REPORT

Port of Leith – Outer Berth

Environmental Impact Assessment Report - Appendices

Reference: PC2045-RHD-ZZ-XX-RP-EV-0007

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Date: 07 April 2022

FORTH PORTS SCOTLAND

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REPORT

Leith Outer Berth

Environmental Screening Report

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Acronyms

Acronym	Acronym description
AEoI	Adverse Effect on site Integrity
AL	Action Level
APR	Annual Progress Report
AQMA	Air Quality Management Area
BPM	Best Practice Measures
CD	Chart datum
CEC	City of Edinburgh Council
CI	Confidence Interval
COSHH	Control of Substances Hazardous to Health
cSAC	Candidate Special Areas of Conservation
DAERA	Department of Agriculture, Environment and Rural Affairs
DBA	Desk Based Assessment
EC	European Commission
EDG	Edinburgh Design Guidance
EIA	Environmental Impact Assessment
EU	European Union
GHG	Greenhouse gas
GPP	Guidance for Pollution Prevention
HES	Historic Environment Scotland
HGV	Heavy Goods Vehicles
HPA	Historic Marine Protected Areas
HRA	Habitats Regulations Appraisal
IAQM	Institute of Air Quality Management

IROPI	Imperative reasons of overriding public interest
LCT	Landscape Character Type
LDV	light-duty road vehicle
LOA	Length Overall
LPAs	Local Planning Authorities
LSE	Likely Significant Effect
LVIA	Landscape and Visual Impact Assessment
MCA	Maritime and Coastguard Agency
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MPA	Marine Protected Area
MS	Marine Scotland
NIEA	Northern Ireland Environment Agency
NRHE	National Record of the Historic Environment
NRW	Natural Resource Wales
NSN	National Site Network
OUV	Outstanding Universal Value
OWF	Offshore Wind Farm
PPE	Personal Protective Equipment
SNH	Scottish Natural Heritage
SAC	Special Areas of Conservation
SEPA	Scottish Environmental Protection Agency
SPA	Special Protection Area
SPMTs	Self-Propelled Modular Transporters
SSSI	Site of Special Scientific Interest

SWMP	Site Waste Management Plan
VTS	Vessel Traffic Service
WeBS	Wetland Bird Survey
WHS	World Heritage Site
WTGs	wind turbine generator
ZTV	Zone of Theoretical Visibility

Executive Summary

This report has been issued to the City of Edinburgh Council (CEC) and Marine Scotland in support of a request for Screening Opinions under The Town and Country Planning (Environmental Impact Assessment (EIA)) (Scotland) Regulations 2017 (as amended) and the Marine Works (EIA) (Scotland) Regulations 2017 (as amended), respectively (the EIA Regulations). This report presents the findings of an EIA screening exercise, to determine the requirement for EIA under the EIA Regulations.

Offshore wind is a key growth sector in Scotland, and the generation and development of offshore wind infrastructure is a key component for reaching Scotland's target to reduce greenhouse gas emissions (by 75% by 2030), and for being net-zero by 2045. Part of the next round of offshore wind development in Scotland (currently being bid for through the ScotWind process) is to ensure that 25% of the offshore wind industry is provided by local business.

The Port of Leith is ideally situated to support the offshore renewables industry, due to its central location for projects within the northern North Sea. Currently, vessels of more than 30m in width are unable to transit through the lock gates into the inner Port of Leith. Forth Ports Limited is therefore proposing to improve a berth located outside of the lock gates to be used primarily by the offshore renewables industry, and to re-configure a section of port land (of 15 hectares) to provide laydown and storage areas for the components associated with, e.g., offshore windfarms (such as nacelles, towers, blades, and foundations).

The proposed development is considered to be a Schedule 2 EIA development, falling under Schedule 2 10(g) of the EIA Regulations, as:

> *Construction of harbours and port installations, including fishing harbours (unless included in schedule 1)*

The potential impacts of the Proposed Development have therefore been assessed in accordance with the criteria set out in Schedule 3 of the EIA Regulations, and are concluded as follows:

- The proposed development would have a significant beneficial impact on the local and regional socio-economy, through the provision of significant numbers of well-paid permanent jobs and career opportunities, as well as indirect and induced employment opportunities.
- Beneficial impacts on the surrounding environment have been identified as a result of the proposed decommissioning of the existing Shawcor facility, which is a current source of air and noise emissions, as well as having a negative visual appearance, when compared to the proposed development. The use of the area as a laydown for the offshore renewables industry, would comprise a uniform stone surface and utilise more quiet modern equipment.
- Potential impacts to ornithology, marine mammals and fish during construction would be managed effectively using current best practice construction methodology and industry standard mitigation measures. No other potentially significant impacts have been identified during construction.
- No significant impacts are expected during operation of the proposed development from noise or emissions to air. In addition, the provision of cutting-edge technology, such as shore power, would reduce the need for vessels to be 'idling' at the berth with engines running while transhipments are taking place, therefore reducing noise and emissions to air.
- The tallest components that would be stored on the laydown area would be towers associated with offshore wind farms; however, their presence would be short term, with full assembly taking place immediately prior to being collected and taken offshore to the wind farm development site. Given their narrow cylindrical form, they would quickly become indistinguishable at any distance from the

Port of Leith. As such, there would be no significant impact to the local landscape character and visual setting during operation.

- The Port of Leith already accepts vessels of a similar size to those that support the offshore renewables industry, in terms of length and height, it is just the wider beam width that prevents these vessels from being able to access the lock. As such, the ability for the Port of Leith to accept these vessels is not considered to represent a change to the existing situation.

Given the beneficial impacts that have been identified and the limited potential for the proposed development to result in significant environmental impacts, which can be managed using best practice construction methodology and industry standard mitigation measures, it has been concluded by Forth Ports Limited and their advisors that **the Proposed Development does not require an EIA** under the Marine Works (EIA) (Scotland) Regulations 2017 (as amended) or The Town and Country Planning (EIA) (Scotland) Regulations 2017 (as amended).

1 Introduction

1.1 Background

Offshore wind is a key growth industry for Scotland, and a key component for reaching Scotland's target to reduce greenhouse gas emissions by 75% by 2030 and being net-zero by 2045[1]. The ScotWind process will mean more wind farm projects in the future, and a part of that process includes the commitment to at least 25% of the Offshore Wind Farm (OWF) industry being local[2]. To be able to achieve this, additional suitable port capacity is required in Scotland. To date, there has been limited local content in relation to the currently installed / being installed capacity. An increase in suitable port capacity will facilitate increased local content. Given the proximity of the Port of Leith to either consented or planned developments, it has been identified that Leith should be a strategic element for the offshore wind supply chain in the future.

The lock gates at the Port of Leith currently restrict access for vessels with a beam (width) of over 30m. Forth Ports Limited is therefore proposing to improve the berth seaward of the entrance to lock; to support vessels associated with the offshore renewables industry (see **Figure 1-1**) which cannot currently transit the lock entrance.

The proposed development would provide:

- Improvements to a 120m section of existing berth (Area 1 as shown on **Figure 1-1**);
- An area of hardstanding to be used for loading/unloading (Area 2 as shown on **Figure 1-1**);
- Space for a reconfigured laydown area within the existing port to be used for the storage and transhipment of cargo, most likely offshore wind farm (OWF) components (such as the blades, towers and nacelles) (Area 3 as shown on **Figure 1-1**); and,
- Enlarge the existing berth pocket (Area 4 as shown on **Figure 1-1**).

1.2 Purpose of this Report

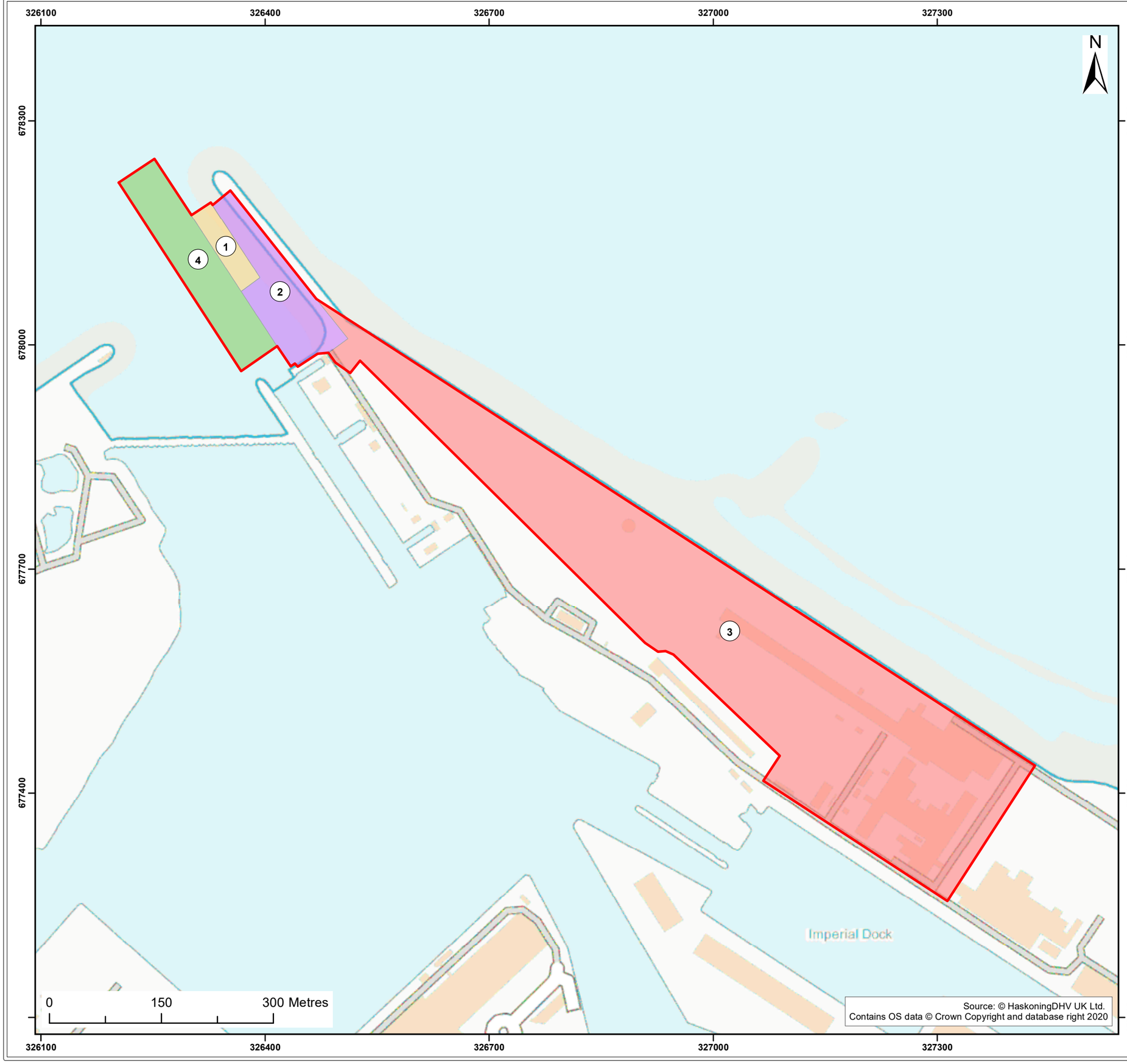
This report has been submitted to Marine Scotland (MS) and City of Edinburgh Council (CEC) along with a request for Screening Opinions in accordance with the Marine Works (Environmental Impact Assessment (EIA)) (Scotland) Regulations 2017 (as amended[3]) and the Town and Country Planning (EIA) (Scotland) Regulations 2017 (as amended[4]).

1.3 Structure of this Report

This Screening Report is structured as follows:

- **Section 2** provides a review of the legislation relevant to the screening for EIA;
- **Section 3** provides an outline description of the proposed development;
- **Section 4** provides a description of the potential environmental impacts arising from the proposed development and whether these are deemed to be significant; and,
- **Section 5** presents the conclusions of the screening exercise.

[1] https://www.gov.scot/policies/climate-change/reducing-emissions/
[2] https://www.crownestatescotland.com/resources/documents/supply-chain-development-statement-summary-1
[3] *The Marine Environment (EU Exit) (Scotland) (Amendment) Regulations 2019*
[4] *The Town and Country Planning and Electricity Works (Miscellaneous Amendments) (EU Exit) (Scotland) Regulations 2019*



Legend:

- Red line boundary
- 1 - Quayside and mooring dolphin
- 2 - Existing jetty, and backland infill / hardstanding area
- 3 - Laydown area for OWF support
- 4 - Dredging works

Client: Port of Leith	Project: Leith Outer Berth

Title: Location Plan

Figure: 1	Drawing No: PC2045-RHD-ZZ-ZZ-DR-EV-0004

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

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2 Enabling and EIA Legislation

2.1 Enabling legislation

2.1.1 Town and Country Planning (Scotland) Act 1997

The Town and Country Planning (Scotland) Act 1997 regulates the development of land in Scotland and provides Local Planning Authorities (LPAs) the power to approve planning proposals, preserve buildings of architectural or historical interest (Listed Buildings) and redevelop land, amongst others. The Town and Country Planning (Scotland) Act 1997 extends to the Mean Low Water Springs (MLWS). The CEC is the LPA.

2.1.1.1 The Town and Country Planning (General Permitted Development) (Scotland) Order 1992

The Town and Country Planning (General Permitted Development) (Scotland) Order 1992, as amended[5], grants planning permission for classes of specific types of developments.

2.1.2 Marine Scotland Act 2010

Part 4 of the Marine Scotland Act 2010 provides a framework for the marine licensing system for those 'licensable marine activities' undertaken within Scottish waters below Mean High Water Springs (MHWS). Marine Scotland is the regulatory authority for marine licensing in Scottish inshore and offshore waters.

2.2 EIA Legislation

The following regulations apply:

1. Marine Works (EIA) (Scotland) Regulations 2017 (as amended) (the MWRs); and,
2. The Town and Country Planning (EIA) (Scotland) Regulations 2017 (as amended) (TCPRs).

For the purposes of this Report, these regulations are termed the 'EIA Regulations'. The EIA Regulations contain two Schedules that identify projects that are considered EIA development and whether an EIA is mandatory or whether this is dependent upon set thresholds and criteria, as follows:

- Schedule 1: development of this type requires that an EIA is undertaken; and,
- Schedule 2: development of this type ***may*** require that an EIA is undertaken depending on the scale of the development, its characteristics and the sensitivity of the environment in which the development will take place.

It has been concluded that the proposed development is not a Schedule 1 Development under the EIA Regulations, and falls under Schedule 2. The reasons for this are outlined in more detail as follows.

Paragraph 8 of Schedule 1 of the EIA Regulations states:

> *(1) Inland waterways and ports for inland-waterway traffic which permit the passage of vessels of over 1,350 tonnes.*
> *(2) Trading ports, piers for loading and unloading connected to land and outside ports (excluding ferry piers) which can take vessels of over 1,350 tonnes.*

[5] *As amended in 2014 and 2017*

Paragraph 21 of the MRWs and Paragraph 24 of the TCPRs of Schedule 1 states:

> *Any change to or extension of projects listed in this schedule where such a change or extension in itself meets the thresholds, if any, or description of projects set out in this schedule.*

Paragraphs 21 and 24 of the MRWs and TCPRs respectively, as outlined above, are to be read in conjunction with paragraphs 8(1) and 8(2). The proposed development does not fall under paragraphs 8(1) and 8(2) of schedule 1; 8(1) does not apply as the development is not for an "inland waterway" or a "port for inland waterway traffic", and 8(2) is aimed at the provision of new "ports" or "piers" with potential to take large vessels. That is not the case with regard to the proposed development at the Port of Leith. The reference to piers (paragraph 8(2)) is not relevant as it refers to piers outside of, i.e. not part of, an existing port. The proposed development is wholly within Forth Ports' existing harbour area. It is also within the confines of the existing Port of Leith, both operationally and from a land ownership perspective. The proposed works at the Port of Leith are concerned with the alteration or improvement of existing infrastructure at a port, which already provides for vessels of over 1,350 tonnes. The works are not to form a new port which can take vessels of over 1,350 tonnes, or to increase the capacity of a port such that in future it can take vessels of over 1,350 tonnes. As such, paragraphs 21 and 24 of the MRWs and TCPRs respectively are not considered relevant as these relate only to changes or extensions to the type of projects listed in schedule 1 which itself does not apply to the proposed works.

The proposed development is however considered to be a Schedule 2 development, falling under Schedule 2 10(g) of the EIA Regulations as:

> *construction of harbours Construction of harbours and port installations, including fishing harbours (unless included in schedule 1)*

Schedule 3 of the EIA Regulations sets out the criteria that should be considered for deciding whether a project should be screened as EIA development (see BOX 1).

Box 1: Schedule 3 of the MWRs

Characteristics of works

1. The characteristics of works must be considered having regard, in particular, to—
    a. the size and design of the works;
    b. cumulation with other existing works and/or approved works;
    c. the use of natural resources, in particular land, soil, water and biodiversity;
    d. the production of waste;
    e. pollution and nuisances;
    f. the risk of major accidents and/or disasters which are relevant to the project concerned, including those caused by climate change, in accordance with scientific knowledge;
    g. the risks to human health (for example due to water contamination or air pollution).

Location of works

2. The environmental sensitivity of geographical areas likely to be affected by works must be considered having regard, in particular, to—
    a. the existing and approved land use;
    b. the relative abundance, availability, quality and regenerative capacity of natural resources (including soil, land, water and biodiversity) in the area and its underground;
    c. the absorption capacity of the natural environment, paying particular attention to the following areas—
        i. wetlands, riparian areas, river mouths;

Box 1: Schedule 3 of the MWRs

ii. coastal zones and the marine environment;
iii. mountain and forest areas;
iv. nature reserves and parks;
v. European sites and other areas classified or protected under national legislation;
vi. areas in which there has already been a failure to meet the environmental quality standards, laid down in Union legislation and relevant to the project, or in which it is considered that there is such a failure;
vii. densely populated areas;
viii. landscapes and sites of historical, cultural or archaeological significance.

Characteristics of the potential impact

3. The likely significant effects of the works on the environment must be considered in relation to criteria set out in paragraphs 1 and 2 above, with regard to the impact of the works on the factors specified in regulation 5(3), taking into account—
    a. the magnitude and spatial extent of the impact (for example geographical area and size of the population likely to be affected);
    b. the nature of the impact;
    c. the transboundary nature of the impact;
    d. the intensity and complexity of the impact;
    e. the probability of the impact;
    f. the expected onset, duration, frequency and reversibility of the impact;
    g. the cumulation of the impact with the impact of other existing and/or approved works;
    h. the possibility of effectively reducing the impact.

Taking these criteria into account, screening Opinions are sought from Marine Scotland under the MWRs and the CEC under the TCPRs. In accordance with Schedule 3 of the EIA Regulations, this request comprises the following information:

- A chart or map (or both) sufficient to identify the location of the project and of the regulated activity (**Section 3**).
- A description of the project, including in particular:
    - a description of the physical characteristics of the whole project and, where relevant, of demolition works (**Section 3**); and,
    - a description of the location of the project, with particular regard to the environmental sensitivity of geographical areas likely to be affected (**Section 4**).
- A description of the aspects of the environment likely to be affected by the project (**Section 4**).
- A description of any likely significant effects of the project on the environment (**Section 4**), to the extent of the information available on such effects resulting from:
    - The expected residues and emissions and the production of waste, where relevant; and,
    - The use of natural resources, in particular soil, land, water and biodiversity.
- Such further information or representations as the applicant may wish to provide or make, including a description of any features of the project or measures envisaged to avoid or prevent what might otherwise have been significant adverse effects on the environment (**Section 4**).

3 Description of the Proposed Development

The proposed development would include (see also **Figure 1-1**):

- Improve a 120m section of existing berth (Area 1);
- An area of hardstanding to be used for loading/unloading (Area 2);
- A laydown area for the storage and transhipment of components for the offshore renewables industry (Area 3); and,
- Capital dredging to enlarge the existing berth pocket (Area 4).

It is envisaged that the majority of earthworks materials, steel tubular piles, steel sheet piles, fenders and bollards required for the construction would be delivered to site by sea.

3.1 Construction Phase

3.1.1 Outer berth

Improvements to the berth seaward of the existing concrete lead-in jetty would be constructed as a suspended deck, approximately 120m long, 30m in width, with a 10m run off apron landside. The existing steel piled jetty currently at this location would be removed by vibro-extraction of the piles if possible or by cutting of the piles at bed level. The improved berth would be located to the northern end of the inner edge of the East Breakwater (shown as Area 1 on **Figure 1-1**).

The improved berth would be constructed using tubular piles, between approximately 1.3m and 1.4m in diameter, with a combi-wall at the rear, constructed using a combination of steel tubular piles (approximately 1.5m in diameter) and infill sheet piles. Mooring dolphins would be installed with piles of approximately 1.3m diameter. It is anticipated that, in total, approximately 150 piles and 44 sheet piles would be required; however, as the design evolves this may change. The installation method of the piles will be confirmed once the design has been fully developed, and could include impacting piling as well as other methods, such as drilling and socketing. Vibro-piling will be used as much as possible. The foundations and screen wall are expected to be above MHWS. An indicative cross section of the proposed improved berth can be seen in **Figure 3-1**, and a plan of Areas 1 and 2 shown on **Figure 3-2**.

The existing jetty in Area 2 (**Figure 1-1**) is formed of large concrete abutments. This structure would be retained. The area to the rear of this structure will be developed to form additional rear-of-quay hardstanding. The final design for this area is still being developed. It is expected that surfaces will be stone finished throughout.

Rock armour would be used to protect all revetment slopes where these interface the water (**Figure 3-2**). These revetments will be located under the improved quay (along the north-western side of the eastern breakwater), and at the rear of the lead in jetty, effectively replacing the existing concrete blocks which provide wave dissipation at the lock entrance. The rock armour is expected to be 1 to 2 tonne, 1.6m thick over an underlayer of 60 to 300kg, and 0.8m thick. Anticipated quantities of each are 5,500m^3 of rock armour and 3,300m^3 of underlayer rock, subject to completion of the design.

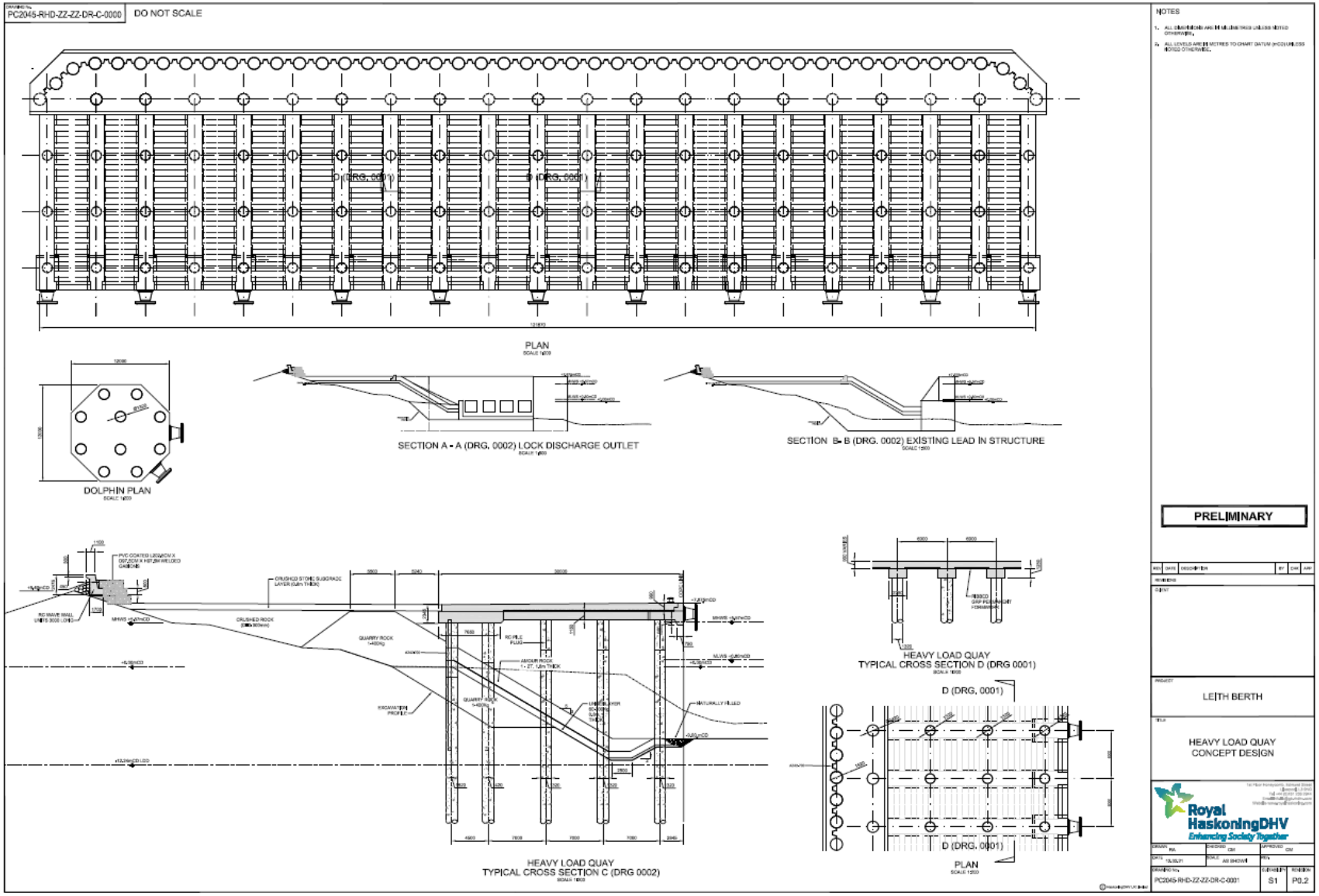

Figure 3-1 Leith Outer Berth Cross Sections

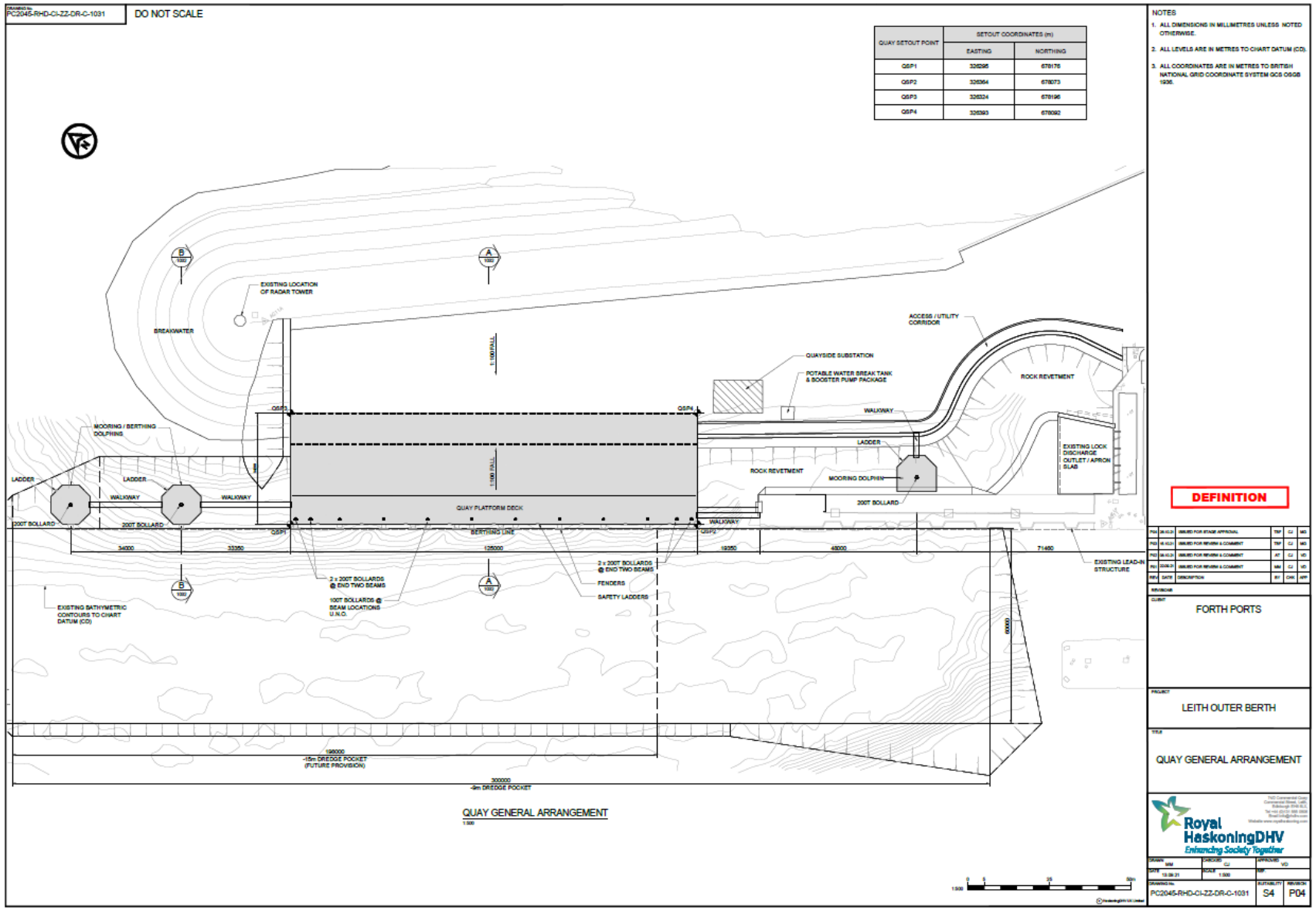

Figure 3-2 Indicative plan of Leith Outer Berth

3.1.2 Laydown area

The proposed laydown area (Area 3 on **Figure 1-1**) is currently used as a pipe coating and storage yard. This area would be cleared, with the existing buildings and infrastructure removed. Thereafter it is expected that a stone hardstanding surface would be provided. Drainage infrastructure and lighting would be installed. New storm water drainage outfalls would be installed to discharge surface water run-off. Surface water would be discharged into the sea following suitable treatment, as per the current situation.

3.1.3 Berth pocket

The existing berth pocket (Area 4 in **Figure 1-1**) would be modified by dredging to between -9 and -10m CD (-9.25 and -10.25m CD including a 0.25m over dredge allowance), and be approximately 300m by 60m wide. Total dredge volume is estimated to be approximately 100,000m^3. Much of this area is already part of a dredge pocket and the Leith approach channel. It is anticipated that the excavated material would either be used in the reclamation, where possible, or be disposed offshore.

3.1.4 Outline construction programme

A high-level construction sequence, and indicative timings, is provided below. These activities will not necessarily be carried out consecutively and may be undertaken partially or wholly in parallel:

- Removal of existing dolphins and jetty, and excavation of existing revetment materials (four months).
- Dredging to modify the existing berth pocket (up to four months).
- Piling works for the improved quay (four months).
- Placement of foundations and wave screenwall units at rear of Area 2 (two months).
- Installation of rock armour (one month).
- Placement of pilecaps, beams and deck panels onto piles to form the new quay deck, and installation of fenders and fixings (five months).
- Piling works for new dolphins (one month).
- Installation of pilecaps, beams, deck, bollards, and walkways for new dolphins (four months).
- Earthworks at the hard standing area (six months)
- Drainage systems, lighting and services (one month).
- Placement of surface layers to hardstanding areas (one month).

