the present day Tay Estuary with fluvial fill evidence of two earlier estuarine cycles.

The current archaeological record of Scotland extends to about 14000 years ago, which dates to the end of the last glacial period at the end of the Pleistocene which provides the current timeframe for the survival of prehistoric material[5].

19.6 Methodology and Approach to EIA

19.6.1 Consultation

The EIA methodology and the receptors/viewpoints required for the setting assessment will be agreed in consultation with Historic Scotland and the Local Authority Archaeologist/s. The archaeologist and landscape architect will liaise with regard to consideration of setting.

[5] (http://www.scottishheritagehub.com/content/1-introduction-palaeolithic-and-mesolithic-periods)

19.6.2 Study Area

The assessment of direct impacts will be based on a 1km radius study area surrounding the proposed port expansion and marine extraction zones. The purpose of establishing a 1km buffer is to cater for future alterations made to the development site and to include records of documented vessel losses that may lie just outside the development area. To determine setting impacts, a wider study area will be imposed in conjunction with the results of the landscape and visual impact assessment.

19.6.3 Data Sources

The principal sources to be consulted in this EIA will include (but not be limited to):

- Site visit;
- HER data;
- Records of wrecks and obstructions accessed as Seazone data (provided by ECR);
- Data from the NMR of Scotland, held by the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS), of known wrecks, documented losses and archaeological finds;
- Records of Protected and Controlled Sites under the Protection of Military Remains Act held by the Ministry of Defence (MoD);
- Various secondary sources relating to the palaeo-environment with specific reference made to submerged palaeo-landscapes and coastal change;
- Previous archaeological studies in the area; and
- Historic mapping and charts.

19.6.4 EIA methodology for the assessment of sensitivity of cultural heritage assets

By incorporating the information in the baseline data gathering and field survey, the environmental impact assessment will consider the importance of cultural heritage receptors with reference to Scottish Planning Policy and Scottish Historic Environment Policy.

The magnitude of impacts will be judged taking into account the direct effects of development activities during construction and maintenance phases; indirect effects on setting, and whether they are temporary or permanent. The significance of these impacts will be derived from a consideration of the sensitivity of the resource/archaeological potential and the magnitude of the impact upon it. Where significant impacts are likely to occur to cultural heritage receptors appropriate mitigation strategies, discussed in consultation with Historic Scotland and the relevant Council Archaeologist, will be applied to reduce to an acceptable level the residual impacts to cultural heritage receptors. The potential cumulative impacts from other developments within the region will also be considered.

20 SOCIO ECONOMICS, RECREATION AND AMENITY

20.1 Introduction

Following on from the N-RIP there is a significant opportunity available to the Port of Dundee which is directly related to the development of the offshore renewables industry.

The benefits to be gained by the expansion of the Port of Dundee, in term of its potential contribution to the UK's renewable ports portfolio, relate mainly to the wider Scottish economy and its contribution to European energy policy but will also benefit the City of Dundee.

20.2 Existing Socio-economic Environment

The port is currently one of the largest economic generators in the city of Dundee. The existing situation is that the Port of Dundee, in order to service the offshore renewable industry, requires more capacity, which has led to this proposal to expand the port.

The existing employment and recreation and amenity value form the baseline against which the development will be set.

An initial consideration of the 'standard occupational classifications' (Soc) was undertaken and is outlined below and further examination of recreation and amenity will be carried out to inform the impact assessment.

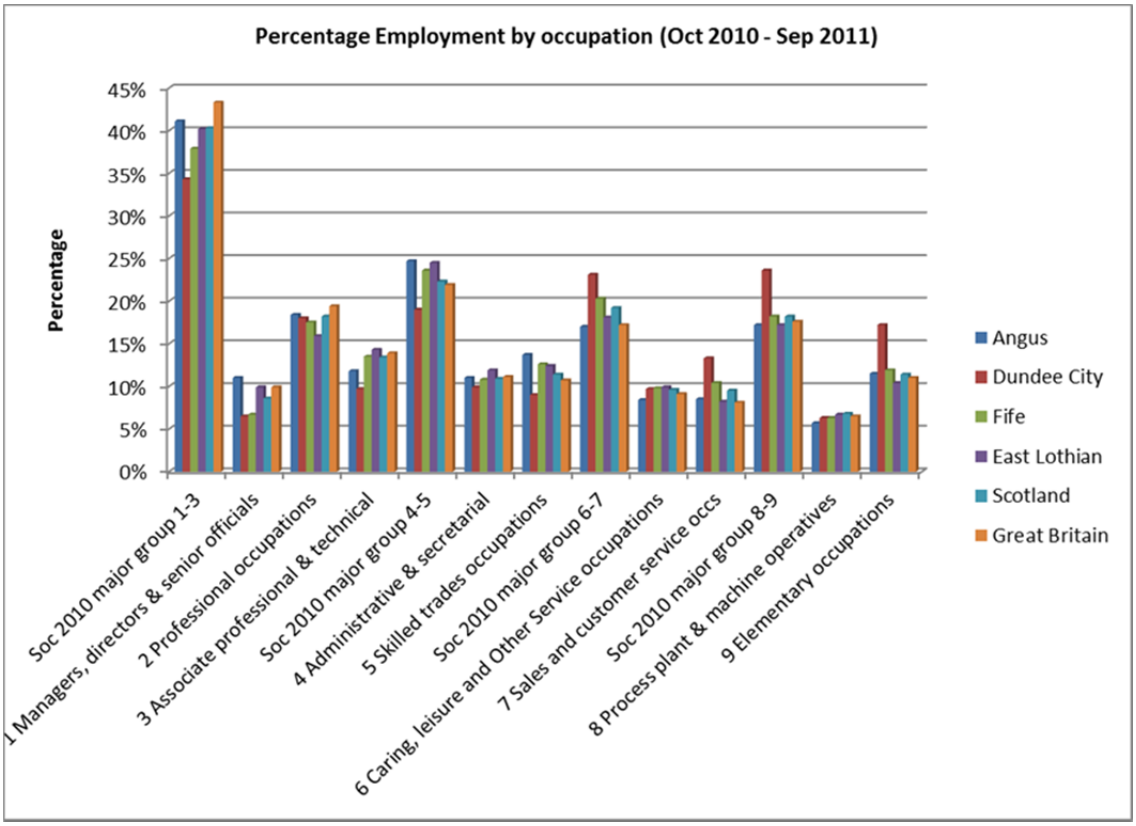
Table 22-1 and Plot 22-1 below show the number of people working in the various professions across Dundee, Scotland and the rest of Great Britain.

In Dundee, the socio-economic sector which employs the largest number of people, albeit below the average percentage for both Scotland and the GB, is Socio-economic group 1-3. The percentage working in group 6-7 is higher in Dundee than in Scotland or the Great Britain (GB).

Table 20-1: Dundee City - Employment by profession (2010 to 2011)

Occupation	Dundee		Scotland	Great Britain
	(numbers)	(%)	(%)	(%)
Soc 2010 major group 1-3	22,700	34.3	40.3	43.3
1 Managers, directors and senior officials	4,300	6.5	8.6	9.9
2 Professional occupations	12,000	18	18.2	19.4
3 Associate professional & technical	6,400	9.7	13.4	13.9
Soc 2010 major group 4-5	12,600	19	22.3	21.9
4 Administrative & secretarial	6,600	9.9	10.9	11.1
5 Skilled trades occupations	6,000	9	11.4	10.7
Soc 2010 major group 6-7	15,300	23.1	19.2	17.2
6 Caring, leisure and Other Service occupations	6,400	9.7	9.6	9.1
7 Sales and customer service occs	8,900	13.3	9.5	8.1
Soc 2010 major group 8-9	15,600	23.6	18.2	17.6
8 Process plant & machine operatives	4,200	6.3	6.8	6.5
9 Elementary occupations	11,400	17.2	11.4	11

Plot 20-1: Angus, Dundee, Fife, East Lothian, Scotland and Great Britain - Employment by Occupation



The City of Dundee performs the function of a regional employment and education centre, with approximately 193,232 economically active people, between the ages of 16-64, residing within 30 minutes' drive of the city centre.

In 2011, an estimated 145,570 people were resident within the city council boundaries with 95,892 of a working age; i.e. between 16-64 years.

As of March 2012 the City of Dundee had approximately 69,700 or 74.0% of its working population classified as economically active though not necessarily within the City Boundaries. The City had 43,313 economically inactive people aged 16-74 residing within its boundaries

20.3 Identification of Key Issues

The key socio-economic issues that the ES will address are the potential significant beneficial impacts that are likely to accrue from the development both in terms of the construction and operation of the proposed development.

This socio economic assessment will address the potential impacts from the development of the expansion site in relation to the Port, and the benefits this new area may bring to the existing operations in terms of increased operational area. Any future use of the expansion site for new work stream(s) would be assessed as part of a separate application.

The potential socio-economic effects from a development can directly and indirectly impact on both individuals and communities. However, there can also be an impact on people who are not in the environs of the development who are affected by the associated knock on economic activity. As such the study area for this assessment will extend beyond the immediate city of Dundee into the wider area of Angus and Perth & Kinross in general and at a Scottish wide level in order to understand the potential impacts of the development in the wider context.

Of particular importance within the socio-economic assessment will be potential employment generated by the proposed scheme during the construction period. Any associated employment from future use would be assessed as part of any subsequent application. It is highly likely that the construction works for this development would be put to competitive tender and as such it possible that a contractor from outside the study area may be successful. Regardless of this it is not unreasonable to assume that a high proportion of the labour force could be sourced locally with specialists being brought in for certain elements of the construction works.

The main objectives for the proposed development in relation to socio-economic considerations will be the:

- identification of the economic benefits such as the impacts on local employers who can provide services for this development during the construction process; and
- provision of any employment opportunities within other related businesses, within the supply chain, which might derive direct benefit from the project.

20.4 Methodology and Approach to EIA

While there is no specific statutory guidance for the assessment of socio-economic impacts with the EIA Regulations. The Scottish Planning Policy provides authorities on guidance on how the planning systems should support economic development in all areas by:

- *taking account of the economic benefits of proposed development in development plans and development management decisions;*
- *promoting development in sustainable locations, particularly in terms of accessibility;*
- *promoting regeneration and the full and appropriate use of land, buildings and infrastructure;*
- *supporting development which will provide new employment opportunities and enhance local competitiveness; and*
- *promoting the integration of employment generation opportunities with supporting infrastructure and housing development.*

The planning system should also be responsive and sufficiently flexible to accommodate the requirements of inward investment and growing indigenous firms (SPP, 2010).

The socio-economic assessment will be undertaken using available data collected from both consultation with stakeholders and from data collated from official resources (e.g. Office for National Statistics etc.). The assessment will then be undertaken through a qualitative assessment of these social and economic indicators. The key stakeholders to be contacted are listed below:

- Dundee City Council – baseline economic data;
- Port of Dundee Limited – operation use of the site and predicted construction jobs;
- Scottish Enterprise – wider Scottish economic benefit(s);
- Scottish Government – N-RIP;
- Sustrans – National Cycling Network;
- Visit Scotland – data on tourism; and
- Royal Yacht Association (RYA) – recreational amenity.

To understand the context for the socio-economic assessment a site visit will be undertaken in order to "place" the development in terms of its surroundings. This will enable the assessment to describe the existing socio-economic conditions in the areas surrounding the development and how these are potentially linked with other impacts for example visual impact may impact on tourism and local business.

The appropriate Development Plan documents will also be reviewed at the Local, Regional, and, to a lesser extent, National in order to set the context within Scotland and the UK.

The assessment will be based on published studies which analyse the supply chain and the economic effects of wind farm developments. The key studies which have been referred to including but are not limited to the following:

- Nomis – official labour market statistics;
- The National Renewables Infrastructure Plan;
- Local Area Labour Markets in Scotland – Statistics from the Annual Population Survey 2010, The Scottish Government August 2011; and
- Scottish Neighbourhood Statistics – Office for National Statistics.

For the purposes of identifying what should be considered within this socio-economic assessment the following criteria has been adapted from the National Policy Statement (NPS) for Energy (EN-1): under sections 5.12.3:

- The creation of jobs and training opportunities including:
    - Direct employment;
    - Supply chain; and
    - Private sector investment.
- The provision of additional local services and improvements to local infrastructure;
- Effects on tourism and recreation;
- The impact of changing influx of workers during the different construction and operational phases of the development; and
- Cumulative effects.

The following documents will be reviewed:

- Socio-economic indicators of marine-related activities in the UK economy (The Crown Estate);
- Identifying the 'Gap' in Business Support: Data Analysis, A report for Scottish Enterprise, 2011;
- Socio-economic indicators of marine-related activities in the UK economy (The Crown Estate) 2008;

- Local Area Labour Markets in Scotland, Statistics from the Annual Population Survey, A National Statistics Publication for Scotland (The Scottish Government) 2010;
- Scotland's Marine Atlas: Information for the National Marine Plan;
- Draft National Marine Plan; and
- Supporting Guidance (WAT-SG-67) Assessing the Significance of Impacts – Social, Economic, Environmental.

21 CUMULATIVE IMPACT ASSESSMENT

21.1 Introduction

This chapter of the ES will address the potential cumulative impacts associated with the expansion of the port and the extraction of marine aggregate together with impacts that result from incremental changes caused by other projects that are proposed or have recently received consent and that are therefore not factored into the baseline/background.

To be able to consider the development in a meaningful way the effects are considered in parallel with other proposed developments that are planned or committed within the local or regional area. This will be within a realistic geographical range in terms of the type of impact and foreseeable in terms of delivery, i.e. will have planning consent. Dundee City Council, Marine Scotland and Transport Scotland will be consulted in order to identify any planned development that might be relevant. SNH, SEPA and Historic Scotland will be consulted as required with respect to specific areas of assessment.

The potential cumulative effects of the development with existing operations within the surrounding area will be reflected in the baseline studies and where necessary dealt with in the respective chapters of the ES and will be drawn together within the cumulative impacts chapter.

The potential for cumulative effect of the interaction of a combination of predicted effects on a particular receptor will be reviewed. Cumulative impacts directly resulting from the construction and operation of the expansion area may occur when there are a range of impacts across the environment that are of the same type or affect the same area. This chapter will address the combination of effects identified in the EIA on the sensitive receptors identified throughout the process.

Scientifically it is a challenge to fully understand cumulative impacts as it is an exceptionally broad and detailed area of assessment and therefore it is necessary to take a realistic and pragmatic approach and set boundaries which are acceptable and in keeping with the scale of development proposed.

1.1 Existing Environment

The study area will be defined prior to undertaking the assessment and as EIA is an iterative process as it will be dependent upon the findings of specialist chapters and information available on the extent of impacts of other developments in the area.

21.2 Potential Cumulative Impacts

The existing environment is currently subject to a number proposed developments that are within the planning system or consented and anticipated to be completed within the life of this proposal. Additionally, offshore there are a number of development proposals in the process of preparation in relation to offshore renewables.

It is anticipated, given current knowledge, that the study area will relate to the expansion site and the extraction site in turn and also include linkages between the two. Therefore, the study area will include terrestrial development in the vicinity of the port and offshore development, largely in connection with the offshore renewable energy industry.

IEMA suggest that a useful ground rule is that the environmental effects of any development that is already built and operational is effectively included within the environmental baseline that is being assessed in the EIA, so are excluded from the cumulative impact assessment, otherwise there would be double counting. The projects that are either in the planning process or consented but not yet developed need to be considered. Any projects that are earlier in the development process (*i.e.* prior to consent submission) can be discounted as that developer will be responsible for taking the effects of this project into consideration in their own EIA.

Consultation will be undertaken with Transport Scotland and DCC to ensure that the relevant developments are included in the assessment.

At this stage the main projects that it is anticipated will be considered include the following:

Offshore wind farm developments:

- Firth of Forth
- Neart na Gaoithe
- Inch Cape

Onshore developments:

- Forth Energy, Dundee Renewable Energy Plant, Port of Dundee;
- Core Site Development; and
- V& A museum, Dundee Waterfront.

21.3 Methodology and Approach to EIA

The scope of the assessment will be reviewed at the time of undertaking the assessment to ensure it is up to date. Following identification of developments to be included data will be collated and reviewed and the residual impacts of developments following mitigation and management will be compiled. Information will be generally gained from documents associated with developments such as environmental statements and planning documents.

A twin track approach will be used;

- Receptor based approach to addressing the cumulative effect of the whole project; and
- Cumulative effect of the project plus other major developments

Overall the cumulative impact assessment aims to address:

- incremental additions to or deletions from a fixed receptor where each increment has the same effect;
- amplification or exponential effects, where each effect has larger effect than the one preceding; and
- discontinuous effects, where the incremental effects have no apparent consequence until a threshold is crossed and component changes occur rapidly with a distinctly different regime of behaviour.

Cumulative or combined effects can be adverse or beneficial and will be assessed using the significance criteria that will be described within the ES.

This approach requires sharing of information and liaison with planning and other consenting authorities in order to be capable of providing a correct assessment and identifying appropriate mitigation if required.

22 SUMMARY OF SCOPING AND ENVIRONMENTAL STATEMENT CONTENT

22.1 Topics Scoped-in to the Environmental Impact Assessment

Following review of the existing baseline and identification of potentially likely significant impacts and consultation with the regulators the following areas are proposed as requiring detailed environmental impact assessment:

- Water Environment including sediment and water quality;
- Coastal Processes;
- Marine Ecology including marine mammals, otters, benthos and fisheries;
- Ornithology;
- Transport;
- Air Quality;
- Noise;
- Shipping and Navigation;
- Seascape, Landscape and Visual;
- Archaeology and Cultural Heritage;
- Socio-economics, Recreation and Amenity; and
- Cumulative Impacts.

22.2 Topics Scoped-out of the Environmental Impact Assessment

It is considered that the following topics will not incur likely significant impacts from the port expansion project and may be scoped out of the EIA:

- Geology;
- Terrestrial ecology, apart from consideration of otters; and
- Aviation.

The ES will include a statement of the position taken with regard to scoping out topics.

22.3 Environmental Statement Content

The ES is a formal report that documents the findings of the EIA process. The ES is likely to be structured as follows:

- Non-technical Summary
- ES
    - Introductory Chapter (s) including statement of need, legislative context, and a description of the EIA process with details of screening and scoping, consultation and impact assessment methodology;
    - Description of the proposed Port of Dundee expansion and the marine aggregate extraction, including discussion of the alternatives considered and the reasons for selecting the preferred options;
    - Description of the site and baseline environment;
    - For each topic:
        - Introduction;
        - Topic specific assessment methodology;
        - Baseline conditions;
        - Identification and assessment of potential impacts;
        - Identification of mitigation measures;
        - Statement of residual impacts
    - Assessment of Cumulative Impacts

    - Summary of findings including a table showing predicted impacts and residual impacts;
    - A list of references of information and publications cited in the ES; and
    - Figures / Technical Drawings.
- Technical Appendices
    - Technical reports, survey information data and reports that support the ES.

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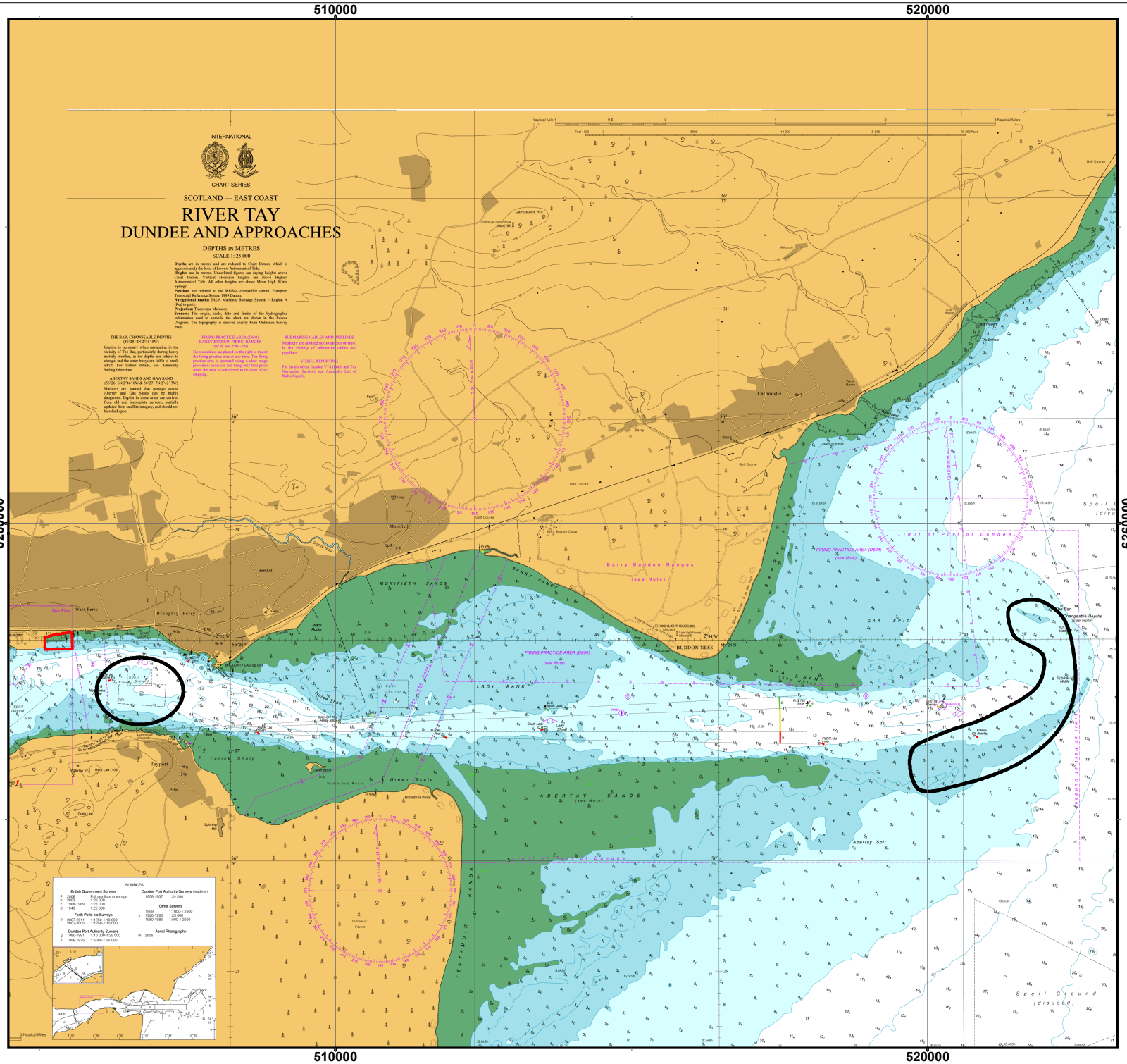

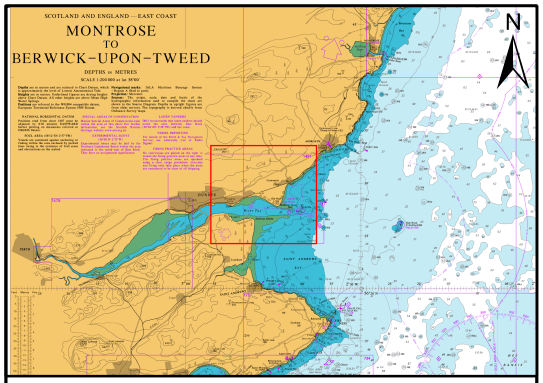

Legend:

- Port of Dundee Expansion Site
- Potential Marine Aggregate Sites

0 1 2
Kilometres

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Client:	Project:
Scottish Enterprise/ Forth Ports	Port of Dundee Expansion Project

Title: Site Location Plan

Figure: 1.1 | Drawing No: 9X5853-004-RH

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	25/10/2012	R	R	A4	1:90,000

Co-ordinate system: WGS UTM Zone 30N

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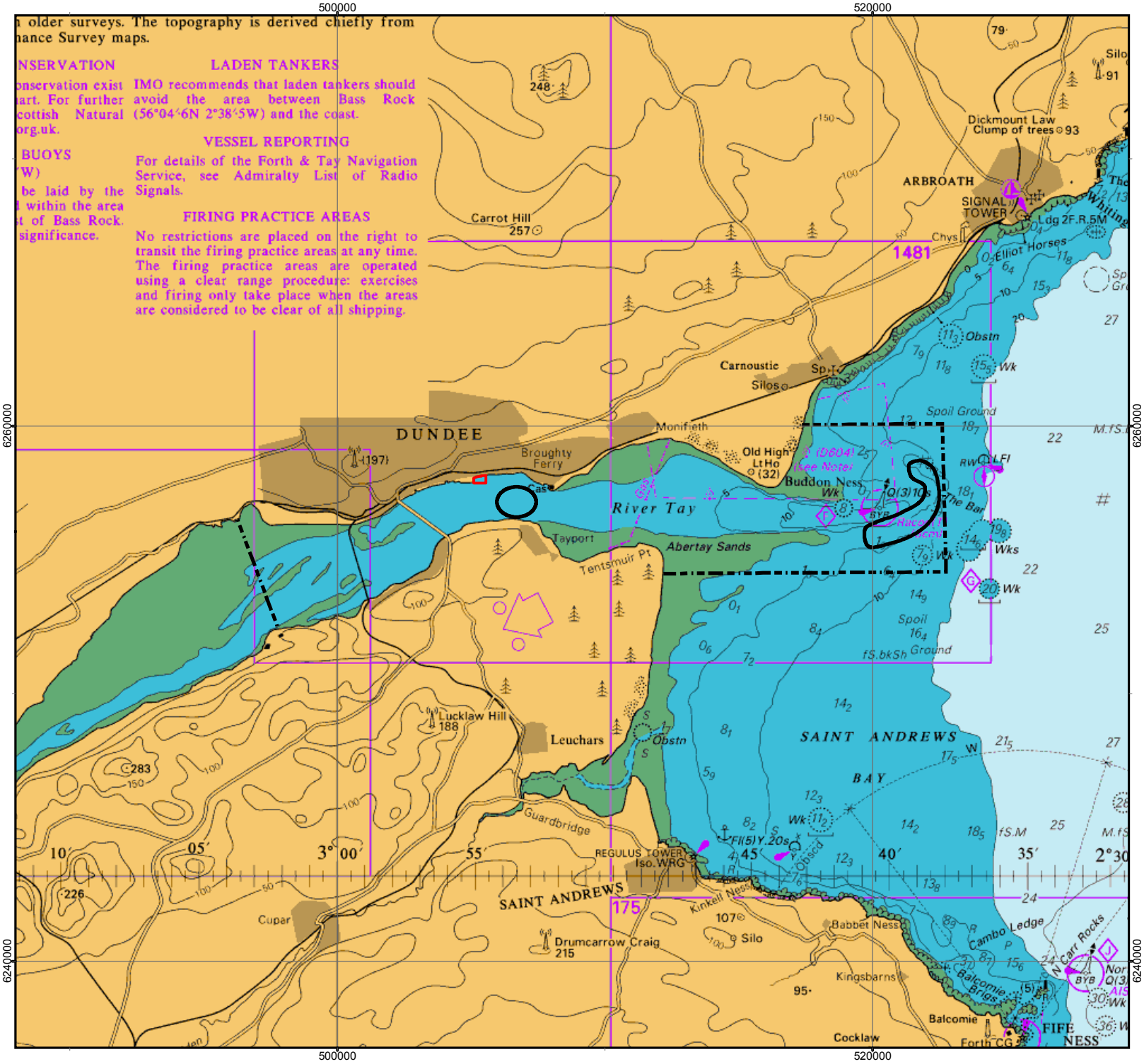

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Client:	Project:
Scottish Enterprise/ Forth Ports	Port of Dundee Expansion Project

Title: Port Jurisdiction

Figure: 1.2 | Drawing No: 9X5853-001-RH

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	15/03/2013	R	R	A4	1:200,000

Co-ordinate system: WGS UTM Zone 30N

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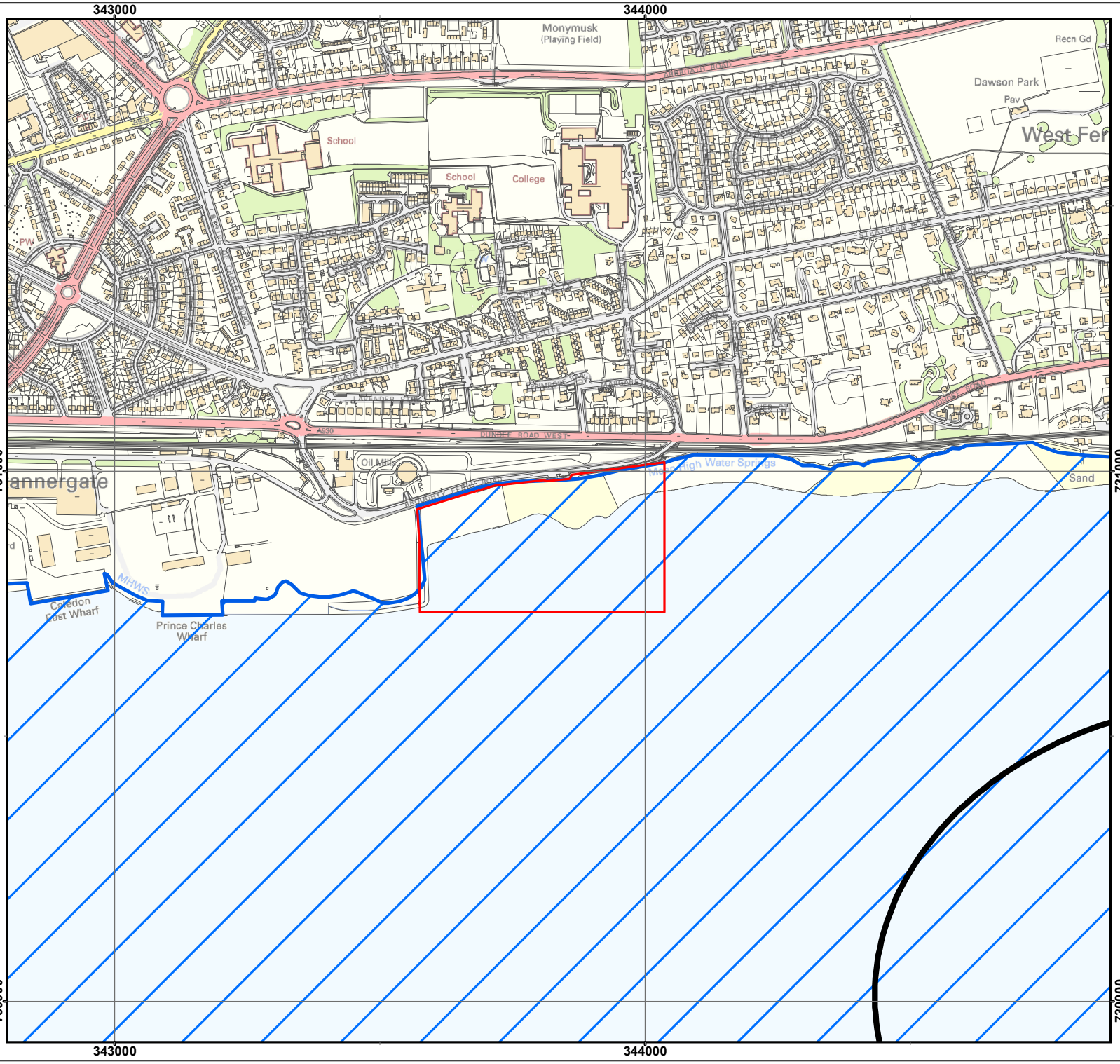

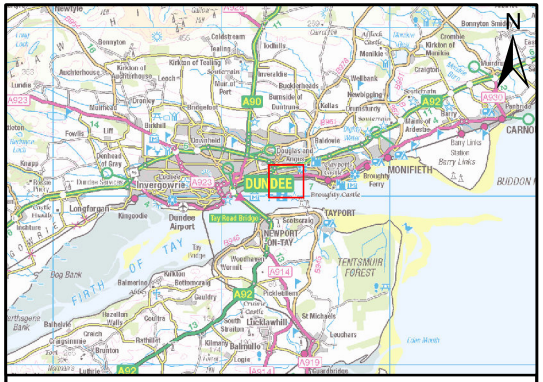

Legend:

- Port of Dundee Expansion Site
- Potential Marine Aggregate Site
- Firth of Tay and Eden Estuary Special Area of Conservation (SAC)

0 250 500

Metres

Client:	Project:
Scottish Enterprise/ Forth Ports	Port of Dundee Expansion Project

Title: Expansion Site (OS base)

Figure: 3.1 | Drawing No: 9X5853-002-RH

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	15/03/2013	R	R	A4	1:10,000

Co-ordinate system: British National Grid

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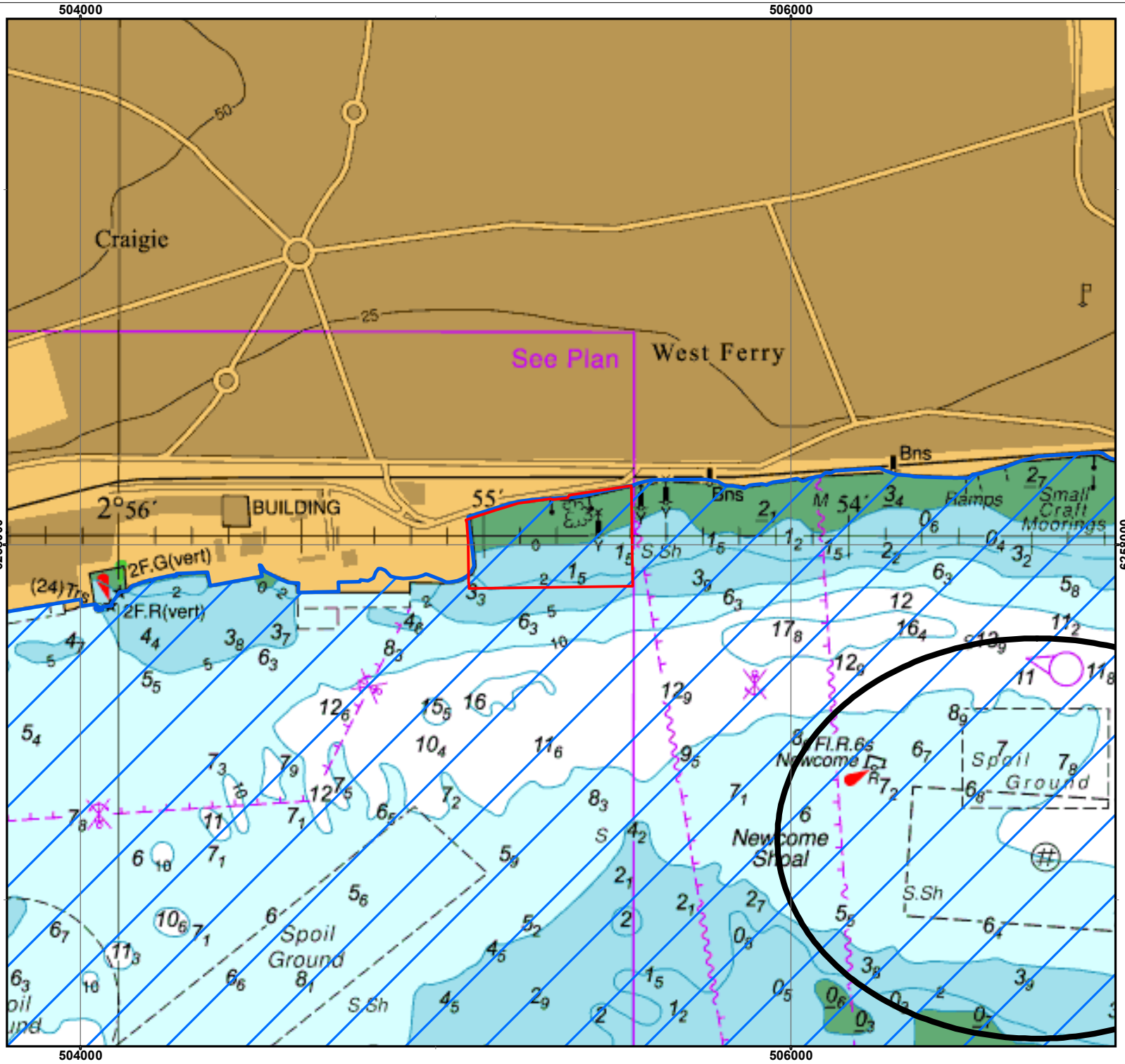

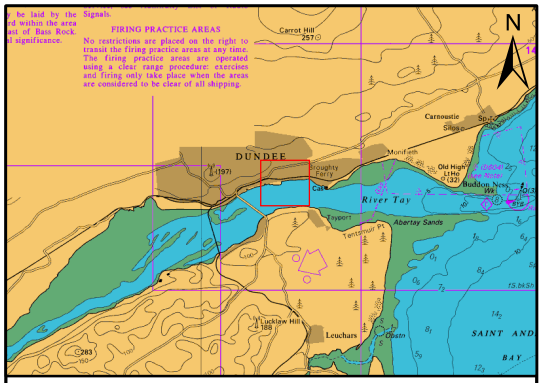

Legend:

- Port of Dundee Expansion Site
- Potential Marine Aggregate Site
- Firth of Tay and Eden Estuary Special Area of Conservation (SAC)

0 250 500
Metres

Data source:
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Client:	Project:
Scottish Enterprise/ Forth Ports	Port of Dundee Expansion Project

Title: Expansion Site (Chart base)

Figure: 3.2 | Drawing No: 9X5853-003-RH

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	15/03/2013	R	R	A4	1:15,000

Co-ordinate system: WGS UTM Zone 30N

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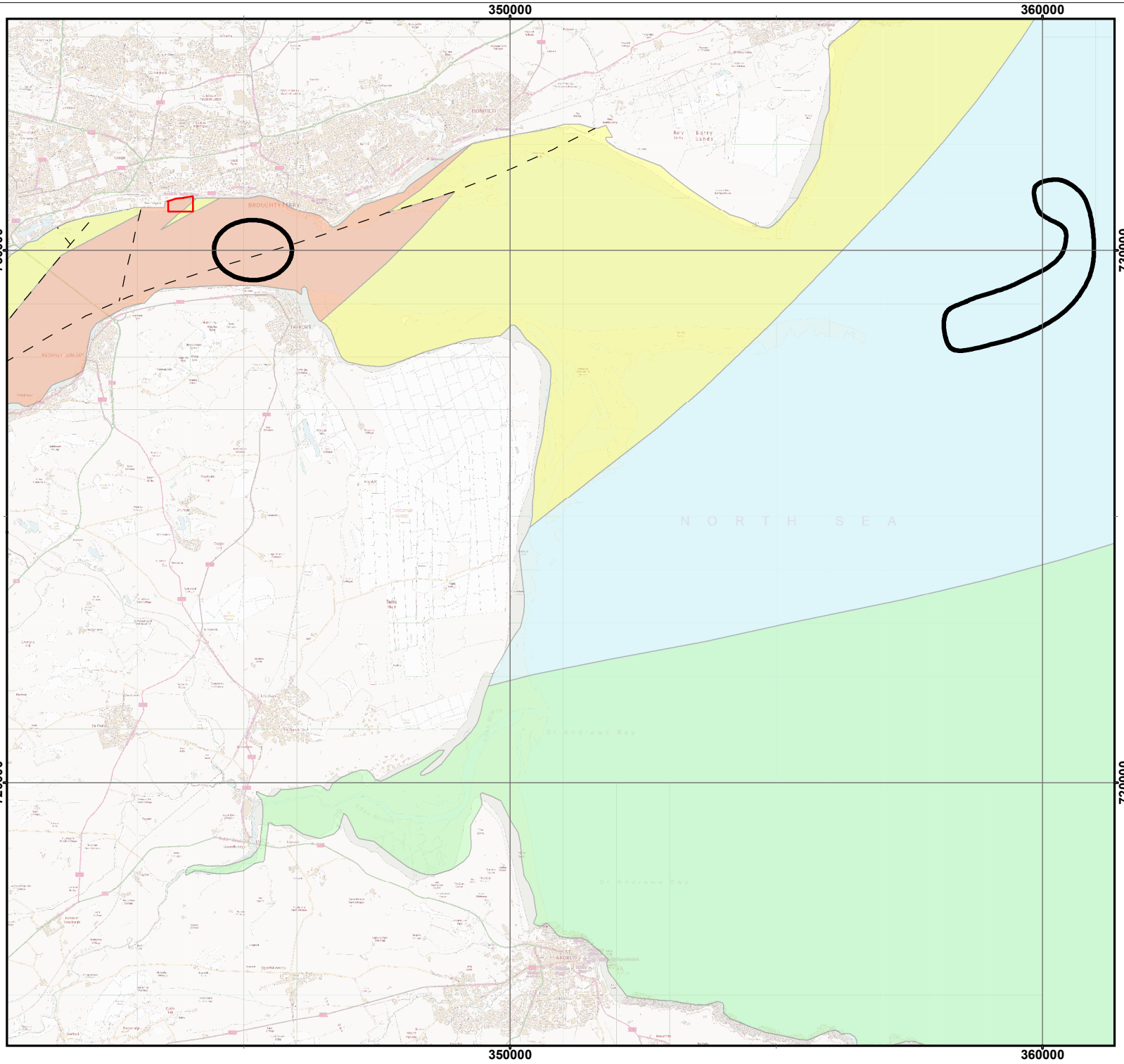

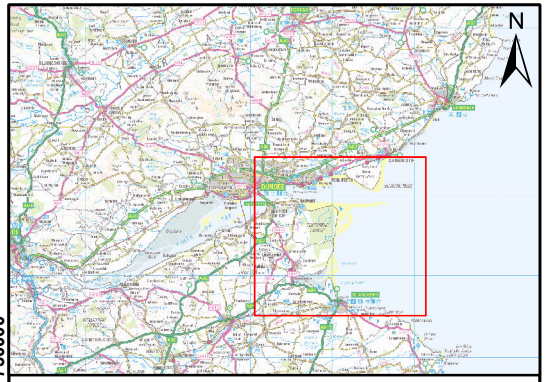

Legend:

- Port of Dundee Expansion Site
- Potential Marine Aggregate Sites
- Fault

Bedrock Geology

- Lava (Undifferentiated)
- Rock, Siliciclastic, Argillaceous with Sandstone (Undifferentiated) with Limestone
- Sandstone (Undifferentiated) and Conglomerate
- Sandstone (Undifferentiated) and Rock, Siliciclastic, Argillaceous

0 2 4
Kilometres

Client:	Project:
Scottish Enterprise/ Forth Ports	Port of Dundee Expansion Project

Title: Bedrock Geology

Figure:	Drawing No:
5.1	9X5853-014-RH

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	06/12/2012	R	R	A4	1:100,000

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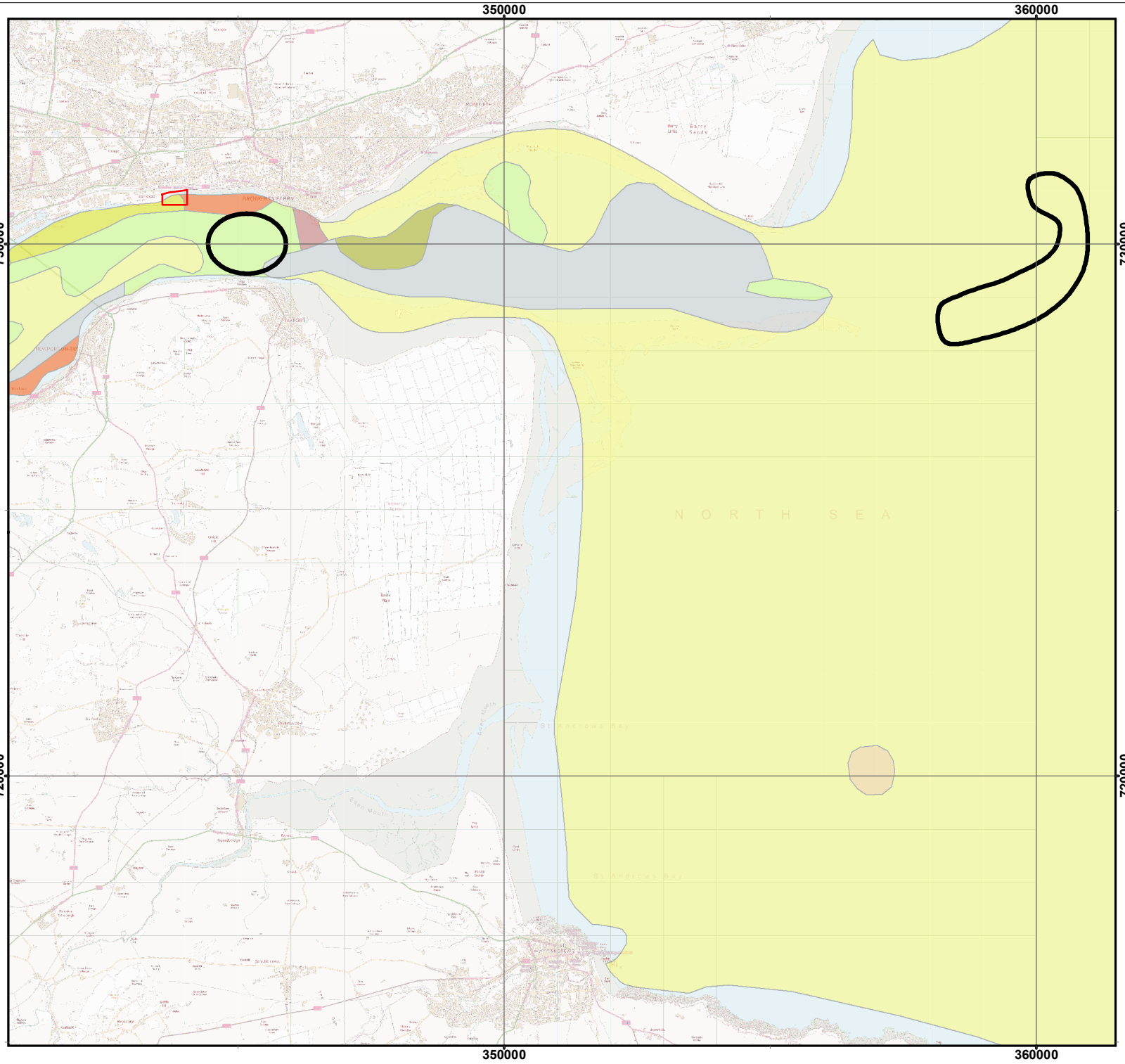