The overall construction programme is anticipated to be 15 months, with an anticipated start date of mid-2022.

3.2 Operational Phase

3.2.1 Outer berth

The primary use of the improved outer berth would be for use within the offshore renewables industry, providing facilities for the transhipment and storage of components such as all wind turbine generator (WTGs) parts associated with a wind farm project (including the blades, towers and nacelles) as well as foundations (such as pin piles, jackets and floating foundations). The berth could also be used for other tidal energy projects and the decommissioning of redundant oil and gas structures where vessels cannot transit the existing lock entrance.

Offshore renewable energy components would be delivered to the Port of Leith from various locations across the UK, Europe, and other international locations. Loading/unloading, using mobile cranes, is expected to

take up to 24 hours; whilst a vessel is berthed, the entrance to the Port of Leith would be restricted. It is therefore in the interest of the port to ensure the proposed outer berth is occupied for the minimum time possible. Overall lock and berth utilisation would be controlled by the Port, as is the case today.

As with the port currently, the outer berth could be operational 24 hours a day, seven days a week, and be available for use by the Port's customers as required; however, use by the offshore renewables industry, i.e. those vessels which cannot transit the lock gates due to the beam restrictions, is expected to be relatively infrequent as these vessels would only use the facility during the construction phase of an offshore renewable project. For illustrative purposes, an offshore wind farm comprising the installation of 100 turbines to pre-installed foundations would be expected to require 25 round trips of the installation vessel from the port to the project site over a period of six to 12 months, i.e., on average, 2.1 to 4.2 times per month. The port can and does accept vessels of a similar size to those that associated with the offshore renewables industry, in terms of length and height, it is just the wider beam that prevents some vessels from being able to access the lock (see **Plate 3-1**).

The number of vessels currently using the port is, on average, 1,150 per year. Given this, and the fact that vessels would no longer access the port for the decommissioned Shawcor facility, the overall change in vessel numbers using the port would not likely be significant. The provision of shore power would reduce the need for vessels to be 'idling' at the berth with engines running, therefore reducing noise and emissions to air.

3.2.2 Laydown area

The use of the proposed lay down area is similar to its current use, which is to store large oil and gas pipes (see **Plate 3-1**). Once completed, it is expected that the laydown area would be formed of a stone hardstanding surface, allowing for drainage into collector drains, which, following suitable treatment, would be discharged into the sea, as per the current situation. Lighting would be provided as required, comprised of downward orientated luminaires, with minimal light spill, and to the appropriate level necessary to meet operational health and safety requirements.

The type of components that may be stored within the laydown area include those that are required for offshore wind farms (such as foundations, towers, nacelles, blades, tidal turbines) as well as other components related to the offshore renewable industry.

Plates 3-2 to **3-4** provide an impression or indication of how the proposed development would look.

Plate 3-1 Current use of the Port and storage area

Plate 3-2 Proposed development once constructed

Plate 3-3 Example use of the outer berth and laydown area

Plate 3-4 Example loading of offshore renewables vessel when berthed

4 Description of Potential Environmental Impacts

4.1 Introduction

This section provides an overview of the potential impacts that could arise as a result of the proposed development during the construction and operational phases, and, where applicable, describes measures that have been identified to avoid or mitigate these impacts.

In addition to the measures set out in the following sections to avoid or mitigate any adverse effects that could arise as a result of the proposed development, industry good practice guidance will be adhered to throughout the programme of works, such as:

- Scottish Environmental Protection Agency (SEPA) guidelines, in particular Guidance for Pollution Prevention (GPP) 5 – works in, near or liable to affect watercourses (NIEA, DAERA, SEPA and NRW, 2018); and,
- CIRIA Coastal and Marine Environmental Site Guide (second edition) (CIRIA report C744).

4.2 Coastal Processes

4.2.1 Existing environment

Waves and tidal currents

The predominant wave approach on this coast is from the east to east-northeast sector (from the North Sea). These waves drive longshore sediment transport to the west at the proposed development. Tidal streams run approximately parallel to the coast and are east-northeast to west-northwest (into the estuary) during the flood tide and west-northwest to east-northeast (out of the estuary) during the ebb tide (British Geological Survey, 1986). Currents are relatively strong in mid-channel (enough to transport and erode fine sediment), but are weaker in the nearshore zone close to the proposed development.

Bedload sediment transport

Sediment transport at and adjacent to the proposed development is relatively benign with a weak net longshore bedload transport direction to the west. Sand has accreted along the outer face of the existing port breakwater, since it was constructed, but limited deposition of bedload in the approach channel suggests that there is little flux of sediment in a westerly direction across the port entrance (Sinclair Knight Merz, 2012). There is likely to be limited nearshore tidally-driven transport of suspended sediments.

Suspended sediment concentrations and deposition

Ambient suspended sediment concentrations in the vicinity of the proposed development are less than 5mg/l (Jacobs Arup, 2009). However, suspended sediments do become trapped within a large eddy in the lee of the breakwater and settle at slack water into the approach channel (ERM, 2021). The main sediment accumulation occurs over approximately the inner 200m of the approach channel and maintenance dredging is required to maintain safe navigation in the channel.

4.2.2 Potential impacts

4.2.2.1 During construction

Construction impacts include:

- Short term increases in suspended sediment concentrations during capital dredging of the berthing pocket and land-claim (infilling) activities to create the new hardstanding area. Given the relatively small quantity of fine estuary bed sediment released (a total dredge volume of up to approximately

100,000m^3), the disturbance would cause only minor and temporary increases in suspended sediment concentrations.

- Changes in sea-bed level due to deposition of the sediment suspended due to dredging activities. Any sediment that becomes entrained within the plume will have the potential to become deposited on the estuary bed as it settles through the water column. The depositional effects are likely to remain within the bounds of natural processes, with construction effects being one-off and temporary in duration (and unlikely to be measurable after a period of time through deposition and resuspension).

The potential impacts of construction on suspended sediment concentrations and changes in sea-bed level are therefore not considered to be significant.

4.2.2.2 During operation

Potential effects during operation could occur due to the berth improvements and enlarged berth pocket, which may result in changes to waves and tidal currents. These changes could potentially affect the sediment transport mechanisms and/or sea bed morphology; however, the geometry of the breakwater on its estuary side will not change and so there would be no changes to waves and tidal currents approaching it and flowing along it. Given the absence of local effects, the regional waves and tidal currents would also not change from their baseline conditions. The length of the breakwater is not going to increase and hence there will be no effects to longshore sediment transport along its seaward face. The enlarged berth pocket may create a small additional sink for suspended sediment.

As the amount of sediment transported both as bedload and in suspension is small, the anticipated effects of the proposed development on the natural physical environment and sediment transport system are considered to be insignificant.

4.2.3 Summary

Overall, potential impacts from changes to coastal processes are not considered to be significant.

4.3 Marine Water and Sediment Quality

4.3.1 Existing environment

4.3.1.1 Water quality

Water quality is managed through the Water Environment and Water Services (Scotland) Act 2003 (the WEWS Act) (as amended[6]) which transcribes the Water Framework Directive (2000/60/EC) into Scottish law. The proposed development is within the Kinghorn to Leith Docks coastal water body (ID: 200041) which has an overall status of Good, a chemical status of Pass and an ecological status of Good[7]. The neighbouring coastal water body to the east of the proposed development is the Leith Docks to Port Seton coastal water body (ID: 200034) which is classified as a heavily modified water body. It has an overall status of Poor due to the modifications to the bed, banks and shores. The reason for not meeting the 2021 target of Good status is the mitigation measures are not technically feasible.

The upstream water body is the Water of Leith (Murray Burn confluence to Estuary) (ID: 3700) which is designated as a heavily modified water body on account of physical alterations to the water body. The current overall status of this water body is Poor as a result of poor access for fish migration. Physical processes and water quality are also classified as Poor due to water flows and levels, and point source

[6] *The Environment (EU Exit) (Scotland) (Amendment etc.) Regulations 2019*
[7] *https://www.sepa.org.uk/data-visualisation/water-environment-hub/*

discharges, respectively. Actions to remedy these classifications are ongoing and target status by 2027 is Good.

Water quality is also monitored at Bathing Waters designated through the Bathing Water Directive (2006/7/EC) enacted in Scotland by the Bathing Waters (Scotland) Regulations 2008 (as amended[3]). The closest Bathing Waters are Portobello (West) and Portobello (Central) approximately 5km and 7km, respectively, to the east of the proposed development. Portobello (West) has a current classification of Sufficient and Portobello (Central) is classified as Good[8].

There are no Shellfish Waters within the Firth of Forth under The Water Environment (Shellfish Water Protected Areas: Designation) (Scotland) Order 2013.

4.3.1.2 Sediment quality

Sediment sampling will be undertaken in Area 4 (**Figure 1**) prior to the dredging works, to measure any contaminant presence against MS Action Levels.

4.3.2 Potential impacts

4.3.2.1 During construction

Potential impacts to marine and sediment water quality during construction include:

- Potential release of historic contamination in sediments during dredging;
- Surface water run-off from land-based construction activities; and,
- Accidental spills or leaks from construction plant or vessels.

The capital dredge would deepen the existing berth pocket to between -9mCD and -10mCD, therefore sediment samples will be obtained to characterise the sediment particle size and any contamination present. A sample plan has been submitted to Marine Scotland to confirm the number of samples and analysis. The results will be compared to MS Action Levels to determine suitability for offshore disposal.

Surface water run-off and accidental spills and leakages are standard construction industry hazards and are commonly and routinely managed using current industry standard practices and procedures.

4.3.2.2 During operation

During operation, surface water run-off will be treated, as required. No other potential impacts are anticipated.

4.3.3 Summary

Neither the construction nor operation of the proposed development, given current industry practices and procedures, is considered to have a significant impact on marine water or sediment quality.

4.4 Ground Conditions

4.4.1 Existing environment

The study area is defined by the land based element of the proposed development's boundary, which is part of the Port of Leith, and has been used for a variety of land uses associated with the operation of the port since the 1960's.

[8] *https://www2.sepa.org.uk/bathingwaters/Classifications.aspx*

Previous intrusive ground investigations undertaken on the site indicate the site is underlain by Made Ground, relating to reclamation of the area from the Firth of Forth. The Made Ground is anticipated to be over 5m thick. It is anticipated that the Made Ground will be underlain by Shoreface and Beach Deposits (undifferentiated) comprising sand and gravel, which overlie the Lower Carboniferous Gullane Formation. This comprises sandstone with interbedded grey to dark grey mudstone and siltstone. The superficial aquifer map indicates a portion of the centre of the site is classified as intergranular flow with moderate productivity. The bedrock is classified as an aquifer with intergranular fracture flow with moderate productivity.

The proposed development is underlain by the Edinburgh Coastal groundwater body (ID: 150724) which has an overall status of Good. Groundwater flow direction at the site is not known, although previous ground investigations within the site indicate that there is a difference in groundwater level either side of a former sea wall. Groundwater to the south of the former sea wall is likely to be in hydraulic continuity with surface water within the impounded dock system. Groundwater to the north of the sea wall is likely to be in hydraulic continuity with the Firth of Forth and subject to greater tidal influence. However, the active sea wall on the northern boundary of the site may also inhibit the connectivity to the Firth of Forth estuary to some extent.

Potential sources of existing contamination include historical and current land uses. These have the potential to present a risk to sensitive receptors associated with the site and surrounding area; however, it should be noted that there has been no issues with land contamination within the port estate to date..

4.4.2 Potential impacts

4.4.2.1 During construction

Potential impacts on ground conditions during construction include:

- Direct impacts to aquifers due earthworks;
- Introduction of new sources of contamination i.e. from the storage of fuels and chemicals or via spillages and leaks; and,
- Direct impacts to surface water receptors from possible sources of contamination by the creation of new pathways.

Construction works will follow best practice and guidance to avoid potential risks to human health and ecology from any potential ground contamination. This includes an intrusive ground investigation that will allow appropriate assessments to be undertaken to ascertain if contaminants are present at concentrations that could result in harm to human health and controlled waters. If unacceptable risks are identified, a detailed remediation strategy will be designed and implemented for the proposed development.

4.4.2.2 During operation

Potential impacts on ground conditions during operation include:

- Indirect impacts may occur as a result of leakages of stored materials or spillages of materials during the operational phase; however, these would be managed using the Port of Leith's existing management plans.

4.4.3 Summary

Overall, potential impacts on ground conditions are not considered to be significant can be managed using standard practices.

4.5 Water Resources and Flood Risk

4.5.1 Existing environment

Flood mapping provided by SEPA[9] shows that the area of the proposed development has a high likelihood of coastal flooding with a 10% chance of flooding each year. The indicative floodplain mapping does not take account of any flood defences which may be in place along the estuary.

The Port of Leith is shown to have a high likelihood of fluvial flooding with a 10% chance of flooding each year. During extreme fluvial events on the Water of Leith waterbody (see **Section 4.3.1.1**), procedures are in place to release water from the port as quickly as it enters from the Water of Leith in order to manage the risk of flooding. The Port of Leith is not known to have flooded historically.

Previous studies have shown there are no private water supplies or surface water extraction licences held within 2km of the Port of Leith. There are three known discharge points relating to the Scottish Water treatment works east of the Port of Leith.

4.5.2 Potential impacts

4.5.2.1 During construction

Construction of the proposed development would not have any impacts on water resources. Potential impacts from the risk of flooding during construction include:

- Risk to construction workers from coastal or fluvial flooding.

Best practice measures will be adopted (including signing up to flood alerts) to avoid flood risk to construction workers during the construction phase.

4.5.2.2 During operation

Under SEPAs Guidance Note 8 (*SEPA standing advice for planning authorities and developers on development management consultations*)[10], developments of water-based infrastructure, such as pontoons, jetties, and moorings, are unlikely to have a significant impact on flood risk, and any flood related impacts can be minimised through good design. In addition, there is no infrastructure within the proposed development area that would come under either the most vulnerable or highly vulnerable uses, as defined by SEPAs Guidance Note 8.

The design of the proposed development will take account of climate change and sea level rise, in line with best practice in respect of wave and flood periods (no less than a 1 in 100 year event of either wave overtopping or flood will be designed for). The height of the wave wall will be designed to minimise wave overtopping. Furthermore, the provision of improved surface water drainage, using the best available technology, is considered to improve the situation with regards to pluvial flood risk. The proposed development is not considered to have the potential to affect the flood risk of the surrounding area.

4.5.3 Summary

Overall, potential impacts on water resources and flood risk are not considered to be significant.

[9] https://map.sepa.org.uk/floodmaps
[10] https://www.sepa.org.uk/media/136130/sepa-standing-advice-for-planning-authorities-and-developers-on-development-management-consultations.pdf

4.6 Traffic and Transport

4.6.1 Existing environment

The study area contains a mix of residential, leisure, industrial and retail areas with a mixture of strategic and local roads. Development in recent years has resulted in enhancement of public transport provision, with the area also benefiting from good walking and cycling infrastructure.

The road network around the Port of Leith can be congested at peak times, and heavy goods vehicle traffic is present due to the existing operational port, including the Shawcor facility, and industrial uses in the area. Typically, the heavy vehicle traffic travels on more strategic routes and therefore outside immediate vicinity of the site the proportion of heavy vehicle traffic reduces as routes become more local. Within the study area there are also large trip attractors such as Ocean Terminal. An extension to the tram service within Edinburgh is under construction, to connect to the Port of Leith, which is due for completion in 2023. This would alleviate some of the traffic during peak times around the Port of Leith area.

4.6.2 Potential impacts

4.6.2.1 During construction

Potential impacts to traffic and transport during construction include:

- Movements of construction workers to and from the site.

4.6.2.2 During operation

Operational impacts to traffic and transport are not anticipated for the proposed development, given all components would arrive and leave the port by sea. In addition, there would be a positive impact to traffic and transport due to the removal of the Shawcor facility from late 2021.

4.6.3 Summary

Overall, potential impacts to traffic and transport are not considered to be significant.

4.7 Noise and Vibration

4.7.1 Existing environment

The immediate surrounding area comprises existing industrial premises and residential dwellings (both existing and proposed) along Western Harbour Drive.

The closest human receptors are approximately 550m south-west from the proposed development, located off Western Harbour View and Western Harbour Drive. The Western Harbour Masterplan includes plans for a new mixed use residential, commercial, open space and school development. This would bring the closest residential properties to a distance of 300m to the west of the proposed berth.

Existing baseline noise data were used to supplement planning applications of the proposed residential schemes along Western Harbour Drive[11]; summarised in **Table 4-1**.

[11] *Full details of the baseline noise survey available within the noise impact assessment supporting planning application 19/00986/AMC*

Table 4-1 Historic baseline noise survey results

Location	Reference period	$L_{Aeq,T}$ (dB)	$L_{AF,max}$ (dB)	L_{A10} (dB)	L_{A90} (dB)
Western Harbour Drive	Day (07:00 to 23:00)	51	83	52	44
	Night (23:00 to 07:00)	40	68	42	37
Sandpiper Drive	Day (07:00 to 23:00)	64	85	69	52
	Night (23:00 to 07:00)	49	73	52	40

During the baseline survey, there was limited activity within the Port of Leith; therefore, the noise environment was dominated by activity at nearby industrial and commercial premises and road traffic. This is reflected in the baseline data with higher noise levels measured at Sandpiper Drive than at Western Harbour Drive.

Ornithological receptors are considered in **Section 4.9**.

4.7.2 Potential impacts

4.7.2.1 During construction

During construction the following activities are considered to be the main sources of noise:

- Demolition of existing structures;
- Installation of piles;
- Infill of hardstanding areas;
- Installation of beams, deck panels and rock armour;
- Dredging; and,
- Vessels arriving with construction materials.

However, only the proposed piling works, and specifically only if impact piling is chosen as the preferred method, are considered to have the potential to cause significant levels of noise. The implementation of Best Practice Measures (BPM) will manage potential noise impacts to human receptors.

Vibration impacts due to piling activities are not considered likely at residential premises due to the separation distance from the proposed works, approximately 550m. Therefore, there would be no requirement to assess vibration impacts. Given the low level of road traffic associated with the construction of the proposed development, there would be no requirement to assess noise from construction traffic.

4.7.2.2 During operation

During operation the following activities are considered to be the main sources of noise:

- Vessels moored at the berth;
- Loading and unloading components between vessel and the hardstanding area; and,
- Movement of components between hardstanding and laydown areas.

ISO 9613-2[12] presents a formula for geometric divergence (A_{div}), which is the attenuation of sound from a point sound source in free-field conditions due to distance. The formula is presented below:

$$A_{div} = 20\log(d/d_0)$$

where d is the separation distance, in meters, and d_0 is the reference distance (=1m)

[12] *International Standards Organisation (1996) ISO 9613-2, Acoustics – Attenuation of sound during propagation outdoors Part 2:General method of calculation*

The resulting attenuation of noise from the source (i.e. the proposed berth) to a distance of 300 – 500m (i.e. the Western Harbour proposed and existing residential properties) is approximately 50 – 54 dB. This decrease in noise does not account for air and ground absorption, or screening effects and therefore presents a very conservative estimate. Given this, and the fact that the activities associated with the proposed development would be similar in nature to existing operations at the Port of Leith, operational noise impacts at the nearby residential receptors are not considered to be significant.

The use of modern equipment for the movement of components is considered to generate less noise than the current Shawcor facility, which tends to utilise HGV's and large industrial material handling machinery. No significant vibration impacts are expected.

In addition, Forth Ports Ltd is proposing to install shore-side electricity supplies on the proposed berth. Shore power supply would then be available for use by vessels with the necessary on-board equipment, which would be able to "plug-in" to this supply and not have to run their auxiliary engines whilst at berth. This would have a further positive impact on the surrounding noise environment.

As there would be no traffic impacts during operation, there can be no noise associated with operational road traffic.

4.7.3 Summary

Based upon the location of the proposed berth and separation distance to nearby residential premises, it is considered that, with adherence to standard best practice measures, construction and operation of the proposed development would not give rise to significant noise impacts. The use of modern equipment to move components would reduce noise levels compared to the operational noise of the existing Shawcor facility.

4.8 Air Quality

4.8.1 Baseline environment

Baseline air quality levels in the vicinity of the Port of Leith vary according to distance from nearby major roads. CEC declared an air quality management area (AQMA) in 2017 along Salamander Street and also covering a portion of the Port of Leith (**Figure 4-1** below), on the basis of elevated concentrations of fine particulate matter (PM_{10}) recorded at a kerbside monitoring station (Point 1 on **Figure 4-1**) near the junction of Salamander Street and Bath Road. The proposed development lies well beyond the boundary of this AQMA.

At the time, it was acknowledged that the excessive PM_{10} concentrations originated from congested road traffic emissions but there was a suspicion that activities within the Port of Leith may have contributed. A subsequent analysis of the monitoring data, backed-up by detailed monitoring of fine particulate matter at a site in Tower Street, close to the Port of Leith boundary (Point 2 on **Figure 4-1**) revealed that PM_{10} concentrations in the Port of Leith were well within Scottish air quality standards in 2018 and 2019.

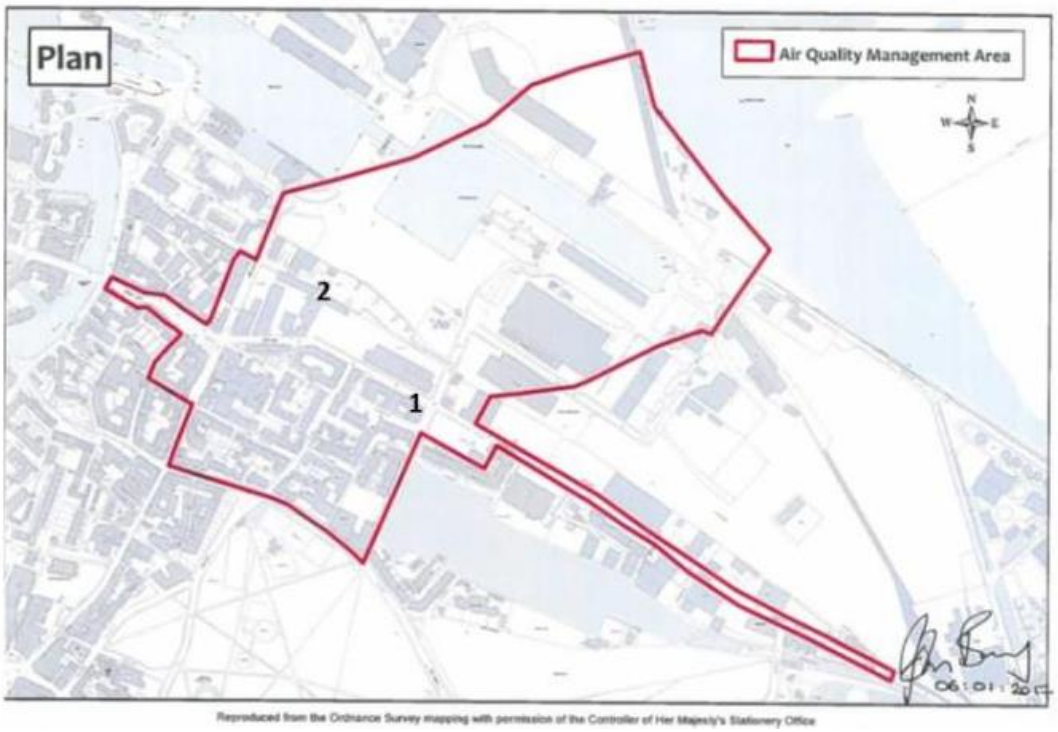

Figure 4-1 Salamander Street AQMA and nearby monitoring stations

In addition, planning permission was granted in 2019 and construction is now proceeding on residential units within the boundary of the previously declared AQMA. Air pollutant concentrations in Edinburgh have been decreasing at a number of sites across the city, and in 2018 the monitoring station at Salamander Street recorded a marginal breach (of less than 4%) of the annual average PM_{10} air quality standard. **Table 4-2** includes a summary of monitored PM_{10} concentrations at the two CEC monitoring stations.

Table 4-2 Monitored PM_{10} concentrations at Salamander Street and Tower Street

Year	Salamander Street (µg m^{-3})	Tower Street (µg m^{-3})
2018	**18.7**	**9.1**
2019	**17.1**	**10.7**
2020	**13.1**	**8.7**
Air Quality Standard	**18**	**18**

Background concentrations of nitrogen dioxide (NO_2) and PM_{10} in the four 1km by 1km grid squares on and around the Port of Leith, obtained from the Defra background maps[13], are detailed below for 2021 in **Table 4-3**, compared with the air quality standards.

Table 4-3 Mapped background air pollutant concentrations for 2021

Grid Square Centroid	NO_2 Annual Average, µg m^{-3}	PM_{10} Annual Average, µg m^{-3}
326500,677500	12.1	9.9
327500,677500	12.8	10.7
326500,676500	15.1	11.6
327500,676500	13.3	12.1
Air Quality Standard	**40**	**18**

[13] http://www.scottishairquality.scot/data/mapping?view=data

Background concentrations are well within the air quality standards for both air pollutants. This has been confirmed by fine particulate (PM_{10} & $PM_{2.5}$) monitoring carried out by Forth Ports Limited in the Western Harbour area for six months in 2018 and a full calendar year in 2019. The results of this monitoring are summarised in **Table 4-4**.

Table 4-4 Fine particulate monitoring results at Western Harbour 2018-2019

Year	PM_{10} Period Average, µg m^{-3}	$PM_{2.5}$ Period Average, µg m^{-3}
2018 – 5 months, August-December	5.7	4.2
2019 – Full calendar year	6.9	5.0
Air Quality Standard	**18**	**12**

Across Edinburgh as a whole, the general picture is one of gradually improving ambient air quality, as stated in the CEC 2020 Air Quality Annual Progress Report (APR)[14], reporting monitoring results for 2019:

- "Exceedances of the NO_2 annual objective have continued to be monitored within St John's and the City Centre AQMAs, therefore these remain valid."
- "For the third consecutive year, Great Junction Street AQMA has reported no breaches of the NO_2 annual objectives. A review will be undertaken to consider the potential revocation of the AQMA, particularly in relation to changing traffic management priorities in the area. With the Inverleith Row AQMA, there was no breach of the said objective for the second year in a row. Monitoring will continue to assess whether this AQMA can be revoked in the future."
- "St John's Road AQMA is also declared for exceedances of the NO_2 1-hour objective. 2019 is the fourth consecutive year in which less than 18 hourly concentrations greater than 200 µg/m^3 were reported. Therefore, the Council will amend the AQMA to remove this designation."
- "PM_{10} and $PM_{2.5}$ monitoring data shows that for all locations, except Salamander Street, there are no breaches of the Scottish objectives. Salamander Street has reported a breach of the annual mean PM_{10} objective when using the local factor to adjust the TEOM data."
- "Trend analysis has shown that for NO_2, PM_{10}, and $PM_{2.5}$, concentrations are largely decreasing across Edinburgh. In some locations (Currie, NO_2, and Glasgow Road, PM_{10}) the concentrations are remaining stable, however no exceedances are located in these areas."

The prevailing wind blows from between west and south-west, although there is a percentage of the year, typically, when the wind blows from the east-north-east (**Figure 4-2**).

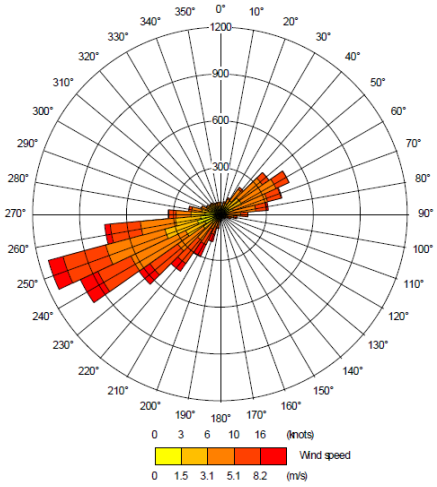

Figure 4-2 Wind rose for Edinburgh (calendar year 2016)

[14] https://www.edinburgh.gov.uk/downloads/file/28720/laqm-annual-progress-report-2020

4.8.2 Receptors

The closest human receptors to the proposed development lie approximately 550m to the west in the existing Western Harbour development, along Western Harbour View. Other residential properties lie between 650m and 730m to the south-west, along Western Harbour Midway, and between 850m and 930m to the south-west, along Western Harbour Way. The next closest residential properties lie more than 1,000m to the south-east, the Cala Homes development along Ocean Drive, opposite Ocean Terminal. Additional properties are under construction on the other side of Ocean Drive, some 1,100m to the south-east of the proposed berth. Also, the remainder of the Western Harbour area has been approved for a mixed use residential, commercial, open space and school development. This would bring the closest residential properties to a distance of 300m to the west of the new proposed berth.

With regard to sensitive ecological receptors, there are a number of national and international designated sites within 1km of the proposed development; however, none are sensitive to impacts to air quality, given their intertidal nature or that they only supporting breeding birds (i.e. the breeding tern colony located within the port).

4.8.3 Potential impacts

4.8.3.1 During construction

During construction the following activities are considered to have the potential to give rise to dust emissions:

- Excavation of existing materials;
- Infilling of hardstanding areas and placement of surface layer; and,
- Installation of rock armour.

Application of the standard dust control and management techniques, as laid out in the Institute of Air Quality Management (IAQM) guidance document[15] would ensure that no significant effects arise in respect of dust or fine particulate matter.

Similarly for emissions from construction plant operating on the berth and associated infrastructure sites, given that emissions are now regulated by The Non-Road Mobile Machinery (Type-Approval and Emission of Gaseous and Particulate Pollutants) Regulations 2018[16], the separation distance from sensitive receptors and the direction of the prevailing wind, these are not considered to represent a significant effect upon air quality.

The greater majority of the materials for construction of the berth and associated infrastructure would be delivered by sea, in order to minimise the road (HGV) movements to and from the Port of Leith and this would take place at intervals over the construction period. There would be some additional light-duty road vehicle (LDV) movements associated with construction workers' travel to and from the site; however, this would be offset by the decommissioning of the Shawcor facility.

4.8.3.2 Operational phase

Once the berth and associated infrastructure are operational, the only emissions to atmosphere would be from vessel exhausts from ships at berth (and arrival/departure) and from shoreside materials handling plant and equipment, all of which occurs at present within the Port of Leith.