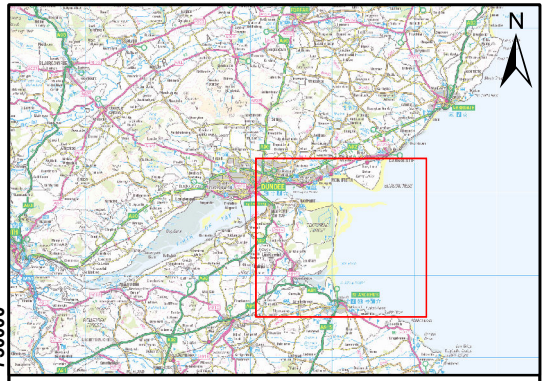

Legend:

- Port of Dundee Expansion Site
- Potential Marine Aggregate Sites

Superficial Geology

- Gravel, Marine, Muddy, Sandy
- Gravel, Marine
- Gravel, Sandy, Marine
- Mud, Marine, Sandy
- Sand, Gravelly, Muddy
- Sand, Marine
- Sand, Marine, Gravelly
- Sand, Marine, Muddy

0 2 4
Kilometres

Client:	Project:
Scottish Enterprise/ Forth Ports	Port of Dundee Expansion Project

Title: Superficial Geology

Figure:	Drawing No:
5.2	9X5853-015-RH

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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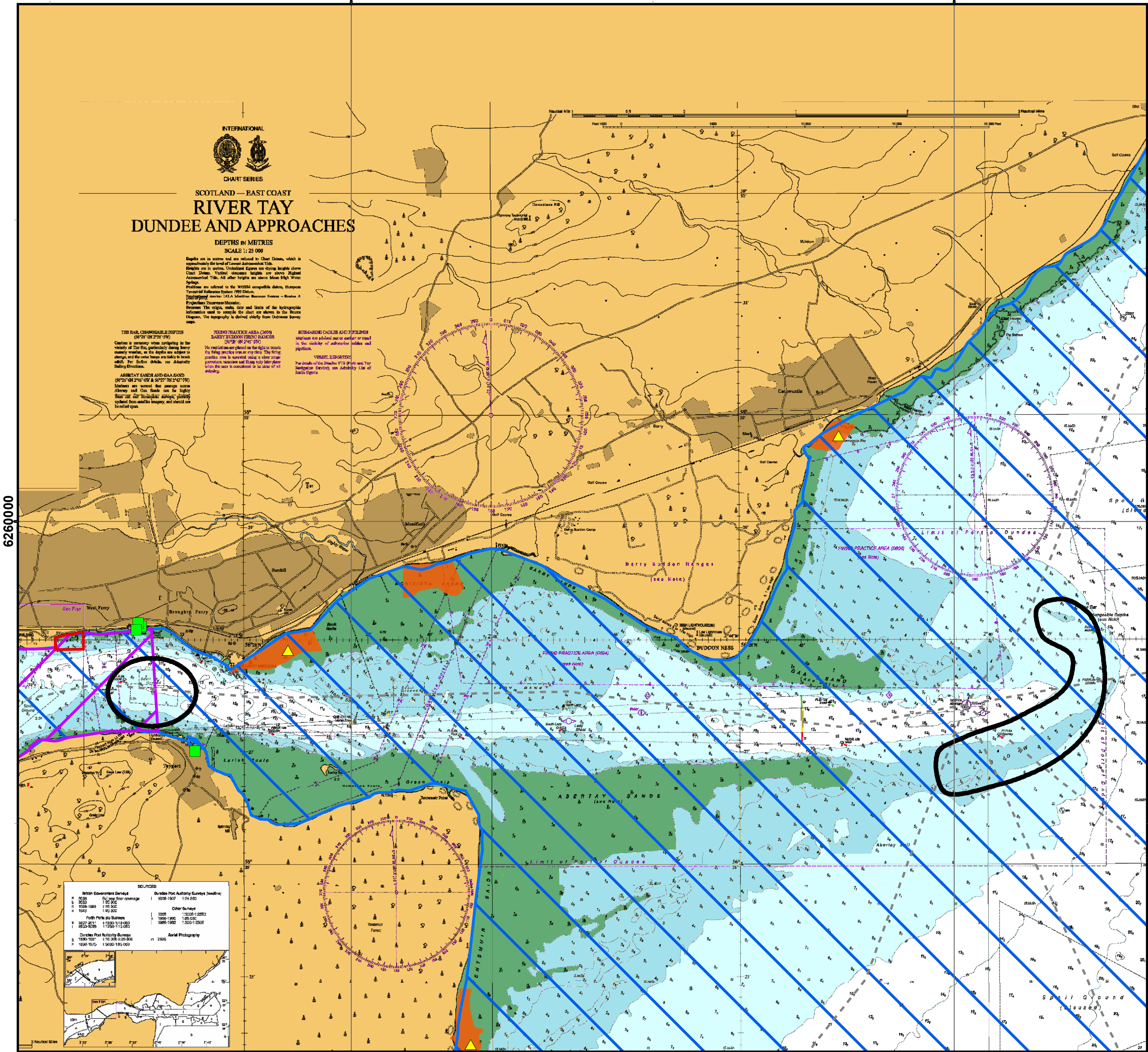

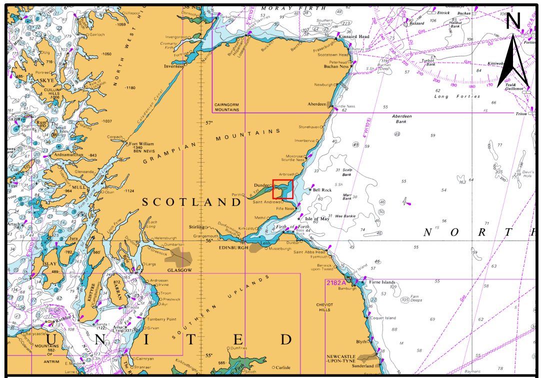

Legend:

- Port of Dundee Expansion Site
- Potential Marine Aggregate Sites
- Bathing Waters
- RYA Sailing Area
- RYA Racing Area
- RYA Cruising Route
- RYA Sailing Club
- Combined Coastal Awards 2010

0 1 2
Kilometres

Data source:
Bathing Waters © The Scottish Government, 2011,
RYA Data © UK Atlas of Recreational Boating RYA, 2011,
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Client:	Project:
Scottish Enterprise/ Forth Ports	Port of Dundee Expansion Project

Title:

Bathing Waters and Recreational Activities

Figure:	6.1	Drawing No:	9X5853-010-RH

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	07/12/2012	R	R	A4	1:90,000

Co-ordinate system: WGS UTM Zone 30N

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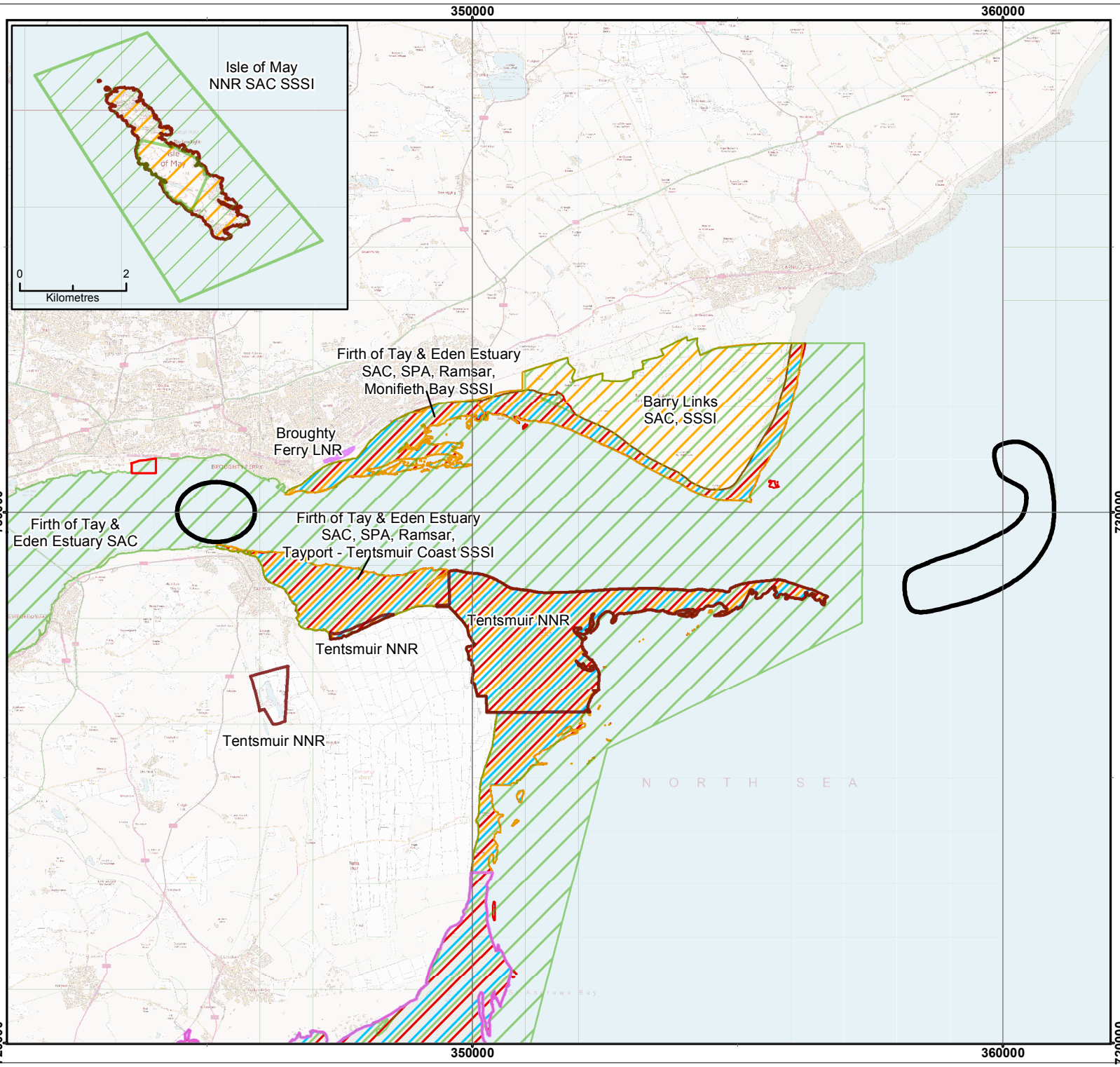

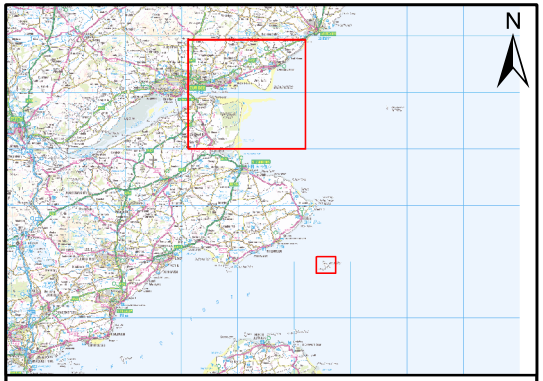

Legend:

- Port of Dundee Expansion Site
- Potential Marine Aggregate Sites
- Local Nature Reserve (LNR)
- National Nature Reserve (NNR)
- Special Area of Conservation (SAC)
- Special Site of Scientific Interest (SSSI)
- Ramsar Site
- Special Protection Area (SPA)

0 1 2
Kilometres

Client:	Project:
Scottish Enterprise/ Forth Ports	Port of Dundee Expansion Project

Title: Nature Conservation Designations

Figure: 8.1 | Drawing No: 9X5853-017-RH

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	19/11/2012	R	R	A4	1:100,000 1:55,000

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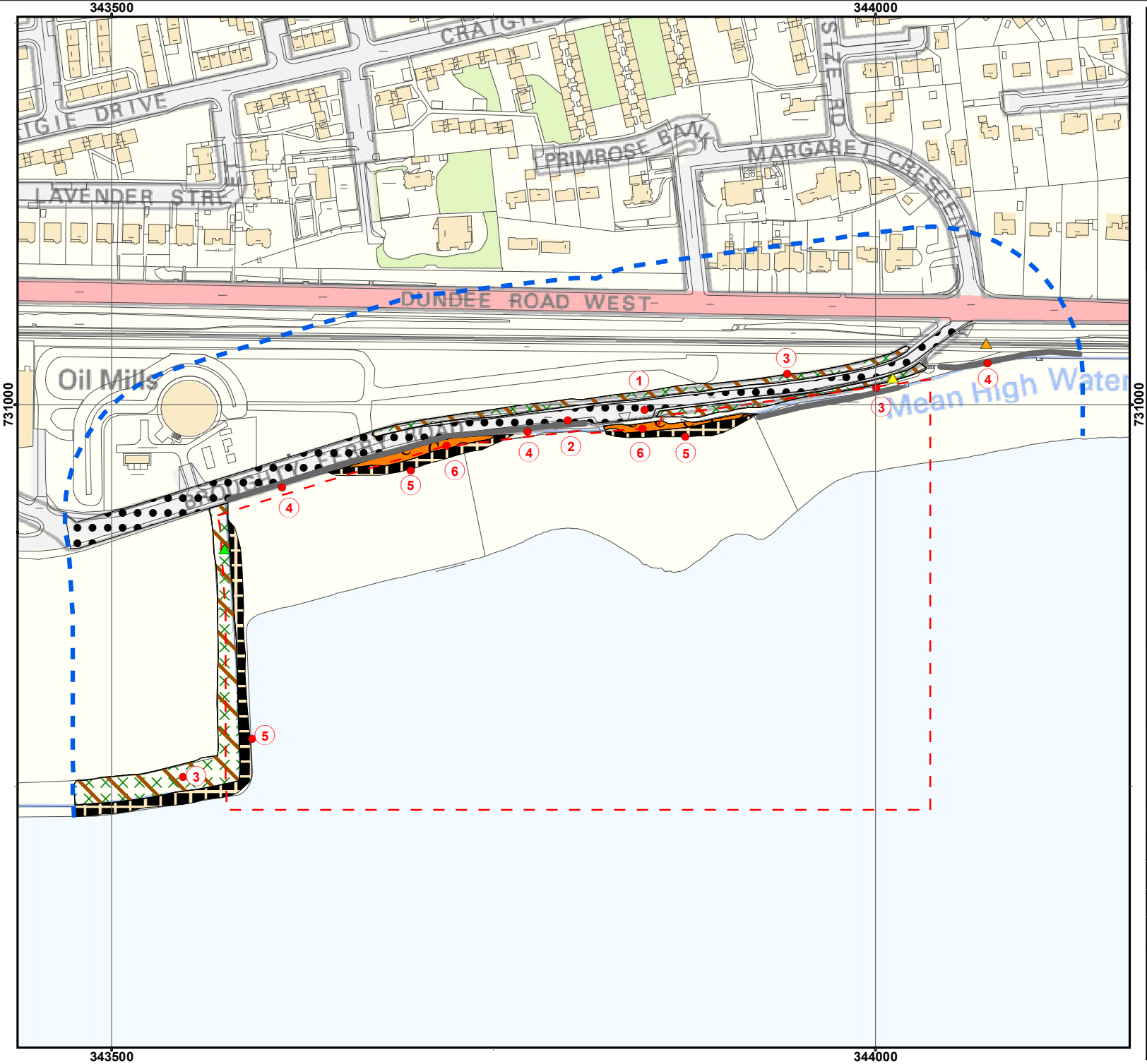

Legend:

- Port of Dundee Expansion Site
- 100m Survey Buffer

Phase 1 Habitat Survey

- Scattered Scrub (A2.2)
- Tall Ruderal (C3.1)
- Boulders (H4)
- Coastal Grassland (H8.4)
- Bareground (J4)
- Seawall (J5)
- Ephemeral/Short Perennial (J3) (not visible, see Target Note 2)
- 1 Target Notes

Non Native Species

- Giant Hogweed
- Japanese Knotweed
- Japanese Rose

0 50 100
Metres

Client:	Project:
Scottish Enterprise/ Forth Ports	Port of Dundee Expansion Project

Title: Phase 1 Habitat Map

Figure: 8.2 | Drawing No: 9X5853-008-RH

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	05/12/2012	R	R	A4	1:3,500

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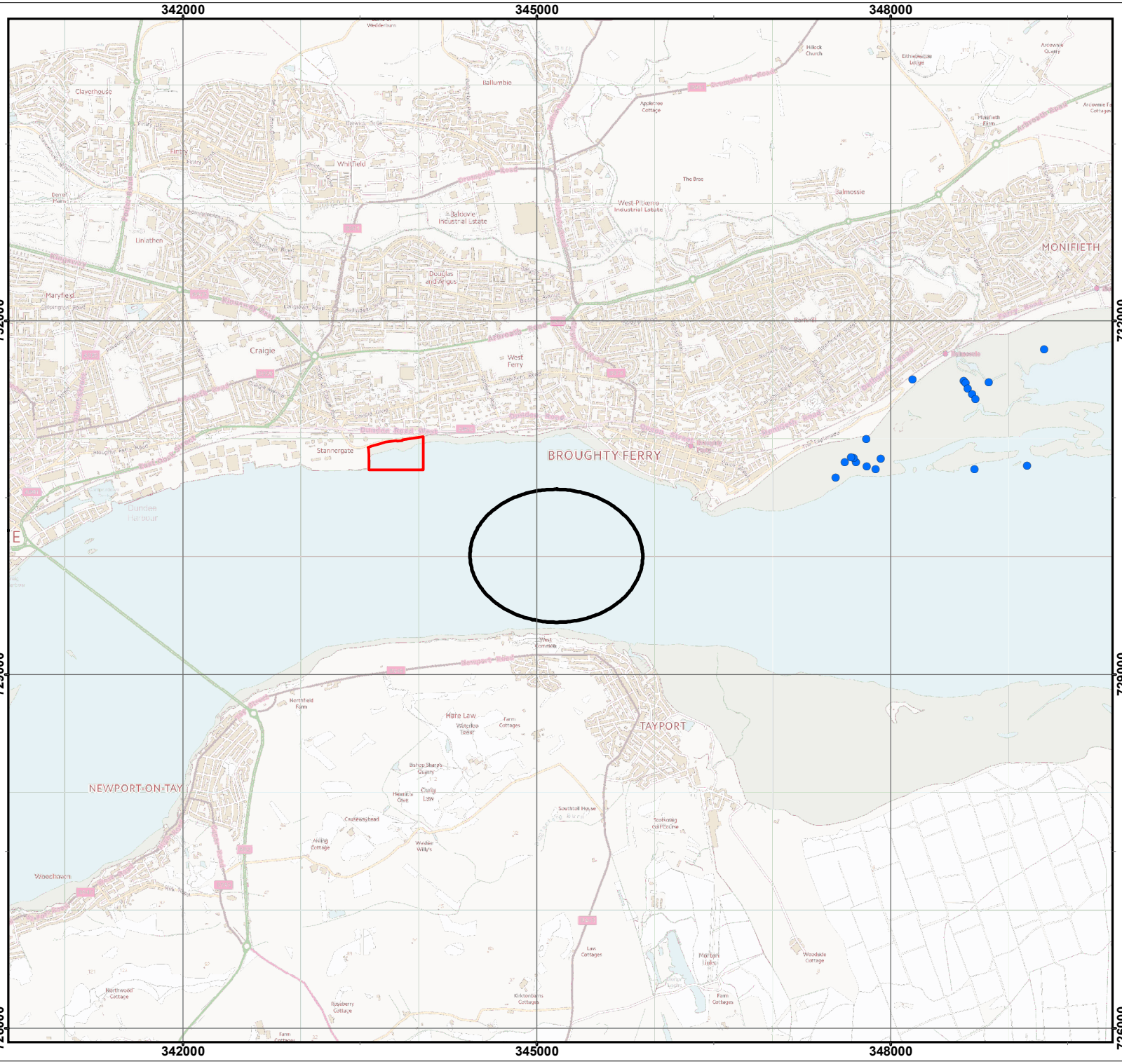

Legend:

- Port of Dundee Expansion Site
- Potential Marine Aggregate Site
- Blue Mussel Beds

Client:	Project:
Scottish Enterprise/ Forth Ports	Port of Dundee Expansion Project

Title: Blue Mussel Beds

Figure:	Drawing No:
9.1	9X5853-009-RH

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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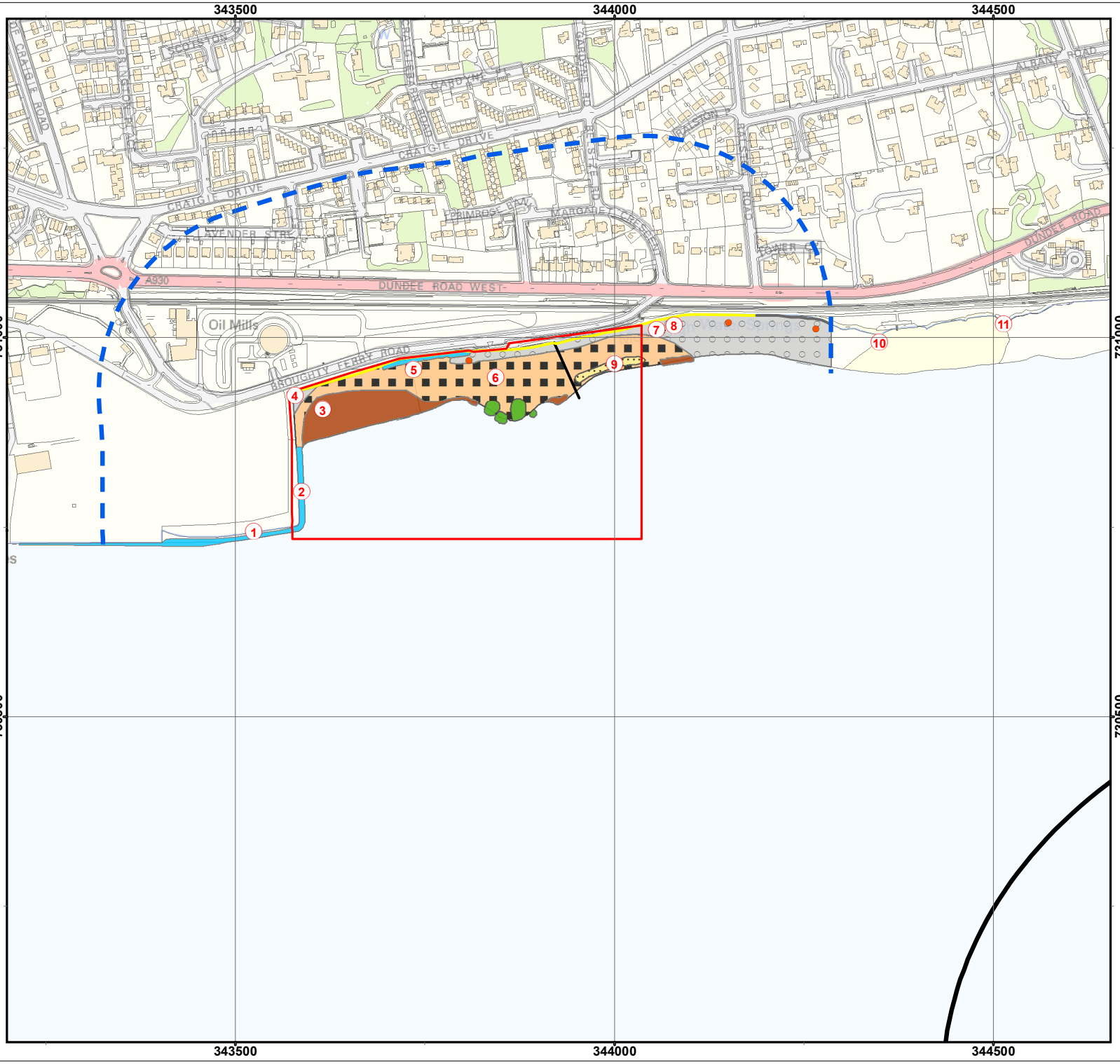

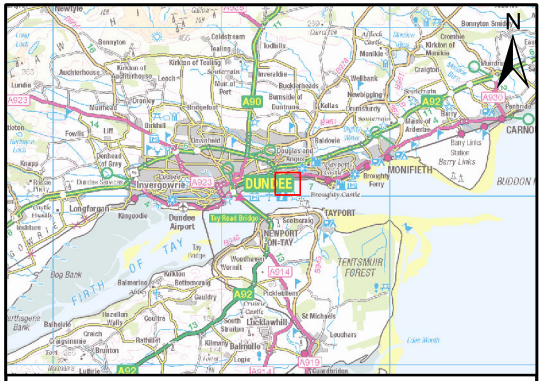

Legend:

- Port of Dundee Expansion Site
- Potential Marine Aggregate Site
- 250m Survey Buffer
- Manhole Cover

Intertidal Survey

- Bedrock Outcrops
- Mudflat
- Pebble/Cobble
- Rock Revetment
- Sand
- Scattered Boulder
- Armoured Water Outflow
- Cliff
- Seawall
- Target Notes

0 100 200
Metres

Client:	Project:
Scottish Enterprise/ Forth Ports	Port of Dundee Expansion Project Intertidal Survey

Title: Intertidal Survey Map

Figure:	Drawing No:
9.2	9X5853-013-RH

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	29/11/2012	R	R	A4	1:7,000

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200000

400000

800000

Faray and Holm of Faray SAC

0 5
Kilometres

Moray Firth SAC

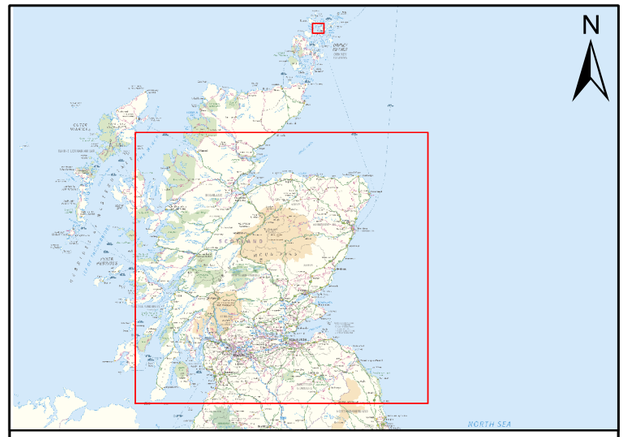
River Tay SAC

Barry Links SAC

Firth of Tay and Eden Estuary SAC

Isle Of May SAC

Berwickshire & North Northumberland Coast SAC



Legend:

- Port of Dundee Expansion Site
- Special Area of Conservation (SAC)

0 25 50
Kilometres

Client:	Project:
Scottish Enterprise/ Forth Ports	Port of Dundee Expansion Project

Title:

Special Areas of Conservation (SAC)

Figure: 11.1 | Drawing No: 9X5853-005-RH

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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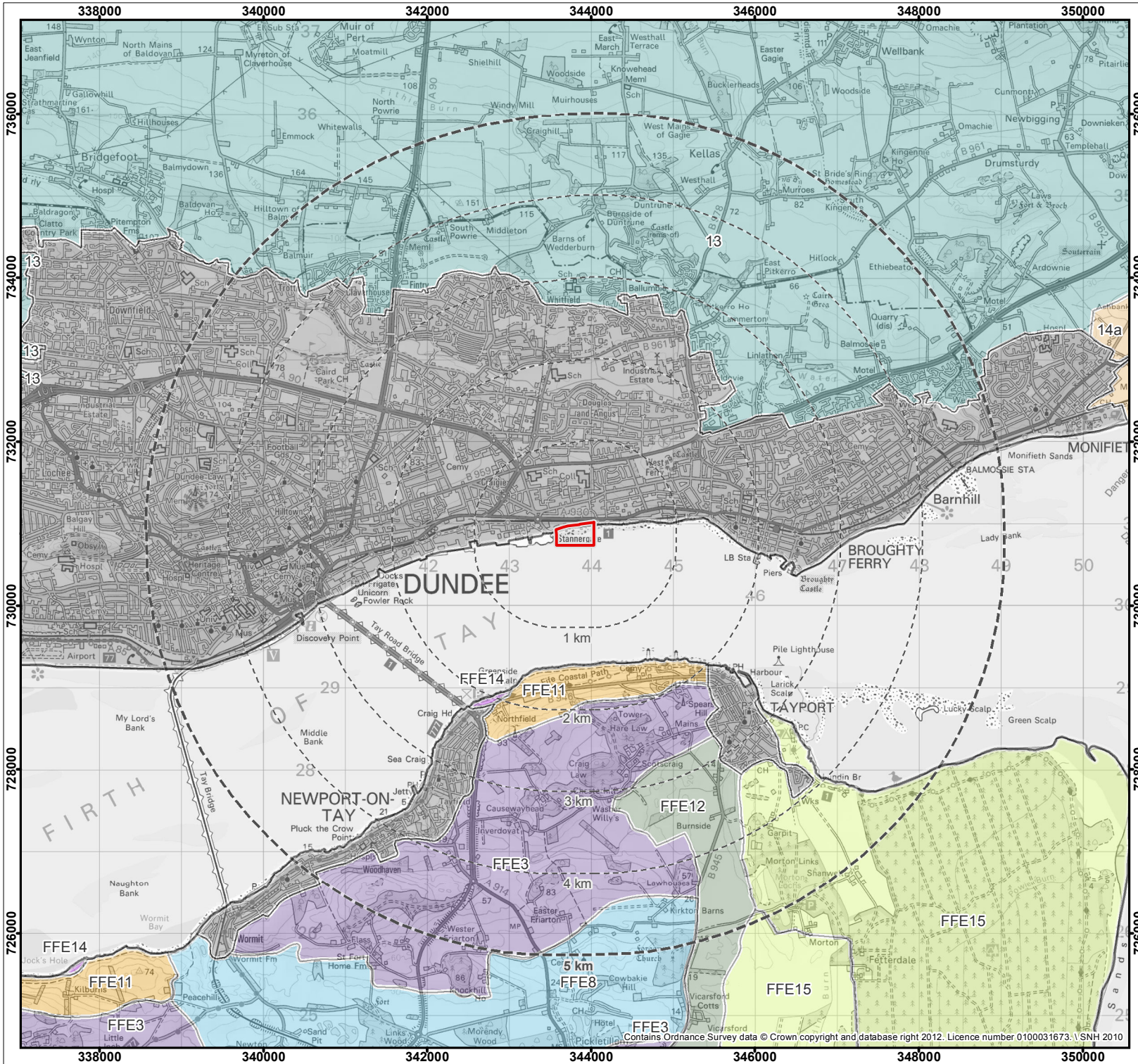

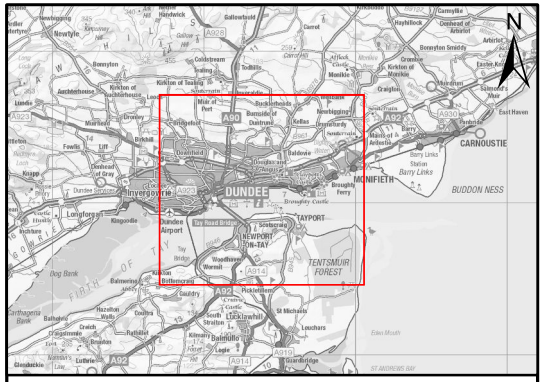

Legend:

Expansion Site

Landscape Character Type:

Fife

- FFE3, Upland Foothills
- FFE8, Lowland Glacial Meltwater Valleys
- FFE11, Coastal Hills
- FFE12, Coastal Terraces
- FFE14, Coastal Braes
- FFE15, Coastal Flats

Tayside

- 13, Dipslope Farmland
- 14a, Coast with Sand

0 1.25 2.5
Kilometres

Client:	Project:
Scottish Enterprise/ Forth Ports	Port of Dundee Expansion Project

Title: SNH Landscape Character Areas

Figure: 1 Drawing No: 5583-001-r0

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
00	22/11/2012	Re	R	A4	1:65,000

Co-ordinate system: British National Grid

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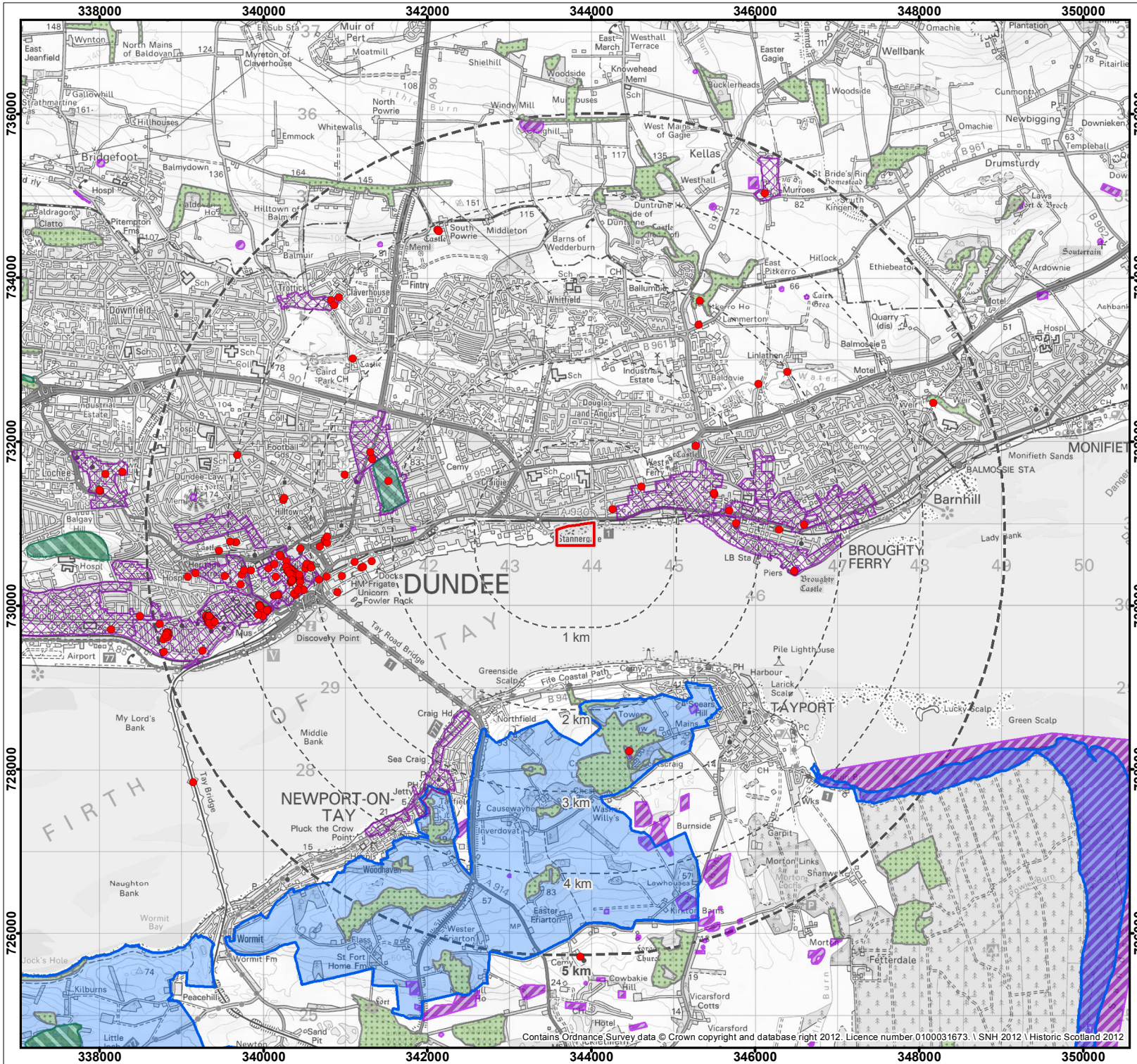

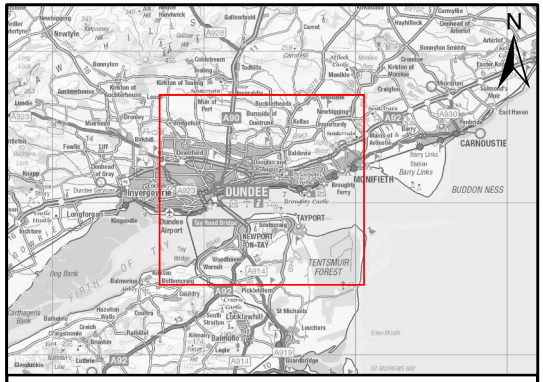

Legend:

- Expansion Site
- Cat. A Listed Building
- Conservation Area
- Scheduled Monument
- Garden or Designed Landscape
- Ancient Woodland
- Fife Local Landscape Area

0 1.25 2.5
Kilometres

Client:	Project:
Scottish Enterprise/ Forth Ports	Port of Dundee Expansion Project

Title: Landscape Designations

Figure: 2 | Drawing No: 5583-003-r0

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
00	22/11/2012	Re	R	A4	1:65,000

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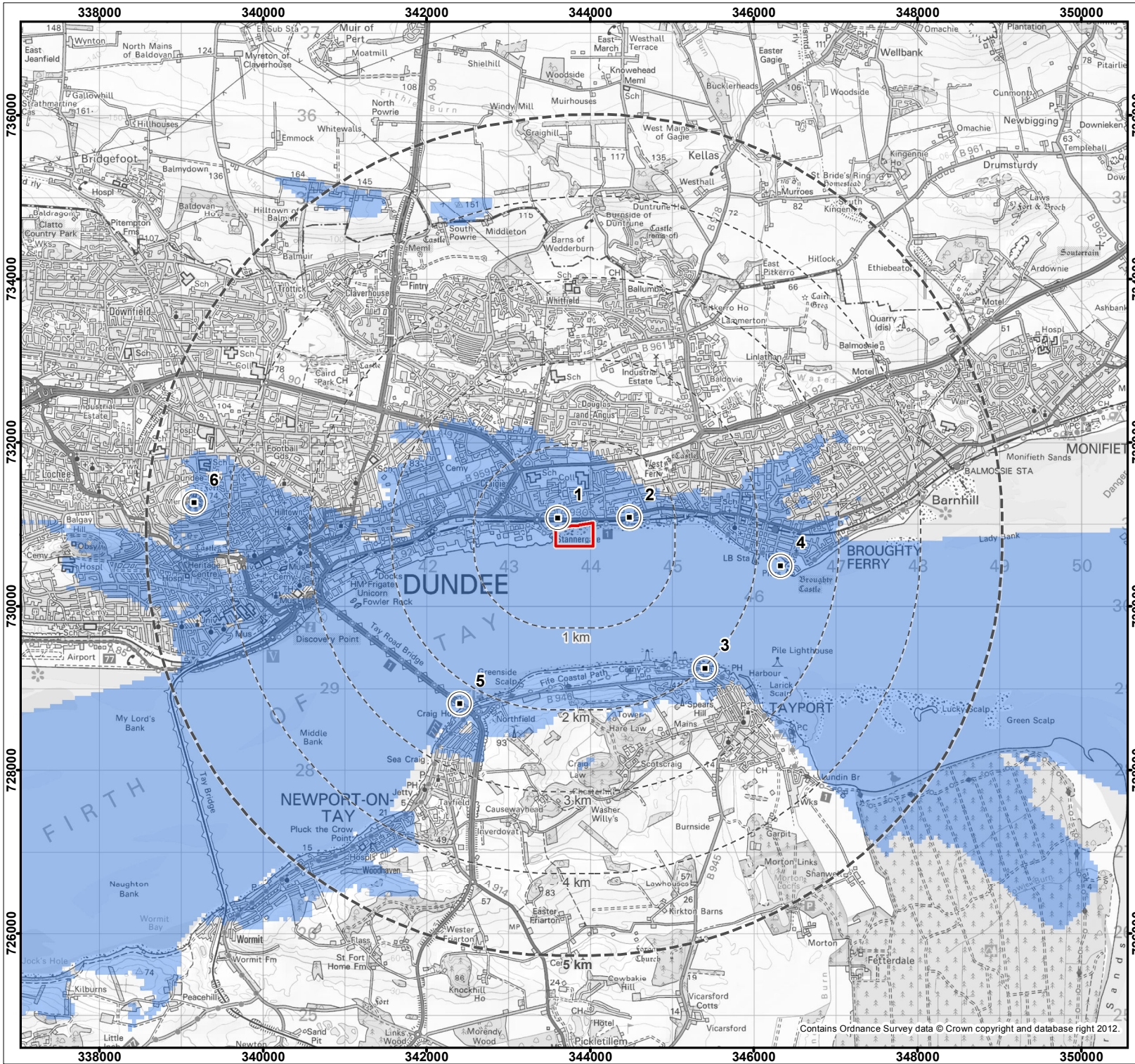

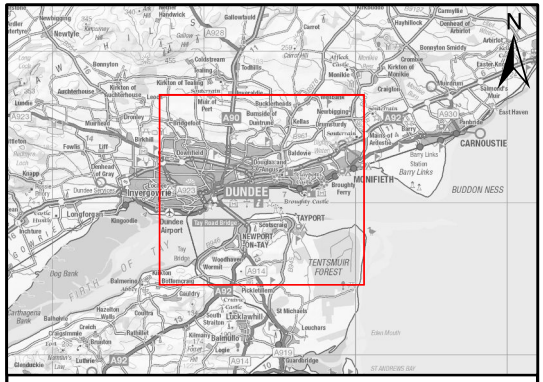

Legend:

- Expansion Site
- Expansion site potentially visible
- Viewpoint Location
  - **1** Dundee Road, A930
  - **2** Dundee Road, A930
  - **3** Fife Coastal Path, Tayport
  - **4** Broughty Ferry Harbour
  - **5** Tay Bridge
  - **6** Dundee Law

Notes:
The ZTV is calculated to development height (6m AOD) from a height of 2m above ground level.
The terrain model is bare ground and derived from OS Panorama height data.
The earth curvature and atmospheric refraction have been taken into account.

0 1.25 2.5
Kilometres

Client:	Project:
Scottish Enterprise/ Forth Ports	Port of Dundee Expansion Project

Title:
Zone of Theoretical Visibility (ZTV) of Dundee Port Expansion

Figure: 3 Drawing No: 5583-001-r1

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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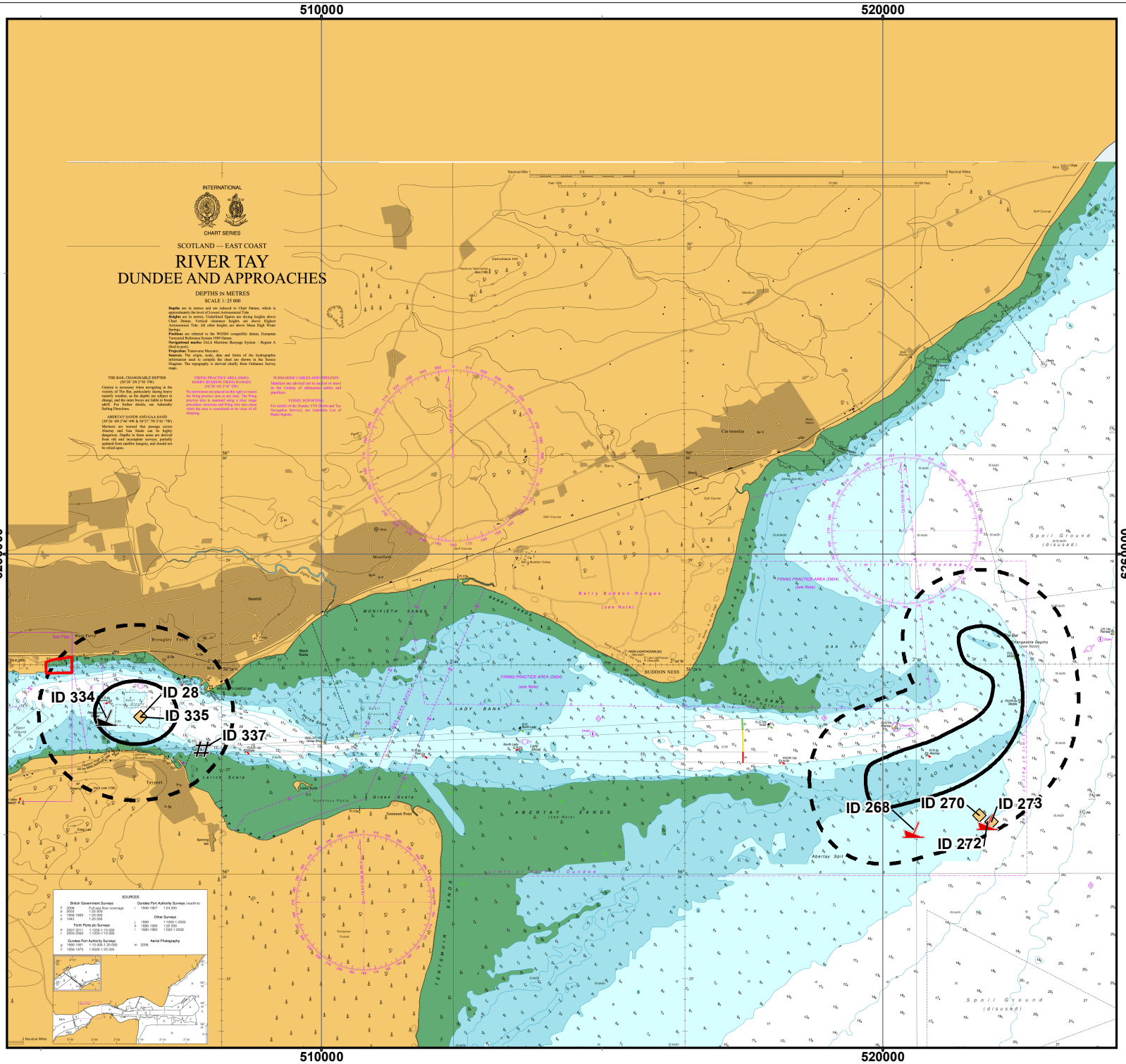

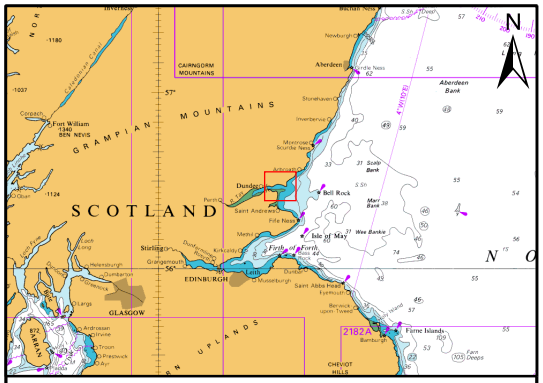

Legend:

- Port of Dundee Expansion Site
- Potential Marine Aggregate Sites 1km Buffer
- Potential Marine Aggregate Sites
- Dangerous Wreck
- Undefined Wreck
- Undefined Obstruction
- Foul Ground/Area

0 2.5 5
Kilometres

Client:	Project:
Scottish Enterprise/ Forth Ports	Port of Dundee Expansion Project

Title:

Known Wrecks and Obstructions within the Firth Extraction Zone Study Areas

Figure:	Drawing No:
19.1	9X5853-012-RH

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01	15/03/2013	R	R	A4	1:95,000

Co-ordinate system: WGS UTM Zone 30N

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APPENDIX A

PORT OF DUNDEE EXPANSION PROJECT

HABITATS REGULATIONS ASSESSMENT SCREENING REPORT

Port of Dundee Expansion

Habitats Regulations Appraisal Screening Report

Scottish Enterprise

June 2013
Final Report
9X5853

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CONTENTS

TABLES

SUMMARY

The proposed Port of Dundee extension project and associated marine aggregate extraction requires Appropriate Assessment (AA) informed by a Habitats Regulations Appraisal (HRA). The HRA screening presented in this document determines if there is potential for a Likely Significant Effect (LSE) on any Special Area of Conservation (SAC) qualifying habitat or species and any Special Protection Area (SPA) qualifying species population arising from the project.