Port of Leith is within the North Sea Emissions Control Area under Annex VI of MARPOL, which means that vessels at berth in port have to use low-sulphur distillate fuels, rather than heavy fuel oil, or scrubbers. This

[15] https://iaqm.co.uk/text/guidance/construction-dust-2014.pdf
[16] https://www.legislation.gov.uk/uksi/2018/764/made

achieves a reduction in emissions of sulphur dioxide and particulate matter. This, coupled with the fact that the berth is greater than 500m down prevailing wind from the nearest existing sensitive receptors and 300m from future committed residential development, means that there would be no significant effects upon air quality. The removal of the Shawcor facility and associated emissions to the atmosphere would result in an overall positive impact on local air quality.

Forth Ports Ltd is proposing to install shore-side electricity supplies on the proposed berth. Shore power supply would then be available for use by vessels with the necessary on-board equipment, which would be able to "plug-in" to this supply and not have to run their auxiliary engines whilst at berth. This would have a further positive impact on air quality.

4.8.4 Summary

Based upon the location of the proposed development, existing air quality conditions, the prevailing winds and remoteness of sensitive receptors, it has been concluded that the construction and operation of the proposed development would not give rise to significant effects upon air quality. The removal of the Shawcor facility and provision of shore power would have positive effects on air quality.

4.9 Ornithology

4.9.1 Existing environment

The proposed development is adjacent to a number of sites designated to protect national and internationally important bird species. These include the Outer Firth of Forth and St Andrews Bay Complex SPA, Firth of Forth SPA and Ramsar site, Imperial Dock Lock, Leith SPA, and Forth Islands SPA and Ramsar site. **Table 4-5** provides details of the species protected within these designations.

Table 4-5 Nature conservation designations within 2km for which birds are a reason for designation

Site name and designation	Distance from the proposed development	Designated species
Outer Firth of Forth and St Andrews Bay Complex SPA	Adjacent	Annex 1 populations of European importance, non-breeding: • Red-throated diver (*Gavia stellata*) • Slavonian grebe (*Podiceps auritus*) • Little gull (*Larus minutus*) Breeding: • Common tern (*Sterna hirundo*) • Arctic tern (*Sterna paradisaea*) Migratory populations of European importance, non-breeding: • Eider (*Somateria mollissima*) • Waterfowl assemblage (long-tailed duck (*Clangula hyemalis*), common scoter (*Melanitta nigra*), velvet scoter (*Melanitta fusca*), goldeneye (Bucephala clangula), red-breasted merganser (*Mergus serrator*)) Breeding: • Shag (*Phalacrocorax aristotelis*) • Gannet (*Morus bassanus*) • Seabird assemblage, breeding (puffin (*Fratercula arctica*), kittiwake (*Rissa tridactyla*), Manx shearwater (*Puffinus puffinus*), guillemot (*Uria aalge*), herring gull (*Larus argentatus*) • Seabird assemblage, non-breeding (black-headed gull (*Chroicocephalus ridibundus*), common gull (*Larus canus*), herring gull, guillemot, shag, kittiwake, razorbill)

Site name and designation	Distance from the proposed development	Designated species
Firth of Forth SPA (and Ramsar site)	Adjacent	Annex 1 populations of European importance, non-breeding: • Red-throated diver • Slavonian grebe[17] • Golden plover (*Pluvialis apricaria*) • Bar-tailed godwit1 (*Limosa lapponica*) Post-breeding (passage): • Sandwich tern[7] (*Thalasseus sandvicensis*) Migratory populations of European importance (non-breeding): • Pink-footed goose[7] (*Anser brachyrhynchus*) • Shelduck[7] (*Tadorna tadorna*) • Knot[7] (*Calidris canutus*) • Redshank[7] (*Tringa totanus*) • Turnstone[7] (*Arenaria interpres*) • Waterfowl assemblage[7] (great-crested grebe (*Podiceps cristatus*), cormorant (*Phalacrocorax carbo*), scaup (*Aythya marila*), eider, long-tailed duck, common scoter, velvet scoter, goldeneye[7], red-breasted merganser, oystercatcher (*Haematopus ostralegus*), ringed plover (*Charadrius hiaticula*), grey plover (*Pluvialis squatarola*), dunlin (*Calidris alpina*), and curlew (*Numenius arquata*).
Imperial Dock, Leith SPA	0.8km	Annex 1 populations of European importance, Breeding: • Common tern
Forth Islands SPA	Adjacent	Annex 1 populations of European importance, breeding: • Arctic tern • Common tern • Roseate tern (Sterna dougallii) • Sandwich tern Migratory populations of European importance, breeding: • Gannet • Lesser black-backed gull • Puffin • Shag • Seabird assemblage (razorbill, guillemot, kittiwake, herring gull, cormorant)

Between 2010 and 2011, non-breeding bird surveys were carried out over the winter period, identifying a total of 21 waterfowl species, with a peak count of the waterfowl assemblage of 454 birds, within or adjacent to the port (SKM, 2012). The only species recorded in numbers greater than 25 within these surveys were eider, goldeneye, oystercatcher, knot, curlew and redshank. Oystercatcher was the most numerous species recorded (peak count 300), with the greatest numbers recorded roosting on the East Breakwater (SKM, 2012).

Breeding surveys were also carried out in 2010, which recorded very few species within the port, with the most notable species being common tern (with 818 pairs in 2010) [Redacted] Peregrine was also recorded but is not known to breed within the port area (SKM, 2012).

[17] *listed on Ramsar site citation in addition to SPA citation.*

4.9.2 Potential impacts

4.9.2.1 During construction

Potential impacts on bird species during construction include:

- Disturbance – disturbance (noise and visual) to breeding and non-breeding birds, although it should be noted that the site is currently an active port subject to high existing levels of disturbance. Sources of disturbance are likely to include noise, lighting, presence of people and plant / machinery and vehicular / shipping traffic, both onshore and offshore;
- Water quality impacts affecting prey availability – due to the potential release of contaminants and increased turbidity; and,
- Loss of prey species due to underwater noise.

4.9.2.2 During operation

It is considered that there would not be any potential for significant impacts to ornithology during the operational phase of the proposed development, given no significant changes are proposed to the current activities at the Port of Leith.

4.9.3 Summary

There is the potential for bird species to be affected by the proposed construction activities; however, given these impacts would be short term and temporary, and managed using standard best practice measures, significant impacts would not occur.

Potential impacts will be discussed and agreed with NatureScot via the Habitats Regulations Appraisal (HRA) process to ensure that potential impacts to ornithology are not significant.

4.10 Terrestrial and Coastal Ecology

4.10.1 Existing environment

The Habitat Map of Scotland (**Figure 4-3**) shows that, within the proposed development boundary, the only habitat noted is '*buildings of cities, towns, and villages'* (habitat code J1). Other adjacent habitats include '*surface standing waters'* (habitat code C1) and '*inland standing waters'* (habitat code C). There are localised areas of '*Atlantic hay meadow'* (habitat code E2.21), and '*broadleaved deciduous woodland'* (habitat code G1); neither of which are closer than 1.1km to the site boundary. To the south-east of the project boundary, is an area of '*annual vegetation of driftlines'*, an Annex I habitat (habitat code B2.12; approximately 870m from the project site).

The foreshore adjacent to the proposed development is designated as the Firth of Forth SSSI. This designation protects an extensive coastal area on the east coast of Scotland. The sites stretch from Alloa Inches in the River Forth to Fife Ness and Dunbar in the east.

Intertidal habitats along the outer edge of the harbour are relatively exposed, and there are sediments ranging from sandy beach (East Sands of Leith) to rocky outcrops. Studies undertaken for Forth Properties Ltd (2007) and by SKM (2011) indicate the intertidal benthic environment on the areas immediately surrounding Leith Docks are defined by man-made hard substrate, such as breakwaters. The man-made substrates were recorded as exhibiting a distinctive zonation pattern of species, relative to the aspect of the slope. The southerly sides showed a lowered diversity than northerly sides of breakwaters and were dominated by barnacles above patchy fucoids with scattered periwinkles, limpets and mussels.

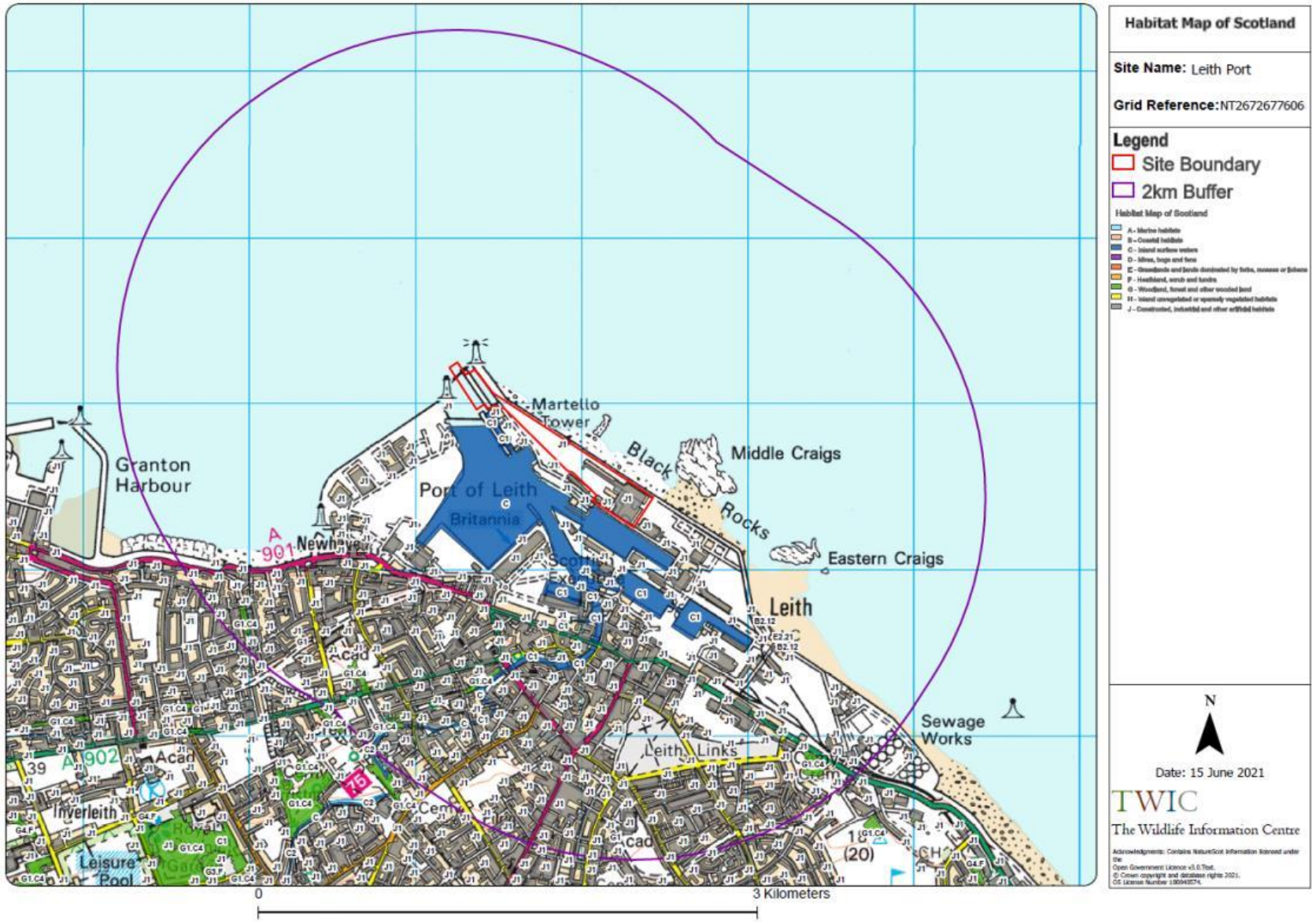

Figure 4-3 Terrestrial habitats within 2km of the proposed development (from the Habitat Map of Scotland)

An extended Phase 1 Habitat Survey was undertaken in June 2012 which recorded no rare or notable plant species, although there are historic records for notable plant species including corn buttercup (*Ranunculus arvensis*) and bog-rosemary (*Andromeda polifolia*) (SKM, 2012).

Table 4-6 below describes the key species that have been reported to the Wildlife Information Centre, within 2km of the proposed development, over the previous five year period (from 2015 to 2021 (to date)), that are afforded protection through national or international legislations.

Table 4-6 Summary of the key species reported to the Wildlife Information Centre (2015 – 2021 (to date))

Species	Distance to site boundary (at closest point)	Protections and Status
Within 2km of site boundary		
Chicory *Cichorium intybus*	391m	Scottish Biodiversity List of species of principal importance for biodiversity conservation (ScotBL).
European rabbit *Oryctolagus cuniculus*	715m	IUCN - Global Red List: Near Threatened (RLGLB.NT).
European otter	973m (opposite side of port)	Bern2; HabRegs2; Habitats Directive Annex 2 (Priority Species) (HSD2p); HSD4; ScotBL; UK Biodiversity Action Plan Priority Species (UKBAP); WCA5/9.4b; WCA5/9.4c.
Weasel *Mustela nivalis*	1,114m	Bern3
Pipistrelle	1,149m	Bern Convention Appendix 2 (Bern2); Bern3; CMS_A2; CMS_EUROBATS-A1; HabRegs2; HSD4; ScotBL; WCA5/9.4b; WCA5/9.4c
Soprano pipistrelle	1,158m	Bern2; CMS_A2; CMS_EUROBATS-A1; HabRegs2; HSD4; ScotBL; UKBAP; WCA5/9.4b; WCA5/9.4c.
Red mason bee *Osmia bicornis*	1,258m	ScotBL
Fork-tailed flower bee *Anthophora furcata*	1,273m	ScotBL
Eurasian badger	1,431m	Bern Convention Appendix 3 (Bern3); Protection of Badgers Act (1992) (PBA).
West European hedgehog *Erinaceus europaeus*	1,484m	Bern3; IUCN - Global Red List: Vulnerable (RLGB.VU) ScotBL; UKBAP
Common pipistrelle	1,674m	Convention on Migratory Species Appendix 2 (CMS_A2); Convention on Migratory Species - EUROBATS Annex 1 (CMS_EUROBATS-A1);

Species	Distance to site boundary (at closest point)	Protections and Status
		The Conservation (Natural Habitats c.) Regulations 2010 (Schedule 2) (HabRegs2); Habitats Directive Annex 4 (HSD4); Wildlife and Countryside Act 1981 Schedule 5 Section 9.4b (WCA5/9.4b); Wildlife and Countryside Act 1981 Schedule 5 Section 9.4c (WCA5/9.4c).

A number of different bat species have been recorded within 2km of the site boundary within the five year period, the closest being just approximately 1,150m from the site boundary. During a site walkover survey undertaken in 2012 (SKM, 2012), three buildings were identified as providing potentially suitable bat roosting habitat, but with a low risk that bats would be present, however, the site was assessed to be of low quality for foraging bats (SKM, 2012). In addition, previous surveys undertaken on the site found no bats roosting within the site, and very low levels of bat activity were recorded (SKM, 2012). Due to the limited potential for providing good foraging areas, and that very minimal bat activity has been recorded within the proposed development areas themselves, it is considered unlikely for there to be any bat presence within the site boundary that would be at risk of any potential impact.

Otter have not been reported within the proposed development site boundary since 2015, and the closest record was 973m from the site; however, there is still the potential for otter to be present within the site boundary.

While badger have been recorded within 2km of the site boundary, the closest record is for over 1,400m form the site, and there is no habitat within the site boundary itself that would be suitable for this species.

4.10.2 Potential impacts

4.10.2.1 During construction

Potential impacts on terrestrial and coastal ecology during construction include:

- Loss of a small area of artificial intertidal habitat; and,
- Species mortality/injury – e.g. potential for otter to fall into excavated areas, potential for bats to be affected should they roost in the buildings to be demolished; however, the potential is considered to be very low given the nature of the buildings and the level of activity of the surrounding area.

4.10.2.2 During operation

No impacts to terrestrial and coastal ecology would occur during the operational phase.

4.10.3 Summary

The loss of the small area of intertidal habitat is not considered significant. Given this and the implementation of standard best practice measures, including the walkover survey and measures to protect otters, potential impacts to terrestrial and coastal ecology would not be significant.

4.11 Marine Benthic Ecology

4.11.1 Existing environment

The subtidal environment within and surrounding the Port of Leith generally comprises relatively shallow water (less than 5m) over sandy, muddy and silty soft sediments (Forth Properties Ltd, 2007). EMODnet

broad-scale seabed habitat mapping suggests that the seabed within the footprint of the proposed development is comprised of infralittoral mixed sediments.

Benthic species in the vicinity of the Port of Leith are common to the area and include the bivalve *Abra alba* and common mussel *Mytilus edulis* (Jacobs Arup, 2009; Forth Properties Ltd, 2007).

4.11.2 Potential impacts

4.11.2.1 During construction

Potential impacts on marine benthic ecology during construction include:

- Loss of benthic habitat as a result of the proposed dredging;
- Increased turbidity and smothering of benthic habitats as a result of the proposed dredging;
- Release of contaminants as a result of the proposed dredging; and,
- Accidental leaks and spillages.

4.11.2.2 During operation

No impacts to marine benthic ecology would occur during the operational phase.

4.11.3 Summary

The majority of the area to be dredged is within the currently dredged approach channel to the Port of Leith. Furthermore, predicted increases in suspended sediment and subsequent deposition are not considered to be significant (see **Section 4.2.2.1**). The potential for the release of contaminants during dredging and disposal will be determined by the sediment quality survey, with mitigation measures put in place as required. Given this, and the adherence of standard mitigation measures to avoid/manage accidental spills and leaks, potential impacts to marine benthic ecology would not be significant.

4.12 Fish and Shellfish Ecology

4.12.1 Existing environment

The Firth of Forth supports a diverse range of fish species, and encompasses several areas reported to be spawning and nursery grounds for species, including herring *Clupea harengus,* cod *Gadus morhua,* whiting *Merlangius merlangus,* plaice *Pleuronectes platessa*, sprat *Sprattus*, and lemon sole *Microstomus kitt* (Ellis *et al*., 2012; Coull *et al.,* 1998). An abundance of other species are also known to be present in the wider area, including mackerel *Scomber scombrus*, blue whiting *Micromesistius poutassou,* ling *Molva molva* (Ellis *et al*., 2012; Coull *et al.,* 1998).

A number of fish species are seasonally present in the area, as they migrate through the Firth of Forth upstream to freshwater spawning grounds. These species may spawn or have nursery areas in the lower estuary (e.g., allis shad *Alosa alosa* and twaite shad *Alosa fallax*) or in the rivers e.g., Atlantic salmon *Salmo salar* and sea trout *Salmo trutta* (SKM, 2012).

The European eel *Anguilla* moves from freshwater to the sea to spawn, and also passes through the Firth of Forth on its way to spawning grounds in the sea (Malcolm *et al.,* 2010). Data collected at the Longannet power station further upstream shows that a number of species migrate through the estuary, including European smelt *Osmerus eperlanus*, river lamprey *Lampetra fluviatilis*, European eel, Atlantic salmon and sea trout (SKM, 2011). Sea lamprey *Petromyzon marinus*, river lamprey and Atlantic salmon are designated under the River Teith SAC.

Several other fish species are known to be present within the Firth of Forth, including flounder *Pleuronectus flesus,* plaice, lesser sandeel *Ammodytes tobianus*, whiting, common goby *Pomatoschistus microps*, lesser spotted dogfish *Scyliorhinus canicular*, and sprat *Sprattus sprattus* (Forth Properties Ltd, 2007; Jennings *et al*., 2012).

A range of shellfish species are found in the vicinity of the Leith Docks area, including brown shrimp *Crangon crangon,* which have been recorded throughout the Forth estuary, while the pink shrimp *Pandalus montagui* occurred in the lower reaches of the estuary (Jayamanne, 1995). Razor shells *Ensis spp*. have been recorded in the inshore areas (Robson, 1997). Other shellfish species found in southeast Scotland that may be found in the area include European lobster *Hommarus Gammarus*, edible/brown crab *Cancer pagurus*, velvet swimming crab *Necora puber*; king scallop *Pecten maximus*, Norway lobster *Nephrops norvegicus*, and squid *Loligo forbesi* (Beard and McGregor, 2004; Robson, 1997).

4.12.2 Potential impacts

4.12.2.1 During construction

Potential impacts to fish and shellfish ecology during construction include:

- Generation of underwater noise from piling operations, which could have physiological and/or behavioural response impacts;
- Impacts due to changes to water quality (e.g., increased suspended sediment); and,
- Impacts due to a change in habitat quality (e.g. increased sedimentation, loss of habitat).

Piling would be temporary and for a short period only. Underwater noise impacts would be managed by the standard mitigation measures proposed for marine mammals (see **Section 4.13.2.1**).

The potential for indirect impacts due to changes in water quality and prey availability will be based on assessments undertaken for other relevant sections, including coastal processes (**Section 4.2**), marine water and sediment quality (**Section 4.3**), benthic ecology (**Section 4.11**); however, potential impacts are not considered to be significant.

4.12.2.2 During operation

There is not expected to be any significant change, through operation, compared to the existing activity levels; therefore, it is not expected that there would be any potential to impact fish and shellfish ecology during the operational phase.

4.12.3 Summary

There is the potential for fish species to be affected by the proposed construction activities; however, given these impacts would be short term and temporary, and managed using standard best practice measures, significant impacts would not occur.

Potential impacts to Sea lamprey *Petromyzon marinus*, river lamprey and Atlantic salmon are designated under the River Teith SAC. Potential impacts to these species will be discussed and agreed with NatureScot via the HRA process to ensure that they are not significant.

4.13 Marine Mammals

4.13.1 Existing environment

A number of marine mammal species are found off the east coast of Scotland, and within the Firth of Forth, with the most common being harbour porpoise *Phocoena phocoena*, white-beaked dolphin *Lagenorhynchus albirostris*, grey seal *Halichoerus grypus* and harbour seal *Phoca vitulina* (Paxton *et al*., 2016; Waggitt *et al*., 2020; Carter *et al*., 2020). Other species include minke whale *Balaenoptera acutorostrata*, with increased presence in the summer periods (DECC, 2016; Paxton *et al*., 2016; Waggitt *et al*., 2020). In recent years, the population of bottlenose dolphin *Tursiops truncatus* has been increasing in this area, as the Moray Firth population extends its range south (Civil *et al*., 2018). Less common marine mammal species in this area include humpback whale *Megaptera novaeangliae*[18], killer whale *Orcinus orca*, Atlantic white-sided dolphin *Lagenorhynchus acutus*, Risso's dolphin *Grampus griseus* and long-finned pilot whales *Globicephala melas* (DECC, 2016; Waggitt *et al*., 2020).

Reported sightings of marine mammal species to the Seawatch Foundation in 2021 (from February to June), within the Firth of Forth, include mainly bottlenose dolphin, with lower numbers of sightings of harbour porpoise, harbour seal, sei whale *Balaenoptera borealis* and humpback whale.

There are a number of marine mammal protected areas along the east coast of Scotland, including:

- Southern Trench Marine Protected Area (MPA), designated for minke whale - approximately 190km from the proposed development;
- Moray Firth SAC, designated for bottlenose dolphin - approximately 300km from the proposed development;
- Firth of Tay and Eden Estuary SAC, designated for harbour seal - approximately 64km from the proposed development;
- Isle of May SAC, designated for grey seal - approximately 43km from the proposed development; and,
- Berwickshire and North Northumberland Coast SAC, designated for grey seal - approximately 63km from the proposed development.

While minke whale are not regularly a common species within the Firth of Forth, the Regional Baselines for Marine Mammals (Scottish Marine and Freshwater Science, 2020) report shows that within the Firth of Forth, an adjusted density of 0-0.10 individuals per km^2 may be observed, with adjusted densities of up to 10 per km^2 observed within the Southern Trench MPA area. Due to the distance between the MPA and the proposed development, there is no potential for direct impacts.

Within the Firth of Forth, a relatively high number of grey seals breed, with a total pup production of 6,894 in 2018, an increase of 4.2% from the previous count in 2014 (SCOS, 2020). Along the east coast of Scotland (from the English border to Fraserburgh), the number of harbour seals are lower, with approximately 343 individuals (SCOS, 2020). Within the Firth of Forth, there are densities of grey seal of up to 0.109 individuals per 25km^2, and harbour seal densities up to 0.151 individuals per 25km^2 (Carter *et al*., 2020).

Within the Firth of Forth the closest designated seal haul-out site[19] is Inchkeith, for grey seal, approximately 4.5km from the proposed development. As such, designated seal haul-out sites would not be affected by the proposed development; however, surveys undertaken between 2004 and 2007, for the Leith Docks Framework for Development, indicated haul out sites for both harbour and grey seals on the rocky outcrops

[18] https://www.edinburghlive.co.uk/news/edinburgh-news/incredible-video-captures-huge-humpback-19884228
[19] *The Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014*

to the east of the eastern breakwater at the Docks, with rare sightings of the species within the docks (Forth Properties Ltd, 2007). Both species were frequently recorded in the area by Jacobs Arup (2009).

The marine mammal species most likely to be present within potential impact ranges of the proposed development are harbour porpoise, bottlenose dolphin, grey seal, and harbour seal. Other species that may be present, although in lower numbers, are white-beaked dolphin and minke whale, as well as less common species such as humpback whale.

4.13.2 Potential impacts

4.13.2.1 During construction

Potential impacts on marine mammals during construction include:

- Generation of underwater noise from piling operations and other construction activities (such as dredging), which could have physiological and/or behavioural response impacts; and,
- Indirect impacts due to changes to water quality (e.g., increased suspended sediment) and prey availability.

Piling would be temporary and for a short period only. Underwater noise impacts would be managed using standard mitigation measures in line with the *Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise*[20]. This will ensure that the potential impact ranges for instantaneous permanent auditory injury are mitigated for and therefore not significant.

For the potential for indirect impacts due to changes in water quality and prey availability will be based on assessments undertaken for other relevant sections, including coastal processes (**Section 4.2**), marine water and sediment quality (**Section 4.3**), benthic ecology (**Section 4.11**), and fish and shellfish ecology (**Section 4.12**); however, potential impacts are not considered to be significant.

Any increase in vessels through the construction phase is expected to be minimal, and in line with current use of the port and surrounding area. Therefore, it is not expected that there would be any potential for impact as a result of the presence of construction vessels (including impacts as a result of underwater noise, or collision risk), either at the proposed development, or while transiting past any nearby seal haul-out sites. Due to the distance between seal haul-out sites and the proposed development, there is not expected to be any potential for direct impact to the sites.

Marine mammals that are qualifying features of the SACs will be assessed by a HRA, of which Stage 1 (Screening for Likely Significant Effect) has already been undertaken (Royal HaskoningDHV, 2021).

4.13.2.2 During operation

There is not expected to be any significant change, through operation, compared to the existing activity levels; therefore, it is not expected that there would be any potential to impact marine mammals during the operational phase.

4.13.3 Summary

With the adherence to the proposed mitigation measures, potential impacts to marine mammals would not be significant.

[20] https://data.jncc.gov.uk/data/31662b6a-19ed-4918-9fab-8fbcff752046/JNCC-CNCB-Piling-protocol-August2010-Web.pdf

4.14 Commercial Fisheries

4.14.1 Existing environment

The proposed development is located within ICES rectangle 40E6. Fisheries landing data indicates that the fishing activities within ICES rectangle 40E6 are mainly undertaken by smaller fishing vessels of 10m and under that fish for shellfish species using pots and traps. 2019 landings data is presented in **Table 4-7** which shows the area is productive and valuable for the shellfish industry.

Table 4-7 Sea fisheries landings in 2019 from ICES rectangle 40E6 by landed weight and value

Species	Landed weight (tonnes)	Value (£)
Crabs	13.85	32,380
Lobster	8.69	115,825
Mackerel	0.054	92
Nephrops	2.29	11,979
Whelks	3.49	3,823
Total	**28.38**	**164,101.77**

Commercial fishing vessels do not land their catch at the Port of Leith. Data gathered for the ScotMap Inshore Fisheries Mapping Project indicates that potting for crabs and lobster is undertaken within the Firth of Forth between Burntisland and the Port of Leith, however the majority of activity is concentrated on the coastline to the east, around North Berwick and Dunbar (Marine Scotland, 2013).

4.14.2 Potential impacts

4.14.2.1 During construction

Potential impacts on commercial fisheries during construction include:

- Impacts to commercial fish species leading to displacement or reduction in available fish and shellfish resource.

As for fish and shellfish ecology (**Section 4.12**), potential impacts to fish species can be managed by adherence to standard mitigation measures.

4.14.2.2 During operation

There is not expected to be any significant change, through operation, compared to the existing activity levels; therefore, it is not expected that there would be any potential to impact marine mammals during the operational phase.

4.14.3 Summary

With the adherence of the proposed mitigation measures, potential impacts to commercial fisheries would not be significant.

4.15 Commercial and Recreational Navigation

4.15.1 Existing environment

4.15.1.1 The Port of Leith

The Port of Leith is Scotland's largest enclosed deep-water port. The port contains a number of locked berths for vessels up to 210m length and 30 metres beam including large bulk carriers, support and supply vessels and enabling Roll on-Roll of and Load On-Load Off facilities and capable of handling in excess of 1 million tonnes of cargo.

The Port of Leith is generally approached via the Leith Channel (shown in **Figure 4-4**), which runs from South Channel and Narrow Deep, to a position to the southeast of Inchkeith Island. Entry to the Port of Leith is through a dredged approach channel with a maintained depth of -6.7m CD, and the Leith Approach is marked with a lateral buoy (to indicate the edge of the approach channel).

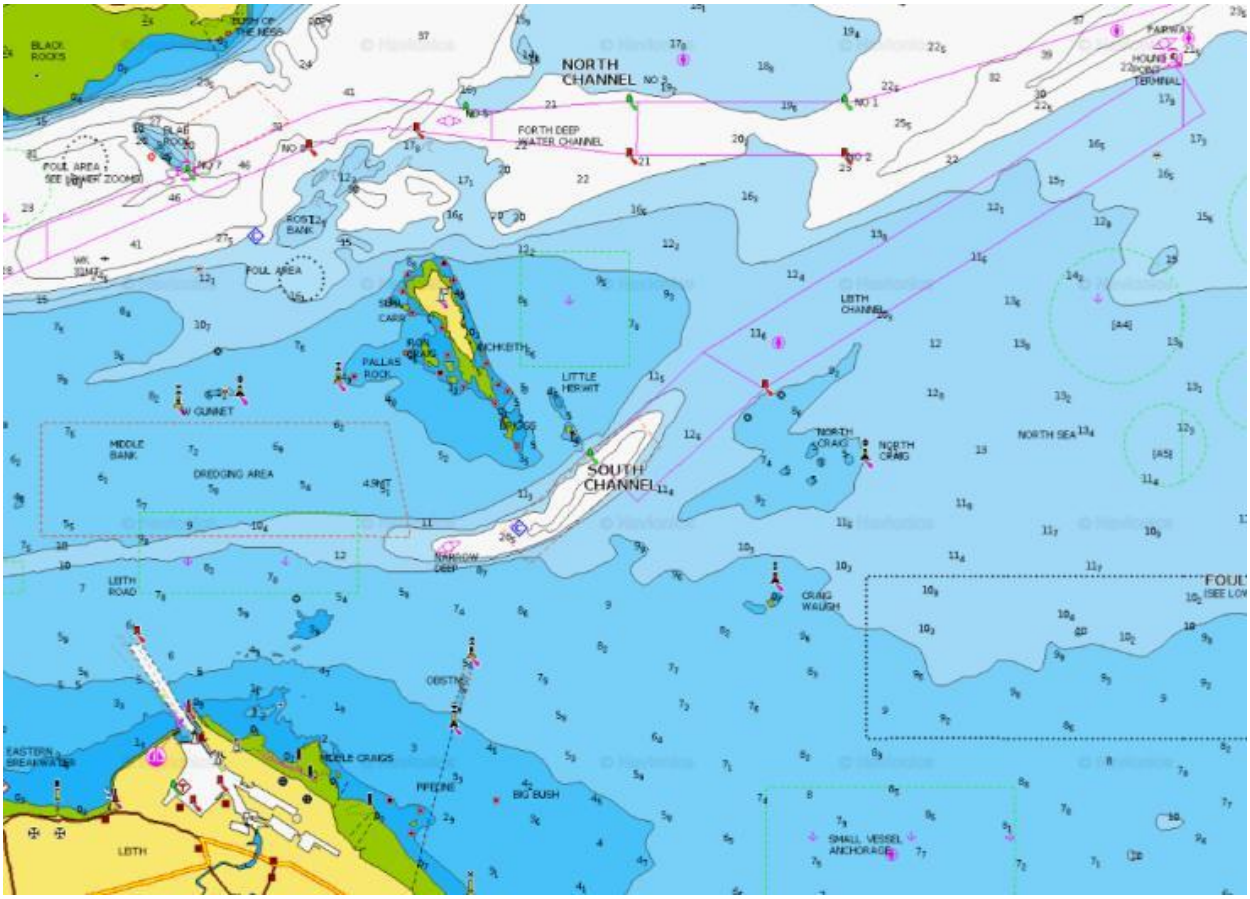

Figure 4-4 Navigation chart of the outer Firth of Forth and Port of Leith in the bottom left corner (Navionics, 2021)

For vessels carrying 12 or more passengers, pilotage is compulsory within the Forth on passing west of 3° W (in the vicinity of the eastern limits of the Forth Deep Water Channel and Leith Channel). Pilotage is also compulsory for vessels bound for South Channel and Leith of 45m Length Overall (LOA) or more carrying dangerous cargoes, and all other vessels of 80m LOA or more, on passing west of 3° 06'.1 W (the western limit of the Leith Channel, to the southeast of Inchkeith). Vessels of 150m length and over and vessels carrying 12 of more passengers embark the pilot at the Fairway Light Buoy, at the eastern limit of the Leith Channel, whereas vessels of less than 150m in length routing to South Channel embark the pilot within the

Leith Channel. Pilot vessels operate out of the Forth Pilot Station at Granton on the south shore of the Firth of Forth.

Forth Ports Ltd, as the Statutory Harbour Authority, actively and responsibly manage shipping receptors within the Forth and Tay through the Forth and Tay Navigation Service. Vessels navigating within the Firth of Forth are covered by the Forth and Tay Vessel Traffic Service (VTS).

The vast majority of vessels routing to and from Leith use the existing approach channel. Vessels using the Port of Leith include passenger vessels (cruise ships), cargo vessels, tugs, offshore support vessels and for example include facilities for agricultural, road salt and aggregate cargoes.

4.15.1.2 Cruise ships

The Port of Leith provides marquee facilities for visiting smaller-sized cruise ships, enabling visitors direct access to the city of Edinburgh and the surrounding area. The Port of Leith handled 85 cruise ship calls in 2019, and none in 2020 (attributable to the Covid-19 pandemic) and 30 cruises are programmed for arrival at Leith in 2021.

4.15.1.3 Recreational navigation

A small marina is present in Newhaven Harbour adjacent to the Port of Leith and there are marinas in Granton. The Royal Forth Yacht Club are based in Granton Harbour and host annual racing events such as the Edinburgh Cup and the Scottish Dragon Championship. A series of special purpose race mark buoys are set out in the area between the port and Granton Harbour. Granton Harbour also provides facilities for visiting yachts. However, the majority of recreational activity is based around Port Edgar near the Forth Road Bridge, approximately 14 km west of the Port of Leith.

4.15.2 Potential impacts

4.15.2.1 During construction

Potential impacts on commercial and recreational navigation during construction include:

- Risk of collision due to the presence of construction vessels;
- Restriction or delay of port activities due to the presence of construction vessels; and,
- Reduced visibility of other nearby vessels at night due to construction lighting.

4.15.2.2 During operation

Potential impacts on commercial and recreational navigation during operation include:

- Delay to inbound or outbound vessels due to a vessel berthed at the outer berth; and,
- Changes to navigational aids associated with the entrance to the Port of Leith.

4.15.3 Summary

Forth Ports Limited will manage the construction and operation activities associated with the proposed development through the issuing of Notice to Mariners and communication of access to the Port and berth availability through the Forth and Tay Navigation Service. Potential impacts would be limited to the Port itself and not be significant.

4.16 Infrastructure and Other Users

4.16.1 Existing environment

4.16.1.1 Existing infrastructure

To the east and west of the Port of Leith are a number of pipelines including Seafield Waste Water Treatment 3km to the east and Granton Sewage Pumping Station at Granton, 2km to the west. Telecommunication cables are also present to the east and west of the Port of Leith, which cross the Firth of Forth; however, these are more than 3km from the proposed development. There are no gas or oil pipelines in the vicinity of the proposed development, nor is the proposed development near to a licensed oil and gas block.

There are five licenced offshore disposal sites within the outer Firth of Forth, three are within 10km of the proposed development – Narrow Deep (FO039), Narrow Deep B (FO038) (to the north-east) and Oxcars Main (FO041) (to the north-west). There are no coastal water abstraction points within 10km of the proposed development.

4.16.1.2 Other users

Other users of the port would include the cruise ships visiting the terminal (see **Section 4.15.1**) and vessels (of all types and purposes) which visit other companies within the Port of Leith. Cargo vessels are the main user of the Port of Leith, with purposes such as transporting construction materials, aggregate industries, oil and gas related activity, and the transportation of agricultural products for brewing and distillery, and animal feed. There are also other used of the Port of Leith, all of which are managed by the Port of Leith. As discussed in **Section 4.15.1** a small marina is present in Newhaven Harbour adjacent to the Port of Leith, and there are marinas in Granton which support recreational users, which have their own approaches.

4.16.2 Potential impacts

4.16.2.1 During construction

There is no existing infrastructure within the footprint of the proposed development and therefore direct impacts will not occur. Indirect impacts are also considered unlikely due to the distance of these structures from the proposed development.

Potential impacts to other users would relate to navigation only, this has been discussed in **Section 4.15**.

4.16.3 Potential operational impacts

There would be no impact to existing infrastructure during operation of the proposed development. Potential impacts to other users have been discussed in **Section 4.15**.

4.16.4 Summary

There would be no impact to existing infrastructure during the construction and operation of the proposed development. Potential impacts to other users have been discussed in **Section 4.15**.

4.17 Archaeology and Cultural Heritage

4.17.1 Existing Environment

Data to inform a description of the existing environment for archaeology and cultural heritage were downloaded from the Historic Environment Scotland (HES) Historic Environment Portal as GIS shapefiles. These were mapped against a study area comprising the red line boundary plus a 500km buffer in order to identify non-designated historic assets within and in the vicinity of the proposed development. This study

area was widened to 2km in order to identify designated heritage with settings which could be subject to changes associated with the proposed development.

In addition, designated monuments within and across the Firth of Forth, and located at high points within the landscape around Edinburgh, are also discussed with respect to key views and potential settings effects. Key views are identified within the Edinburgh Design Guidance (EDG) (City of Edinburgh Council, 2020) based upon a study of views and skylines undertaken for the Council between 2005 and 2008. This study led to the development of a skyline policy to define which key views should be protected from new development (City of Edinburgh Council, 2008). This policy was subsequently reviewed and updated in 2012 (City of Edinburgh Council, 2012). The key views identified as part of the 2009 skyline study are all available for download from the City of Edinburgh Council website:

- Key Views – North available at: https://www.edinburgh.gov.uk/downloads/download/13261/key-views---north; and,
- Key Views – Centre available at: https://www.edinburgh.gov.uk/downloads/download/13259/key-views---centre.

Reference has been made to these key views where relevant to the setting of historic assets set out below.

Reference is also made to additional information available via Canmore (Scotland's National Record of the Historic Environment (NRHE)), compiled and maintained by HES to provide public access to information on archaeological sites, buildings, industry and maritime heritage across Scotland.

4.17.1.1 World Heritage Sites

There are no World Heritage Sites (WHSs) within the study area, although the northern edge of the Old and New Towns of Edinburgh designated by UNESCO as a WHS in 1995, is located c. 3km to the south west. The Forth Bridge, designated in 2015, is located c. 12.5km to the west of the Port of Leith.

The Outstanding Universal Value (OUV) of the Forth Bridge lies with its status as a "masterpiece of creative genius" and as an "extraordinary and impressive milestone in the evolution of bridge design and construction during the period when railways came to dominate long-distance land travel, innovative in its concept, its use of mild steel, and its enormous scale" (UNESCO, 2015). The view from the western end of Leith Docks towards the Forth Bridge is defined as a key viewpoint (N12b) in the EDG. Views from the bridge itself do not form part of its OUV and this is reflected in the key views defined for the bridge which are all focused towards the bridge rather than from it.

The OUV of the Old and New Towns of Edinburgh is focused upon the "remarkable juxtaposition of two clearly articulated urban planning phenomena. The contrast between the organic medieval Old Town and the planned Georgian New Town of Edinburgh, Scotland, provides a clarity of urban structure unrivalled in Europe" (UNESCO, 1995). There are views from within the world heritage site looking northwards across Leith, from Calton Hill, for example, which include views towards the Port. The Port of Leith features in several of the key views defined in the EDG. Two of these have relevance to the proposed development which are described by the 2009 skyline study as follows:

- C01b: Inchkeith Island from Castle lower ramparts:
  - View: Castle lower ramparts, north side
  - Skyline: falling sight line to the surface of the sea halfway between Port of Leith north breakwater and Inchkeith Island; George Street spire rises above this sightline against distant sea; and.

- Backdrop: Inchkeith Island standing in open water all round; the line of the tops of buildings in front of Inchkeith Island is irregular in height, but the Port of Leith upper skyline keeps lower than the near shore of the island.

- N12b: Castle and Hub spire:
  - View: quay side at west end of development area; a wonderful and unique view made possible by width of water in harbour;
  - Skyline: visible base of Castle walls and bottom of Hub spire; and,
  - Backdrop: roof levels to west of Castle rock from which Castle rises.

4.17.1.2 Scheduled Monuments

There is a single Scheduled Monument within the 500m study area, also located within the proposed laydown area:

- Martello Tower, Leith (SM2418).

This Martello Tower was built on Mussel Cape Rocks in 1809 to defend the entrance to Leith Harbour (Canmore ID 51960). The tower was scheduled in 1964 and survives, half buried within the reclaimed land forming the east breakwater within Forth Ports Ltd land and is not publicly accessible. The heritage significance of this asset primarily lies in its status as one of a number of small defensive forts that were built across the British Empire at the time of the French Revolutionary wars.

There are four further Scheduled Monuments within the 2km study area:

- Edinburgh, Citadel Arch at Johnston Street (SM2993);
- Custom House, hydraulic crane & cabin S of, Albert Dock, Leith (SM3528);
- Leith Links, artillery mounds (SM1195); and,
- Leith, dry dock off Sandport Street (SM5683).

In addition, there are a number of Scheduled Monuments within, and across the Firth of Forth which could have settings which could be impacted by the proposed development, including (but not limited to):

- Charles Hill, Monks' Cave storehouse, military camp and battery (SM5660);
- Braefoot Point, battery (SM7775);
- Inchmickery, fortifications (SM3332);
- Inchkeith Island and fortifications (SM3838);
- Inchcolm, Abbey, hermit's cell, First World War and Second World War defences (SM90166); and,
- Cramond Island, First World War and Second World War defences (SM13684).

Finally, Scheduled Monuments within the city of Edinburgh which have views across the Port of Leith may also have settings which could be affected, including (but not limited to):

- Edinburgh Town Wall, Flodden Wall and Telfer Wall, Heriot Place (SM2901);
- Edinburgh Town Wall, Flodden Wall, Johnston Terrace to Grassmarket (SM3012);
- Edinburgh Town Wall, Flodden Wall, Drummond Street to Pleasance (SM3013);
- Holyrood Park (SM13032);
- Holyrood Abbey, precinct and associated remains (SM13031);
- St Triduana's Aisle,chapel and wellhouse (SM90133); and,
- Edinburgh Castle/Caisteal Dhùn Èideann (SM90130).

As set out above, the view of Inchkeith Island from the Castle lower ramparts is defined as a key view in the EDG (C01b).

4.17.1.3 Listed Buildings

In Scotland, once a building is found to be of special architectural or historic interest, it is then classified under one of three categories according to its relative importance:

- Category A: Buildings of special architectural or historic interest which are outstanding examples of a particular period, style or building type;
- Category B: Buildings of special architectural or historic interest which are major examples of a particular period, style or building type; and,
- Category C: Buildings of special architectural or historic interest which are representative examples of a period, style or building type.

There are no listed buildings within the site, although there are nine within the 500m study area which may have settings which could be affected by the proposed development:

- Victoria Swing Bridge, Leith Docks, Edinburgh Category A (LB27644);
- Albert Dock, Leith Docks, Edinburgh Category B (LB27590);
- Alexandra Dry Dock, Leith Docks, Edinburgh Category B (LB27595);
- Hydraulic Power Station, Alexandra Dry Dock, Leith Docks, Edinburgh Category B (LB27601);
- Imperial Dock Grain Elevator, Leith Docks, Edinburgh Category B (LB27619);
- Prince Of Wales Graving Docks, Leith Docks, Edinburgh Category B (LB27629);
- Prince Of Wales Graving Docks, Leith Docks, Edinburgh Category B (LB27634);
- Hydraulic Station, Prince Of Wales Dry Dock, Leith Docks, Edinburgh Category B (LB27634); and,
- Harbour and Docks Office, Tower Place, Leith Docks Category C (LB27639).

Within the wider 2km study area there are 764 further listed buildings comprising:

- 46 Category A;
- 434 Category B; and,
- 282 Category C.

4.17.1.4 Historic Marine Protected Areas

There are no Historic Marine Protected Areas (HMPA) within the study area.

4.17.1.5 Gardens and Designated Landscapes

Within Edinburgh there are four Gardens or Designated Landscapes which may all have settings incorporating the Port of Leith:

- The New Town Gardens (GDL00367);
- Royal Botanic Garden, Edinburgh (GDL00334);
- Palace of Holyroodhouse (GDL00308); and,
- Dean Cemetery (GDL00135).

4.17.1.6 Conservation Areas

The northern edge of Leith Conservation Area (CA7) falls within the 500m study area, incorporating the area of Albert Dock. The Conservation Area Character Appraisal (City of Edinburgh Council, 2002) defines the character of the Conservation Area as deriving from Leith's history both as a port and an independent burgh and covers the older parts of the Port of Leith, containing many early features including listed dock buildings

and the Victoria Bridge, a Category A Listed Building (LB27644). Although views are predominantly internal, the character appraisal also describes how longer views to and from the Port of Leith and Nelson Monument on Calton Hill relate Leith to the city and to the sea.

Six further Conservation Areas are located wholly or partially within the 2km study area:

- Newhaven (CA5);
- Trinity (CA6);
- Lochend (CA653);
- Victoria Park (CA20);
- Pilrig (CA646); and,
- Hawthornbank Colonies (CA652).

4.17.1.7 Non-Designated Historic Assets (Canmore)

The NRHE maritime records from Canmore comprise records relating to Scotland's marine historic environment, including shipwrecks. There are 38 maritime records within the 500m study area. These are all, however, records of casualties rather than known wrecks (i.e. records of losses which were historically documented at Leith, but for which the actual location of any physical remains is unknown). As these records do not represent actual remains, these provide only an indication of the potential for encountering previously undiscovered remains during works. Although the records indicate a fairly high number of losses, the previous works within the area of the docks, including reclamation and the excavation of the entire area around the lock, means that there would be no potential for discovering *in situ* undisturbed wrecks during works.

There are no aircraft crash sites or reported losses of aircraft within the study area although, similarly, the discovery of isolated finds of aircraft material associated with crash sites may still occur. For example, to the north of the study area within the Firth of Forth, there are two recorded losses of aircraft at a location c. 2.5km west of Inchkeith described as follows:

- A/C HAWKER (BRITISH, HURRICANE I) Ditched off Burntisland in 1941 (Canmore ID 329853); and,
- A/C FAIREY (BRITISH, BARRACUDA II) Crashed into the sea 1 mile west of Inchkeith in 1943 (Canmore ID 328528).

In addition, there are 40 Canmore monument points within the 500m study area. Thirty-nine of these correlate to architectural elements associated with the docks including two of the Scheduled Monuments (the hydraulic crane and cabin SM3528 and Martello Tower SM2418) and a number of records relating to listed structures. For example, ten of the records correspond to various elements of the listed Albert Dock (LB27590).

Only one of the records corresponds to an archaeological discovery, comprising the discovery of a 20th century stone wall and a late 19th century timber jetty during two phases of evaluation in advance of development of land at Ocean Drive (Canmore ID 365145). During both phases of evaluation significant depths of made ground were revealed, with excavation indicating that this made ground extended beyond 3m in depth, although this could not be recorded due to the water level. This indicates that the potential for buried archaeology within the reclaimed areas is limited.

There are no further findspots or records indicating the archaeological potential of the study area. Below the reclaimed areas, and below recently accumulated marine sediments, it is possible that deposits of

prehistoric palaeo-environmental interest may be present although this potential is reduced within the areas of the docks which have been subject to routine dredging.

4.17.2 Potential impacts

4.17.2.1 During construction

Direct (physical) impacts to known historic assets will not occur.

There is a single known historic asset located within the footprint of the proposed development (the Martello Tower Scheduled Monument). The Martello Tower will be preserved *in situ* and protected by fences during construction works to prevent accidental impacts. As no direct changes to the Martello Tower will occur Scheduled Monument Consent will not be required.

Due to the limited groundworks and significant depths of made ground within reclaimed areas direct (physical) impacts to buried archaeology onshore are not anticipated to occur.

Piling, and potential the excavator dredging, may impact sub-surface deposits of potential paleoenvironmental interest in marine areas should these be present, although this potential is anticipated to have been reduced by previous disturbance associated with reclamation, port development activities and routine dredging.

4.17.2.2 During operation

4.17.2.3 Direct (physical) impacts to historic assets

Direct (physical) impacts to known historic assets will not occur.

4.17.2.4 Indirect (physical) impacts to historic assets

As set out in **Section 4.2** above, the anticipated effects of the proposed development on the natural physical environment and sediment transport system are considered to be insignificant. Together with the absence of known historic assets from marine areas, there is no pathway for indirect (physical) impacts to historic assets to occur.

4.17.2.5 Impacts upon the setting of historic assets

As the proposed development does not include provision for any new structures with significant height, and as the new berth, mooring dolphins, walkways, lay down area and associated elements are similar in nature to the current use of the study area, it is not anticipated that the proposed development will result in a material change to the defined key views, to the OUV of the WHSs or to the setting of the Martello Tower.

4.17.3 Summary

Potential impacts to archaeology and cultural heritage during construction and operation of the proposed development are not considered to be significant

4.18 Landscape and Visual Impact

4.18.1 Existing environment

The proposed development is located within an operational port. The proposed development is within an Urban Landscape Character Type (LCT)[21] which encompasses Edinburgh and the coastline from Portobello in the east to Cramond in the west. It is also within the Developed Inner Firths Coastal Character Type[22].

Adjacent to the proposed development is the Western Harbour development which includes residential apartments, a hotel, commercial properties and recreational and fitness facilities. At the end of Western Harbour is the Western Harbour Lighthouse and Lighthouse Park which is open to public access. Residents and visitors to this area will have uninterrupted views of the proposed development across the Western Harbour and approach channel.

Within sight of the proposed development are a number of heritage designations (see **Section 4.17**). The Old and New Towns of Edinburgh and Forth Bridge were designated as a UNESCO World Heritage Site (WHS). The boundary of the Old and New Towns of Edinburgh WHS is approximately 3km to the south of the Port of Leith.

Key views to and from the Old and New Towns of Edinburgh WHS have been identified in a Skyline Policy and incorporated in the Edinburgh Design Guidance 2020[23]. Protected Skyline Views include views of Inchkeith Island from Edinburgh Castle and Blackford Hill, with the Port of Leith in the middle ground and views of Calton Hill, Edinburgh Castle, Arthurs Seat and Forth Bridge from the Port of Leith.

4.18.2 Potential impacts

4.18.2.1 During construction

During construction there would be temporary impacts to the local landscape/coastal character and on views from residential, recreational and commercial areas within the Western Harbour development due to the presence of construction plant and vessels. Standard best practice would be adhered to that would minimise any impacts. Given this and the existing operational port setting, potential impacts to the landscape/coastal character and visual setting during construction would not be significant.

4.18.2.2 During operation

Vessels would be temporarily berthed at the quay during loading/off-loading operations, taking up to 24hrs, and the berth itself would not be discernible from any vantage point at distance from the port. Given the proposed development provides additional port infrastructure within an existing port, there would be no impact on the local landscape / coastal character.

The proposed development is considered to have a beneficial impact on the area's visual setting, through the removal of the Shawcor facility and 'tiding up' of the Eastern Breakwater. The proposed development would connect the Eastern Breakwater to the port by providing a uniform area of hardstanding that flows into the Port of Leith. The tallest components that would be stored on the laydown area would be towers associated with offshore wind farms; however, their presence would be short term, with full assembly taking place immediately prior to being collected and taken offshore to the wind farm development site. Given their narrow cylindrical form, they would quickly become indistinguishable at any distance from the Port of Leith.

[21] *https://www.nature.scot/professional-advice/landscape/landscape-character-assessment/landscape-character-assessment-scotland*
[22] *https://www.nature.scot/sites/default/files/2018-05/National%20coastal%20character%20map.pdf*
[23] *https://www.edinburgh.gov.uk/downloads/file/27602/edinburgh-design-guidance-january-2020*

4.18.3 Summary

The proposed development would not affect the local landscape/coastal character. Nor is it anticipated to have a significant impact on the visual setting.

4.19 Tourism and Recreation

4.19.1 Existing environment

The proposed development is within an operational port with no public access. The Port of Leith is marketed as the gateway to Edinburgh for cruise ship passengers, offering marquee facilities to visitors and direct access to the city of Edinburgh, its attractions and the wider area.

The Port of Leith hosts the Royal Yacht Britannia (HMY Britannia) which was Queen Elizabeth II's royal yacht between 1954 and 1997. HMY Britannia is permanently berthed at the Ocean Terminal and is open to tourists.

The neighbouring Western Harbour comprises a mix of residential, retail, leisure and commercial facilities, as well as hotels and serviced apartments. At the end of Western Harbour is Lighthouse Park and the Western Harbour Lighthouse which offers views across the approach to Port of Leith to the East Breakwater and across the Firth of Forth to the island of Inchkeith, and Burntisland and Kinghorn on the northern shore of the Forth.

4.19.2 Potential impacts

Potential impacts to recreational navigation are discussed in **Section 4.15**. No other potential impacts to tourism and recreation are anticipated.

4.20 Waste

4.20.1 Existing environment

4.20.1.1 Waste management at the Port of Leith

Forth Ports Limited update their Port Waste Management Plan every three years to manage the disposal of vessel-generated wastes in an environmentally sustainable and legally correct manner, in accordance with the requirements of the International Convention on the Prevention of Pollution by Ships (MARPOL) 1973/78). The Plan is approved by the Maritime and Coastguard Agency (MCA).

The current maintenance dredging licence for the Port of Leith permits the disposal of up to 130,000 wet tonnes of dredged material per year at the Narrow Deep B (FO038) disposal site (licenced from 2021 to 2024). This material is formed of 76% clay and silt, 23% sand, and 1% pebbles, cobbles, and boulders[24].

4.20.1.2 Offshore disposal sites

There are five licenced offshore disposal sites within the outer Firth of Forth, three are within 10km of the proposed development – Narrow Deep (FO039), Narrow Deep B (FO038) (to the north-east) and Oxcars Main (FO041) (to the north-west).

4.20.2 Potential construction impacts

Potential impacts on waste during construction include:

[24] *https://marine.gov.scot/sites/default/files/application_-_maintenance_dredging_and_sea_deposit-_port_of_leith_-_00009166_redacted.pdf*

- Disposal of up to approximately 100,000m^3 of dredged material; and,
- Generation of typical construction site related waste (e.g. plastics, food, hazardous, demolition waste).

Where possible, dredged material would be used in the construction of the proposed development. Where this is not possible a Best Practicable Environmental Option (BPEO) study will be undertaken to identify the most appropriate disposal option. Given the majority of the material is expected to comprise Diamict (also known as bolder clay), it is anticipated that the material would be required to be disposed of offshore.

Construction waste will be managed using a Site Waste Management Plan (SWMP). Material will be reused on site as much as possible, with landfill waste kept as low as possible.

4.20.3 Potential operational impact

Given the removal of the Shawcor facility, waste generated by the proposed development would likely be lower than that currently generated.

4.20.4 Summary

Construction waste would be managed using standard processes, whilst operational waste is considered to be lower than that generated currently. As such, potential significant impacts to waste are not anticipated.

4.21 Accidents and Disasters

4.21.1 Existing environment

The only disaster risk to the proposed development is associated with flood risk, as the proposed works are located within an area that is theoretically at high risk of coastal and fluvial flooding[25]. Relative sea level rise would increase coastal flood risk.

4.21.2 Potential impacts

Potential impacts from flooding has been discussed in **Section 4.5**. No significant impacts were identified.

4.22 Climate Change

4.22.1 Existing environment

In 2018, total GHG emissions in Scotland were 41.6 Mt CO_2e, of which 12.9 Mt were contributed by transport, 8.4 Mt by business activity and 1.9 Mt by aviation and shipping. Within the CEC area, total CO_2 emissions in 2018 were 3.27 Mt[26,27]. As discussed in **Section 1.1**, Scotland has pledged to reduce its GHG emissions by 75% by 2030 and to be net-zero by 2045. The ScotWind process will mean more wind farm projects in the future, and a part of that process includes the commitment to 25% of the OWF industry being local.

In the context of GHG emissions, then the receptor is effectively the global atmosphere. With regard to climate resilience, the receptor is the proposed development itself, together with its ancillary infrastructure.

[25] *https://map.sepa.org.uk/floodmaps*
[26] *https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-to-2018*

[27] *https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-to-2019*

4.22.2 Potential impacts

The function of the proposed berth facility is to provide logistical support to the ScotWind Round 4 initiative, with the aim of achieving construction and operation of an additional 8 – 10 GW of offshore wind electrical generation capacity. It is, therefore, intimately entwined in the zero-carbon electricity production industry and associated GHG emissions should, therefore, be interpreted and viewed in that specific context[28].

An assessment will be conducted of the embedded and other GHG emissions generated during the construction and operation of the facility and these will be evaluated in the context of the overall outcome project boundaries of offshore wind electricity generation. In general, GHG emissions generated by the construction and operation of offshore wind farms are effectively "neutralised" in the early years of the operation of a project, with the remaining years of electricity production being effectively zero-carbon. Emissions associated with the proposed development will be assessed in this context and mitigation measures applied accordingly.

4.22.3 Climate resilience

The design approach and procedures applied for the proposed development will result in an ultimate design that will cater for resilience to future changes in climate-related coastal variables, based upon conservative assumptions about future changes.

4.22.4 Summary

Given that the purpose of the proposed development is to service the ScotWind Round 4 (and beyond) renewable energy generation initiative, which itself is central to decarbonisation of the Scottish economy, it is concluded that any GHG emissions associated with the project would be subsumed into the overall carbon accounting of the offshore wind generation.

Similarly, climate resilience of the project would be designed into its construction and operation and would therefore not be significant.

4.23 Socio-economics

4.23.1 Existing environment

The Port of Leith is surrounded by mixed use development comprising retail, leisure and commercial offices primarily around Western Harbour, Ocean Terminal, the Victoria Quay office complex and Ocean Point office building. To the south and east there is extensive residential development, interspersed with this retail, leisure, and commercial accommodation.

4.23.2 Potential impacts

4.23.2.1 During construction

Potential impacts on socio-economics during construction include:

- Temporary construction jobs; and,
- Multiplier and supply chain effects at both a local and regional level.

[28] https://www.pure.ed.ac.uk/ws/portalfiles/portal/19730442/Main_Report_Life_Cycle_Costs_and_Carbon_Emissions_of_Offshore_Wind_Power.pdf

4.23.2.2 During operation

During operation it is likely that employment impacts and the economic benefits from the proposed development will be significant for the long term operational period, which is expected to generate significant numbers of well-paid permanent job and career opportunities in a number of activities related to the key target economic sectors of the offshore and marine energy industries. In addition, indirect and induced employment opportunities are also anticipated to be created as a result of the proposed development.

4.23.3 Summary

The proposed development is considered to have a significant beneficial impact on local and regional socio-economy.

5 EIA Screening Conclusion

The proposed development is considered to be a Schedule 2 EIA development, falling under Schedule 2 10(g) of the EIA Regulations, as:

construction of harbours Construction of harbours and port installations, including fishing harbours (unless included in schedule 1)

The potential impacts of the proposed development have therefore been assessed in accordance with the criteria set out in Schedule 3 of the EIA Regulations, and are concluded as follows:

- The proposed development would have a significant beneficial impact on the local and regional socio-economy, through the provision of significant numbers of well-paid permanent jobs and career opportunities, as well as indirect and induced employment opportunities.
- Beneficial impacts on the surrounding environment have been identified as a result of the proposed decommissioning of the existing Shawcor facility, which is a current source of air and noise emissions, as well as having a negative visual appearance, when compared to the proposed development. The use of the area as a laydown for the offshore renewables industry, would comprise a uniform stone surface and utilise more quiet modern equipment.
- Potential impacts to ornithology, marine mammals and fish during construction would be managed effectively using current best practice construction methodology and industry standard mitigation measures. No other potentially significant impacts have been identified during construction.
- No significant impacts are expected during operation of the proposed development from noise or emissions to air. In addition, the provision of cutting-edge technology, such as shore power, would reduce the need for vessels to be 'idling' at the berth with engines running while transhipments are taking place, therefore reducing noise and emissions to air.
- The tallest components that would be stored on the laydown area would be towers associated with offshore wind farms; however, their presence would be short term, with full assembly taking place immediately prior to being collected and taken offshore to the wind farm development site. Given their narrow cylindrical form, they would quickly become indistinguishable at any distance from the Port of Leith. As such, there would be no significant impact to the local landscape character and visual setting during operation.
- The Port of Leith already accepts vessels of a similar size to those that support the offshore renewables industry, in terms of length and height, it is just the wider beam width that prevents these vessels from being able to access the lock. As such, the ability for the Port of Leith to accept these vessels is not consider to represent a change to the existing situation.