The screening exercise has identified SAC protected marine habitats and species could be affected by the development. These are:

- Estuaries;
- Intertidal mudflats and sandflats;
- Subtidal sandbanks;
- Shifting dunes;
- Dunes with marram;
- Harbour seal;
- Atlantic salmon;
- River lamprey; Sea lamprey; and Bottlenose dolphin.

With respect to the SPA the screening exercise identified three groups of birds could be affected by the development namely:

- Wintering waders and wildfowl in the vicinity of the Stannergate reclamation site;
- Wintering seaduck that forage in the vicinity of the marine aggregate extraction sites; and
- Breeding seabirds that forage in the vicinity of the marine aggregate extraction sites.

The potential for the development to impact on SPA qualifying populations of geese wintering in or migrating through the region was also considered but was concluded to be implausible because none of the areas that are likely to be affected are used by geese species.

It was determined that the areas directly affected by the development, i.e. the port expansion site and potential marine aggregate sites, are outside the boundary of all SPAs. However, the areas affected are close to (<5 km in parts) to the boundary of the Firth of Tay and Eden Estuary SPA and as a result there is likely to be connectivity for some species with this SPA. In addition, for some wide-ranging species, the areas that would be affected are sufficiently close to certain other SPAs for connectivity with these to be also likely, albeit to a lesser extent.

Potential LSEs on SPA qualifying populations were identified by combining information on the known or likely value to a species of the Anticipated Impact Footprints (AIFs), the potential for connectivity between AIFs and SPAs, and the nature and duration of potential impacts.

No potential LSEs were identified on any SPA qualifying population stemming from the effects on wintering waders and wildfowl in the vicinity of the Stannergate reclamation site.

No potential LSEs were identified on any SPA qualifying population stemming from the effects on (breeding) seabirds that may forage in the vicinity of the aggregate extraction sites.

Potential LSEs were identified on the wintering populations of four qualifying species of seaduck (eider, long-tailed duck common scoter and velvet scoter) at the Firth of Tay and Eden Estuary SPA (Table 4.3). These species feed on benthic molluscs, are known (or suspected) to forage at times in reasonably large numbers in the aggregate extraction sites and are likely to have high connectivity with this SPA. In the case of velvet scoter, the conclusion for potential LSE recognises the uncertainty regarding the value of the extraction sites for this species.

Further, it is argued that in the case of eider, long-tailed duck and common scoter, there is the potential for connectivity between the aggregate extraction sites and several other SPAs in the region. On this basis, and recognising the current uncertainty in the strength of any connectivity, it is also concluded that there is potential for LSE on the qualifying species populations at Firth of Forth SPA (all three species), Montrose Basin SPA (eider only) and Ythan Estuary, Sands of Forvie and Meikle Loch SPA (eider only) and Lindisfarne SPA (eider and common scoter only) (Table 4).

The method, and where required professional judgement, used in determining the potential for LSEs are cautious and where there was significant uncertainty potential effects are screened in. The uncertainty could be reduced by more detailed information and were this available it is likely that some of the potential LSEs identified so far would be shown not to have the potential for a LSE on an SPA feature. In particular, more detailed information on the location and duration of marine aggregate extraction and more recent data on the value of the extraction site(s) to birds, especially seaduck species, would enable the potential LSEs identified in this report to be re-examined.

ABBREVIATIONS

AA	Appropriate Assessment
AIF	Anticipated Impact Footprint (this is taken to be either development area at Stannergate or the aggregate extraction sites buffered by up to 1 km)
CIA	Cumulative Impact Assessment
HRA	Habitat Regulations Appraisal
LSE	Likely Significant Effect
MS	Marine Scotland
SNH	Scottish Natural Heritage
SAC	Special Area of Conservation
SPA	Special Protection Area

1 INTRODUCTION

1.1 Aim and Purpose of Report

This report presents the screening exercise undertaken as the first stage of a comprehensive Habitats Regulations Assessment (HRA) that is required for the Port of Dundee Expansion Project and the associated Marine Aggregate Extraction works.

The Habitats Regulations require that where an authority concludes that a development proposal is unconnected with the nature conservation management of a Natura site and is likely to have a significant effect on that site; it must undertake an Appropriate Assessment (AA) of the implications for the qualifying interests for which the area has been designated.

The aim of this report is a clearly defined scope of the aspects to be considered within the HRA and cumulative impact assessment (CIA) which in turn will be used to inform an AA that will be carried out by the Competent Authority.

The purpose of this screening stage is to identify all aspects of the Port expansion project and marine aggregate extraction that would be 'likely' or 'not likely' to result in significant effects on a Natura 2000 Site. This assessment considers the project alone or in combination with other plans or projects, so that they can be eliminated from further consideration within the HRA process. The screening stage also identifies those aspects of the project where it is not possible to discount risk of significant effects on a European site arising from the construction and operation of the Port of Dundee Expansion site and the extraction of marine aggregate from the seabed. Decommissioning does not form part of this project as the Port facility is a permanent long-term development and any future decommissioning work required is likely to be subject to environmental impact assessment under the environmental legislation in force at the time.

Sometimes more than one competent authority may need to undertake an AA of a plan or project or determine if an AA is required. In such circumstances, it may be appropriate for competent authorities to coordinate their roles. In this case, the project at Dundee has two clearly defined construction phase elements, land reclamation by infill, marine aggregate extraction by dredging and potential navigational dredging. It is assumed therefore that the two authorities, Transport Scotland and Marine Scotland (MS), will inform the applicant as to how it is proposed to manage the role of competent authority.

1.2 Likely Significant Effect (LSE)

'Likely', in this context, should not simply be interpreted as 'probable' or 'more likely than not', but rather whether or not a significant effect can objectively be ruled out. Where a plan or project could affect the attainment of a Natura site's conservation objectives, the effects on the site must be considered to be significant. The assessment of that risk must be made in the light of the characteristics of the development and of the Natura 2000 site concerned.

2 HABITATS REGULATIONS ASSESSMENT (HRA)

2.1 The Habitats Directive

The Council Directive on the conservation of natural habitats and of wild fauna and flora (92/43/EEC), generally known as 'The Habitats Directive' requires that certain important habitats and species are given legal protection through a network of protected sites, the Natura 2000 Network.

Under Article 6 of Habitats Directive the competent authority must consider whether a plan or project has the potential to have an adverse effect on the integrity of a Natura 2000 site (including candidate and proposed sites). Natura Sites include all SAC and SPA sites. This process is known as HRA.

Paragraph 3, Article 6 of the Habitats Directive states that:

> *'Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to paragraph 4 (see below), the competent national authority shall agree to the plan or project only having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public'.*

Paragraph 4, Article 6 of the Habitats Directive states that:

> *'If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of social or economic nature, the Member State shall take all compensatory measures to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.*
>
> *Where the site concerned hosts a priority natural habitat type and/or a priority species, the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest'.*

The requirements of the Habitats Directive are transposed into UK law out to territorial water limits (12 nautical miles) by means of several pieces of legislation. In Scotland the EC Habitats Directive is transposed into national law through a combination of the Conservation (Natural Habitats, &c.) Regulations 1994 ("the Regs") and, in relation to reserved matters, the Habitats Regulations 2010.

Under Regulation 48 of "the Regs", 'Appropriate Assessment' is required for a plan or project, which either alone or in combination with other plans or projects, is likely to have a significant effect on a Natura 2000 Site and is not directly connected with or necessary for the management of the site. This forms stage two of the HRA – see below.

Under Regulation 48 (5) of "the Regs" the question is "can it be ascertained that the proposal will **not** adversely affect the integrity of the European site?" This needs to take account of all effects associated with the proposal; in this case including marine aggregate extraction, construction and operational effects.

2.2 Natura 2000 Network

The Birds Directive requires the establishment of Special Protection Areas (SPAs) for birds. The Habitats Directive similarly requires Special Areas of Conservation (SACs) to be designated for species other than birds, and for habitats. Together, SPAs and SACs make up the Natura 2000 network of protected areas.

2.3 Special Areas of Conservation (SAC)

SACs are sites designated under EU Directive 92/43/EEC on the conservation of habitats and of wild flora and fauna (known as the Habitats Directive), because they make a significant contribution to conserving the 189 habitat types and 788 species identified in Annexes I and II of the Directive. Designated SACs on the East coast of Scotland that may be impacted by the Port of Dundee Expansion are noted in Section 3.4.

2.4 Special Protection Areas (SPA)

SPAs are statutory designated sites that are classified under European Union (EU) law in accordance with Article 4 of the European Council (EC) Directive on the conservation of wild birds (2009/147/EC) (known as the Birds Directive). They are classified for rare and vulnerable birds, listed in Annex I to the Birds Directive, and for regularly occurring migratory species. Designated SPAs on the East Coast of Scotland that may be impacted by the Port of Dundee expansion are noted as scoped in Section 3.4.

2.5 Ramsar Sites

The Scottish Government has chosen as a matter of policy to apply the same considerations to the protection of Ramsar sites as if they were classified as SPA (Scottish Office Circular No. 6/1995 (updated June 2000). Therefore, on completion of the HRA a separate conclusion should be drawn for any relevant Ramsar sites.

2.6 HRA - Four Stage Process

HRA is a four stage process, these are defined as:

Stage 1: Screening is the process which initially identifies the likely impacts from a project or plan upon a Natura 2000 Site, either alone or in combination with other projects or plans, and considers whether these impacts may be significant. It is important to note that the burden of evidence is to show, on the basis of objective information, that there will be no significant effect. If the effect may be significant, or is not known, that would trigger the need for an AA. This report forms Stage 1.

Stage 2: AA is the detailed consideration of the impact on the integrity of the Natura 2000 Site of the project or plan, either alone or in combination with other projects or plans, with respect to the attainment of a site's conservation objectives and its structure and function. This is to determine whether there is objective evidence that adverse

effects on the integrity of the site can be excluded. This stage also includes the development of mitigation measures to avoid or reduce any possible impacts.

Stage 3: Assessment of alternative solutions is the process that examines alternative ways of achieving the objectives of the project or plan that would avoid adverse impacts on the integrity of the Natura 2000 Site, should avoidance or mitigation measures be unable to cancel out adverse effects.

Stage 4: Assessment where no alternative solutions exist and where adverse impacts remain. At Stage 4 an assessment is made with regard to whether or not the development is necessary for imperative reasons of overriding public interest (IROPI) and, if so, of the compensatory measures needed to maintain the overall coherence of the Natura 2000 network.

This report has been developed to demonstrate to (Transport Scotland and Marine Scotland) as the competent authorities the process which 'the applicant', has adhered to in order to comply with Stage 1 of the HRA process.

Where priority habitats or species are present, the imperative reasons need to be

> "…reasons relating to human health, public safety or beneficial consequences of primary importance to the environment, or other reasons which in the opinion of the European Commission are imperative reasons of overriding public interest",

whereas for non-priority habitats and species, imperative reasons of a social or economic nature may be acceptable, as long as they are considered sufficient to over-ride the harm to the site.

2.7 Screening the HRA Issues

'Screening' is a term used to describe the initial stage of the Habitats Regulations Appraisal. It is not a term that is used in the Directive or Regulations. The screening stage allows for thorough consideration of all SACs or SPAs and their interest features where likely significant impacts can be expected to occur, where impacts are very unlikely and where impacts are uncertain but potentially could be significant.

The purpose of the screening stage is to:

a) identify all aspects of the plan which would not be likely to have a significant effect on a Natura 2000 site, either alone or in combination with other aspects of the same plan or other plans or projects, so that they can be eliminated from further consideration; and
b) Identify those aspects of the plan where it is not possible to rule out the risk of significant effects on a Natura 2000 Site, either singly or in combination with other plans or projects. As a result, the screening stage should aim to provide a clear scope for the parts of the plan that will require 'Appropriate Assessment'.

2.8 Source-Pathway-Receptor Approach

By adopting the 'source-pathway-receptor' approach it is possible to consider the potential for a Likely Significant Effect (LSE) on the features of each relevant Natura 2000 site to arise during project construction and operation. Tabulating findings

wherever possible, the screening process identifies for each relevant designated site and its features:

- The SOURCE of the impact (e.g. construction works);
- The PATHWAY for the impact (the route the source takes to reach the receptor, e.g. physical loss of habitat, disturbance such as noise and vibration, etc.); and
- The RECEPTOR (if an impact is to cause harm, it must reach a receptor, e.g. marine mammal, fish or bird species, or coastal and marine habitats).

For an LSE to occur, an impact must have a source and also a clear linking pathway and a negative impact upon the receptor.

There is little guidance for project related HRA in Scotland, the most recent Government policy relating to HRA can be found in Planning Circular 1/2009: Development Planning Appendix 1: The Habitats Regulations (August 2010).

2.9 Cumulative Impact Assessment (CIA)

The assessment of potential significant effects of a development upon a Natura 2000 Site calls for the impact of the proposed development to be considered alone and 'in combination' with other developments. As a result this in combination or cumulative impact assessment is an important element within the HRA process.

2.10 Geographical Context of Proposed Expansion Project

The Port of Dundee expansion site is located within the Firth of Tay and Eden Estuary SAC, which means that the development has the potential to be constrained by the presence of European designated habitats of conservation importance. With respect to the expansion site there is potential to impact upon species and assemblages of a number of qualifying features (e.g. marine mammals and birds) of other Natura sites within the zone of influence.

There are currently two potential marine aggregate extraction sites; one located within the River channel close to the expansion site, and therefore within the SAC; the other is located at the Port limit east of the mouth of the estuary outside the boundaries of the SPA and SAC. It is recognised that the potential marine extraction sites also have the potential to impact qualifying habitats and species from a number of other Natura sites.

The Ramsar site boundary is the same as the SPA boundary and may also be to be affected by the location of the marine extraction site.

2.11 Consultation on HRA

Consultation is important in respect of gaining views on the proposed expansion project, taking account of those views and any concerns raised and addressing them within the final consent and licence applications, gaining wider understanding and helping to facilitate the process of obtaining the required permissions, licenses and consents. Consultation has been initiated early in the pre-scoping phase of the Port of Dundee Expansion particularly, in relation to marine mammal issues, with MS and SNH. These discussions have been used to shape the Scoping Study (Royal HaskoningDHV, 2012).

2.12 Natura Sites – The Process of SAC and SPA Identification

The process of SAC and SPA identification commenced during the pre-scoping process. Consultation with MS and SNH identified the need for the Environmental Impact Assessment (EIA) to assess impacts on coastal processes and marine mammals at a regional scale, and on the integrity of the Natura 2000 Sites.

2.13 Appropriate Assessment Approach

To decide whether an Appropriate Assessment may be required, the following information has been taken into account when considering qualifying features:

- Geomorphological conservation importance;
- Contribution to the function of the Natura site;
- Species conservation importance;
- Current conservation status;
- Numbers recorded within the zone of influence;
- Proximity of breeding colonies;
- Temporal-spatial distribution of animals/birds within regional waters;
- Habitat association patterns within the zone of influence and adjacent waters; and
- Foraging dynamics (the distribution and seasonal abundance of prey species within regional waters).

3 HRA SCREENING OF SPECAIL AREAS OF CONSERVATION (SAC)

3.1 Relevant Special Areas of Conservation

This section provides a general description of each of the relevant SAC and specifically focuses on the qualifying interest features that have been identified as having the potential to be affected by the Port Expansion. The list of relevant SACs[1] to be considered within this HRA screening is:

- Firth of Tay and Eden Estuary Marine SAC;
- River Tay SAC;
- Barry Links SAC;
- Berwickshire and North Northumberland SAC;
- Isle of May SAC;
- Faray and Holm of Faray SAC, and
- Moray Firth SAC.

3.1.1 Firth of Tay and Eden Estuary Marine SAC

The Firth of Tay & Eden Estuary Marine SAC is designated for Annex II species, harbour seals (*Phoca vitulina*), which are a primary reason for selection of this site. The other qualifying interests are estuaries, mudflats and sandflats not covered by seawater at low tide and sandbanks which are slightly covered by seawater all the time (subtidal)

The Firth of Tay & Eden Estuary are two high-quality estuarine areas considered together as one functional unit in the SPA and SAC designations. The Tay is the least-modified of the large east coast estuaries in Scotland, while the Eden is a relatively small estuary located between the Firth of Tay to the north and the Firth of Forth to the south. The inner parts of the estuaries are largely sheltered from wave action, while outer areas, particularly of the Tay, are exposed to stronger tidal streams, giving rise to a complex pattern of erosion and deposition of the sandbank feature at the mouth of the Firth. The Eden estuary is predominantly muddy in nature, although towards the mouth, the substrate becomes increasingly sandy.

The sediments within the SAC support biotopes that reflect the gradients of exposure and salinity, and are typical of estuaries on the east coast of the UK. The abundance, distribution and composition of the associated plant and animal communities are ecologically representative of northern North Sea estuaries.

The Firth of Tay & Eden Estuary supports a nationally important breeding colony of harbour seal; part of the east coast population of harbour seals (*Phoca vitulina*) that typically utilise sandbanks. The most recent estimate for the Firth of Tay and Eden Estuary SAC population is 172 (95% Confidence Interval (CI) 141-230), based on corrected haul out counts from 2010. The Firth of Tay population has declined by around 85% over the last 10 years (SCOS, 2011). The cause of these local declines is not yet known but possible causes include; disease, predation, competition with grey seals, declines in important prey species and anthropogenic mortality. Investigations into some of these factors are continuing (SCOS, 2011).

[1] The SACs and SPAs are shown on Figures 8.1 and 11.1.

SNH has provided statutory advice under Regulation 33(2), which identifies those operations either on or affecting the SAC, which may cause deterioration of the marine natural habitats or the habitats of species, or disturbance of species, for which the site has been designated.

3.1.2 River Tay SAC

The River Tay SAC is designated for Annex II species, Atlantic salmon (*Salmo salar)*, which is a primary reason for selection of this site.

The SAC supports a high-quality Atlantic salmon population, with rod catch returns showing that the Tay is consistently one of the top three salmon rivers in Scotland. The Tay drains a very large catchment, and has the greatest flow of all UK Rivers. There is considerable ecological variety in the Tay catchment, resulting in the Tay supporting the full range of salmon life-history types found in Scotland, with adult salmon entering the River Tay throughout the year to spawn in different parts of the catchment[2].

The SAC also comprises Annex II species, river lamprey (*Lampetra fluviatilis*), brook lamprey (*Lampetra planeri*) and sea lamprey (*Petromyzon marinus*) and otter that are present as a qualifying feature but not a primary reason for site selection.

The clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels (oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetae*) are also listed as qualifying features. These are out of the zone of influence of the project. It will, however, be necessary to consider freshwater pearl mussels (*Margaritifera margaritifera*) and it is anticipated that this will be picked up when considering the Atlantic salmon.

3.1.3 Barry Links SAC

Barry Links SAC overlaps with the Firth of Tay and Eden Estuary SPA; the Annex 1 habitats are the primary reason for selection of this site. With respect to the project the embryonic shifting dunes and the shifting dunes along the shoreline are most likely to be affected by changes in coastal processes. However, the dune system as a whole must be taken into consideration.

The Barry Links SAC qualifying interests are:

Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)*	- Coastal dune heathland
Embryonic shifting dunes	- Shifting dunes
Fixed dunes with herbaceous vegetation (“grey dunes”)*	- Dune grassland
Humid dune slacks	- Humid dune slacks
Shifting dunes along the shoreline with *Ammophila arenaria* (“white dunes”)	- Shifting dunes with marram

Note: Coastal dune heath and humid dune slack are classified as priority habitat.

[2] http://jncc.defra.gov.uk/protectedsites/sacselection/sac.asp?EUCode=UK0030312 Accessed 14/12/2012

The links are also designated as a SSSI for coastal geomorphological features.

3.1.4 Berwickshire and North Northumberland SAC

The Berwickshire and North Northumberland SAC is designated for grey seal. The other qualifying interests are mudflats and sandflats not covered by seawater at low tide, large shallow inlets and bays, reefs, and submerged or partially submerged sea caves. Within this SAC the main breeding colonies for grey seal are the Farne Islands, and at Fast Castle, to the northern boundary of the SAC. The only potential connectivity of interest with this SAC is considered to be grey seal, which is discussed further in this report.

3.1.5 Isle of May SAC

The Isle of May SAC is designated for grey seal, and inshore sublittoral rock (marine) reefs. Numbers of pups born on the Isle of May have been relatively stable since the late 1990s, at around 2000 pups. The Isle of May SAC overlaps with the Forth Islands SPA; however the Forth Islands SPA is not relevant to the proposed marine aggregate extraction site or the Port of Dundee expansion. The only potential connectivity of interest with this SAC is considered to be grey seal which is discussed further in this report.

3.1.6 Faray and Holm of Faray SAC

Faray and Holm of Faray SAC is designated for grey seal. It is a pair of inhabited islands in Orkney that contributes approximately 9% of the annual pup production. Although this SAC is spatially separated from the development site grey seal are wide ranging outside the breeding season. This SAC is presented for consideration in this initial screening exercise.

3.1.7 The Moray Firth SAC

The Moray Firth SAC is designated for Annex II species, bottlenose dolphin which are a primary reason for selection of this site. Other qualifying interests are inshore sublittoral sediment (marine); subtidal sandbanks.

The SAC is situated in the north-east of Scotland and it supports the only known resident bottlenose dolphin population in the North Sea. The most recent estimate of the Scottish east coast bottlenose dolphin population is 195 (95% HPDI 162-253) from 2006 (Cheney et al., 2012). Dolphins are present all year round, and, while they range widely in the Moray Firth, they appear to favour particular areas within the inner firth. Although this population is often considered resident in the Moray Firth, it is known that animals from this population regularly use other areas including the Firth of Tay (Wilson et al., 2004, Quick and Janik 2008 Thompson et al., 2011; Cheney et al., 2012).

3.2 SAC Habitats and Species which require screening for Appropriate Assessment

The features requiring Appropriate Assessment Screening based on qualifying species and habitats included within the SAC's listed above are as follows:

Habitats:

- Intertidal mudflats and sandflats;
- Subtidal sandbanks;
- Estuaries (sub-features listed below);
- Clear-water lochs with aquatic vegetation and poor to moderate nutrient levels;
- Reefs; and
- Ligotrophic to mesotrophic standing waters with vegetation.