Given the beneficial impacts that have been identified and the limited potential for the proposed development to result in significant environmental impacts, which can be managed using best practice construction

methodology and industry standard mitigation measures, it has been concluded by Forth Ports Limited and their advisors that **the Proposed Development does not require an EIA** under the Marine Works (EIA) (Scotland) Regulations 2017 (as amended) or The Town and Country Planning (EIA) (Scotland) Regulations 2017 (as amended).

Screening Opinions are requested from CEC and Marine Scotland to confirm that an EIA is not required.

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Appendix 1-2 CEC Screening Opinion

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THE CITY OF EDINBURGH COUNCIL

HaskoningDHV UK Ltd.
FAO: Gemma Starmore.
Stratus House,
Emperor Way,
Exeter,
EX1 3QS

Forth Ports.
C/o Agent.

Date:

Our Ref: 21/04933/SCR

Dear Sir/Madam

SCREENING OPINION UNDER THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA) (SCOTLAND) REGULATIONS 2017

Western Harbour Western Harbour Drive Edinburgh

EIA Screening Request - EIA Screening request for a proposal to improve a berth located outside of the lock gates to be used primarily by the offshore renewables industry, and to reconfigure a section of port land to provide laydown and storage areas for the components for associated use.

I refer to your request dated 20 September 2021 for a screening opinion on whether the proposal is an EIA development.

This letter constitutes the Council's formal Screening Opinion on whether this is an EIA development and an EIA Report is required. In coming to a determination, I have considered the criteria as set out in The Environmental Impact Assessment (EIA) (Scotland) Regulations 2017 and the advice set out in Circular 1/2017.

For the summary reasons set out below, it is considered that an **EIA Not Required**.

Reason for Opinion

On the basis of the information provided and the assessment carried out in accordance with the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017) and Circular 1/2017 it is concluded that an EIA will not be required for this proposal.

The key points for this opinion are:

- The proposal relates to uses that are of a similar nature to operations already undertaken within the wider area. Vessels of a similar size are already accepted within the dock. It also includes the removal existing facility that creates noise and air emissions.

Kenneth Bowes, Senior Planning officer, Planning & Building Standards, PLACE.
Email kenneth.bowes@edinburgh.gov.uk,
Waverley Court, 4 East Market Street, Edinburgh, EH8 8BG

- The screening request indicates that there will be some effects from the construction stage, but these will be short term.
- To the south and east of the site there are identified Air Quality Management Area areas but the continued use of the dock for appropriate uses would not warrant an EIA with the proposals including the loss of an existing industrial use and proposed materials associated with this development indicated to be transported by sea.
- In terms of noise, the area already accepts ships and operates as a port.
- The Habitats Regulations Appraisal submitted to accompany the screening request indicates that Appropriate Assessment will be undertaken and agreed with NatureScot and mitigation measures put in place if required.
- The Martello Tower is a Scheduled Monument, but its location is already surrounded by existing industrial style uses.
-Visual impacts will be temporary in nature.

I trust that the screening opinion is self-explanatory. If you require any further guidance please contact me on kenneth.bowes@edinburgh.gov.uk.

Yours sincerely

Lesley Carus

Team Manager

ENVIRONMENTAL IMPACT APPRAISAL SCREENING OPINION
(under the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017)

Address: Leith Docks	**Applicant/ Agent:** Forth Ports / HaskoningDHV UK Ltd FAO: Gemma Starmore. Stratus House, Emperor Way, Exeter, EX1 3QS
Summary Description of Development: Improve a berth located outside of the lock gates to be used primarily by the offshore renewables industry (120m), and to reconfigure a section of port land (of 15 hectares) to provide laydown and storage areas for the components associated with, e.g., offshore windfarms (such as nacelles, towers, blades, and foundations).	
Date of Receipt of Screening Request: 20/09/2021	
Application or Pre- Application: Pre- Application	
Reference Number (Application/ PAN): 21/04933/SCR	
Sufficient Information to Make Assessment: Yes	

Declaration:

We have screened the proposals and determined that EIA is not required for this submission, for the reasons detailed below.

Signed… Kenneth Bowes (Planning Officer)

Signed …Lesley Carus (Team Manager)

Date ……14 October 2021

IDENTIFYING THE DEVELOPMENT:

1. Is the development of a type described in Schedule 1?

~~YES/~~ NO

Yes – Proceed to declaration EIA is required
No – Proceed to next question.

---

2. Is the development of a type listed in column 1 of schedule 2 which:

a) is located wholly or in part on a 'sensitive area' as defined in regulation 2(1) (see paragraph 45;

OR

b) meets one of the relevant criteria or exceeds one of the relevant thresholds listed in the second column of the table in Schedule 2.

YES/ ~~NO~~

If No, proceed to declaration.

Threshold Requirement:

The proposal is classed as 10 (g) Construction of harbours and port installations, including fishing harbours and the area of the works exceeds 1 hectare.

It falls within 10(b) as an urban development project of over 0.5 hectares

It also may fall within class 10(c) as it involves an intermodal trans-shipment facility.

Consideration of EIA

3. Is the development likely to have a significant effect on the environment taking into account the following areas?

Selection Criteria for Screening Schedule 2 Development	
In accordance with Schedule 3 of the Regulations the following selection criteria are used to inform the screening opinion:	
Characteristics of development **1.** The characteristics of development must be considered having regard in particular to—	
	Yes/ No – Briefly Describe
a) the size and design of the whole development;	No - the proposals relate to the existing dock area, with areas such as the proposed laydown area already used as a storage yard. The outer berth will be suspended and replace the existing jetty at this location. Total site area approximately 18.5 ha.
b) the cumulation with other existing development and/or approved development;	No – existing dock. Potential mixed use development to the south.

c) the use of natural resources, in particular land, soil, water and biodiversity;	No – as with all developments use of natural resources will be required.
d) the production of waste;	No - Construction waste will be managed using a waste management plan. Material will be reused on site as much as possible, with landfill waste kept as low as possible.
e) pollution and nuisances;	No
f) the risk of major accidents and/or disasters relevant to the development concerned, including those caused by climate change, in accordance with scientific knowledge;	No
g) the risks to human health (for example, due to water contamination or air pollution).	No – air quality considered below. Leith Docks already operates in a similar manner to that proposed. Activities will be similar in nature to existing operations within the site.
Location of development **2.** The environmental sensitivity of geographical areas likely to be affected by development must be considered having regard in particular to—	
	Yes/ No – Briefly Describe
a) the existing and approved land use;	No – current dock area and proposals continue this use.
b) the relative abundance, availability, quality and regenerative capacity of natural resources (including soil, land, water and biodiversity) in the area and its underground;	No – current dock area
c) the absorption capacity of the natural environmental paying particular attention to the following areas—	
(i) wetlands, riparian areas, river mouths;	Yes - dock area at mouth of Water of Leith. Information submitted indicates short term temporary effects from construction stage.
(ii) coastal zones and the marine environment;	Yes - dock area. Information submitted indicates short term temporary effects from construction stage.
(iii) mountain and forest areas;	No
(iv) nature reserves and parks;	No
(v) European sites and other areas classified or protected under national legislation;	Yes - Leith Imperial Dock Special Protection Area to the south (approx. 120m).

	North of the site is the Firth of Forth (part of) SPA, Ramsar, SSSI. Information indicates potential for short term impacts primarily from the construction stage. The HRA provided concludes that an appropriate assessments (AA) will be required for the Leith Outer Berth. The applicants are in consultation with NatureScot.
(vi) areas in which there has already been a failure to meet the environmental quality standards, laid down in Union legislation and relevant to the project, or in which it is considered that there is such a failure;	Yes - Great Junction and Salamander Street Air Quality Management Areas to the south and east of the site. Construction stages governed by other regulations. Materials will be delivered by sea. Proposals involve the removal of some existing uses (Shawcor facility)
(vii) densely populated areas;	No
(viii) landscapes and sites of historical, cultural or archaeological significance.	No listed buildings within the site. Martello Tower scheduled monument is within the site. But is already surrounded by current dock related uses. Site some distance from WHS and general uses proposed expected within this area.
Types and characteristics of the potential impact **3.** The likely significant effects of the development on the environment must be considered in relation to criteria set out in paragraphs 1 and 2 above, with regard to the impact of the development on the factors specified in regulation 4(2), taking into account—	
	Yes/ No – Briefly Describe
(a) the magnitude and spatial extent of the impact (for example geographical area and size of the population likely to be affected);	No. Although the upright storage of the towers may have a visual impact by virtue of the height and appearance.
(b) the nature of the impact;	No
(c) the transboundary nature of the impact;	No, although views to the city from other local authority areas (such as Fife) may be temporarily affected.

(d) the intensity and complexity of the impact;	No
(e) the probability of the impact;	No
(f) the expected onset, duration, frequency and reversibility of the impact;	No – potential impacts generally during construction stage.
(g) the cumulation of the impact with the impact of other existing and/or approved development;	No
(h) the possibility of effectively reducing the impact.	No

Overall Conclusion: The proposed development constitutes a Schedule 2 Development under the EIA Regulations and for this reason have been tested against the above criteria as set out in Schedule 3 of the Regulations. The conclusion based on this test is that the proposals are for dock related uses, expected to be undertaken at location including new/replacement berth areas and alterations to existing areas within the dock. There may be some visual impacts in relation to the vertical storage of the towers, however it is not considered that these will be of such a scale as to require an EIA. This is also due to the temporary nature of the operation. Consideration of any ecology matters (SPA) and potential air quality impacts do not in themselves or combined warrant an EIA.

4. Screening Opinion

On the basis of the information provided and the assessment carried out in accordance with the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017) and Circular 1/2017 it is concluded that an EIA **will not be** required for this proposal.

The key points for this opinion are:

- The proposal relates to uses that are of a similar nature to operations already undertaken within the wider area. Vessels of a similar size are already accepted within the dock. It also includes the removal existing facility that creates noise and air emissions.
- The screening request indicates that there will be some effects from the construction stage, but these will be short term.
- To the south and east of the site there are identified Air Quality Management Area areas but the continued use of the dock for appropriate uses would not warrant an EIA with the proposals including

the loss of an existing industrial use and proposed materials associated with this development indicated to be transported by sea.

- In terms of noise, the area already accepts ships and operates as a port.
- The Habitats Regulations Appraisal submitted to accompany the screening request indicates that Appropriate Assessment will be undertaken and agreed with NatureScot and mitigation measures put in place if required.
- The Martello Tower is a Scheduled Monument, but its location is already surrounded by existing industrial style uses.
- Visual impacts will be temporary in nature.

Appendix 1-3 MS Screening Opinion

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marinescotland

Scottish Government
Riaghaltas na h-Alba
gov.scot

E: ms.marinelicensing@gov.scot

Gemma Starmore
Royal HaskoningDHV
Stratus House
Emperor Way
Exeter
EX1 3QS

Date: **18 January 2022**

Dear **Ms. Starmore**,

SCREENING OPINION UNDER THE MARINE WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017

Thank you for your screening opinion request dated **09 November 2021** in regards to the proposed creation of a new outer berth, including rock armour, suspended deck construction, capital dredging and dredged material deposit at the Port of Leith, Firth of Forth ("the Proposed Works").

The Scottish Ministers consider the Proposed Works to fall under paragraph **10(g)** of schedule 2 of The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 ("the 2017 MW Regulations"), with the Proposed Works **being carried out in a sensitive area, as defined by the 2017 MW Regulations.** Consequently, the Scottish Ministers are obliged to adopt a screening opinion as to whether the Proposed Works are, or are not, an Environmental Impact Assessment ("EIA") project under the 2017 MW Regulations.

Under regulation 10(5) of the 2017 MW Regulations, the Scottish Ministers have consulted with NatureScot (formerly Scottish Natural Heritage), the Scottish Environment Protection Agency, The City of Edinburgh Council and Historic Environment Scotland as to their view on whether the Proposed Works are an EIA project. Copies of the consultation responses received are attached for your review (at Appendix I).

When making a determination as to whether schedule 2 works are an EIA project, the Scottish Ministers must take into account such of the selection criteria set out in schedule 3 of the 2017 MW Regulations as are relevant to the Proposed Works. In this regard, the Scottish Ministers have considered the following:

INVESTOR IN PEOPLE
POSITIVE ABOUT DISABLED PEOPLE

Characteristics of the works

Forth Ports Limited propose to extend and improve an existing berth on the inner edge of the eastern breakwater at the Port of Leith in order to accommodate windfarm construction and service vessels. The Proposed Works are expected to take 15 months. Figure 1 shows the area of Proposed Works colour coded to show the activities.

The Proposed Works include the construction of a suspended deck approximately 120 metres ("m") long and 30m wide. The deck will be constructed using tubular piles and a wall at the rear will be constructed using a combination of tubular and sheet piles. Piles will also be used to construct mooring dolphins. It is anticipated that approximately 150 tubular and 44 sheet piles will be used. The existing steel piled jetty at this location will be removed. Existing dolphins will also be removed as will revetment materials.

The pile installation method is yet to be confirmed but may include impact piling or drilling and socketing. Vibro piling will be used where possible. The removal of the jetty will require either vibro-extraction or cutting down at seabed level.

A hardstanding area will be created behind the suspended deck and to the rear of an existing concrete jetty which is to be retained (see Figure 1). This area will be infilled, possibly with material from the proposed dredge.

Revetment slopes will be protected by rock armour, specifically under the suspended deck and at the rear of the lead in jetty. This will replace the existing revetment of concrete blocks. 5500 m^3 of rock armour is expected to be constructed, consisting of pieces 1 to 2 tonnes each and 1.6 m thick to form a top layer and an 0.8m under-layer consisting of 3300m^3 of 60 – 300 kg rock pieces.

There will be works above Mean High Water Springs ("MHWS") to the existing concrete jetty and the adjacent laydown area.

A capital dredge of approximately 100,000 m^3 from an area of 300 m by 600 m immediately adjacent to the construction works is also required to achieve a depth of between -9.25 m and -10.25 m Chart Datum ("CD"). It is anticipated that the dredge material will be used as infill where possible or deposited offshore.

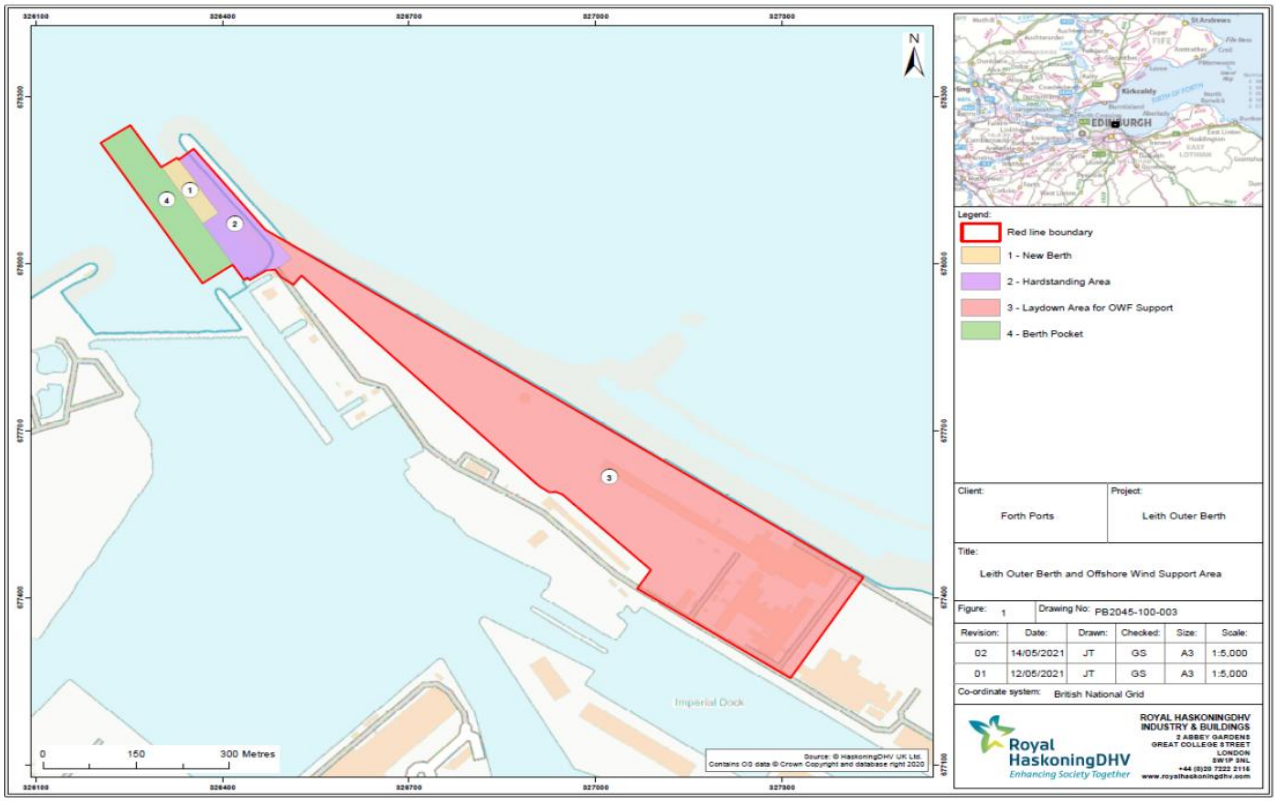

Figure 1. Showing the extent of the Proposed Works and the areas of each element of construction.

Location of the works

The site of the Proposed Works is within the boundary area of the Port of Leith, Firth of Forth on the seaward side of the entrance locks to the Port.

The site of the Proposed Works partially lies within the Outer Firth of Forth and St Andrews Bay Complex SPA designated for various breeding and non-breeding seabird and waterfowl qualifying interests. It is also immediately adjacent to the Firth of Forth SPA and RAMSAR sites which are both designated for various non-breeding waterfowl and wading birds. Imperial Dock Lock, Leith SPA is within 500 m of the Proposed Works and the Forth Islands SPA, designated for various breeding ornithological qualifying interests is located approximately four kilometres from the site. The EIA screening report identifies potential impacts on bird species including disturbance (both noise and visual), displacement, water quality and loss of prey species.

The site of the Proposed Works also has connectivity to various sites designated for their marine mammal qualifying interests namely; the Isle of May and the Berwickshire and North Northumberland Coast SACs designated for their grey seal qualifying interest, the Moray Firth SAC designated for its bottlenose dolphin qualifying interest, and the Firth of Tay and Eden Estuary SAC designated for its harbour seal qualifying interest. Potential impacts are identified as disturbance due to underwater noise from construction activities and indirect impacts due to changes in water quality and prey availability.

In addition to the above sites, the site of the Proposed Works has connectivity to the River Teith SAC, designated for its diadromous fish qualifying interests including sea lamprey, river lamprey, and Atlantic salmon. The HRA report identified physiological or behavioural response impacts due to underwater noise, impacts to water quality such as sedimentation and impacts to habitat quality such as loss of habitat.

Characteristics of the potential impact

Following the conclusions of the HRA report, the applicant has gone on to conclude within the main EIA screening report that the potentially significant impacts noted above could be managed through a combination of best practice construction methods and standard mitigation measures.

In its advice, NatureScot states that while the scope of the HRA, in terms of the sites and interests covered, appears adequate, and provides information regarding what further work might be needed to undertake a satisfactory appropriate assessment, an assessment has not been carried out, nor is there any indication in regards to many of the impacts identified above, as to what the outcomes of the appropriate assessment might be. As such, NatureScot states that the conclusions of the applicant's EIA screening report are premature and further information and/or assessment is required to satisfactorily determine that there will be no significant impacts as a result of the Proposed Works on marine mammals, ornithology, and fish receptors.

Further, NatureScot noted that the Proposed Works may have an impact upon European Protected Species ("EPS") which are not necessarily afforded protected by the sensitive sites included in the applicant's HRA such as otters, minke whales and harbour porpoises. NatureScot advised that the impacts outlined in the applicant's HRA were likely to apply to marine EPS as well, and impacts upon these receptors should be considered further.

Based on the information provided and available to us, the Scottish Ministers are in agreement with the conclusions reached by NatureScot that due to insufficient information, currently it cannot be concluded that the proposed works will not have a significant effect on the environment.

Conclusion

In view of the findings above, the Scottish Ministers are of the opinion that the Proposed Works **are** an EIA project under the 2017 MW Regulations and, therefore, an EIA **is** required to be carried out in respect of the Proposed Works.

If you increase, alter or extend the Proposed Works, you are advised to contact Marine Scotland - Licensing Operations Team again to confirm if the screening opinion is still valid.

A copy of the screening opinion has been forwarded to The City of Edinburgh Council planning department. The screening opinion has also been made publicly available through the Marine Scotland Information website here: https://marine.gov.scot/ml/port-leith-outer-berth.

If you require any further assistance or advice on this matter, please do not hesitate to contact me.

Yours sincerely

Claire Crookston
Marine Scotland - Licensing Operations Team

NatureScot
Scotland's Nature Agency
Buidheann Nàdair na h-Alba

Claire Crookston
Marine Licensing Officer
Marine Scotland
Claire.Crookston@gov.scot

15 December 2021

Our ref: A3619432

Dear Claire

THE MARINE WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017 ("THE EIA REGULATIONS")

CONSULTATION UNDER PART 2, REGULATION 10(5) OF THE EIA REGULATIONS

FORTH PORTS LTD (PER ROYAL HASKONING DHV) - PORT DEVELOPMENT - LEITH, EDINBURGH

Thank you for your consultation with the above Environmental screening report, which is accompanied with the Habitats Regulations Appraisal (HRA) screening report. We apologise for the late submission of comments, due to not having received the initial consultation.

Summary

The proposal may have effects upon several European sites (SACs and SPAs). An HRA screening document has been submitted, which concludes likely significant effects (LSE) on various environmental receptors, and an appropriate assessment is therefore underway to assess these impacts. An EIA should also be undertaken focusing on these receptors.

The proposal may also have effects upon European Protected Species (EPS) that are not specifically protected by relevant European sites, for example otter, minke whale or harbour porpoise. Impacts upon these receptors should be considered through EIA. We advise that assessment, conclusions, and mitigation measures identified in the HRA report are likely to apply to the marine EPS also.

Advice - EIA screening report and HRA screening report

The Environmental screening report concludes that any potentially significant impacts on ornithology, marine mammals or fish could be managed using best practice construction methodology and standard mitigation measures, and on this basis, has concluded that the

proposed development will not raise significant environmental effects and does not require an EIA.

The HRA screening report scopes in several designated sites and species to be taken forward to appropriate assessment, due to various identified likely significant effects (LSE). It has not indicated its likely conclusion at this stage, outlining what further work is required to inform the appropriate assessment. It does give some indication on likely outcomes for underwater noise disturbance but not other potential impacts.

The conclusion of the EIA screening report, with regard ornithology, marine mammals or fish is therefore premature and it cannot be concluded at this stage that there will be no significant impacts without further assessment and/or information. On that basis, this would mean that EIA is required.

Further to this, we advise:

1) that the EIA could be focussed on the above receptors and mirror the work undertaken for the appropriate assessment, as well as including EPS which are outwith the HRA process.
2) Alternatively, further details of the proposed mitigation and best practice measures, which should be robust and fully address all likely receptor impacts, could be submitted in terms of the EIA screening. However, these measures are likely to be identified through the appropriate assessment work and may not be clear at this stage.
3) Finally, should the appropriate assessment work conclude no adverse effect on site integrity, prior to commencement of EIA, then significant impacts could be screened out.

In terms of other EIA topics, we note the conclusions of the coastal processes section that effects are unlikely to be significant. However, from earlier pre-application discussions, we understood hydrodynamic modelling was to be undertaken to confirm this. So although impacts are anticipated to be non significant, we assume that modelling will be done to support the application and confirm this.

We are also content that impacts on other terrestrial protected species are unlikely to be significant.

In terms of the HRA screening report, we are generally content with the scope of the appropriate assessment but given the short timescales for comment, we are unable to provide detailed comments at this stage. However we are happy to continue dialogue and/or provide more detailed comments to the HRA as required.

Should you wish to discuss these comments further then please do not hesitate to contact me at my e-mail address.

Yours sincerely,

[redacted]

Area Officer / Forth

[redacted]@nature.scot

From: [redacted]
To: Crookston C (Claire)
Subject: RE: Forth Ports Ltd (per Royal Haskoning DHV) - Port Development - Leith, Edinburgh - Consultation on Request for Screening Opinion – Response Required by 06 December 2021
Date: 15 November 2021 15:19:38

OFFICIAL

Claire

THE MARINE WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017 ("the EIA Regulations")
CONSULTATION UNDER PART 2, REGULATION 10(5) OF THE EIA REGULATIONS
FORTH PORTS LTD (per ROYAL HASKONING DHV) – PORT DEVELOPMENT, LEITH, EDINBURGH

I refer to your consultation with SEPA of 15 November on the EIA screening request detailed above.

We consider that, **with respect to our interests**, Environmental Impact Assessment is not required for the above proposal. Whether or not Environmental Impact Assessment is required, we refer you to our standing advice and other guidance which is available on our website at www.sepa.org.uk/environment/land/planning. In addition, please also refer to our *SEPA standing advice for the Department for Business, Energy and Industrial Strategy and Marine Scotland on marine consultations* available at https://www.sepa.org.uk/media/143312/lups-gu13.pdf

If there is a significant site specific issue, not addressed by our guidance or other information provided on our website, with which you would want our advice, then please reconsult us highlighting the issue in question and we will try our best to assist.

I trust these comments are of assistance – please do not hesitate to contact me if you require any further information.

Regards

[redacted]
Senior Planning Officer
Scottish Environment Protection Agency
Strathallan House
Castle Business Park
Stirling
FK9 4TZ

Telephone [redacted]
Mobile [redacted]
www.sepa.org.uk

From: Claire.Crookston@gov.scot <Claire.Crookston@gov.scot>
Sent: 15 November 2021 11:43

Subject: Forth Ports Ltd (per Royal Haskoning DHV) - Port Development - Leith, Edinburgh - Consultation on Request for Screening Opinion – Response Required by 06 December 2021

CAUTION: This email originated from outside the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

Dear Sir/Madam,

THE MARINE WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017 ("the EIA Regulations")

CONSULTATION UNDER PART 2, REGULATION 10(5) OF THE EIA REGULATIONS

Forth Ports Ltd (per Royal Haskoning DHV) - Port Development - Leith, Edinburgh

Forth Ports Ltd have requested the Scottish Ministers adopt a screening opinion in relation to the above proposed works under regulation 10(1) of the EIA Regulations.

I should be grateful if you would please review the attached information and, as required by regulation 10(5) of the EIA Regulations, provide your view as to whether the above proposed works are an EIA project as defined in the EIA Regulations.

In accordance with regulation 10(6) of the EIA Regulations, please ensure you provide your view no later than 06 December 2021.

Kind regards,

Claire

Claire Crookston
marinescotland
Marine Licensing Officer
Marine Scotland Licensing Operations Team

Scottish Government | Marine Laboratory | 375 Victoria Road | Aberdeen | AB11 9DB
Email: Claire.Crookston@gov.scot
Website: http://www.gov.scot/Topics/marine/Licensing/marine

COVID-19: Marine Scotland - Licensing Operations Team (LOT) is working from home and unable to respond to general phone enquiries. Please communicate with LOT via email. Email addresses are MS.MarineRenewables@gov.scot for marine renewables correspondence or MS.MarineLicensing@gov.scot for all licensing queries.

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****
*****

OFFICIAL

OFFICIAL

OFFICIAL

From:	[redacted]
To:	Crookston C (Claire)
Cc:	[redacted]
Subject:	FW: Forth Ports Ltd (per Royal Haskoning DHV) - Port Development - Leith, Edinburgh - Consultation on Request for Screening Opinion – Response Required by 06 December 2021
Date:	06 December 2021 12:38:18
Attachments:	image001.jpg image002.png EIA_SCREENING_OPINION-5168651.docx EIA_SCREENING_OPINION_LETTER-5168653.pdf

Dear Claire,

The Council recently undertook a screening of the proposals in relation to the Town and Country Planning (Environmental Impact Assessment (EIA)) (Scotland) Regulations 2017 (as amended) and concluded that no EIA was required. Please see attached files.

In addition, the Council's Natural Heritage section has provided the following comments:

The key environmental impacts on the natural environment of this scheme are those that will impact on the international and national designations with ornithological interest.

These matters are dealt with separately via the Habitats Regulation Appraisal (HRA) process and subsequent Appropriate Assessment (AA), the details of which the applicant intends to discuss further with NatureScot.

Having reviewed the HRA submitted I believe it to deal with the issues appropriately and I have no further comment to make on the HRA.

I trust this of use.

Kind regards

[redacted]
Senior Planning Officer

Waterfront Area | Planning & Building Standards | Sustainable Development | Place Directorate | The City of Edinburgh Council

Have you signed up to the Planning Blog? We are using the Planning Blog to communicate and consult on important changes and improvements to the Planning service. Please sign up to the Planning Blog to make sure you are up-to-date.

Corona_Council_srvs_020420

From: Claire.Crookston@gov.scot <Claire.Crookston@gov.scot>
Sent: 15 November 2021 11:43
Subject: Forth Ports Ltd (per Royal Haskoning DHV) - Port Development - Leith, Edinburgh - Consultation on Request for Screening Opinion – Response Required by 06 December 2021

Dear Sir/Madam,

THE MARINE WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017 ("the EIA Regulations")

CONSULTATION UNDER PART 2, REGULATION 10(5) OF THE EIA REGULATIONS

Forth Ports Ltd (per Royal Haskoning DHV) - Port Development - Leith, Edinburgh

Forth Ports Ltd have requested the Scottish Ministers adopt a screening opinion in relation to the above proposed works under regulation 10(1) of the EIA Regulations.

I should be grateful if you would please review the attached information and, as required by regulation 10(5) of the EIA Regulations, provide your view as to whether the above proposed works are an EIA project as defined in the EIA Regulations.

In accordance with regulation 10(6) of the EIA Regulations, please ensure you provide your view no later than 06 December 2021.

Kind regards,

Claire

Claire Crookston
marinescotland
Marine Licensing Officer
Marine Scotland Licensing Operations Team

Scottish Government | Marine Laboratory | 375 Victoria Road | Aberdeen | AB11 9DB
Email: Claire.Crookston@gov.scot
Website: http://www.gov.scot/Topics/marine/Licensing/marine

COVID-19: Marine Scotland - Licensing Operations Team (LOT) is working from home and unable to respond to general phone enquiries. Please communicate with LOT via email. Email addresses are MS.MarineRenewables@gov.scot for marine renewables correspondence or MS.MarineLicensing@gov.scot for all licensing queries.

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·EDINBVRGH·
THE CITY OF EDINBURGH COUNCIL

HaskoningDHV UK Ltd.
FAO: Gemma Starmore.
Stratus House,
Emperor Way,
Exeter,
EX1 3QS

Forth Ports.
C/o Agent.

Date:

Our Ref: 21/04933/SCR

Dear Sir/Madam

SCREENING OPINION UNDER THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA) (SCOTLAND) REGULATIONS 2017

Western Harbour Western Harbour Drive Edinburgh

EIA Screening Request - EIA Screening request for a proposal to improve a berth located outside of the lock gates to be used primarily by the offshore renewables industry, and to reconfigure a section of port land to provide laydown and storage areas for the components for associated use.

I refer to your request dated 20 September 2021 for a screening opinion on whether the proposal is an EIA development.

This letter constitutes the Council's formal Screening Opinion on whether this is an EIA development and an EIA Report is required. In coming to a determination, I have considered the criteria as set out in The Environmental Impact Assessment (EIA) (Scotland) Regulations 2017 and the advice set out in Circular 1/2017.

For the summary reasons set out below, it is considered that an **EIA Not Required**.

Reason for Opinion

On the basis of the information provided and the assessment carried out in accordance with the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017) and Circular 1/2017 it is concluded that an EIA will not be required for this proposal.

The key points for this opinion are:

- The proposal relates to uses that are of a similar nature to operations already undertaken within the wider area. Vessels of a similar size are already accepted within the dock. It also includes the removal existing facility that creates noise and air emissions.

[redacted], Senior Planning officer, Planning & Building Standards, PLACE.
Email [redacted]@edinburgh.gov.uk,
Waverley Court, 4 East Market Street, Edinburgh, EH8 8BG

- The screening request indicates that there will be some effects from the construction stage, but these will be short term.
- To the south and east of the site there are identified Air Quality Management Area areas but the continued use of the dock for appropriate uses would not warrant an EIA with the proposals including the loss of an existing industrial use and proposed materials associated with this development indicated to be transported by sea.
- In terms of noise, the area already accepts ships and operates as a port.
- The Habitats Regulations Appraisal submitted to accompany the screening request indicates that Appropriate Assessment will be undertaken and agreed with NatureScot and mitigation measures put in place if required.
- The Martello Tower is a Scheduled Monument, but its location is already surrounded by existing industrial style uses.
-Visual impacts will be temporary in nature.

I trust that the screening opinion is self-explanatory. If you require any further guidance please contact me on [redacted]@edinburgh.gov.uk.

Yours sincerely

[redacted]

Team Manager

ENVIRONMENTAL IMPACT APPRAISAL SCREENING OPINION
(under the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017)

Address: Leith Docks	**Applicant/ Agent:** Forth Ports / HaskoningDHV UK Ltd FAO: Gemma Starmore. Stratus House, Emperor Way, Exeter, EX1 3QS
Summary Description of Development: Improve a berth located outside of the lock gates to be used primarily by the offshore renewables industry (120m), and to reconfigure a section of port land (of 15 hectares) to provide laydown and storage areas for the components associated with, e.g., offshore windfarms (such as nacelles, towers, blades, and foundations).	
Date of Receipt of Screening Request: 20/09/2021	
Application or Pre- Application: Pre- Application	
Reference Number (Application/ PAN): 21/04933/SCR	
Sufficient Information to Make Assessment: Yes	

Declaration:

We have screened the proposals and determined that EIA is not required for this submission, for the reasons detailed below.

Signed… [redacted] (Planning Officer)

Signed … [redacted] (Team Manager)

Date ……14 October 2021

IDENTIFYING THE DEVELOPMENT:

1. Is the development of a type described in Schedule 1?

~~YES~~/ NO

Yes – Proceed to declaration EIA is required
No – Proceed to next question.

---

2. Is the development of a type listed in column 1 of schedule 2 which:

a) is located wholly or in part on a 'sensitive area' as defined in regulation 2(1) (see paragraph 45;

OR

b) meets one of the relevant criteria or exceeds one of the relevant thresholds listed in the second column of the table in Schedule 2.

YES/ ~~NO~~

If No, proceed to declaration.

Threshold Requirement:

The proposal is classed as 10 (g) Construction of harbours and port installations, including fishing harbours and the area of the works exceeds 1 hectare.

It falls within 10(b) as an urban development project of over 0.5 hectares

It also may fall within class 10(c) as it involves an intermodal trans-shipment facility.

Consideration of EIA

3. Is the development likely to have a significant effect on the environment taking into account the following areas?

Selection Criteria for Screening Schedule 2 Development	
In accordance with Schedule 3 of the Regulations the following selection criteria are used to inform the screening opinion:	
Characteristics of development **1.** The characteristics of development must be considered having regard in particular to—	
	Yes/ No – Briefly Describe
a) the size and design of the whole development;	No - the proposals relate to the existing dock area, with areas such as the proposed laydown area already used as a storage yard. The outer berth will be suspended and replace the existing jetty at this location. Total site area approximately 18.5 ha.
b) the cumulation with other existing development and/or approved development;	No – existing dock. Potential mixed use development to the south.
c) the use of natural resources, in particular land, soil, water and biodiversity;	No – as with all developments use of natural resources will be required.
d) the production of waste;	No - Construction waste will be managed using a waste management plan. Material will be reused on site as much as possible, with landfill waste kept as low as possible.
e) pollution and nuisances;	No
f) the risk of major accidents and/or disasters relevant to the development concerned, including those caused by climate change, in accordance with scientific knowledge;	No
g) the risks to human health (for example, due to water contamination or air pollution).	No – air quality considered below. Leith Docks already operates in a similar manner to that proposed. Activities will be similar in nature to existing operations within the site.
Location of development **2.** The environmental sensitivity of geographical areas likely to be affected by development must be considered having regard in particular to—	

	Yes/ No – Briefly Describe
a) the existing and approved land use;	No – current dock area and proposals continue this use.
b) the relative abundance, availability, quality and regenerative capacity of natural resources (including soil, land, water and biodiversity) in the area and its underground;	No – current dock area
c) the absorption capacity of the natural environmental paying particular attention to the following areas—	
(i) wetlands, riparian areas, river mouths;	Yes - dock area at mouth of Water of Leith. Information submitted indicates short term temporary effects from construction stage.
(ii) coastal zones and the marine environment;	Yes - dock area. Information submitted indicates short term temporary effects from construction stage.
(iii) mountain and forest areas;	No
(iv) nature reserves and parks;	No
(v) European sites and other areas classified or protected under national legislation;	Yes - Leith Imperial Dock Special Protection Area to the south (approx. 120m). North of the site is the Firth of Forth (part of) SPA, Ramsar, SSSI. Information indicates potential for short term impacts primarily from the construction stage. The HRA provided concludes that an appropriate assessments (AA) will be required for the Leith Outer Berth. The applicants are in consultation with NatureScot.
(vi) areas in which there has already been a failure to meet the environmental quality standards, laid down in Union legislation and relevant to the project, or in which it is considered that there is such a failure;	Yes - Great Junction and Salamander Street Air Quality Management Areas to the south and east of the site. Construction stages governed by other regulations. Materials will be delivered by sea. Proposals involve the removal of some existing uses (Shawcor facility)
(vii) densely populated areas;	No

(viii) landscapes and sites of historical, cultural or archaeological significance.	No listed buildings within the site. Martello Tower scheduled monument is within the site. But is already surrounded by current dock related uses. Site some distance from WHS and general uses proposed expected within this area.
Types and characteristics of the potential impact **3.** The likely significant effects of the development on the environment must be considered in relation to criteria set out in paragraphs 1 and 2 above, with regard to the impact of the development on the factors specified in regulation 4(2), taking into account—	
	Yes/ No – Briefly Describe
(a) the magnitude and spatial extent of the impact (for example geographical area and size of the population likely to be affected);	No. Although the upright storage of the towers may have a visual impact by virtue of the height and appearance.
(b) the nature of the impact;	No
(c) the transboundary nature of the impact;	No, although views to the city from other local authority areas (such as Fife) may be temporarily affected.
(d) the intensity and complexity of the impact;	No
(e) the probability of the impact;	No
(f) the expected onset, duration, frequency and reversibility of the impact;	No – potential impacts generally during construction stage.
(g) the cumulation of the impact with the impact of other existing and/or approved development;	No
(h) the possibility of effectively reducing the impact.	No

Overall Conclusion: The proposed development constitutes a Schedule 2 Development under the EIA Regulations and for this reason have been tested against the above criteria as set out in Schedule 3 of the Regulations. The conclusion based on this test is that the proposals are for dock related uses, expected to be undertaken at location including new/replacement berth areas and alterations to existing areas within the dock.

There may be some visual impacts in relation to the vertical storage of the towers, however it is not considered that these will be of such a scale as to require an EIA. This is also due to the temporary nature of the operation.

Consideration of any ecology matters (SPA) and potential air quality impacts do not in themselves or combined warrant an EIA.

4. Screening Opinion

On the basis of the information provided and the assessment carried out in accordance with the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017) and Circular 1/2017 it is concluded that an EIA **will not be** required for this proposal.

The key points for this opinion are:

- The proposal relates to uses that are of a similar nature to operations already undertaken within the wider area. Vessels of a similar size are already accepted within the dock. It also includes the removal existing facility that creates noise and air emissions.
- The screening request indicates that there will be some effects from the construction stage, but these will be short term.
- To the south and east of the site there are identified Air Quality Management Area areas but the continued use of the dock for appropriate uses would not warrant an EIA with the proposals including the loss of an existing industrial use and proposed materials associated with this development indicated to be transported by sea.
- In terms of noise, the area already accepts ships and operates as a port.
- The Habitats Regulations Appraisal submitted to accompany the screening request indicates that Appropriate Assessment will be undertaken and agreed with NatureScot and mitigation measures put in place if required.
- The Martello Tower is a Scheduled Monument, but its location is already surrounded by existing industrial style uses.
- Visual impacts will be temporary in nature.

By email to: Claire.Crookston@gov.scot

Claire Crookston
Marine Licensing Officer
Marine Scotland Licensing Operations Team
Marine Scotland

Longmore House
Salisbury Place
Edinburgh
EH9 1SH

Enquiry Line: 0131-668-8716
HMConsultations@hes.scot

Our case ID: 300051634

06 December 2021

Dear Claire Crookston

The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017
The Town and Country Planning (EIA) (Scotland) Regulations 2017
Forth Ports Ltd (per Royal Haskoning DHV) - Port Development - Leith, Edinburgh
Request for Screening Opinion for Leith Outer Berth

Thank you for your consultation which we received on 15 November 2021 seeking our comments on an Environmental Impact Assessment (EIA) screening opinion for the above proposed development. This letter contains our comments for our historic environment interests. That is world heritage sites, scheduled monuments and their setting, category A-listed buildings and their setting, gardens and designed landscapes and battlefields on their respective Inventories.

Your archaeological and conservation advisors will also be able to offer advice for their interests. This may include unscheduled archaeology, category B- and C-listed buildings and conservation areas.

Our Screening opinion
We have no comments to make on the requirement or otherwise for an EIA for this proposed development. However, you may find the information provided below helpful in reaching your decision on the matter.

Our advice
As the screening report notes, the scheduled monument Martello Tower, Leith (SM 2418) lies within the 500m study area. We note that the proposed reconfigured laydown area of the docks in the vicinity of the scheduled monument is consistent with its current use and as such the impact on the setting of the tower is likely to be similar to the existing level of impact.

In terms of the modification of the existing berth pocket we note that the potential for submerged archaeological remains such as wrecks as well as sub-surface deposits of

potential paleo-environmental interest is not considered significant due to previous reclamation and excavation works around the lock.

We hope this is helpful. Please contact us if you have any questions about this response. The officer managing this case is Andrew Stevenson and they can be contacted by phone on 0131 668 8960 or by email on andrew.stevenson2@hes.scot.

Yours faithfully

Historic Environment Scotland

Appendix 6-1 Presentation to Regulators and Statutory Authorities

↑ Table of Contents ↑

Leith Outer Berth

Early stakeholder consultation

Royal HaskoningDHV
09 June 2021
Project related

Overview

1. Purpose of the meeting
2. Project Overview
3. Key Environmental Sensitivities
4. Key Potential Environmental Issues
5. Consenting
6. Programme
7. Any other business

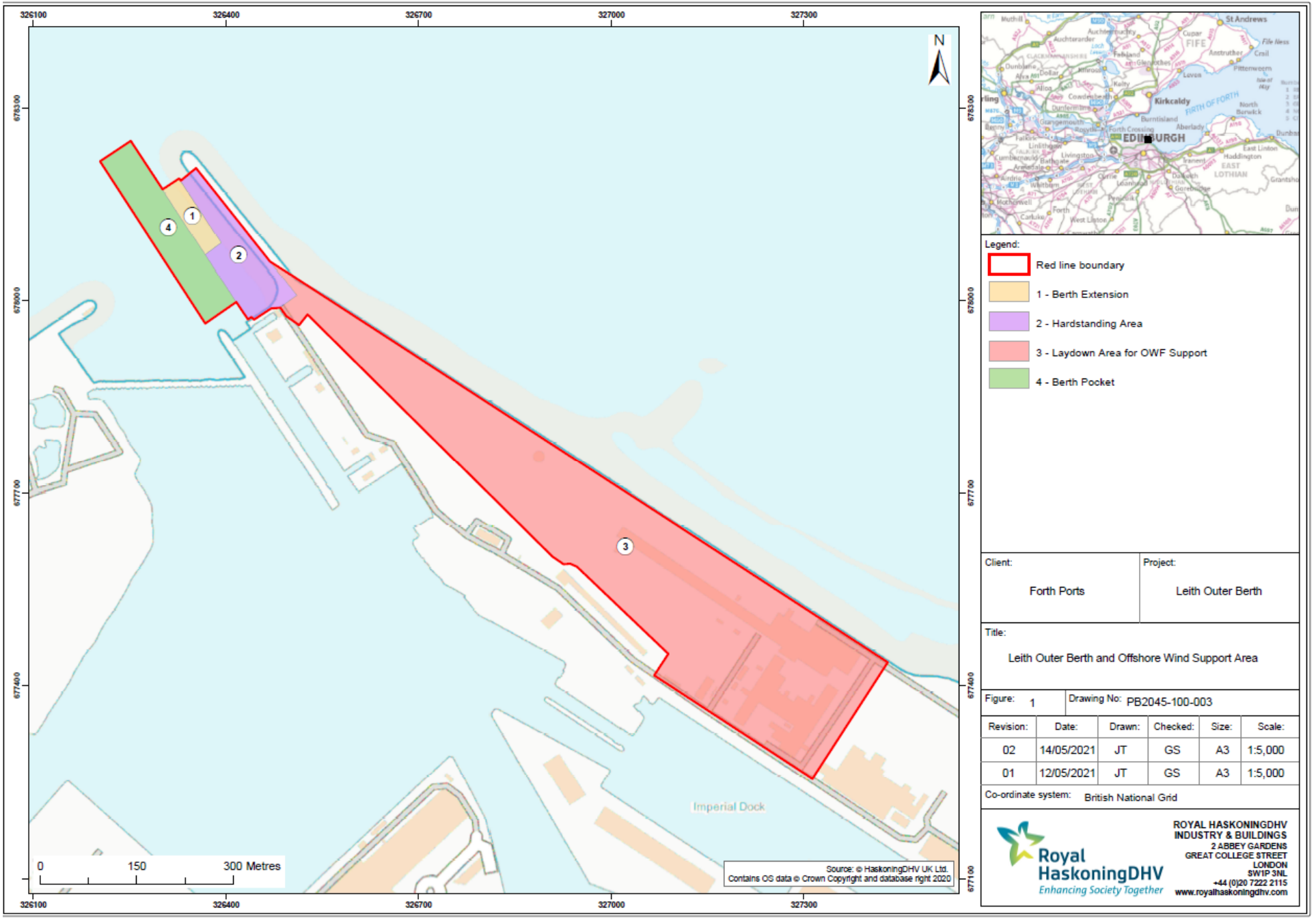
Purpose of meeting

1. Introduce the proposed development

2. Seek early input on:
   a) Environmental sensitivities
   b) Potential Environmental issues
   c) Consenting approach

Project Overview - Background

- Part of the ScotWind process is the inclusion of ‘local content’ in terms of the offshore wind industry support.
- The proximity of the Port of Leith to both consented and future offshore wind projects (and other renewables) means it could be a key area to support the industry in the future.
- Lock gates at Leith restrict the access to vessels over 30m in beam width.
- Forth Ports is therefore proposing to develop a berth seaward of the lock entrance to accommodate these vessels and support the offshore renewables industry.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Legend:
Red line boundary
1 - Berth Extension
2 - Hardstanding Area
3 - Laydown Area for OWF Support
4 - Berth Pocket
Client: Forth Ports
Project: Leith Outer Berth
Title: Leith Outer Berth and Offshore Wind Support Area
Figure: 1
Drawing No: PB2045-100-003
Revision: 02 | Date: 14/05/2021 | Drawn: JT | Checked: GS | Size: A3 | Scale: 1:5,000
Revision: 01 | Date: 12/05/2021 | Drawn: JT | Checked: GS | Size: A3 | Scale: 1:5,000
Co-ordinate system: British National Grid
Royal HaskoningDHV
Enhancing Society Together
ROYAL HASKONINGDHV
INDUSTRY & BUILDINGS
2 ABBEY GARDENS
GREAT COLLEGE STREET
LONDON
SW1P 3NL
+44 (0)20 7222 2115
www.royalhaskoningdhv.com

Current site

Project Overview - Construction

Outer berth (Area 1)

- Part of existing jetty would be removed and a 120m long (30m wide) piled extension constructed
- Combi-wall constructed using combination of steel tubular piles and infill sheet piles
- Mooring dolphins

Hard standing area (Area 2)

- Structure would be retained, and area behind infilled to form hardstanding

Laydown area (Area 3)

- Existing buildings and infrastructure to be removed and a gravelled hardstanding storage area shall be constructed

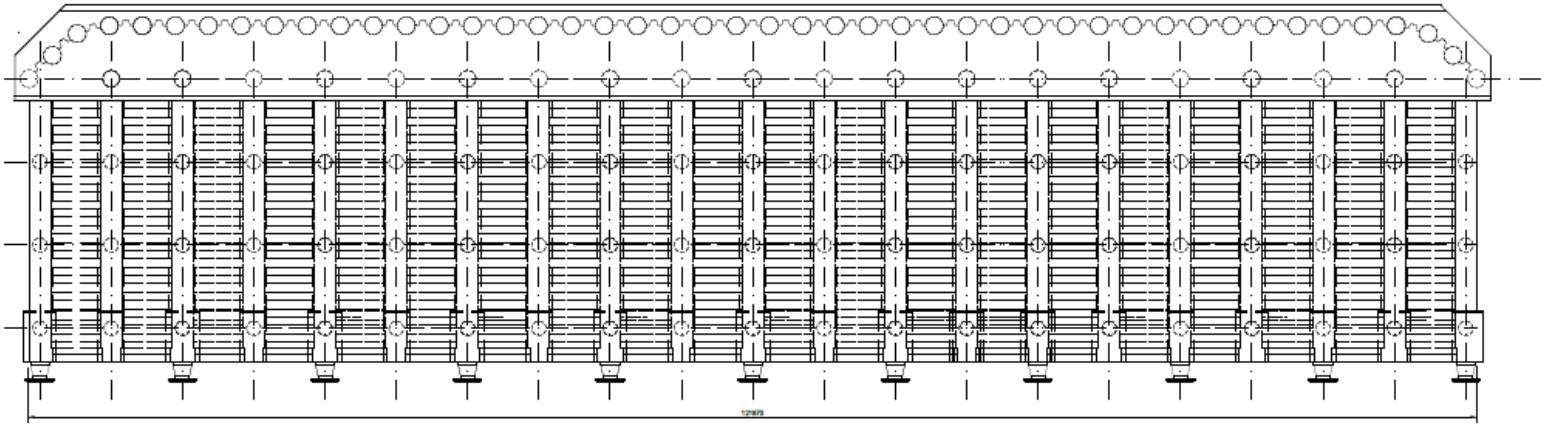
Berth pocket (Area 4)

- Dredge depth between -9 and -10 m CD, approximately 300m by 60m
- Total material to be dredged, approximately 100,000m^3

- Majority of material delivered by sea.
- The overall construction programme is anticipated to be 15 months, with an anticipated start date of mid-2022.

DRAWING No. PC2045-RHD-ZZ-ZZ-DR-C-0000

DO NOT SCALE



PLAN
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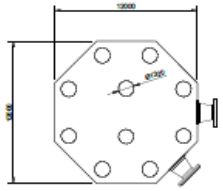

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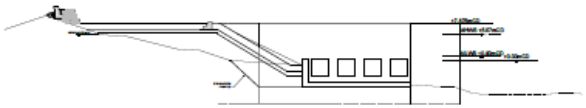

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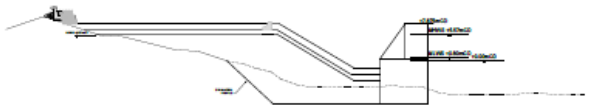

EXISTING LEAD IN STRUCTURE
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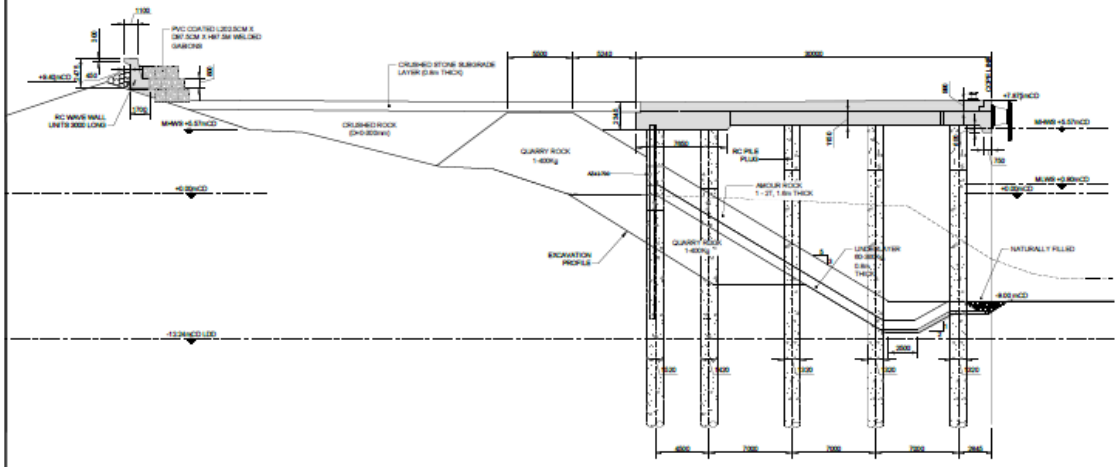

HEAVY LOAD QUAY
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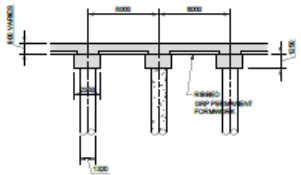

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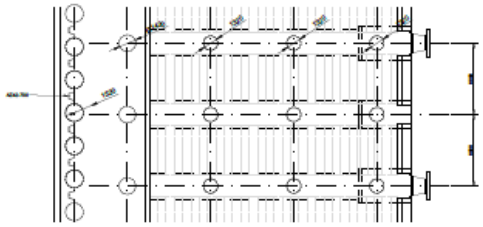
TYPICAL CROSS SECTION 2
SCALE 1:200



PLAN
SCALE 1:200

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE IN METRES TO CHART DATUM (mCD) UNLESS NOTED OTHERWISE.

PRELIMINARY

REV	DATE	DESCRIPTION	BY	CHK	APP

REVISIONS

CLIENT

PROJECT

LEITH BERTH

TITLE

HEAVY LOAD QUAY
CONCEPT DESIGN

Royal HaskoningDHV
Enhancing Society Together

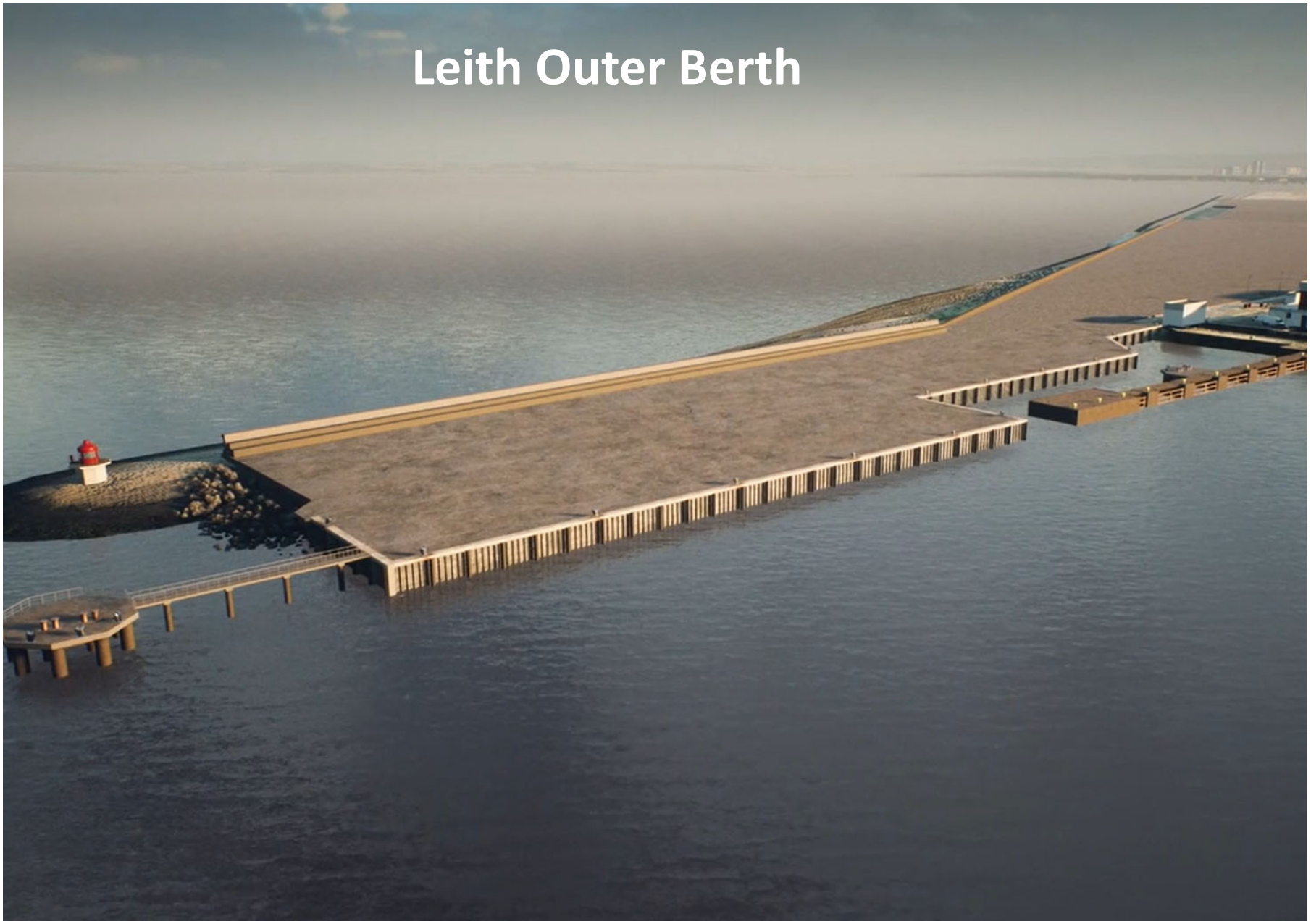
Drawn	RA	Checked	CM	Approved	CM
Date	12.02.21	Scale	AS SHOWN		

Drawing No.	Suitability	Revision
PC2045-RHD-ZZ-ZZ-DR-C-0001	S1	P0.2

Project Overview - Operation

- Primary use is to support the offshore renewables industry, by providing storage and trans-shipment facilities.
- Particularly for vessels that cannot access the Port due to the 30m width restriction.
- Loading and unloading operations are expected to take less than 24 hours.
- Entrance to the port through the lock gate would be restricted while the outer berth is in use, and therefore vessels would remain berthed for as short a time as possible.
- It is the intention that the berth would provide shore power.

Leith Outer Berth



Key Environmental Sensitives

- Designated sites:
  - 4No Special Protection Areas;
  - 4No Special Areas of Conservation;
  - 1No Ramsar site; and,
  - 1No Site of Special Scientific Interest.

- Heritage:
  - Martello Tower Scheduled Monument is located within Area 3;
  - Six Scheduled Monuments and 10 listed buildings within 1km of project; and,
  - Leith Conservation Area.

- Residential properties:
  - Existing residential properties within 500m; and,
  - Proposed residential properties are included within the Western Harbour Masterplan and, if built, would be within 300m of the outer berth.

Are there any other key environmental sensitivities?

Key Potential Environmental Issues

Construction

- **Noise from piling works** (anticipated to last for four months):
  - People and birds – Noise assessment will be undertaken. 12 months of bird surveys started in March 2021; and,
  - Marine mammals and fish potentially present, considered can be managed via best practice, i.e. underwater noise modelling is not considered necessary.
- **Visual disturbance**: Excluding noise, development site is part of the working port, so not expected to be significant to birds (habituated) or people.
- **Dredging**: Increases in suspended sediment / contaminants. Sediment quality survey and sediment dispersion modelling (also at disposal site – assuming offshore disposal) will be undertaken.
- **Benthic ecology**: Nearly all of the dredge footprint is within the maintenance dredge channel, as such a benthic ecology survey is not considered necessary.
- **Traffic**: Majority of materials would be delivered by sea, so would be minimal.
- **Air quality**: Not expected to be significant and related mostly to dust. Managed via best practice.
- **Heritage:** Martello Tower will be protected.

Are there any other key environmental issues to consider?

Key Potential Environmental Issues

Operation

- Overall, the majority of the operational phase effects are considered to be similar to the existing situation, e.g. use of the laydown area; no significant changes to navigation or to other users; it's a load on load off facility, so no traffic issues.
- Key environmental considerations during operation are therefore limited to:
  - **Changes to coastal processes**: Given location of East Breakwater and relatively small dredge footprint, any effects are considered to be very localised to the development. Hydrodynamic modelling will be undertaken.
  - **Intertidal loss**: Very minimal and limited to upper shore levels due to suspended deck.
  - **Air / noise emissions** when a vessel is berthed:
    - Given distance to sensitive receptors, not considered to be significant; however, assessments will be undertaken to prove this; and,
    - The use of shore power, would remove this issue.
  - **Landscape and visual setting**:
    - No change in use so no effect on character; and,
    - Effects to the visual setting are considered to be limited to views from residential properties and lines of sight from/to affecting the historic setting. A visual assessment will be undertaken to determine if any mitigation is required.

Are there any more key environmental issues to consider?