Species:

- Harbour seal (*Phoca vitulina*);
- Grey seal (*Halichoerus grypus*);
- Bottlenose dolphin (*Tursiops truncatus*);
- Atlantic salmon (*Salmo salar*);
- Sea Lamprey (*Petromyzon marinus*);
- River Lamprey (*Lampetra fluviatilis*);
- Brook Lamprey (*Lampetra planeri*); and
- Otter (*Lutra lutra*);

3.3 Relevant Special Protection Areas

The Firth of Tay & Eden Estuary SPA (hereafter referred to as the Tay SPA), which is located on the east coast of Central Scotland and is a complex of estuarine and coastal habitats, is considered to be relevant to the HRA. The 'Tay' SPA stretches from the mouth of the River Earn in the inner Firth of Tay east to Barry Sands on the Angus coast and St Andrews on the Fife coast, an area of 6,923.29ha.

The Tay SPA includes extensive invertebrate-rich intertidal flats and areas of reedbed, saltmarsh and sand dune. The following SSSIs are contained within the SPA: Inner Tay estuary, Monifieth Bay, Barry Links, Tayport-Tentsmuir Coast and Eden Estuary.

For much of its length the main channel of the Tay lies close to the southern shore of the Firth and the most extensive intertidal flats are on the north side, west of Dundee. In Monifieth Bay, to the east of Dundee, the substrate becomes sandier and there are also Mussel (*Mytilus edulis)* beds (these are listed as sub-features in the Firth of Tay & Eden Estuary SAC). The south shore consists of fairly steeply shelving mud and shingle. The Inner Tay Estuary is particularly noted for the continuous dense stands of common reed (*Phragmites australis)* along its northern shore. These reedbeds, inundated during high tides, are amongst the largest in Britain. Eastwards, as conditions become more saline, there are areas of saltmarsh, a relatively scarce habitat in eastern Scotland.

The site is of importance for regularly supporting breeding populations of the Annex 1 species marsh harrier (*Circus aeruginosus*), and little tern (*Sternula albifrons*) and an internationally important wintering population of Annex 1 species bar-tailed godwit (*Limosa lapponica*).

In winter the SPA regularly supports over 20,000 waterfowl, comprising wildfowl and waders. This assemblage includes:

- Internationally important wintering populations of redshank*,* pink-footed goose and greylag goose*; and*
- Nationally important wintering populations of cormorant, shelduck, eider, long-tailed duck, common scoter, velvet scoter, goldeneye, red-breasted merganser, goosander, oystercatcher, grey plover, sanderling, dunlin and Icelandic black-tailed godwit*.*

As with the SACs the purpose of this screening report is to anticipate whether or not there is a risk that the port expansion and associated dredging activities will have potential for causing a likely significant effect on the integrity of the SPA and to conclude whether the site and qualifying species require AA.

It is anticipated that consultation with SNH will lead to the agreement over which SPA populations are potentially affected. It is suggested that the geographical range of influence for each species is considered on a case-by-case basis according to the species' ranging behaviour and seasonal movements. The SPA screening exercise is described in Section 4 of this report.

3.4 Potential effects of the Port of Dundee Expansion and Associated Marine Aggregate Extraction

In their Advice under Regulation 33(2) SNH has identified a number of operations of which the following are relevant to this project:

- Coastal development
    - civil engineering;
- Marine development
    - aggregate extraction;
    - maintenance dredging;
- Marine traffic;
    - Commercial vessels.

The potential effects link to the different activities or phases of the proposed development works. These include the:

- Dredging and vessel movements associated with the marine extraction works and port activities;
- Reclamation operations at the port;
- Navigational dredging; and
- Operation of the site.

The HRA considers likely significant impacts arising from the two central phases of the port expansion project; i.e. construction and operation and also the marine aggregate extraction. The expansion site will not be decommissioned its use will simply change to meet market needs; e.g. from marine renewables development to marine renewables support/general port use.

The potential effects that may lead to deterioration of qualifying habitats and communities are listed below. A number has been assigned to each type of impact

(Ref: Table 3-1) to indicate the potential effects associated with each qualifying feature. These numbers are then utilised in the screening process (Ref: Table 3-3).

Table 3-1: List of potential environmental impacts associated with the proposed expansion project

No.	Potential Impact associated with civil engineering and marine development
1	Noise and vibration impacts from vessel operation, piling and construction/infilling works.
2	Visual disturbance from vessels, humans and other elements during breeding, pupping and moulting seasons.
3	Injuries to marine mammals from vessels.
4	Reduced water quality, including:
	a) increased suspended solids from dredging and infilling works;
	b) reduced dissolved oxygen from dredging, piling and aggregate deposition (infilling works); and
	c) possible release of contaminants from spillages and leaks.
5	Physical obstruction and/or severance.
6	Changes to coastal processes – sediment erosion and deposition, changes to flow and wave climate. (Which could alter the sediment characteristics of areas adjacent to marine aggregate extraction and their associated plant and animal communities.)
7	Permanent habitat loss.
8	Changes to hydrology; (terrestrial rivers and drainage).
9	Lighting effects.
10	Effects linked to timing, frequency and duration of activities.

3.5 SAC Screening Outcome

The screening exercise is summarised in Table 3.2 below where the features of the relevant SACs that will be taken forward for further consideration and those that can be screened out have been identified.

From the EIA scoping study onwards, based on the environmental assessments made, it is considered unlikely that there will be significant effects upon brook lamprey or otter within the freshwater rivers and therefore appropriate assessment for these features is unlikely to be needed.

Table 3-2: Summary of SAC habitats and species that may require Appropriate Assessment

Natura 2000 Sites	Feature for which AA may be required
Firth of Tay & Eden Estuary SAC	Harbour seal Estuaries Intertidal mudflats and sandflats Subtidal sandbanks
River Tay SAC	Atlantic salmon River lamprey Sea lamprey,
Moray Firth SAC	Bottlenose dolphin
Barry Links SAC	Shifting dunes Shifting dunes with marram

Table 3-3: HRA Screening Process for SACs

(Green = scoped out; Orange = scoped in for further consideration)

Natura 2000 Site Name	Natura 2000 Site Features	Species or features of interest	Seasonality and Key Characteristics of Feature	LSE Yes/ No	Justification notes	Inclusion in HRA Yes/No	SNH Agreement Y/N
Firth of Tay & Eden Estuary SAC							
Firth of Tay & Eden Estuary SAC	Harbour seal *Phoca vitulina* Annex II species that are a primary reason for selection of this site	Harbour seal *(Phoca vitulina)*	Population status – Unfavourable declining Harbour seal are the characteristic seal of sandflats and estuaries, but are also found on rocky shores in Scotland. As pups swim almost immediately after birth, seals can breed on sheltered tidal areas where banks allow access to deep water. Seals may range widely in search of prey, but individuals often return to favoured haul-out sites. The breeding season is from June – August inclusive. The population in the Firth of Tay is in serious decline.	Yes	Potential impacts: 1; 2; 3; 4a, 4b & 4c; 5; 7; 9; and 10. Relevant only during short construction phase only. The harbour seal is an important feature of the SAC with respect to the HRA and will require a full assessment of potential impacts. The Port of Dundee expansion project and associated marine aggregate extraction will include dredging, piling and other construction operations which may create noise impacts. This has the potential to affect seal foraging behaviour and cause potential injury. The decline in the harbour seal population is under investigation. The seals are not confined within the SAC	Yes	Yes

Natura 2000 Site Name	Natura 2000 Site Features	Species or features of interest	Seasonality and Key Characteristics of Feature	LSE Yes/ No	Justification notes	Inclusion in HRA Yes/No	SNH Agreement Y/N
					itself, and will forage widely in the surrounding waters and further afield. Underwater noise, from construction and vessel movements are likely to extend beyond the boundaries of the site and may overlap with important transit and foraging areas. Indirect effects on important prey species, either from the placement of infrastructure or disturbance from Underwater noise, could also affect the survivorship and productivity of the SAC population. This note also reflects the advice received from SNH.		
Firth of Tay & Eden Estuary SAC	Estuaries Annex I habitats that are a primary reason for selection of this site:	Estuaries: Sub-features - When undertaking an appropriate assessment of impacts at a site, all features of European importance (both	Habitats favourable maintained A population of the nationally rare fish, sparling, exists in the Firth of Tay.	Yes	1; 4; 5 and 10. Relevant to construction and operation phases of the project. Further consideration required as the marine extraction works, reclamation and operation of the expansion site may indirectly impact the estuary and the sub-features listed.	Yes	Yes

Natura 2000 Site Name	Natura 2000 Site Features	Species or features of interest	Seasonality and Key Characteristics of Feature	LSE Yes/ No	Justification notes	Inclusion in HRA Yes/No	SNH Agreement Y/N
		primary and non-primary) need to be considered.					
		Edible mussel *Mytilus edulis*	Mussel reef are present in the SAC	Yes	4a, 4b, & 4c; 6; and 7. Relevant to construction and operation phases of the project.	Yes	
		Mudflats	Extensive mudflats with large numbers of mud-dwelling invertebrates	Yes	4a, 4b, & 4c; 6; and 7. Relevant to construction and operation phases of the project	Yes	
		Reedbeds		No	Extensive reedbeds occur in the inner Firth of Tay well away from the effects of this proposal.	No	
		Saltmarsh		No	Saltmarsh communities around the fringes of both estuaries away from any effects of this proposal.	No	
		Eelgrass (*Zostera angustifolia)*		Yes	Sparse beds occur in both estuaries, this will require further investigation	Yes	
		Eelgrass (*Zostera noltii)*		Yes	Eelgrass beds occur in the inner estuary. Will require further investigation.	Yes	

Natura 2000 Site Name	Natura 2000 Site Features	Species or features of interest	Seasonality and Key Characteristics of Feature	LSE Yes/ No	Justification notes	Inclusion in HRA Yes/No	SNH Agreement Y/N
Firth of Tay & Eden Estuary SAC	Mudflats and sandflats not covered by seawater at low tide Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site	Intertidal Mudflats & Sandflats	Favourable maintained	Yes	4a, 4c, 6, 7 & 10 Relevant to construction and operation phases of the project. Further consideration required as there is a limited area of mudflat within the footprint of the expansion site which requires to be placed in context. The small area of mudflat will be subject to direct impact from the construction and operation of the project.	Yes	Yes
Firth of Tay & Eden Estuary SAC	Sandbanks which are slightly covered by Seawater at all times. Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site	Subtidal sandbanks	Favourable maintained	Yes	4a, 4c, 6, 7 & 10. Relevant to construction and operation phases of the project. Further consideration required as the marine aggregate extraction, reclamation/construction and operation of the expansion site may directly or indirectly impact the site feature. This position also reflects the advice received from SNH.	Yes	Yes

Moray Firth SAC							
Moray Firth SAC	Bottlenose Dolphins *Tursiops truncatus* Annex II species that are a primary reason for selection of this site	Bottlenose dolphin *(Tursiops truncatus)*	Population Status - Unfavourable recovering The Moray Firth in north-east Scotland supports the only known resident Bottle Nose Dolphin population in the North Sea. The population is estimated to be around 195 individuals (Cheyney et al., 2012).Dolphins are present all year round, and, while they range widely in the Moray Firth, they appear to favour particular areas.	Yes	1; 2; 3; 4a-c; 5; 6; 10. Relevant to the construction phase of the project. It is well established that bottlenose dolphin are wide-ranging and individuals from the Moray Firth SAC may be found in the waters of the Firths of Forth and Tay. JNCC advise that they travel regularly to St Andrews Bay and that their movements are likely to be close to the coast. The assessment of vessel movement during construction and operation will require consideration. Construction (and other) noise arising from the project may to extend beyond the boundaries of the marine extraction and the expansion sites. This may in turn impact the behaviour of prey species. Displacement, noise disturbance and collision risk will be assessed for the construction activities.	Yes	Yes

Moray Firth SAC							
Moray Firth SAC	Inshore Sublittoral Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site sandbanks which are slightly covered by sea water all the	Subtidal sandbank habitat	Favourable maintained	Yes	4a, 4c, 6, 7 & 10 No further consideration required as there is limited potential for connectivity between the site feature and the construction and operation of the project.	No	No
River Tay SAC							
River Tay SAC	Atlantic salmon *(Salmo salar)* Annex II species that are a primary reason for selection of this site	Atlantic salmon *(Salmo salar)*	Population Status – favourable Migratory pathways interconnectivity	Yes	1; 2; 4a-c; 5; 6; 10. Relevant to the construction phase of the project. There could be connectivity between the Port of Dundee expansion project and the River Tay SAC. The effects of construction and operational noise / vibration, as well as any other types of disturbance on the fish which are the qualifying feature, will be assessed. There is the possibility of secondary indirect impacts on pearl mussels which will be addressed through consideration of the migratory salmon.	Yes	Yes

River Tay SAC							
River Tay SAC	Brook lamprey *(Lampetra planeri)* Annex II species that are present as a qualifying feature but not a primary reason for site selection	Brook lamprey *(Lampetra planeri)*	Population status – favourable No Connectivity	No	No further consideration required as there is limited potential connectivity between the site feature and likely significant impacts of the construction and operation of the proposed Port expansion developments. This position also reflects the advice received from JNCC & SNH.	No	No
	River lamprey *Lampetra fluviatilis* Annex II species that are present as a qualifying feature but not a primary reason for site selection	River lamprey *(Lampetra fluviatilis)*	Population status – favourable Migratory pathways interconnectivity	Yes	1; 2; 4 a-c; 5; 6; & 10. Relevant to the construction phase of the project. There could be connectivity between Port expansion proposal and the River Tay SAC. The effects on these fish from	Yes	Yes

River Tay SAC							
River Tay SAC	Sea lamprey Annex II species that are present as a qualifying feature but not a primary reason for site	Sea lamprey *(Petromyzon marinus)*	Population status – favourable Migratory pathways interconnectivity	Yes	1; 2; 4 a-c; 5; 6; & 10. Relevant to the construction phase of the project. There could be connectivity between the Port expansion proposal and the River Tay SAC MS (Malcolm et. al).review. The effects on these fish of construction and operational noise / vibration, as well as any other types of disturbance will be assessed.	Yes	Yes

River Tay SAC							
River Tay SAC	Otter Annex II species that are a primary reason for selection of this site	Otter *(Lutra lutra)*	Population status – favourable No connectivity	No	There is no potential connectivity between the site feature and likely significant impacts of the construction and operation of the proposed Port expansion development or the extraction operations. The otter in the vicinity of the expansion and extraction sites are unlikely to be part of the River Tay SAC population. This location does not offer suitable otter holt habitat. NB: Otter is a European Protected Species. If holts/resting places are located within the development site a licence will be required. This position also reflects the advice received from JNCC & SNH.	No	

River Tay SAC							
River Tay SAC	Standing open water and canals Annex I habitats that are a primary reason for selection of this site	Clear water lochs	Status – favourable No connectivity	No	No further consideration required as there is limited potential connectivity between the site feature and likely significant impacts of the construction and operation of the proposed Port of Dundee expansion development.	No	

Isle of May SAC							
Isle of May	Grey seal Annex II species that are a primary reason for selection of this site	Grey seal (*Halichoerus grypus)*	Favourable maintained To avoid significant disturbance to the qualifying species. Maintain the population of the species as a viable component of the site; maintain distribution within the site and extent of habitats supporting the species. Grey seals breeding from October to December.	No	The Isle of May is some distance from the marine extraction site; it is unlikely that there will be overlap impact footprints from the development and any activity that can cause disturbance at the SAC. Grey seals are known to forage and disperse over wide areas and significant distances outside of the breeding season and are likely to come within the zone of influence of marine aggregate extraction works. However during the breeding season, (when impacts on the SAC are of particular concern) the spatial separation between the extraction site and the SAC should prevent any likely significant impacts. It is unlikely that grey seals will be impacted by the reclamation works at the expansion site.	No	
Isle of May	Inshore sublittoral rock (marine)	Reefs	Favourable maintained	No	The reef interest is not considered further in this assessment as the reclamation and marine extraction works will have no impact on this feature as it is some distance from the proposed sites.	No	

Berwickshire and North Northumberland SAC							
Berwickshire and North Northumberland SAC	Grey seal (*Halichoerus grypus)* Annex II species that are a primary reason for the selection of the site.	Grey seal (*Halichoerus grypus)*	Favourably maintained.	No	Berwickshire and North Northumberland SAC is some distance from the marine extraction site; it is unlikely that there will be overlap impact footprints from the development and any activity that can cause disturbance at the SAC. Grey seals are known to forage and disperse over wide areas and significant distances outside of the breeding season and are likely to come within the zone of influence of marine aggregate extraction works. However during the breeding season, (when impacts on the SAC are of particular concern) the spatial separation between the extraction site and the SAC should prevent any likely significant impacts. It is unlikely that grey seals will be impacted by the reclamation works at the expansion site.	No	

Berwickshire and North Northumberland SAC							
	Mudflats and sand flats not covered by seawater at low tide; Intertidal mud and sand flats; Large shallow inlets and bays; shallow inlets and bays; Reefs; Submerged or partially submerged sea caves. Annex I habitats that are a primary reason for the selection of the site.	.	Sea caves favourably maintained. No condition report found for other Annex 1 habitats listed	No	Berwickshire and North Northumberland SAC is some distance from the marine extraction site; it is unlikely that there will be overlap impact footprints from the development and any activity that can cause disturbance to habitats at the SAC.	No	

Faray and Holm of Faray SAC,							
	Grey seal (*Halichoerus grypus)* Annex II species that are a primary reason for the selection of the site	Grey seal (*Halichoerus grypus)*		No	Farray and Holm of Farray SAC is some distance from the marine extraction site; it is unlikely that there will be overlap impact footprints from the development and any activity that can cause disturbance at the SAC the SAC. Grey seals are known to forage and disperse over wide areas and significant distances outside of the breeding season and are likely to come within the zone of influence of marine aggregate extraction works. However during the breeding season, (when impacts on the SAC are of particular concern) the spatial separation between the extraction site and the SAC should prevent any likely significant impacts. It is unlikely that grey seals will be impacted by the reclamation works at the expansion site.	No	

Barry Links SAC							
Barry Links	Supralittoral sediment (Coast**)**	Humid Dune Slacks	Unfavourable No change	No	The dune slacks are outside the zone of influence and any impacts are unlikely to be significant.	No	
Barry Links	Supralittoral sediment (Coast)	Shifting Dunes	Unfavourable Recovering	Yes	6 Relevant to the construction phase of the project. Changes to coastal process may have an indirect impact of this feature.	Yes	
Barry Links	Supralittoral sediment (Coast)	Coastal dunes heathland	Unfavourable Recovering	No	Outside the zone of influence and any impacts are unlikely to be significant.	No	
	Supralittoral sediment (Coast)	Dunes grassland	Unfavourable No change	No	Outside the zone of influence and any impacts are unlikely to be significant.	No	
Barry Links	Supralittoral sediment (Coast)	Shifting dunes with marram	Unfavourable Recovering	Yes	6 Relevant to the construction phase of the project. Changes to coastal process may have an indirect impact of this feature.	Yes	

4 HRA SCREENING OF SPECIAL PROTECTION AREAS

4.1 Introduction

The aim of this screening section is to determine if any Special Protection Area qualifying features could be subject to a potential Likely Significant Effect (LSE) arising from the Dundee Port Extension proposal, including associated marine aggregate extraction (Stage 2 of the Habitats Regulations Appraisal process). If a potential LSE is identified then under the Habitats Regulations, an appropriate assessment is required to assess whether there is a risk to the site integrity of that SPA. This screening report only considers SPA qualifying species populations that are plausibly affected; in particular, it includes SPAs designated for:

- wintering coastal birds (especially waders and wildfowl);
- breeding seabirds; and
- wintering marine birds (especially sea duck species).

The LSE is with respect to the cited Conservation Objectives for the SPA in question.
For there to be a potential for a LSE on a qualifying SPA species population three conditions need to be satisfied.

The receptor population under consideration needs to:

1. regularly use the AIF;
2. be sensitive to one or more of the potential impacts of the development; and
3. The number of individuals using the AIF must be sufficiently large (in the context of the size and status of the SPA population) for it to be plausible that an adverse effect on the population could arise.

The HRA screening addresses these points with reference to information on the following subjects:

- Species ranging behaviour and seasonal movements;
- Sensitivity to anticipated potential impacts;
- The importance of the potential AIF for a species based on existing local survey data; and
- Generic information on species ecology and habitat selection.

4.2 Further Guidance on HRA Process in relation to SPAs

Further to the outline of the HRA process as presented in Section 2.6 of this document this SPA section of the report refers to 'SNH Guidance to Habitats Regulations Appraisal' (SNH 2012).

Step 1 of HRA process, is to '*determine whether the proposal is directly connected with or necessary to site management for conservation*'. In the case of the Dundee Port Extension, the answers to both these questions is 'no' and therefore the HRA proceeds to Step 2 of the process.

Step 2 of the HRA process is to address the question '*Is the proposal likely to have a significant effect on the qualifying interests of the SPAs either alone or in combination with other plans or projects?*' The procedure used to do this is, through a process of reasoned argument, is to identify which Natura 2000 sites (i.e., SPAs in the case of birds) overlap or are likely to have connectivity with a development's AIFs, and then screen the qualifying features at these to determine whether the development is likely to have a significant effect on any of them.

On other marine projects SNH have recently advised on Step 2 as follows:

"*This step acts as a screening stage: it removes from the HRA those proposals (plans or projects) which clearly have no connectivity to SPA qualifying interests or where it is very obvious that the proposal will not undermine the conservation objectives for these interests, despite a connection. When this screening step is undertaken at an early stage in the development process, it usually means that it takes the form of a desk-based appraisal. We advise that this is kept broad so that potentially significant impacts are not missed out, or discounted too early, in any HRA (or EIA).*

Expert agreement over species sensitivity should help to identify those SPA qualifying interests for which the conservation objectives are unlikely to be undermined by a development, despite any possible connection (e.g. SPA qualifiers which are recorded within a proposed tidal array site but where their flight behaviour and / or foraging ecology means that the tidal array will not have a likely significant effect).

Determination of 'likely significant effect' is not just a record of presence or absence of bird species at a tidal array site, but also involves a judgement as to whether any of the SPA conservation objectives might be undermined.

There are three possible conclusions for this step of HRA:

- The likely impacts are such that there is clear potential for the conservation objectives to be undermined – conclude likely significant effect;
- The likely impacts are so minimal (either because the affected area is not of sufficient value for the birds concerned or because the risk to them is so small) that the conservation objectives will not be undermined – conclude no likely significant effect; and
- There is doubt about the scale of the likely impacts in terms of the conservation objectives – conclude likely significant effect.

Step 3 of the HRA process, appropriate assessment, as set out in SNH Guidance to Habitats Regulations Appraisal (SNH 2012), is, "Can it be ascertained that the proposal will not adversely affect the integrity of the SPA, either alone or in combination with other plans or projects?" This step is the actual undertaking of an appropriate assessment and is the responsibility of the competent authority.

This screening report is Step 2 as described above.

4.3 SPA Conservation Objectives

The SPAs relevant to the proposed development share the same generic Conservation Objectives (http://gateway.snh.gov.uk/sitelink/siteinfo).

The SPA conservation objectives are as follows (http://gateway.snh.gov.uk/sitelink/siteinfo):

a. To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained;
b. 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 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.

4.4 SPAs Considered

The Firth of Tay and Eden Estuary SPA has by far the greatest relevance to the project on account of its close proximity and the sensitivity of some of its qualifying species to the predicted effects of the of the development. For this reason, this SPA is considered in greatest detail.

For SPAs designated for species other than breeding seabirds, the HRA screening considered all SPAs within 110km that are designated for wintering waders and wildfowl. (Note: the initially intended threshold of 100 km was extended to 110 km so that the Ythan Estuary, a site of high importance for eider would be included). No SPAs designated for breeding terrestrial birds were considered in detail because none of the qualifying species at these SPAs are known to make use of the areas affected by the development or have connectivity to these SPAs. Thus, in addition to the 'Tay' SPA the following were considered: Firth of Forth SPA, Loch Leven SPA, Montrose Basin SPA, Lindisfarne SPA and Ythan Estuary, Sands of Forvie and Meikle Loch SPA. Full details of the qualifying species at these SPAs are presented in Appendix 1.

Whereas 110km is an arbitrary distance threshold it nevertheless 'captures' a reasonably geographically discrete cluster of estuarine and wetland type SPAs in SE Scotland and NE England; the next closest designated estuarine sites (e.g. Moray Firth, Tees Estuary) are considerably further away. Studies of wintering waders and wildfowl in the UK show that, for some species at least, there is a modest level of exchange of individuals within a winter period between relatively nearby sites. For example, ringing studies show that some individuals will relocate relatively short distances to other sites (Wernham 2003); probably in responses to changes in food supply and weather conditions. Short-scale movements between sites can also be inferred from the month-to-month variation in numbers of a species at a site through a winter (e.g. WEBS count data). For example, it is not uncommon for a decline in numbers at one site to be approximately mirrored by an increase at another within the same region. Clearly bird redistribution takes place at a range of geographic scales from a few kilometres to much greater distances, however in this case it was judged that for the species of greatest interest (in particular seaduck species) the 110 km distance threshold for SPA

consideration was sufficiently cautious to include all SPAs where there could be plausible potential LSE.

Various additional SPAs designated for overwintering feeding or roosting geese were briefly considered (see Appendix 1 'Other SPAs), but these are not discussed in detail because there is no likelihood that the proposed development will adversely affect geese species: they were not recorded using the Stannergate- Broughty Ferry coast (Bell 2011 and 2012) nor would they be expected to use the marine aggregate extraction sites as the habitat there (open sea) is not suitable for them.

The candidate marine aggregate extraction sites are likely to be used for feeding by some breeding seabird species, particularly the two sites situated in the Outer Firth of Tay. Due to the generally large foraging ranges of breeding sea birds, seabirds using these areas could potentially originate from a number of breeding colonies. There is a wealth of information on how far breeding seabirds travel to forage and the recent meta-data reviews by Thaxter et al (2012) and BirdLife (http://seabird.wikispaces.com/) are used here to identify which breeding seabird SPAs plausibly have connectivity with the marine aggregate extraction sites (see Appendix 2 for full list). Connectivity in this case is a measure of the likelihood that the birds using the AIF are from the SPA population under consideration.

4.5 Seabird Connectivity

The strength of the theoretical potential for connectivity was categorised as high, moderate, low or none based on the criteria in Table 1. These criteria have been modified slightly to criteria recently suggested by SNH to better reflect the biology of the species of interest and remove ambiguity. The results of applying this theoretical connectivity categorisation are presented in Appendix 2. The potential connectivity ratings are theoretical and are not a measure of the actual connectivity between the sites and SPAs under consideration; merely they represent the maximum theoretical potential for connectivity. Determining the more useful metric of the actual level of connectivity would require information of abundance of a species at the site and the likelihood of conspecifics[3] also being present from other populations (e.g. from other colonies). There is currently no detailed information on the numbers of seabirds using the candidate aggregate extraction sites. There is also no approved method to proportion individuals to different populations (colonies) when multiple origins are likely.

In general, seabird tagging studies show that where there is potential for connectivity with multiple seabird colonies it is individuals from the closest colonies that predominate at a site. Such a pattern is also to be expected from theoretical considerations of where birds would be expected to forage most profitably. On this basis, the greatest potential for impacts on SPA qualifying seabirds will be at the closest breeding seabird SPAs. The Forth Islands SPA (29 km away at its closest) is by far the closest large seabird colony to the candidate marine aggregate extraction sites and it is likely that the great majority of seabirds (with the exception of certain gull species breeding at closer non-SPA sites) using these sites in the summer originate from this SPA. The next two closest breeding seabird SPAs (Fowlsheugh, 54 km at closest; and St Abb's Head to

[3] Definition: 'conspecific' – belonging to the same species

Fast Castle, 63 km at closest) are almost twice as far away and therefore much less likely to be the source of the any birds present.

Table 4-1: Criteria used to categorise theoretical connectivity of breeding seabirds between a SPA and aggregate extraction sites

Theoretical connectivity	Definition
High	Site within Mean Foraging Range
Moderate	Site within Mean Maximum Foraging Range +10% (Method 1), or Site within 95% of Cumulative Foraging Distance (Method 2)
Low	Site within Maximum Foraging Range (and beyond Mean Max. Foraging Range) (Method 1) or Site >95% of Cumulative Foraging Distance (and below Max. Foraging Range) (Method 2)
None	Site further than the Maximum Foraging Range

4.6 Information on bird use of impacts footprint

The proposal has two geographically distinct components that could potentially affect birds, the land reclamation and port development site at Stannergate, and the site(s) where marine aggregate extraction will occur. The types of birds potentially affected by each component are largely different.

Forth Ports and SE commissioned baseline ornithological surveys of the proposed Stannergate dock development area and adjacent foreshore eastwards as far as Broughty Ferry (Bell 2011, Bell 2012). These surveys give high quality information on which species could be potentially affected by the proposed land reclamation work at Stannergate. The surveys showed that in winter (October to March) this area held only low numbers of common shorebird and wildfowl species and held no regular large high tide roosts. Nevertheless, some of the species present are qualifying species at the nearby 'Tay' SPA. Further, the numbers recorded in the area surveyed showed moderate month-to-month changes and this, together with generic information on the behaviour of these species, suggests that some individuals are also likely to use areas inside SPA as part of their regular home range.

The Stannergate – Broughty ferry coast survey area is also used by birds in the summer months (Bell 2012), but none of the species occurring in the breeding season are qualifying species at SPAs in the region (for example, marsh harrier is the only qualifying breeding species in the 'Tay' SPA).

The candidate marine aggregate extraction sites have been surveyed several times previously by JNCC aerial surveys and these give high quality information on species using these areas, at least in the winter period (Dean et al. 2003, Dean et al. 2004, Wilson et al. 2006, Söhle 2007, Dawson et al. 2008). A key result of these surveys is that eider, long-tailed duck, common scoter and velvet scoter, all qualifying species at SPAs in the region, show moderate to large seasonal and year-to-year changes in their distribution and abundance within the Firth of Tay and St Andrews Bay. On some occasions they have been shown to occur (and presumably forage) within the two candidate aggregate extraction sites in the outer Firth of Tay.

Numerous other sources of information are also available that give a considerable amount of information on bird populations using the areas potentially affected (see Scoping Report).

4.7 Potential Impacts

Potential impacts on birds, arising from the proposed project, are identified in the Scoping Report. The main potential impacts are as follows:

- Displacement and disturbance of birds, arising from shore-based and vessel-based activities associated with the development.
- Habitat loss. In particular the permanent loss of 3 ha of inter-tidal habitat at Stannergate and its replacement by terra firma industrial dockland habitat.
- Habitat change (direct and indirect). In particular, the extraction of marine aggregates has the potential to cause medium-term degradation to mollusc-bed habitat used by some foraging seaduck species. Aggregate extraction is also likely to lead to short-term water turbidity increases in the vicinity of the extraction sites, which could affect some foraging seabird species.

4.8 LSE Screening Results

Three different groups of birds could be affected by the development:

- Wintering waders and wildfowl in the vicinity of the Stannergate reclamation site;
- Overwintering seaduck populations that use the vicinity of the candidate marine aggregate extraction sites; and
- Breeding seabird that forage in the vicinity of the marine aggregate extraction sites.

In all cases, the areas affected by the development are outside the boundaries of any SPA. Nevertheless, it is likely that individuals of some SPA qualifying species populations are at time amongst those using the areas potentially affected, i.e. the AIFs are likely to have connectivity to one or more SPA; this is considered in detail for each of the three groups. Where potential connectivity is identified, the nature and duration of the potential impacts, together with information on the expected use of the AIFs is used to determine if there is potential for LSE on SPA qualifying species.

Wintering waders and wildfowl at Stannergate

The AIF for birds the Stannergate reclamation area would be entirely within the area covered by this baseline Stannergate – Broughty Ferry survey work. In the case of wintering wader and wildfowl species that used the Stannergate survey area, six are

qualifying species at the nearby 'Tay' SPA. It is considered likely that some of the individuals of these species using this area have connectivity to this SPA (i.e. at times they use areas inside the SPA boundary). However, the number of individuals shown by recent survey work to be using the vicinity of Stannergate are very small in the context of the size of the SPA populations (Table 4-2), with the possible exception of red-breasted merganser (size of SPA population not given in SPA citation). The primary effect of the land reclamation at Stannergate is the permanent loss of up to 3 ha of intertidal habitat. Given that the current value of the area to be reclaimed to these species is low, and that the size of area to be reclaimed is very small in the context of the size of the SPA (3 ha to be reclaimed compared with an SPA size of 6919 ha), it is concluded that the development at Stannergate will not affect the 'Tay' SPA Conservation Objectives for these species and therefore that there is no potential for LSE on these qualifying species (but see below regarding red-breasted merganser).

It is also concluded that there is no potential for LSEs on SPA qualifying wintering or passage wader populations at any other SPA considered.

Wintering seaduck

In the case of wintering seaduck species that could be affected at the candidate marine aggregate extraction sites, it is clear from existing survey work (JNCC aerial surveys, e.g., Dean et al. 2003, Dean et al. 2004, Wilson et al. 2006, Söhle 2007, Dawson et al. 2008), that at times these areas are used by moderate numbers of eider, long-tailed duck, common scoter, small numbers of red-breasted merganser and perhaps small numbers of velvet scoter also (Table 4-3). These species are all qualifying species at the nearby 'Tay' SPA and at the Firth of Forth SPA (27 km away at closest). Eider is also a qualifying species at Montrose Basin SPA (35 km away) and Ythan Estuary, Sands of Forvie and Meikle Loch SPA (108km away). Eider and common scoter are also qualifying species at Lindisfarne SPA (99 km away). At all these SPAs, where they qualify, species do so because the population is a component of an Internationally Important Bird Assemblage. None of the seaduck species listed above qualify at these SPAs on the grounds of the numbers at the site exceeding international importance for that species, though at times the numbers of eider using the 'Tay' SPA may exceed the international importance threshold (>25,000 individuals for eider).

All individuals of the seaduck species listed above as using the aggregate extraction sites are likely to have high connectivity to the 'Tay' SPA, indeed the great majority are considered likely to be 'from' this SPA. Given that sea duck species, especially eider and common scoter, are relatively mobile and may move between multiple sites in a region (Wernham et al. 2003) it is also considered likely that there is potential for low or moderate connectivity (in a generic sense) with the other east coast seaduck SPAs listed above. Connectivity with Montrose Basin SPA and Firth of Forth SPA is particularly likely as these are both relatively close (<40 km). Ringing studies of eider breeding at the Sands of Forvie show that birds from here use all suitable sites southwards to the Firth of Tay and Firth of Forth (Baillie and Milne 1989).

The two main impacts that could affect wintering seaduck are short-term disturbance by project vessels and the medium-term loss of foraging habitat, in particular bivalve mollusc beds. Vessel disturbance would be a short-term impact and can in any case be mitigated to a large extent by best practice procedures. Therefore, this effect alone in considered unlikely to result in potential for LSE on the seaduck qualifying interests of

any SPA. Nevertheless, vessel disturbance could exacerbate the adverse effects of foraging habitat loss. The medium-term loss (or degradation) of seaduck mollusc-bed foraging habitat at either of the two candidate aggregate extraction sites in the outer Firth of Tay has the potential to result in a LSE on the 'Tay' SPA wintering populations of long-tailed duck, eider and common scoter (Table 4-4). This conclusion is based on the survey results that shows these parts of the Firth of Tay, even though they are outside the SPA boundary, are at times important feeding areas for moderate numbers of individuals of these species (Table 4-3). Therefore, the medium-term loss or degradation of these areas could compromise the SPA Conservation Objective 'to maintain the distribution and extent of habitats supporting the species'. There is some uncertainty about the use made by velvet scoter of the aggregate extraction sites (this stems of identification uncertainties during survey work). Following SNH guidance for cases where there is significant uncertainty, it is also concluded for the same reasons as for common scoter that there is potential for a LSE on the 'Tay' SPA velvet scoter population.

Red-breasted mergansers are not a mollusc specialist but feed mainly on small fish species. This will mean they are less vulnerable to the impacts of seabed disturbance and the effects of aggregate extraction on this species are likely to be short-term only (i.e. for the duration of the extraction work). Furthermore, the aerial survey results show that the extraction sites are of low importance for red-breasted merganser. On this basis, it is considered that there is no potential for a LSE on the 'Tay' SPA red-breasted merganser population.

As discussed above, seaduck species are relatively mobile and it is therefore likely that there is connectivity between the aggregate extraction sites and other wintering sea duck SPAs, albeit to a much smaller extent than with the 'Tay' SPA. Recognising the uncertainty in the strength of this likely connectivity, it is further concluded that there is potential for LSEs on the populations of long-tailed duck, eider and common scoter at the other SPAs considered on account of their wintering seaduck populations (Table 4-4).

Breeding Seabirds

Seabird foraging range metadata analyses clearly shows that there is potential for moderate and high connectivity between the aggregate extraction sites and several seabird colonies, especially the Firth Islands SPA (Appendix 2). This alone is not sufficient to conclude a potential LSE on these populations. Breeding seabird could potentially be impacted in two main ways, vessel disturbance and increased water turbidity, which could impair feeding. In both cases, these effects arise for the aggregate extraction element of the project and would be short-term in duration, lasting only as long as the extraction works. Although the development itself might be argued to lead to increased vessel movements to /from Dundee Port, these would be routine vessel movements restricted to the existing defined shipping lane and would therefore not be expected to cause significant additional disturbance to that which already occurs.

In determining the potential of the aggregate extraction work to affect foraging areas of breeding seabirds, it is clear that the a small part of the foraging area of some SPA qualifying species populations could be effected (Appendix 2), but only for a short-term duration (i.e., the extraction period). In judging whether or not there is potential for a LSE on any of these populations, information is also needed on the likely importance of the AIF(s). A short-term reduction in feeding habitat quality, (for example due to

disturbance or increased water turbidity) could not lead to a LSE on these populations if the area of habitat effected is small in the context of the area available (which is clearly the case for all species), unless there was evidence that the area effected was of particularly high importance. Whilst there have been no detailed surveys of the importance to foraging breeding seabirds of the candidate aggregate extraction sites, there is a wealth of information from regional tagging studies and nearby seabird distribution and abundance surveys (Camphuysen et al 2005, Neart na Gaoithe wind farm ES, Inchcape wind farm ES). These characterise in detail the pattern of seabird utilisation of marine feeding resources in the region, which is considered appropriate for this work. Most relevant is that all the SPA qualifying species populations that could potentially forage in the aggregate extraction AIF(s) (Appendix 2) are known to forage over very wide areas of sea (100s to 1000s of square kilometres, depending on the species). There is no evidence or expectation (based on the understanding of these species' foraging ecology) that any of the candidate extraction sites are of high value for a species; the expectation is that they would be of average value, in proportion to their area. On this basis, and bearing in mind the short-term nature of any possible impacts and the very large areas of alternative foraging habitat available, it is judged that there is no potential for LSE on any SPA breeding seabird qualifying species population.

The candidate aggregate extraction sites are potentially relatively attractive to foraging shag and Arctic tern as both these species mainly forage within a few kilometres of the coast in relatively shallow water (typically <25m deep). In this case, however, the distance to the extraction sites from the closest colony where these species are SPA qualifying species (Isle of May, part of the Forth Islands SPA) is greater than their maximum foraging range. Therefore, it is concluded that for these two species there is unlikely to be connectivity between any SPA population and the extraction sites.

Table 4-2: Species recorded in Winter (October to March) at Stannergate to Broughty Ferry Coast that are also listed as qualifying species at the Firth of Tay and Eden estuary SPA (based on results I Bell 2011)

Species	Peak monthly winter counts within Stannergate land claim footprint	Peak monthly winter counts in Stannergate to Broughty Ferry survey area	SPA qualifying reason	SPA population in site citation
Eider	0-3	0-14	Wintering population, component of an Internationally Important Bird Assemblage	13,800
Red-breasted merganser	0-3	0-17	Wintering population, component of an Internationally Important Bird Assemblage	No count given (WEBS count of 172 counted 2005/06)
Goldeneye	0	0-6	Wintering population, component of an Internationally Important Bird Assemblage	230
Oystercatcher	0-14	21-116	Wintering population, component of an Internationally Important Bird Assemblage	5,100
Redshank	0-8	6-28	Wintering population, component of an Internationally Important Bird Assemblage	1,800
Dunlin	0	0-1	Wintering population, component of an Internationally Important Bird Assemblage	5,200

Table 4-3: Occurrence in the two candidate marine aggregate extraction sites of Firth of Tay and Eden Estuary SPA qualifying species (based on JNCC aerial surveys and Bell 2011)

Species	Use of candidate aggregate extraction areas			SPA qualifying reason	SPA population in site citation
	Inner area	NW Outer area	SE Outer area		
Common eider	Yes, small numbers only	Yes, regularly moderate numbers	Yes, regularly moderate numbers	Wintering population, component of an Internationally Important Bird Assemblage	13800
Long-tailed duck	No	Yes, occasionally moderate numbers	Yes, occasionally moderate numbers	Wintering population, component of an Internationally Important Bird Assemblage	560
Black (common) scoter	No	Yes, regularly moderate numbers	Yes, regularly moderate numbers	Wintering population, component of an Internationally Important Bird Assemblage	3100
Velvet scoter	No	Probably yes, occasionally small numbers?	Probably yes, occasionally small numbers?	Wintering population, component of an Internationally Important Bird Assemblage	730
Common goldeneye	Yes, small numbers only	No	No	Wintering population, component of an Internationally Important Bird Assemblage	230
Red-breasted merganser	Yes, small numbers only	Yes, occasionally small numbers	No	Wintering population, component of an Internationally Important Bird Assemblage	no count given
Goosander	No	No	No	Wintering population, component of an Internationally Important Bird Assemblage	no count given

Table 4-4: SPA qualifying species populations provisionally identified as having potential for Likely Significant Effects arising from the proposed development

SPA	Species	Potential LSE
Firth of Tay and Eden Estuary SPA	Eider, long-tailed duck, common scoter and velvet scoter. All these species designated as a component of an Internationally Important Bird Assemblage.	In all cases, the potential for LSE arises due to habitat loss in the vicinity of the marine aggregate extraction sites, both through the potential for short-term disturbance from vessels and medium-term loss or degradation of seabed substrates providing mollusc rich feeding. To assess these potential LSEs in detail, more information is need on the location and size of the extraction site selected, its value to seaduck species, and the connectivity between the birds using the Outer Firth of Tay and other sites.
Firth of Forth SPA	Eider, long-tailed duck, common scoter and velvet scoter. All these species designated as a component of an Internationally Important Bird Assemblage.	
Montrose Basin SPA	Eider. Designated as a component of an Internationally Important Bird Assemblage.	
Lindisfarne SPA	Eider and common scoter. Both these species designated as a component of an Internationally Important Bird Assemblage.	
Ythan Estuary, Sands of Forvie and Meilkle Loch SPA	Eider. Designated as a component of an Internationally Important Bird Assemblage.	

5 CONCLUSIONS

This screening report has aimed to map out the SAC and SPA habitats and species that may be subject to likely significant effects from the proposed Port of Dundee expansion project and associated marine aggregate extraction. The screening report highlights a limited number of interest features on a number of relevant Natura 2000 sites, some of which will be taken forward for more detailed consideration in the HRA process. Those species and topics screened out it at this stage will not be considered further within the HRA.

Scottish Enterprise is seeking consultation, approval and agreement from Marine Scotland and Transport Scotland, as advised by SNH, on the HRA screening process presented in this report.

Scottish enterprise anticipates that the approach to Appropriate Assessment will be the subject of specific consultation and discussion in order to reach a consensus of agreement on the scope of the HRA.

Species Lists	
Birds	
Bar-tailed godwit	*Limosa lapponica*
Common scoter	*Melanitta nigra*
Cormorant	*Phalacrocorax carbo*
Dunlin	*Calidris alpina*
Eider	*Somateria mollissima*
Goldeneye	*Bucephala clangula*
Goosander	*Mergus merganser*
Grey plover	*Pluvialis squatarola*
Greylag goose	*Anser anser*
Icelandic black-tailed godwit	*Limosa limosa islandica*
Little tern	*Sternula albifrons*
Long-tailed duck	*Clangula hyemalis*
Marsh harrier	*Circus aeruginosus*
Oystercatcher	*Haematopus ostralegus*
Pink-footed goose	*Anser brachyrhynchus*
Red-breasted merganser	*Mergus serrator*
Redshank	*Tringa totanus*
Sanderling	*Calidris alba*
Shelduck	*Tadorna tadorna*
Velvet scoter	*Malanitta fusca*
Fish	
Atlantic salmon	*Salmo salar*
Brook lamprey	*Lampetra planeri*
River lamprey	*Lampetra fluviatilis*
Sea lamprey	*Petromyzon marinus*
Marine Mammals	
Bottlenose dolphin	*Tursiops truncatus*
Grey Seal	*Halichoerus grypus*
Harbour seal	*Phoca vitulina*
Otter	*Lutra lutra*

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Port of Dundee HRA Screening Report

Appendix 1

Non-breeding wader and waterbird SPA's

Non-breeding wader and waterbird SPAs

Notes

1. I.B.A. refers to 'Internationally important bird assemblage'; N.I.P. refers to 'nationally important population'; I.I.P. refers to 'internationally important population; I.I.P. (pending) refers to population proposed for inclusion as I.I.P.; I.M.P. refers to 'important migratory population'.
2. Population counts for SPAs taken from JNCC 2001. The UK SPA network: its scope and content. Volume 3. Site accounts. Joint Nature Conservation Committee. No population counts are given for I.I.B.A. component-only qualifiers so in these cases counts are from JNCC. 2011a. Spatial/summary data for UK Special Protection Areas (SPAs). Joint Nature Conservation Committee. http://jncc.defra.gov.uk/page-1409.
3. Population counts for Ramsar sites are taken from JNCC. 2011b. Spatial/summary data for UK Ramsar sites (RAMSARs). Joint Nature Conservation Committee. http://jncc.defra.gov.uk/page-2392. Last updated 31 August 2007. Accessed 20 November 2011.