Consenting - Key Pieces of Legislation

The key legislation of relevance for the proposed development is:

- **The Marine (Scotland) Act 2010**, and the requirement for a Marine Licence.
- **The Town and Country Planning (Scotland) Act 1997**, and the requirement for planning permission.
- **The Conservation (Natural Habitats, &c.) Regulations 1994, as amended**, and the requirement to undertake a HRA.
  - The requirement for a EPS licence would be determined through the consenting process.
- **The Wildlife and Natural Environment (Scotland) Act 2011**, and the potential requirement for SSSI assent.
- **Water Environment and Water Services (Scotland) Act 2003**.
  - It is expected that the requirement for approval under The Water Environment (Controlled Activities) (Scotland) Regulations 2003 Act would be superseded by the Marine Licencing process, as normal practice.
- **Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997**.
  - Given that no Listed Buildings would be directly affected by the proposed development, Listed Building Consent would not be required.

Consenting - Environmental Impact Assessment

- Environmental Impact Assessment (EIA) Screening Opinions will be sought from:
  - Marine Scotland; and,
  - the City of Edinburgh Council.

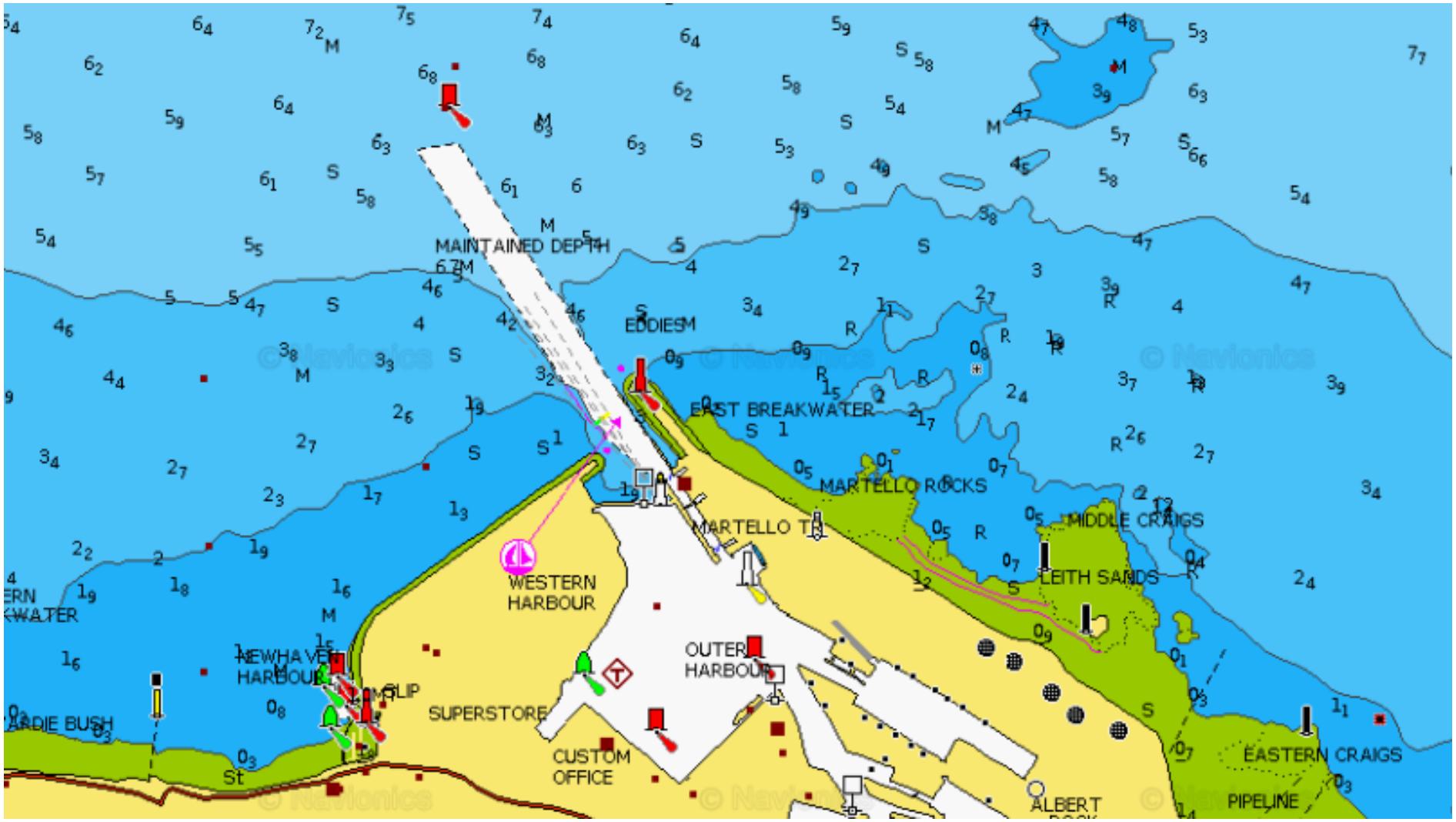
- Given this is an extension/replacement of an existing jetty, the proposed development is considered to fall within Schedule 2 of the EIA Regulations:
  - *10(m) Coastal work to combat erosion and maritime works capable of altering the coast through the construction, for example, of dykes, moles, jetties and other sea defence works, excluding the maintenance and reconstruction of such works;*

- Given potential significant effects are limited to the construction phase, potential impacts to the natural environment will be managed via the HRA and the limited potential to affect people, it is considered that the proposed development does not constitute an EIA Development.

Programme

	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22
EIA / HRA Screening Exercises														
Determination of EIA Screening Opinions														
Bird Surveys (remaining)														
Studies and investigations														
Reporting														
Submission of applications														
Determination of applications														


Any further comments
or questions?



Royal HaskoningDHV

Appendix 6-2 Note to Key Stakeholders

↑ Table of Contents ↑

Note

HaskoningDHV UK Ltd.
Industry & Buildings

To:	Click to enter "Recipient"
From:	Gemma Starmore
Date:	27 May 2021
Our reference:	PC2045-RHD-ZZ-XX-NT-Z-0002

Subject: **Leith Outer Berth and Offshore Wind Support Area: Early Consultation**

---

1 Introduction

Offshore wind is a key growth industry for Scotland, and a key component for reaching Scotland's target to reduce greenhouse gas emissions by 75% by 2030, and being net-zero by 2045. The ScotWind process will mean more wind farm projects in the future, and a part of that process includes the commitment to 25% of the OWF support industry being local. To be able to achieve this, additional suitable port capacity is required in Scotland. To date, there has been limited local content in relation to the currently installed / being installed capacity. An increase in suitable port capacity will facilitate increased local content.

Given the proximity of the Port of Leith to either consented or planned developments, it has been identified that Leith should be a strategic element for the offshore wind supply chain in the future. The lock gates at the Port of Leith currently restrict access to the port for vessels with a beam width of over 30m. Forth Ports Ltd. is therefore proposing to develop a berth seaward of the entrance to the Port of Leith to support vessels associated with the offshore renewables industry (see **Figure 1**) which cannot currently transit the lock entrance. The proposed development would provide:

- A 120m long berth extension (Area 1 as shown on **Figure 1**);
- An area of hardstanding to be used for loading/unloading (Area 2 as shown on **Figure 1**); and,
- Space for a reconfigured laydown area within the existing port to be used for the storage and transhipment of cargo, most likely offshore wind farm (OWF) components (such as the blades, towers and nacelles) (Area 3 as shown on **Figure 1**).

This note provides an introduction to the proposed development for the purposes of early stakeholder consultation, and includes:

- a description of the proposed development;
- an overview of the potential environmental constraints and opportunities that have been identified;
- the key pieces of legislation relevant to the proposed development; and,
- consultation objectives.

Legend:

- Red line boundary
- 1 - Berth Extension
- 2 - Hardstanding Area
- 3 - Laydown Area for OWF Support
- 4 - Berth Pocket

Client:	Project:
Forth Ports	Leith Outer Berth

Title:

Leith Outer Berth and Offshore Wind Support Area

Figure: 1 | Drawing No: PB2045-100-003

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	14/05/2021	JT	GS	A3	1:5,000
01	12/05/2021	JT	GS	A3	1:5,000

Co-ordinate system: British National Grid

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2 Description of the Proposed Development

2.1 Construction Phase

The 120m long quay would form an extension to the existing jetty and be 30m in width, with a 10m run off apron landside, located to the northern end of the inner edge of the East Breakwater and lead in jetty (shown as Area 1 on **Figure 1**). Part of the existing piled jetty would be removed and the quay constructed using piles, between approximately 1.3m and 1.4m in diameter. A combi-wall would also be constructed using a combination of steel tubular piles (approximately 1.5m in diameter) and infill sheet piles. Mooring dolphins would be installed with piles of approximately 1.3m diameter. In total, approximately 1 piles and 44 sheet piles would be required. A cross section of the proposed new berth can be seen in **Figure 2**.

The existing jetty (in Area 2) is formed of large concrete abutments . This structure would be retained with the area behind filled in to form additional hardstanding. Additional sheet-piled walls would be required behind the existing jetty, and infilled. At present, the final design for this area is still being developed, and the area behind the existing jetty may not be entirely infilled.

Area 3 (in **Figure 1**) would form the laydown area to be used for the temporary storing of offshore renewable energy components as an area of the port that is currently active. The area is currently used as a pipe coating and storage yard. This area would be reconfigured and the existing buildings and infrastructure demolished.

The berth pocket (Area 4 in **Figure 1**) would be dredged to between -9.0 and -10.0m CD, and be approximately 300m by 60m wide, which, including side slopes, would have a total dredge volume of up to approximately 100,000m^3.

It is envisaged that the majority of construction materials would be delivered to site by sea.

A high level construction sequence, and indicative timings, is provided below:

- Removal of existing dolphins and jetty, and excavation of existing materials (four months).
- Excavator dredging of the berth pocket (one month).
- Hardstanding areas infilled (one month).
- Installation of tubular piles to rear of new quay, and sheet piles for suspended deck (four months).
- Placement of foundations and wave screenwall units at rear of Area 2 (two months).
- Installation of rock armour (one month).
- Placement of beam and deck panels onto piles to form new quay, and installation of fenders and fender sleeves (five months).
- Installation of piles for three new dolphins (one month).
- Installation of beams, bollards, and walkway for new dolphins (four months).
- Drainage systems, lighting and quay furniture (one month).
- Placement of surface layer to hardstanding areas (seven months).

The overall construction programme is anticipated to be 15 months, with an anticipated start date of mid-2022.

DRAWING No.
PC2045-RHD-ZZ-ZZ-DR-C-0000

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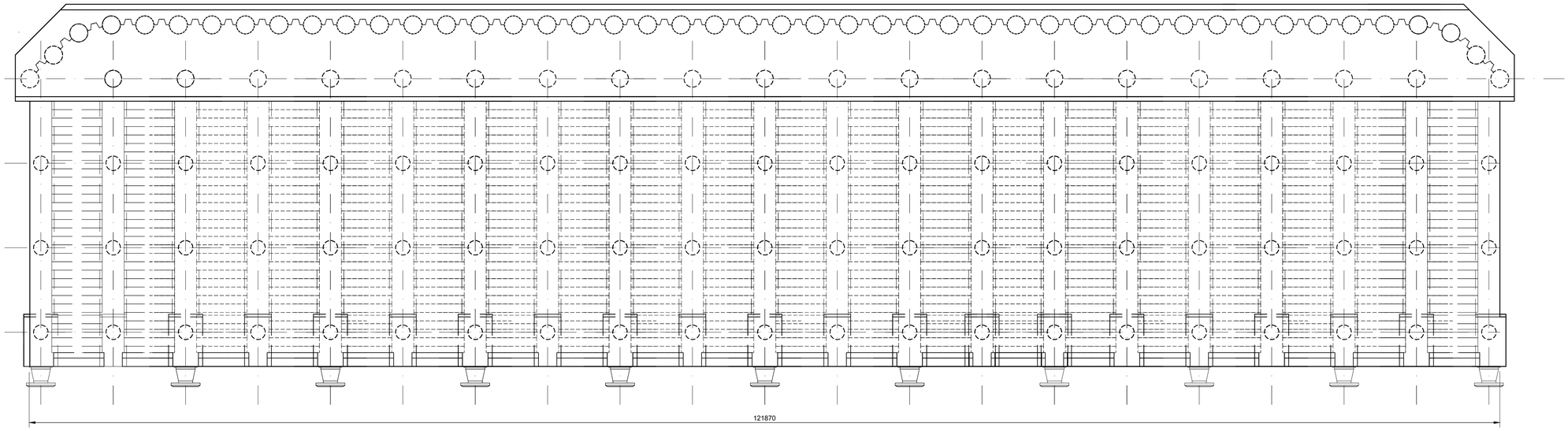

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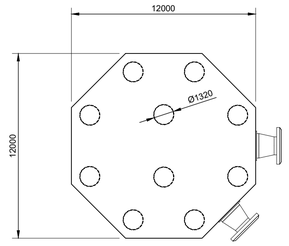

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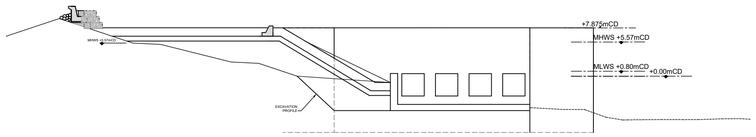

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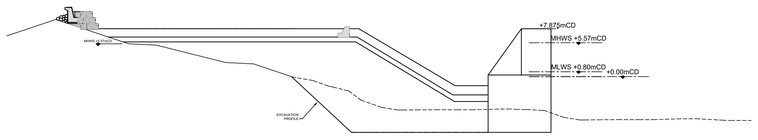

EXISTING LEAD IN STRUCTURE
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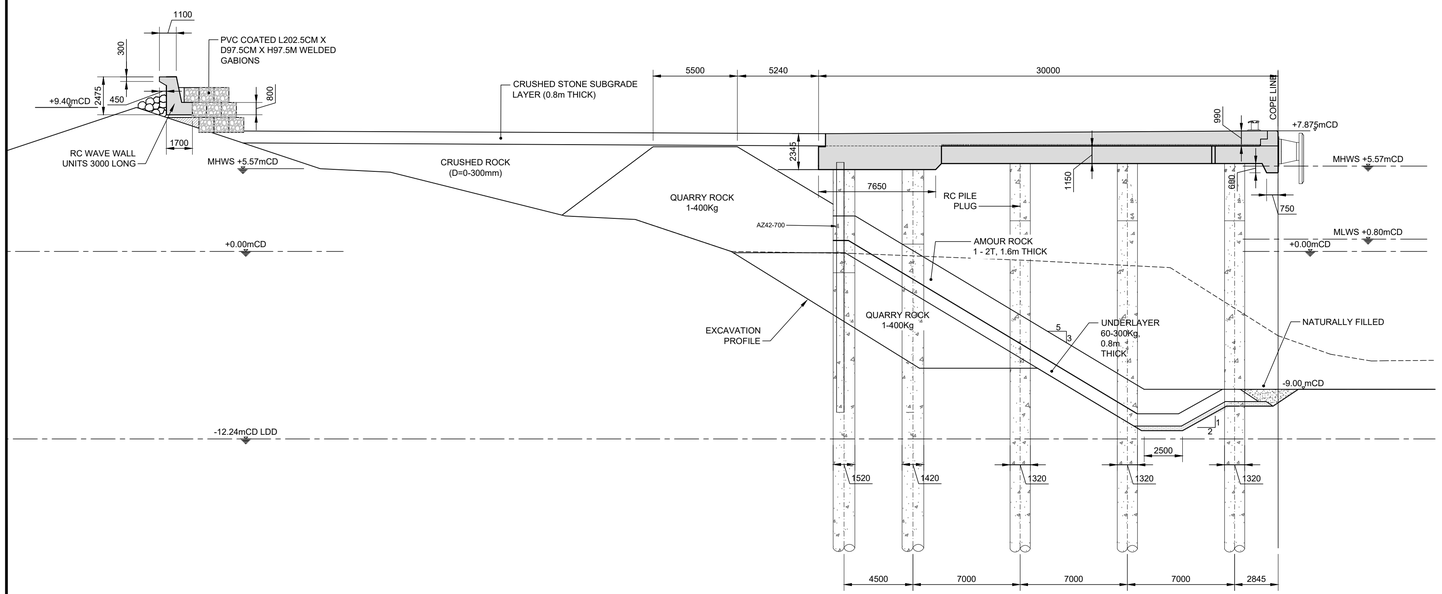

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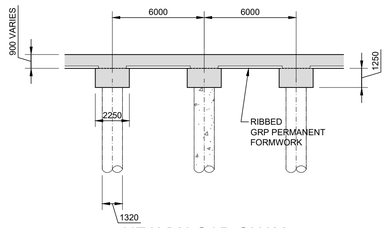

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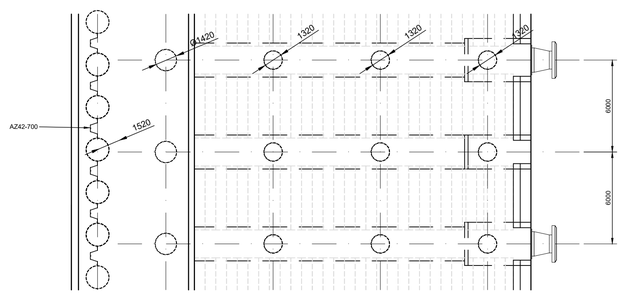

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NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE IN METRES TO CHART DATUM (mCD) UNLESS NOTED OTHERWISE.

PRELIMINARY

REV	DATE	DESCRIPTION	BY	CHK	APP

REVISIONS

CLIENT

PROJECT
LEITH BERTH

TITLE
HEAVY LOAD QUAY
CONCEPT DESIGN

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Website www.royalhaskoning.com
Royal HaskoningDHV
Enhancing Society Together

DRAWN	CHECKED	APPROVED
RA	CM	CM
DATE	SCALE	REF.
12.02.21	AS SHOWN	

DRAWING No.	SUITABILITY	REVISION
PC2045-RHD-ZZ-ZZ-DR-C-0001	S1	P0.2

2.2 Operational Phase

The primary use of the upgraded outer berth would be to support the offshore renewables industry, providing facilities for the transhipment and storage of components such as all wind turbine generator (WTGs) parts associated with a wind farm project (including the blades, towers and nacelles) as well as foundations (such as pin piles, jackets and floating foundations). The berth could also be used for other tidal energy projects, and the decommissioning of redundant oil and gas structures where vessels cannot transit the existing lock entrance.

The offshore renewable energy components would be delivered to the Port of Leith from various locations across the UK, Europe, and other international locations. Loading/unloading is expected to take up to 24 hours. The entrance to the Port of Leith would be restricted with regards to larger vessels when a vessel is moored at the outer berth, it is therefore in the interest of the port to ensure the proposed outer berth is occupied for the minimum time possible. Overall lock and berth utilisation would be controlled by the Port, the Forth and navigation, as is the case today. The number of required trips per project would be dependent on the size of the wind farm. It is intended that the new berth would provide shore power for vessels to draw electricity from.

The use of the proposed lay down area is considered similar to its current use, which is used as a laydown area, predominantly to store oil and gas pipelines prior to export. Once completed, the laydown area would be formed of a gravel surface, allowing for drainage into collector drains and, following suitable treatment, would be discharged into sea.

3 Key Environmental Considerations

The following key environmental sensitivities will require consideration as part of the proposed development planning:

- Protected sites for nature conservation:
    - Outer Firth of Forth and St Andrews Bay Complex Special Protection Area (SPA) (0km from the proposed development);
    - Firth of Forth SPA, Ramsar site and Site of Scientific Interest (0km from the proposed development);
    - Imperial Dock Lock, Leith SPA (0.8km from the proposed development);
    - Forth Islands SPA (3.6km from the proposed development).
    - Sites located at a distance that have the potential to be affected:
        - River Teith Special Area of Conservation (SAC) (potential migratory fish connectivity); and,
        - Marine mammal SACs to consider:
            - Isle of May SAC, Firth of Tay and Eden Estuary SAC and Berwickshire and North Northumberland Coast SAC (potential grey seal connectivity); and,
            - Moray Firth SAC (potential bottlenose dolphin connectivity).
- Heritage:
    - Martello Tower Scheduled Monument is located within Area 3;
    - Six Scheduled Monuments and 10 listed buildings within 1km of project; and,
    - Leith Conservation Area.
- Existing residential properties within 500m. Proposed residential properties are included within the Western Harbour Masterplan and, if built, would be within 300m of the outer berth.

Potential significant impacts are considered to arise during the construction phase only, given the operational phase is similar to existing port operations. The removal of the current pipe coating facility in Area 3 is considered to provide environmental benefits compared to the current situation, and the use of shore power at the berth would reduce air and noise emissions when a vessel is moored.

4 Key Legislation Relevant to the Proposed Development

The key legislation of relevance for the proposed development is:

- The Marine (Scotland) Act 2010, and the requirement for a Marine Licence for any works below Mean High Water Springs (MHWS).
- The Town and Country Planning (Scotland) Act 1997, and the requirement for planning permission for works above Mean Low Water.
- The Conservation (Natural Habitats, &c.) Regulations 1994, as amended by The Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations 2019, and the requirement to undertake a Habitats Regulations Appraisal (HRA).

  The requirement for a European Protected Species licence would be determined through the consenting process.
- The Wildlife and Natural Environment (Scotland) Act 2011, and the potential requirement for SSSI assent.
- Water Environment and Water Services (Scotland) Act 2003.

  It is expected that the requirement for approval under The Water Environment (Controlled Activities) (Scotland) Regulations 2003 Act is expected to be superseded by the Marine Licencing process, as normal practice.
- Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997. Given that no Listed Buildings would be directly affected by the proposed development, Listed Building Consent would not be required.

Environmental Impact Assessment (EIA) Screening Opinions will be sought from Marine Scotland and the City of Edinburgh Council, under The Marine Works (EIA) (Scotland) Regulations 2017 and The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017, respectively, to determine the requirement for EIA.

5 Request for Consultation

As part of the early consultation being undertaken on the project, we are seeking stakeholders' views on the proposed development and in particular:

- Any other key environmental constraints and opportunities;
- Potential issues (relating to the environmental impacts, or otherwise) that should be considered through the consenting process; and,
- Any information that would benefit the consenting process.

We would therefore like to invite you to a stakeholder workshop to discuss the proposed development and the items listed above.

Due to the project's programme, we would ask for your availability during the week commencing 7th June 2021, or as soon as possible thereafter. Should it not prove possible to organise the workshop relatively soon, we will revert to individual stakeholder meetings.

Appendix 6-3 Bird Survey Specification Report

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REPORT

Survey specification

Port of Leith Bird Surveys

Client: Forth Ports Ltd.

Reference: PC2045-RHD-ZZ-ZZ-RP-EV-0002

Status: Final/P01.01

Date: 23 March 2021

Royal HaskoningDHV

Enhancing Society Together

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Document title:	Survey specification
Document short title:	Leith Bird Survey Specification
Reference:	PC2045-RHD-ZZ-ZZ-RP-EV-0002
Status:	P01.01/Final
Date:	23 March 2021
Project name:	Leith Port
Project number:	PC2045
Author(s):	Ben Hughes
Drafted by:	Ben Hughes
Checked by:	Helen Riley
Date:	18/03/2021
Approved by:	Jamie Gardiner
Date:	22/03/2021

Classification
Project related

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Appendices

Appendix 1 Port of Leith Bird Surveys Recording Form

Appendix 2 Contractor Risk Assessment

1 Introduction

Royal HaskoningDHV has been commissioned by Forth Ports Ltd. (hereafter 'Forth Ports') to carry out a programme of estuarine bird and tern surveys at the Port of Leith from March 2021 to February 2022, inclusive. The Port of Leith is located on the south shore of the Firth of Forth, and serves the city of Edinburgh, Scotland (see **Figure 1**).

Forth Ports is proposing to construct a new quay at the Port of Leith (hereafter the 'proposed development'), adjacent to the East Breakwater in the outer harbour. Construction would involve the installation of a piled suspended deck around 300m long along the port-side length of the breakwater, plus dredging of a berth pocket to serve the new quay. At this stage, the assumption is that some or all of the piles will be installed by percussive means.

It is not known if the proposal has been discussed with existing users of the port or the local community, and at this stage there is no requirement to either raise expectations or concerns. There will likely be local interest when the surveyor is on site. To ensure confidentiality, the reply when questioned is that the purpose of the survey is to collate data on breeding and non-breeding estuarine birds from the Special Protection Areas (SPAs, Wild Birds Directive 2009/147/EC).

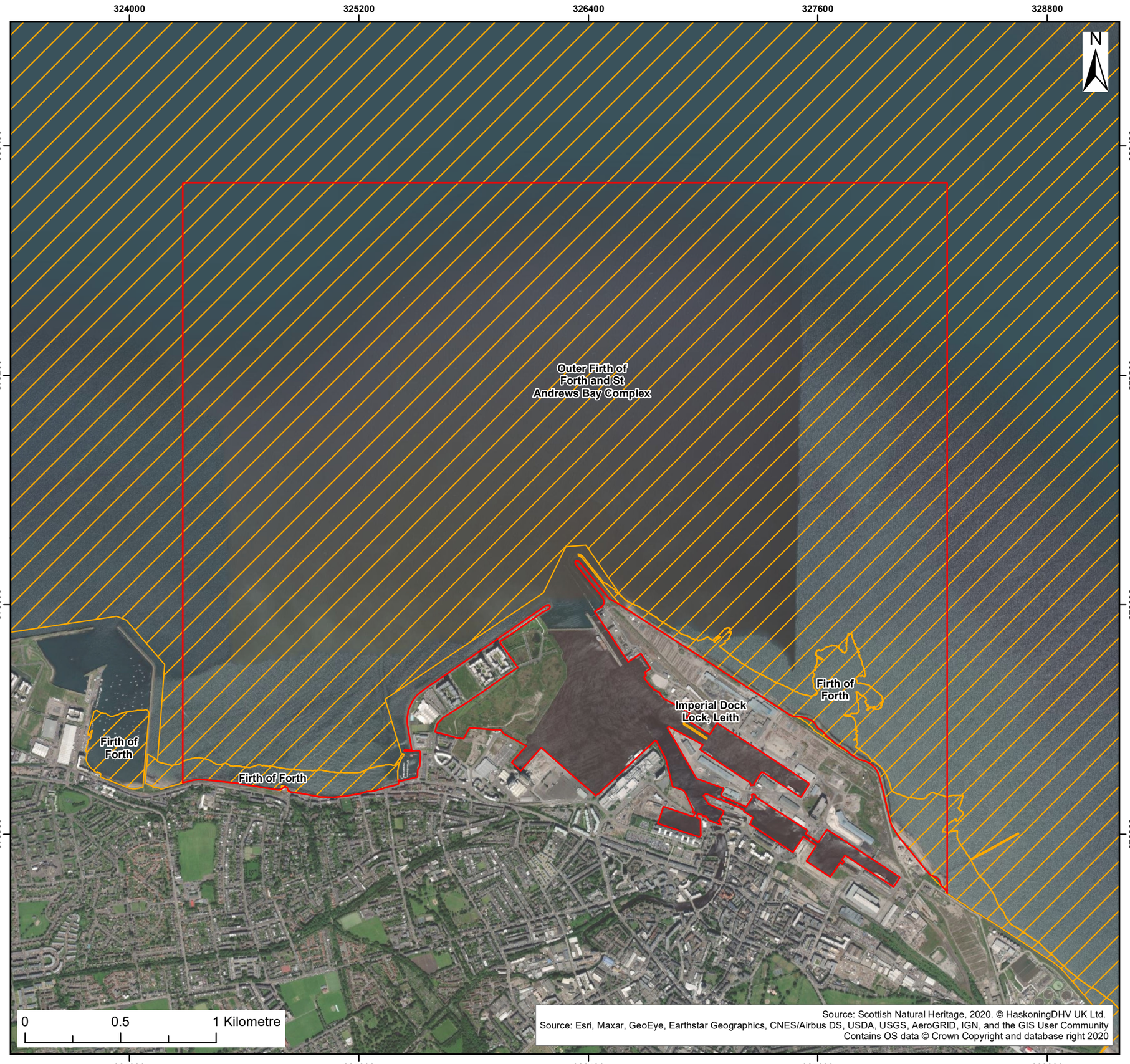
The survey fieldwork will be overseen by Tom Edwards, of 3E Services Ltd., an experienced ecologist with an ongoing relationship with Royal HaskoningDHV and Forth Ports. This document provides a specification of the study area and methodology to be employed by the surveyor. The scope of the study area and methodology is based upon professional opinion and, given time constraints for beginning the surveys, has not been agreed with NatureScot prior to the first survey (March 2021) being undertaken, as agreed with Forth Ports.

It is recommended that NatureScot is consulted on this survey scope for subsequent surveys, given that the study area overlaps with three SPAs and that a Habitats Regulations Appraisal (HRA) will be required for the proposed development in due course.

2 Study Area

Given that the most significant potential impacts to birds associated with the proposed development are anticipated to be disturbance impacts arising from airborne noise from percussive piling, the study area has been selected to fully encompass the area where disturbance effects may be expected and nearby areas where any disturbed birds might relocate to, in order to provide detail on the usage of the area by estuarine birds and terns.

Waterbirds and seabirds present in an estuarine environment, such as that in the Firth of Forth, are generally understood to be relatively unaffected by sounds below 65dB(A) to 70dB(A) (e.g. Cutts *et al.*, 2009 & 2013; Wright *et al.*, 2010), particularly when set within an area of relatively high background noise (such as within a port setting). Professional experience from similar developments elsewhere has indicated that the peak impact noise levels in air arising from percussive piling would not be expected to exceed 65dBA_{max} beyond a distance of about 1km from source (estimated 64.7dBA_{max} @ 1km from source, based on consultation with a Royal HaskoningDHV acoustic specialist).



Legend:

- Study Area
- Special Protection Areas (SPA)

Client: Port of Leith	Project: Leith Outer Berth

Title: Bird Surveys

Figure: 1 | Drawing No: PB2045-100-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	23/03/2021	JT	BH	A3	1:20,000
01	19/03/2021	JT	BH	A3	1:20,000

Co-ordinate system: British National Grid

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The study area is shown in Figure 1. In order to encompass the zone of influence from airborne noise plus the adjacent area to which disturbed birds may move, the study area comprises all shoreline, intertidal and subtidal areas extending 2km west and east of the proposed development site, between Lower Granton Road (nr. Granton Harbour) (west) (NT24261 77036) and the East Sands of Leith (east) (NT 28277 76485), plus offshore waters within *c.*2km north of the shoreline. The study area also encompasses all dockland waters within the Port, namely Western / Outer Harbour, Imperial Dock, Prince of Wales Dock, Albert Dock, Victoria Dock and Edinburgh Dock, since they lie within a 2km radius of the proposed development site. Additionally, an area of non-tidal scrubland with small pools immediately to the west of Western Harbour is included in the study area.