Designated sites information and population data references

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Firth of Tay and Eden Estuary SPA: qualifying non-seabird bird populations					
Species	**Qualifying season**	**Qualifying reason**	**Population count**		**Comment**
Pink-footed goose	Wintering	I.M.P. of a non-Annex 1 species	3769	individuals	
Greylag goose	Wintering	I.M.P. of a non-Annex 1 species	1355	individuals	
Common shelduck	Wintering	I.I.B.A. component only	1200	individuals	
Common eider	Wintering	I.I.B.A. component only	13800	individuals	
Long-tailed duck	Wintering	I.I.B.A. component only	560	individuals	
Black (common) scoter	Wintering	I.I.B.A. component only	3100	individuals	
Velvet scoter	Wintering	I.I.B.A. component only	730	individuals	
Common goldeneye	Wintering	I.I.B.A. component only	230	individuals	
Red-breasted merganser	Wintering	I.I.B.A. component only	no count given		First included at SPA review. JNCC Report 401 (Söhle *et al.* 2007) report a peak mean count of 109 birds and a maximum of 251 birds in Tay Bay between 2000 and 2005.
Goosander	Wintering	I.I.B.A. component only	no count given		First included at SPA review. JNCC Report 401 (Söhle *et al.* 2007) gives no results for goosander, suggesting that this species rarely occurs in Tay Bay.
Eurasian marsh harrier	Breeding	N.I.P. of an Annex 1 species	4	pairs	
Eurasian oystercatcher	Wintering	I.I.B.A. component only	5100	individuals	
Grey plover	Wintering	I.I.B.A. component only	920	individuals	
Sanderling	Wintering	I.I.B.A. component only	220	individuals	
Dunlin	Wintering	I.I.B.A. component only	5200	individuals	
Black-tailed godwit	Wintering	I.I.B.A. component only	150	individuals	
Bar-tailed godwit	Wintering	N.I.P. of an Annex 1 species	2400	individuals	
Common redshank	Wintering	I.M.P. of a non-Annex 1 species	1800	individuals	
Waterfowl assemblage	Wintering	I.I.B.A.	34074	individuals	

Firth of Forth SPA: qualifying non-seabird bird populations (Approx direct distance to gravel extraction area opposite onshore installation 27km)					
Species	**Qualifying season**	**Qualifying reason**	**Population count**		**Comment**
Great crested grebe	Wintering	I.I.B.A. component only	646	individuals	
Slavonian grebe	Wintering	N.I.P. of an Annex 1 species	71	individuals	
Pink-footed goose	Wintering	I.M.P. of a non-Annex 1 species	12400	individuals	
Common shelduck	Wintering	I.M.P. of a non-Annex 1 species	3586	individuals	
Eurasian wigeon	Wintering	I.I.B.A. component only	2139	individuals	
Mallard	Wintering	I.I.B.A. component only	2564	individuals	
Greater scaup	Wintering	I.I.B.A. component only	437	individuals	
Common eider	Wintering	I.I.B.A. component only	9400	individuals	
Long-tailed duck	Wintering	I.I.B.A. component only	1045	individuals	
Black (common) scoter	Wintering	I.I.B.A. component only	2880	individuals	
Velvet scoter	Wintering	I.I.B.A. component only	635	individuals	
Common goldeneye	Wintering	I.I.B.A. component only	2465	individuals	
Red-breasted merganser	Wintering	I.I.B.A. component only	670	individuals	
Eurasian oystercatcher	Wintering	I.I.B.A. component only	7846	individuals	
Ringed plover	Wintering	I.I.B.A. component only	328	individuals	
European golden plover	Wintering	N.I.P. of an Annex 1 species	2970	individuals	
Grey plover	Wintering	I.I.B.A. component only	724	individuals	
Northern lapwing	Wintering	I.I.B.A. component only	4148	individuals	
Red knot	Wintering	I.M.P. of a non-Annex 1 species	8013	individuals	
Dunlin	Wintering	I.I.B.A. component only	9514	individuals	
Bar-tailed godwit	Wintering	N.I.P. of an Annex 1 species	2600	individuals	
Eurasian curlew	Wintering	I.I.B.A. component only	1928	individuals	
Common redshank	Wintering	I.M.P. of a non-Annex 1 species	3700	individuals	
Ruddy turnstone	Wintering	I.M.P. of a non-Annex 1 species	1286	individuals	
Waterfowl assemblage	Wintering	I.I.B.A.	86067	individuals	

Loch Leven SPA: qualifying non-seabird bird populations (Approx direct distance to gravel extraction area opposite onshore installation 38km)					
Species	Qualifying season	Qualifying reason	Population count		Comment
Whooper swan	Wintering	N.I.P. of an Annex 1 species	101	individuals	
Pink-footed goose	Wintering	I.M.P. of a non-Annex 1 species	18230	individuals	
Gadwall	Wintering	I.I.B.A. component only	245	individuals	
Eurasian teal	Wintering	I.I.B.A. component only	2771	individuals	
Northern shoveler	Wintering	I.M.P. of a non-Annex 1 species	520	individuals	
Common pochard	Wintering	I.I.B.A. component only	1095	individuals	
Tufted duck	Wintering	I.I.B.A. component only	3636	individuals	
Common goldeneye	Wintering	I.I.B.A. component only	339	individuals	
Waterfowl assemblage	Wintering	I.I.B.A. component only	32177	individuals	

Montrose Basin SPA: qualifying non-seabird bird populations (Approx direct distance to gravel extraction area opposite onshore installation 35km)								
Species	**Qualifying season**	**Qualifying reason**	**Population count**		**Comment**			
Pink-footed goose	Wintering	I.M.P. of a non-Annex 1 species	31622	individuals				
Greylag goose	Wintering	I.M.P. of a non-Annex 1 species	1080	individuals				
Common shelduck	Wintering	I.I.B.A. component only	no count given		First included at SPA review			
Eurasian wigeon	Wintering	I.I.B.A. component only	no count given		First included at SPA review			
Common eider	Wintering	I.I.B.A. component only	no count given		First included at SPA review			
Eurasian oystercatcher	Wintering	I.I.B.A. component only	2368	individuals				
Red knot	Wintering	I.M.P. of a non-Annex 1 species	4500	individuals				
Dunlin	Wintering	I.I.B.A. component only	no count given		First included at SPA review			
Common redshank	Wintering	I.M.P. of a non-Annex 1 species	2259	individuals				
Waterfowl assemblage	Wintering	I.I.B.A.	54917	individuals				

Lindisfarne SPA: qualifying non-seabird bird populations (Approx direct distance to gravel extraction area opposite onshore installation 99km)					
Species	**Qualifying season**	**Qualifying reason**	**Population count**		**Comment**
Whooper swan	Wintering	N.I.P. of an Annex 1 species	79	individuals	
Pink-footed goose	Wintering	I.I.B.A. component only	no count given		
Greylag goose	Wintering	I.M.P. of a non-Annex 1 species	1416	individuals	
Light-bellied brent goose	Wintering	I.M.P. of a non-Annex 1 species	1844	individuals	
Common shelduck	Wintering	I.I.B.A. component only	899	individuals	
Eurasian wigeon	Wintering	I.M.P. of a non-Annex 1 species	13375	individuals	
Common eider	Wintering	I.I.B.A. component only	1568	individuals	
Black (common) scoter	Wintering	I.I.B.A. component only	263	individuals	
Ringed plover	Passage	I.M.P. of a non-Annex 1 species	527	individuals	
European golden plover	Wintering	N.I.P. of an Annex 1 species	5300	individuals	
Grey plover	Wintering	I.M.P. of a non-Annex 1 species	1570	individuals	
Northern lapwing	Wintering	I.I.B.A. component only	no count given		
Red knot	Wintering	I.M.P. of a non-Annex 1 species	3827	individuals	
Dunlin	Wintering	I.I.B.A. component only	7703	individuals	
Bar-tailed godwit	Wintering	N.I.P. of an Annex 1 species	2946	individuals	
Common redshank	Wintering	I.I.B.A. component only	904	individuals	
Waterfowl assemblage	Wintering	I.I.B.A.	41870	individuals	

Ythan Estuary, Sands of Forvie and Meikle Loch SPA: qualifying non-seabird bird populations (Approx direct distance to gravel extraction area opposite onshore installation 108km)					
Species	**Qualifying season**	**Qualifying reason**	**Population count**		**Comment**
Pink-footed goose	Wintering	I.M.P. of a non-Annex 1 species	17213	individuals	
Common eider	Wintering	I.I.B.A. component only	no count given		First included at SPA review
Northern lapwing	Wintering	I.I.B.A. component only	no count given		First included at SPA review
Common redshank	Wintering	I.I.B.A. component only	no count given		First included at SPA review
Waterfowl assemblage	Wintering	I.I.B.A.	51265	individuals	

SPA	Approx direct distance to gravel extraction area opposite onshore installation (km)	Species	Qualifying season	Qualifying reason	Population count		Comment
Cameron Reservoir	18	Pink-footed goose	Wintering	I.M.P. of a non-Annex 1 species	16233	individuals	
Loch of Kinnordy	25	Pink-footed goose	Wintering	I.M.P. of a non-Annex 1 species	4760	individuals	
Loch of Kinnordy	25	Greylag goose	Wintering	I.M.P. of a non-Annex 1 species	1000	individuals	
Loch of Lintrathen	28	Greylag goose	Wintering	I.M.P. of a non-Annex 1 species	3098	individuals	
South Tayside Goose Roosts	41	Pink-footed goose	Wintering	I.M.P. of a non-Annex 1 species	43300	individuals	
South Tayside Goose Roosts	41	Greylag goose	Wintering	I.M.P. of a non-Annex 1 species	3667	individuals	
South Tayside Goose Roosts	41	Waterfowl assemblage	Wintering	I.I.B.A. component only	52403	individuals	
Muir of Dinnet	69	Greylag goose	Wintering	I.M.P. of a non-Annex 1 species	29458	individuals	
Muir of Dinnet	69	Waterfowl assemblage	Wintering	I.I.B.A. component only	28600	individuals	
Fala Flow	70	Pink-footed goose	Wintering	I.M.P. of a non-Annex 1 species	6719	individuals	
Gladhouse Reservoir	76	Pink-footed goose	Wintering	I.M.P. of a non-Annex 1 species	3068	individuals	
Slamannan Plateau	80	Taiga bean goose	Wintering	N.I.P. of an Annex 1 species	221	individuals	Site not in SPA review
Loch of Skene	83	Whooper swan	Wintering	N.I.P. of an Annex 1 species	203	individuals	
Loch of Skene	83	Greylag goose	Wintering	I.M.P. of a non-Annex 1 species	10840	individuals	
Westwater	83	Pink-footed goose	Wintering	I.M.P. of a non-Annex 1 species	31127	individuals	
Westwater	83	Waterfowl assemblage	Wintering	I.I.B.A. component only	31465	individuals	
Greenlaw Moor	84	Pink-footed goose	Wintering	I.M.P. of a non-Annex 1 species	5450	individuals	

Port of Dundee HRA Screening Report

Appendix 2

Breeding Seabirds SPA's

Breeding Seabird SPAs

DPE qualifying interests and connectivity: breeding seabirds - includes all designated SPAs with qualifying seabird species that have a maximum foraging distance within range of the development using direct distances for skuas, gulls and terns and by-sea distances for all other species. The rating of the strength of theoretical connectivity follows (modified) SNH advice (2/7/2012) and uses meta-data on mean, mean max + 10% and maximum foraging range and cumulative frequency distance parameters.
Designated sites with qualifying seabird species whose maximum foraging ranges are equal to or exceed the shortest 'by-sea' ; or shortest direct distance for skuas, gulls excluding kitiwake, and terns , between the nearest land to the DPE candidate aggregate extraction boundary area within the designated area and the edge of the DPE alternative gravel extraction boundary. I.I.B.A. refers to 'Internationally important bird assemblage'; N.I.P. refers to 'nationally important population'; I.I.P. refers to 'internationally important population; I.I.P.(pending) refers to population proposed for future inculsion as I.I.P.; I.M.P. refers to 'important migratory population'.

Site	Distance by sea (km)	Distance direct (km)	Species	Mean foraging range (km)	Mean max foraging (MMFR) range (km)	Mean max foraging range +10% of MMFR	Max foraging range (km)	Cumulative frequency range that includes 95% of pop (approx km)	Qualifying season	Qualifying reason	Population count		Theoretical connectivity rating Method 1 prioritising MMFR+ 10% of MMFR (see blue box below)	Theoretical connectivity rating Method 2 prioritising 95% CFD where available (see blue box below)
Forth Islands SPA	29		Atlantic puffin	4	105.4	115.9	200	65	Breeding	species	21000	pairs	Moderate	Moderate
	29		Black-legged kittiwake	24.8	60	66	120	60	Breeding	I.I.B.A. component only	8400	pairs	Moderate	Moderate
	29		Common guillemot	37.8	84.2	92.6	135	65	Breeding	I.I.B.A. component only	16000	pairs	High	High
	29		Great cormorant	5.2	25	27.5	35		Breeding	I.I.B.A. component only	200	pairs	Low	No 95% CFD
		29	Herring gull	10.5	61.1	67.2	92		Breeding	I.I.B.A. component only	6600	pairs	Moderate	No 95% CFD
		29	gull	71.9	141	155.1	181		Breeding	species	2920	pairs	High	No 95% CFD
	29		Northern fulmar	47.5	400	440	580	375	Breeding	I.I.B.A. component only	798	pairs	High	High
	29		Northern gannet	92.5	229.4	252.3	590	325	Breeding	species	34400	pairs	High	High
	29		Razorbill	23.7	48.5	53.4	95	25	Breeding	I.I.B.A. component only	1400	pairs	Moderate	Low
		29	Sandwich tern	11.5	49	53.9	54	33	Breeding	N.I.P. of an Annex 1 species	22	pairs	Moderate	Moderate
Fowlsheugh SPA	54		Black-legged kittiwake	24.8	60	66	120	60	Breeding	species	34870	pairs	Moderate	Moderate
	54		Common guillemot	37.8	84.2	92.6	135	65	Breeding	species	40140	pairs	Moderate	Moderate
		54	Herring gull	10.5	61.1	67.2	92		Breeding	I.I.B.A. component only	3190	pairs	Moderate	No 95% CFD
	54		Northern fulmar	47.5	400	440	580	375	Breeding	I.I.B.A. component only	1170	pairs	Moderate	Moderate
	54		Razorbill	23.7	48.5	53.4	95	25	Breeding	I.I.B.A. component only	3886	pairs	Low	Low
St Abb's Head to Fast Castle SPA	63		Black-legged kittiwake	24.8	60	66	120	60	Breeding	I.I.B.A. component only	21170	pairs	Moderate	Low
	63		Common guillemot	37.8	84.2	92.6	135	65	Breeding	I.I.B.A. component only	21273	pairs	Moderate	Moderate
		63	Herring gull	10.5	61.1	67.2	92		Breeding	I.I.B.A. component only	1160	pairs	Moderate	No 95% CFD
	63		Razorbill	23.7	48.5	53.4	95	25	Breeding	I.I.B.A. component only	1461	pairs	Low	Low
Loch Leven Ramsar site		49	gull	71.9	141	155.1	181		Breeding	N.I.P.	1103	ly	High	No 95% CFD
Buchan Ness to Collieston Coast	104		Black-legged kittiwake	24.8	60	66	120	60	Breeding	I.I.B.A. component only	30452	pairs	Low	Low
	104		Common guillemot	37.8	84.2	92.6	135	65	Breeding	I.I.B.A. component only	8640	pairs	Low	Low
	104		Northern fulmar	47.5	400	440	580	375	Breeding	I.I.B.A. component only	1765	pairs	Moderate	Moderate
Farne Islands SPA	111		Atlantic puffin	4	105.4	115.9	200	65	Breeding	species	34710	pairs	Moderate	Low
	111		Black-legged kittiwake	24.8	60	66	120	60	Breeding	I.I.B.A. component only	5096*	pairs	Low	Low
	111		Common guillemot	37.8	84.2	92.6	135	65	Breeding	species	23499	pairs	Low	Low
Coquet Island SPA	144		Atlantic puffin	4	105.4	115.9	200	65	Breeding	species	11400	pairs	Low	Low
Troup, Pennan and Lion`s Heads	162		Northern fulmar	47.5	400	440	580	375	Breeding	I.I.B.A. component only	4400	pairs	Moderate	Moderate
East Caithness Cliffs SPA	252		Northern fulmar	47.5	400	440	580	375	Breeding	I.I.B.A. component only	15000	pairs	Moderate	Moderate
North Caithness Cliffs SPA	267		Northern fulmar	47.5	400	440	580	375	Breeding	I.I.B.A. component only	14700	pairs	Moderate	Moderate
Copinsay SPA	289		Northern fulmar	47.5	400	440	580	375	Breeding	I.I.B.A. component only	1615	pairs	Moderate	Moderate
Hoy SPA	292		Northern fulmar	47.5	400	440	580	375	Breeding	I.I.B.A. component only	35000	pairs	Moderate	Moderate
Flamborough Head and Bemptor	293		Northern gannet	92.5	229.4	252.3	590	325	Breeding	I.I.B.A. component only	2501	pairs	Low	Moderate
Calf of Eday SPA	326		Northern fulmar	47.5	400	440	580	375	Breeding	I.I.B.A. component only	1955	pairs	Moderate	Moderate
Rousay SPA	330		Northern fulmar	47.5	400	440	580	375	Breeding	I.I.B.A. component only	1240	pairs	Moderate	Moderate
West Westray SPA	334		Northern fulmar	47.5	400	440	580	375	Breeding	I.I.B.A. component only	1400	pairs	Moderate	Moderate
Fair Isle SPA	349		Northern fulmar	47.5	400	440	580	375	Breeding	I.I.B.A. component only	35210	pairs	Moderate	Moderate
	349		Northern gannet	92.5	229.4	252.3	590	325	Breeding	I.I.B.A. component only	1166	pairs	Low	Low
Sule Skerry and Sule Stack SPA	368		Northern gannet	92.5	229.4	252.3	590	325	Breeding	I.M.P. of a non-Annex 1 species	4890	pairs	Low	Low
Cape Wrath SPA	376		Northern fulmar	47.5	400	440	580	375	Breeding	I.I.B.A. component only	2300	pairs	Moderate	Low
Sumburgh Head SPA	387		Northern fulmar	47.5	400	440	580	375	Breeding	I.I.B.A. component only	2542	pairs	Moderate	Low
Foula SPA	417		Northern fulmar	47.5	400	440	580	375	Breeding	I.I.B.A. component only	46800	pairs	Moderate	Low
Handa SPA	418		Northern fulmar	47.5	400	440	580	375	Breeding	I.I.B.A. component only	3500	pairs	Moderate	Low
Noss SPA	421		Northern fulmar	47.5	400	440	580	375	Breeding	I.I.B.A. component only	6350	pairs	Moderate	Low
	421		Northern gannet	92.5	229.4	252.3	590	325	Breeding	I.M.P. of a non-Annex 1 species	7310	pairs	Low	Low
Royal Haskoning DHV	442		Northern fulmar	47.5	400	440	580	375	Breeding	I.I.B.A. component only	11500	pairs	Low	Low
Hermaness, Saxa Vord and Valla	442		Northern gannet	92.5	229.4	252.3	590	325	Breeding	species	9000	pairs	Low	Low
Fetlar SPA	469		Northern fulmar	47.5	400	440	580	375	Breeding	I.I.B.A. component only	9500	pairs	Low	Low
The Shiant Isles SPA	500		Northern fulmar	47.5	400	440	580	375	Breeding	I.I.B.A. component only	6820	pairs	Low	Low
Hermaness, Saxa Vord and Valla	502		Northern fulmar	47.5	400	440	580	375	Breeding	I.I.B.A. component only	19539	pairs	Low	Low

Table continued

Noss SPA	421		Northern fulmar	47.5	400	440	580	375	Breeding	I.I.B.A. component only	6350	pairs	Moderate	Low
	421		Northern gannet	92.5	229.4	252.3	590	325	Breeding	I.M.P. of a non-Annex 1 species	7310	pairs	Low	Low
North Rona and Sula Sgeir SPA	442		Northern fulmar	47.5	400	440	580	375	Breeding	I.I.B.A. component only	11500	pairs	Low	Low
	442		Northern gannet	92.5	229.4	252.3	590	325	Breeding	species	9000	pairs	Low	Low
Fetlar SPA	469		Northern fulmar	47.5	400	440	580	375	Breeding	I.I.B.A. component only	9500	pairs	Low	Low
The Shiant Isles SPA	500		Northern fulmar	47.5	400	440	580	375	Breeding	I.I.B.A. component only	6820	pairs	Low	Low
Hermaness, Saxa Vord and Valla	502		Northern fulmar	47.5	400	440	580	375	Breeding	I.I.B.A. component only	19539	pairs	Low	Low
	502		Northern gannet	92.5	229.4	252.3	590	325	Breeding	I.M.P. of a non-Annex 1 species	12000	pairs	Low	Low
Flannan Isles SPA	544		Northern fulmar	47.5	400	440	580	375	Breeding	I.I.B.A. component only	4730	pairs	Low	Low

Notes
1. Mean, Mean max and mean foraging ranges from **Thaxter, C. B., Lascelles, B., Sugar, K., Cook, A. S. C. P., Roos, S., Bolton, M., Langston, R. H. W. & Burton, N. H. K**. 2012. Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas. *Biological Conservation*. doi: 10.1016/j. biocon. 2011.12.009. Cumulative frequency range at which 95% of population incuded is estimated from plots given at: (http://seabird.wikispaces.com/)
2. Population counts for SPAs taken from **JNCC 2001**. The UK SPA network: its scope and content. Volume 3. Site accounts. Joint Nature Conservation Committee. No population counts are given for I.I.B.A. component only qualifiers so in these cases counts are from **JNCC. 2011a**. Spatial/summary data for UK Special Protection Areas (SPAs). Joint Nature Conservation Committee. http://jncc.defra.gov.uk/page-1409. Where an I.I.B.A. component is first included at SPA review (*) the Seabird 2000 colony count in the JNCC Seabird Monitoring Programme (SMP) online database is given. Counts of guillemot and razorbill given as 'individuals on land' in the spatial/summary data have been converted to pairs by mulipying counts by 0.67 based on **Harris, M.P.** 1989. Variation in the correction factor used for converting counts of individual guillemots Uria aalge into breeding pairs. *Ibis,* 131: 85-93. This conversion is the same as that used in the JNCC Seabird Monitoring Programme (SMP) online database. Population counts for Ramsar sites are taken from **JNCC. 2011b**. Spatial/summary data for UK Ramsar sites (RAMSARs). Joint Nature Conservation Committee. http://jncc.defra.gov.uk/page-2392. Last updated 31 August 2007. Accessed 20 November 2011.

Designated sites information and population data references									
JNCC. Notes on data parameters for SMP online database downloadable at: http://jncc.defra.gov.uk/page-4460									
JNCC 2001. The UK SPA network: its scope and content. Volume 3. Site accounts. Joint Nature Conservation Committee.									
JNCC. 2011a. Spatial/summary data for UK Special Protection Areas (SPAs). Joint Nature Conservation Committee. http://jncc.defra.gov.uk/page-1409. Last updated 5 September 2011. Accessed 20 November 2011.									

Theoretical connectivity Method 1								
Connectivity category	**Definition Method 1 (prioritising MMFR + 10% of MMFR)**							
High	Nearest development boundary < mean foraging range							
Moderate	Nearest development boundary > mean foraging range but <= MMFR + 10% of MMFR							
Low	Nearest development boundary > MMFR + 10% of MMFR but < max foraging range							
No connectivity	Nearest development boundary > max foraging range							
Theoretical Connectivity Method 2								
Connectivity category	**Definition Method 2 (Prioritising 95% CFD where available)**							
High	Nearest development boundary < mean foraging range							
Moderate	Nearest development boundary > mean foraging range but <= 95%CFD (where available) otherwise MMFR + 10% of MMFR							
Low	Nearest development boundary > 95% CFD where available, otherwise MMFR + 10% of MMFR but < max foraging range							
No connectivity	Nearest development boundary > max foraging range							