3 Designated sites

The study area overlaps with the Firth of Forth SPA (the intertidal part of the study area along the coastline to the east of the East Breakwater) and the Outer Firth of Forth and St Andrews Bay Complex proposed SPA (all subtidal and offshore areas beyond Mean Low Water Springs (MLWS) within the study area, not including dock areas). Also within the study area is the Imperial Dock Lock Leith SPA, a structure within the Imperial Dock lock that has historically hosted a large breeding colony of common terns. Figure 1 indicates the SPA boundaries in relation to the study area.

4 Method Statement

4.1 Estuarine bird surveys

Surveys of estuarine birds using the shoreline, intertidal areas and offshore areas within 2km of the shore will be carried out twice monthly. The survey period will run from March 2021 to February 2022, inclusive, with the first survey planned for the w/c 29th March 2021.

Surveys will comprise 'through the tide counts', thereby capturing a range of tidal states (high, low and mid-tide) over the survey period. The survey objectives are to provide estimates of the total numbers of estuarine birds using the study area during each month, and to provide information on the distribution and behaviour of estuarine birds within the study area at a range of tide states. Tidal information will be based on tide tables for the Port of Leith (available at https://www.tidetimes.org.uk/leith-tide-times).

The aim will be to complete up to two counts of the study area during each visit. The need to undertake two counts per visit will be subject to confirmation during the first survey visit, in March 2021. Each count would incorporate two consecutive phases of the tide (e.g. a rising low to mid-tide count, followed by a rising mid- to high tide count).

Survey methods will be based on the Wetland Bird Survey (WeBS) core (high tide) and low tide counts (as described in Bibby *et al.,* 2000). Estuarine birds to be recorded will include gulls, terns, divers, grebes, cormorants, herons, swans, geese, ducks, rails, waders and kingfishers. Any other notable species (e.g. birds of prey) will be recorded as incidental sightings.

During each count, birds will be viewed with the assistance of binoculars and telescopes from specific vantage points (VP) along the shoreline. Prior to the first survey visit, the surveyor will identify suitable VP locations and numbers, and will confirm their suitability during the first survey visit; however, there will be

ample VPs to allow the maximum possible coverage of the study area whilst few enough in number to complete comprehensive counts from each VP during every survey visit. At each VP, the surveyor will take a 'snapshot' scan and record the number, location and behaviour of birds within the study area visible from the VP on printed recording maps. Observations will be recorded on the recording maps using standard 2 letter BTO bird species codes, with the number of each species recorded in superscript and the related behaviour indicated in subscript text. Behaviour codes are listed in Table 1.

Table 1 Bird behaviour codes

Behaviour	Code	Notes
Loafing	L	Bird inactive but observed showing alert behaviour such as head turning
Roosting	R	Bird inactive with no sign of alert behaviour (often with eyes closed or head under wing)
Feeding/Foraging	F	Actively seen feeding on the ground or in the air
Flying	Y	Directly flying / commuting (an arrow indicates direction)
Carrying Food	O	Bird likely to be carrying food to a nest site

After completing a count at one VP the surveyor will continue to the next VP, thus covering the entire study area. When counting and moving between VPs the surveyor will attempt, as far as possible, to track and avoid double-counting birds which move from one count sector to the next.

In addition to bird data, weather (wind speed and direction, rainfall, cloud cover and visibility) and sources of potential or actual disturbance to birds (e.g. walkers with dogs, bait-diggers, boats) will be recorded during the counts using the recording form presented in Appendix 1.

4.2 Breeding Tern Counts

Initially, Royal HaskoningDHV will undertake a data search to understand the availability of breeding tern data from the common tern colony at Imperial Dock Lock Leith SPA. In the event that data from the summer 2021 breeding season would not be available from other sources (e.g. local ringing groups), breeding tern counts will be undertaken by the surveyor. The location and suitability of VP(s) for undertaking the breeding tern counts will be confirmed by the surveyor prior to the first tern count being undertaken.

Counts will be undertaken following the methodology set out for Tern *spp*. Census Method 1 ('Count of Apparently Incubating Adults') in JNCC'S Seabird Monitoring Handbook (Walsh *et al.*, 1995). During each survey visit in May and June, a full count of apparently occupied nests (AONs), based on the number of apparently incubating adults in the colony, will be undertaken. If small portions of the colony are hidden from view, the surveyor will attempt to estimate the likely number (minimum-maximum) of incubating birds involved, based on densities elsewhere in the colony.

If unattended nests or visible clutches are visible, the minimum number of these will also be recorded. If more than one VP is required, the surveyor will ensure, as far as possible, that no AONs are double counted or missed.

4.3 Surveys of common tern flight-behaviour

During the tern breeding season, surveys will be carried out at the Imperial Dock Lock colony to record the flight-behaviour of terns leaving the colony to forage. The purpose of these surveys is to provide information on the use of the area by common terns so the potential for disturbance to flight-lines from the colony to foraging areas can be assessed.

Surveys will follow the methodology described in Jennings (2012), which will allow comparison with surveys carried out previously in 2008-2010. The survey area will be divided into four survey sectors, as shown in Figure 2. Working from a suitable VP(s), for each sector in turn, a surveyor will spend 20 minutes recording the number of terns flying into the port (inbound) and out of the port towards the Firth of Forth (outbound). Heights of birds will be recorded in the categories: 0-5 m, >5-10 m, >10-20 m or >20 m, using buildings and other structures within the docks as references. Surveyors will note whether or not individual terns are carrying fish, and tidal and weather data will also be recorded.

Flight behaviour surveys will be carried out between May and July, inclusive, for periods of up to three hours at a time, and an overall period of six hours for the season, with the aim of covering the daylight period from dawn until dusk. There will be no restrictions on the weather conditions under which surveys can be carried out, providing there is sufficient visibility.

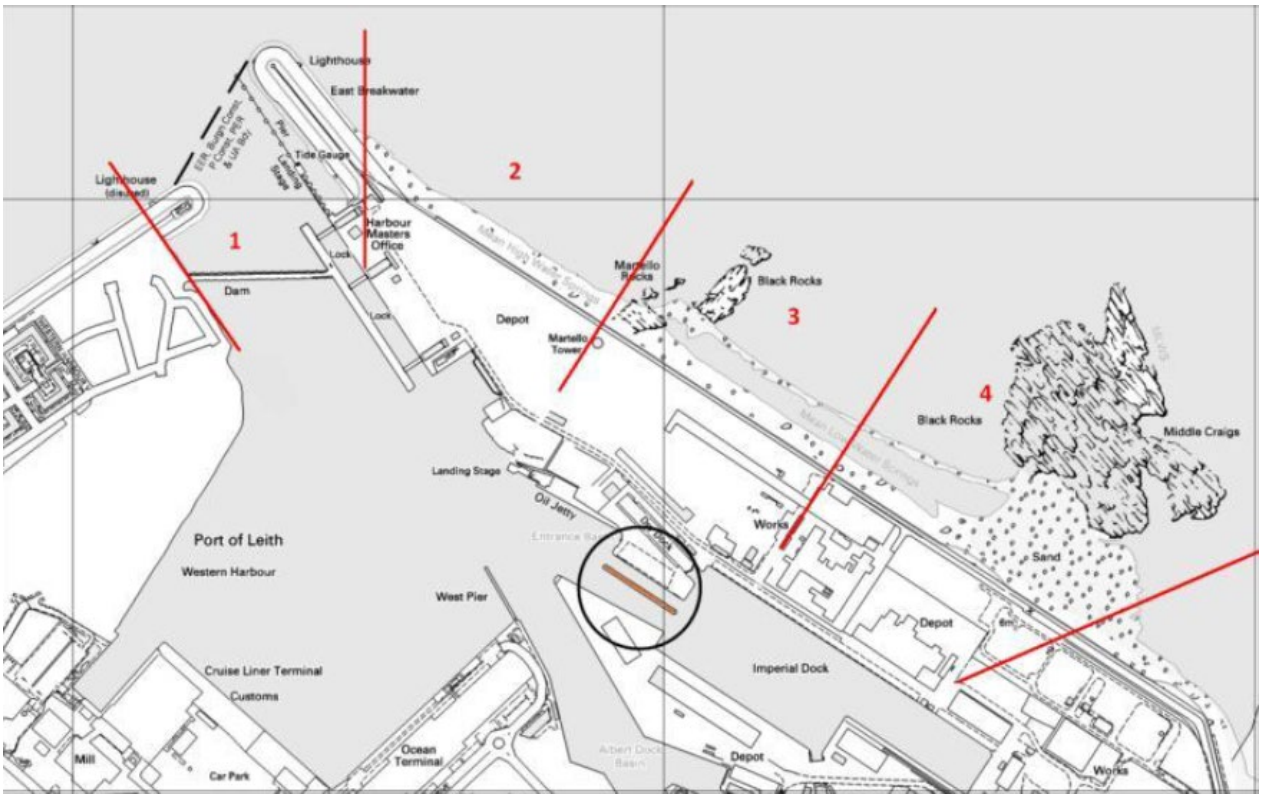

Figure 2 Port of Leith survey sectors for tern flight behaviour (taken from Jennings, 2012)

4.4 Other breeding birds

A full breeding bird survey of the study area is not proposed. The surveyor will however make notes of evidence of breeding for notable species (e.g. seabirds, waterfowl and rarer species) during survey visits within the breeding season (March until August, inclusive).

4.5 Other records

During surveys, anecdotal records of other species of interest will be made, for example marine mammals (e.g. seals and cetaceans) and terrestrial mammals (e.g. mink, otter and fox).

4.6 Outputs

Expected deliverables from each survey visit would consist of completed recording maps and data sheets for all survey visits from March 2021 to February 2022, inclusive. Scans of the completed recording maps and data sheets will be provided to Royal HaskoningDHV within one week of each respective survey visit.

A final technical report will be compiled by Royal HaskoningDHV following receipt of the final survey data in February 2022. It is proposed that the survey report will form an appendix to an ornithological assessment and HRA undertaken during the consenting process.

5 QHSE Requirements

The principle objective is for the entire survey work to be completed in a safe, efficient and timely manner. The primary HSE objectives are:

- No accidents or illness;
- No harm to the surveyor or others; and,
- No damage to the environment.

All survey works will be undertaken in a way that complies with appropriate environmental and health and safety legislation and the specific requirements of Forth Ports for the survey area. Survey works must comply with the guidance set out by the Scottish Government in relation to the Covide-19 pandemic. A copy of the survey risk assessment from the contractor for the field surveys, including management of risks related to the Covid-19 pandemic, can be seen in Appendix 2.

6 References

Bibby, C., Burgess N., Hill, D. and Mustoe, S. (2000). Bird Census Techniques. 2nd Edition. Academic Press, 302pp.

Cutts, N. Hemmingway, K. & Spencer, J. (2013). Waterbird Disturbance Mitigation Toolkit Informing Estuarine Planning and Construction Projects (Version 3.2, March 2013). University of Hull. [Online]. http://www.tide-project.eu/

Cutts, N., Phelps, A. and Burdon, D. (2009). Construction and waterfowl: defining sensitivity, response, impacts and guidance. Report to Humber INCA.

Jennings, G. (2012). The ecology of an urban colony of common terns *Sterna hirundo* in Leith Docks, Scotland. PhD thesis, University of Glasgow. [Online]: http://theses.gla.ac.uk/3910/

Walsh, P.M., Halley, D.J., Harris, M.P., del Nevo, A., Sim, I.M.W. and Tasker, M.L. (1995). Seabird Monitoring Handbook for Britain and Ireland. JNCC / RSPB / ITE / Seabird Group, Peterborough. 153pp.

Wright, M.D. Goodman, P. and Cameron, T.C. (2010). Exploring behavioural responses of shorebirds to impulsive noise. Wildfowl, 60, pp.150-167.

Royal HaskoningDHV

Appendix 1 Port of Leith Bird Surveys Recording Form

Date		**Start time** Count 1		**End time** Count 1		**Tide times** (high and low tide)		**Surveyor**	
		Count 2		Count 2					

		Count 1	**Count 2**
Weather	Wind speed (Beaufort Scale)		
	Wind direction		
	Rainfall (none, light, moderate, heavy)		
	Cloud cover (%)		
	Visibility (>10km, 5-10km, 1-5 km, 100m – 1km, <100m)		

Disturbance		**Source of disturbance**													
		Walkers	Dogs	Horse riders	Anglers	Shooters	Bait diggers	Shell-fishers	Un-powered boats	Power boats	Wind-surfers	Jet skis	Vehicles	Aircraft	Other (specify below)
Level	None														
	Moderate														
	Low														
	High														

Additional notes (e.g. notable behaviour or disturbance events, % accuracy for any species where identification is not certain)

Appendix 2 Contractor Risk Assessment

3E Services Limited – Risk Assessment for bird surveys in Leith 2021/22

Risk Assessment Matrix					
x	**5**	**4**	**3**	**2**	**1**
5	25	20	15	10	5
4	20	16	12	8	4
3	15	12	9	6	3
2	10	8	6	4	2
1	5	4	3	2	1

Likelihood	**x**	**Severity**
Very Unlikely	1	No injury
Unlikely	2	Minor injury
Possible	3	3 day + injury
Probable	4	Serious injury
Certain, Imminent	5	Fatal

Person Writing Risk Assessment
T Edwards

Date:	**Tasks:**	**Assessment No**
17 March 2021	Bird survey from vantage points on shoreline, accessed by path / public road / within Leith port area.	1
Job Name:	**Place of Work**	**Work Start Date**
Burntisland, Royal HaskoningDHV	Leith, Edinburgh	March 2021

Dynamic Risk Assessment: 3E Services Ltd operates a dynamic risk assessment system, meaning that risk assessments are updated, should the nature of risk change or a new risk become apparent. This will then be documented and briefed to all concerned with the work. All relevant information supplied by clients relating to known risks are fully considered during the risk assessment process.

Hazard	**Risk**	**L**	**S**	**R**	**Control Measures**	**L**	**S**	**R**
Coronavirus	Contracting /spreading coronavirus	3	3 - 5	9 to 15	Travel to site will be by car, travelling alone. The vehicle will have sufficient fuel for a return journey prior to leaving base, so there will be no need to refuel. Surveys will be conducted alone. All food and drink to be consumed during the surveys will be taken from home, and no shops will be visited. No equipment used for the surveys is shared with anyone else. No contact with other workers is required to carry out the survey. Members of the public are likely to be encountered on the surveys. Social distancing will be applied, to maintain at least 2m from any other person. It is highly unlikely that coronavirus could be spread from contact with outside surfaces during the survey. To minimise this risk, hands will be sanitised on re-entering the vehicle, when driving between survey locations, prior to leaving site, and before eating or drinking.	1	3 - 5	3 to 5
Lone Working	Unable to raise alarm if incident occurs	2	5	10	A buddy system will be operated with an off-site safety contact. The buddy will be contacted at survey mid-point with a text message, and when survey completed and leaving site.	1	5	5

Poor Communication	Unable to raise alarm	1	5	15	The work area has excellent mobile phone coverage.	1	5	5
Weather	Cold and wet due to bad weather	2	4	8	Wear appropriate clothing to protect against weather Weather forecast will be checked before setting out each day so bad weather can be anticipated. Continuously assess changing conditions, with agreed stop work cut-offs. In cold weather warm clothes must be worn i.e. hats, gloves, mitts, thermals, fleece/buffalo jacket, waterproof shell jacket. Will carry sufficient food and hot drinks to keep warm. Head torches to be carried at all times. Vehicle will also be available for shelter close to work area	1	4	4
	Heat exhaustion/sunburn	3	2	5	Hat and suncream will be worn on hot sunny days. Suffient cold drinks will also be taken.	3	1	3
Snow and ice (for surveys in winter months)	Slips and falls	2	3	6	Continually assess the ground avoiding ice and deep snow. Survey points are accessible from paths / tracks / roads so difficult ground is not encountered (also see under working near water)	1	3	3
Walking on uneven surfaces or rough terrain	Falling over objects on the ground and twisting ankles etc.	2	3	6	Vigilance while walking on uneven surfaces, wear boots with ankle supports.	1	3	3
Soft ground e.g. mudflats	Sinking or becoming stuck in soft ground or swampy areas	2	4	8	Continually assess ground conditions while moving through the Site. The survey does not involve accessing the foreshore, and survey points will be accessible from paths / tracks / roads so difficult ground is unlikely to be encountered.	1	4	4
Driving on site and access tracks	Injury/damage to persons/equipment from accident.	2	4	8	No off-road driving required for these surveys.	1	4	4
Accident whilst driving to/from site	Collision	2	5	10	Driving Policy will be followed and adhered to. Main points are not driving while tired, and avoiding distractions while driving.	1	5	5
Vehicle breakdowns on Site.	Becoming stranded in remote locations.	3	2	6	Ensure vehicle is in good driving condition with regular checks. Site is accessible.	2	2	4
Accident with traffic/plant while walking around site	Collision	2	5	10	Survey does not involve entering areas where plant is being operated. Follow standard practice re: walking near site traffic/plant – do not enter exclusion zone around vehicles without first confirming safe to do so with driver / plant operator. Use segregated pedestrian routes where available. Follow any briefing / induction re: risks from site traffic/ plant. Wear hi-viz if required.	1	5	5

Crossing or working near water	Risk of drowning	2	5	10	No crossings of water courses required for these surveys. Vantage points for the survey will be chosen so that they provide a safe place from which to view, away from any exposed quay edges close to deep water.	1	5	5
Working in/around watercourses	Contracting waterborne disease	2	5	10	Always wash hands with anti-bacterial soap after work in/around watercourses on site.	1	5	5
Landowners/ Members of Public	Injury or stress from violent or threatening behaviour from opposing/irate individuals / landowners.	2	3	6	Likely to be N/A (see also under Coronavirus). The method statement provides a response for questions from members of the public as to the reason for the surveys.	1	3	3
Lack of Welfare facilities	Ill health or sickness from lack of clean welfare facilities	3	3	9	Welfare facilities are available in Leith.	1	3	3
Personal Protective Equipment Requirements		Suitable safety boots with ankle support, appropriate outer clothing for weather conditions, GPS, site maps, hi-viz, hard-hat and safety glasses will be worn if required.						

Person likely to be affected by works. **delete as appropriate*			**Likelihood x Severity = RISK** Scores must be below 10 after control measures are in place, below 10 should result in the level of risk being tolerable.
Employees	Others on site	Public	
Yes	No	No	

Emergency contact details:	[Redacted] Contact point at Royal HaskoningDHV: Helen Riley 0131 460 3037; Ben Hughes 0151 433 0381
Nearest A&E Hospital: (inc. contact details)	**Edinburgh Royal Infirmary** 51 Little France Cres, Old Dalkeith Rd, Edinburgh EH16 4SA Emergency department: Open 24 hours · More hours **Phone:** 0131 536 1000

Site Access info:	Site accessed from Leith / Newhaven with vehicle parking available at roadside along public roads within / close to survey area.

Comments	*Were there any unforeseen circumstances or conditions experienced that could be mitigated in the future?*

Appendix 6-4 Confirmation of Scope of HRA

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Note

HaskoningDHV UK Holdings Ltd.
Industry & Buildings

To:	Carolyn Clark, NatureScot
From:	Ritu Paliwal
Date:	31 January 2022
Copy:	
Our reference:	PC2045-RHD-ZZ-XX-NT-Z-0001
Classification:	Project Related
Checked by:	Jamie Gardiner

Subject: **Leith Outer Berth: Proposed Approach to the Habitats Regulations Appraisal**

---

1 Introduction

1.1 Description of the Proposed Development

Forth Ports Limited is in the process on planning and consenting for the redevelopment of the Leith outer berth (the proposed development). **Figure 1** below shows a location plan of the proposed outer berth development at Leith. Graphic representation of the proposed development is presented in Appendix A.

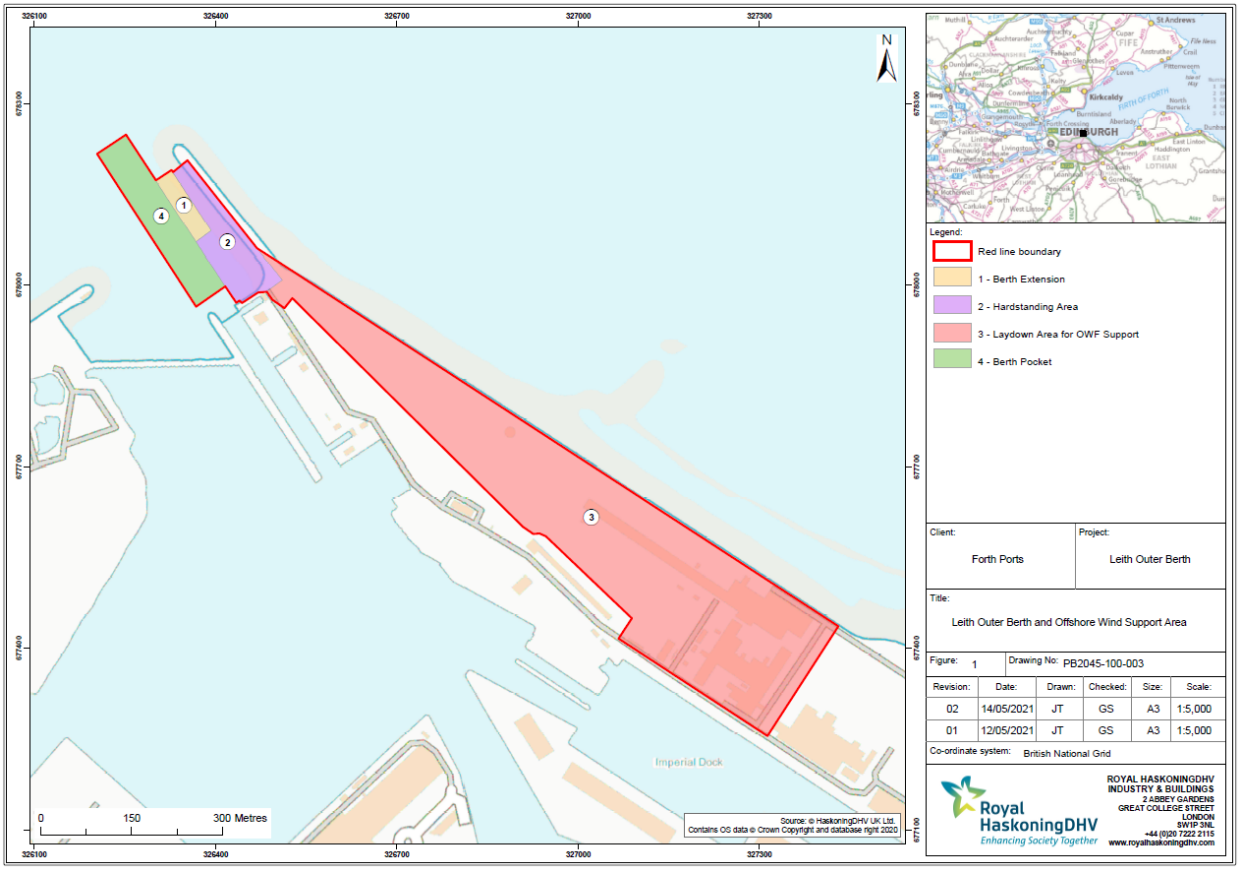

Figure 1 Location of the proposed berth development at the Port of Leith

The proposed development would provide:

- A 120m long berth extension (Area 1)
- Area of hardstanding for loading and unloading (Area 2)
- Laydown area within existing port for the storage and shipment of large cargo (e.g. wind farm blades, towers, and nacelles) (Area 3)
- Berth pocket to be dredged to -9m CD, an area of 300m by 60m (Area 4). Total dredge volume approx.100,000m^3

1.2 Summary of Potential Environmental Effects

A description of the potential environmental effects that would arise during construction and operation of the proposed development were described in the Leith Outer Berth: HRA Stage 1: Screening Report[1], a summary of which is provided below for ease of reference. The changes to the proposed development identified in Section 1.1 fall within the envelope of potential environmental effects being considered.

1.2.1 During construction

The footprint of proposed development is within the current port area which is subject to high existing levels of disturbance. The area proposed for dredging is also an active dredge area, forming part of the Port of Leith's approach channel where maintenance dredging takes place on a regular basis.

The following environmental effects could arise during the construction of the proposed development:

- Disturbance and displacement from noise and visual effects;
- Direct and indirect habitat loss;
- Water quality effects affecting foraging potential;
- Effects on prey species; and,
- Barriers to movement.

1.2.2 During operation

It is considered that there would not be any potential for significant effects during the operational phase of the proposed development, given no significant changes are proposed to the current activities at the Port of Leith. The Port of Leith already accepts vessels of a similar size to those that support the offshore renewables industry, in terms of length, height and deadweight; it is just the wider beam (width) that prevents these vessels from being able to access the lock for which redeployment of the existing berth is required.

Overall, the proposed development would have a beneficial impact to the surrounding environment, due to the proposed decommissioning of the existing Shawcor facility, which is a current source of air and noise emissions, as well as having a negative visual appearance.

The provision of cutting-edge technology, such as shore power, would reduce the need for vessels to be 'idling' at the berth with engines running, therefore reducing noise and emissions to air.

1.3 Habitats Regulations Appraisal

The Stage 1 of the HRA (Screening for Likely Significant Effect (LSE)) was carried on the proposed development and issued to Stakeholders, including NatureScot, to confirm the findings of the Stage 1 assessment.

Based on the HRA guidance specifically developed for the Firth of Forth area and previous consultation with NatureScot, a number of designated sites were considered within the Stage 1 assessment. The table below summarises the sites and features where an LSE was concluded and therefore will be the subject of the next stage of the HRA process (appropriate assessment (AA)).

Designated Site	Feature
River Teith SAC	Sea lamprey, river lamprey, and Atlantic salmon
Outer Firth of Forth and St Andrews Bay Complex SPA	Common tern, eider, and red-throated diver Waterfowl assemblage Breeding seabird assemblage Non-breeding seabird assemblage
Firth of Forth SPA and Ramsar site	Pink-footed goose, red-throated diver, redshank, sandwich tern, and turnstone Waterfowl assemblage
Imperial Dock Lock Leith SPA	Common tern
Forth Islands SPA	Common tern, lesser black-backed gull, sandwich tern, and shag breeding seabird assemblage
Isle of May SAC	Grey seal
Firth of Tay and Eden Estuary SAC	Harbour seal
Berwickshire and North Northumberland Coast SAC	Grey seal
Moray Firth SAC	Bottlenose dolphin

1.4 Purpose of this note

This note describes our proposed approach to various assessments required to inform the Habitats Regulations Appraisal (HRA) being undertaken on the proposed development.

2 Proposed Approach to Assessments

The AA will be informed by the following assessments:

- Coastal processes;
- Marine water and sediment quality;
- Benthic ecology;
- Ornithology; and,
- Marine mammals and fish.

The proposed approach to these assessments is provided below.

2.1 Coastal Processes

2.1.1 Hydrodynamic modelling

We propose to use Royal HaskoningDHV's established Firths of Forth Tay Model for this study. The model is illustrated in Figure 2. The Firths of Forth and Tay model was built in Delft3D software and has been calibrated and validated by measured tidal data. The boundary conditions of the Firths of Forth and Tay Model will be provided by Royal HaskoningDHV's established North Sea and Baltic Sea Regional Model.

The Firths of Forth and Tay model will be converted from Delft3D software to MIKE3-HD software. In this process, computation mesh will be refined for this study and bathymetry of the model will be updated with the latest available data from Admiralty Marine Data Portal and the new survey data from the client. The model will be re-calibrated and validated with latest tidal level data recorded by a A-Class tidal gauge at Leith harbour and measured tidal currents outside Leith Harbour collected by Fugro in 2013 (see Figure 3).

The calibrated hydrodynamic model will be run for the existing and one future layout for both spring and neap tides to investigate potential changes on tidal current strength and bed shear stress. So that the modelling is conservative, the period with the highest annual tidal range will be used for when the dredging may be carried out. The change in current strength and bed shear stress will be used to assess potential impact on morphology.

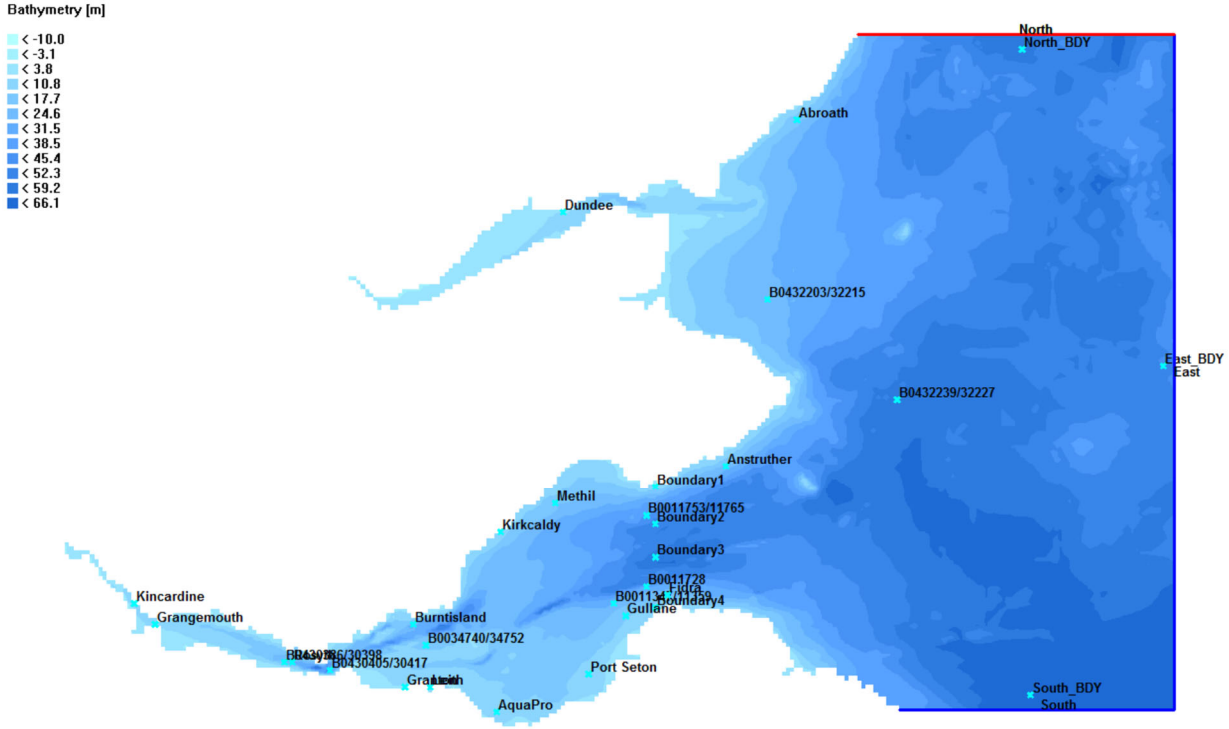

Figure 2: Extent of Firths of Forth and Tay Hydrodynamic Model

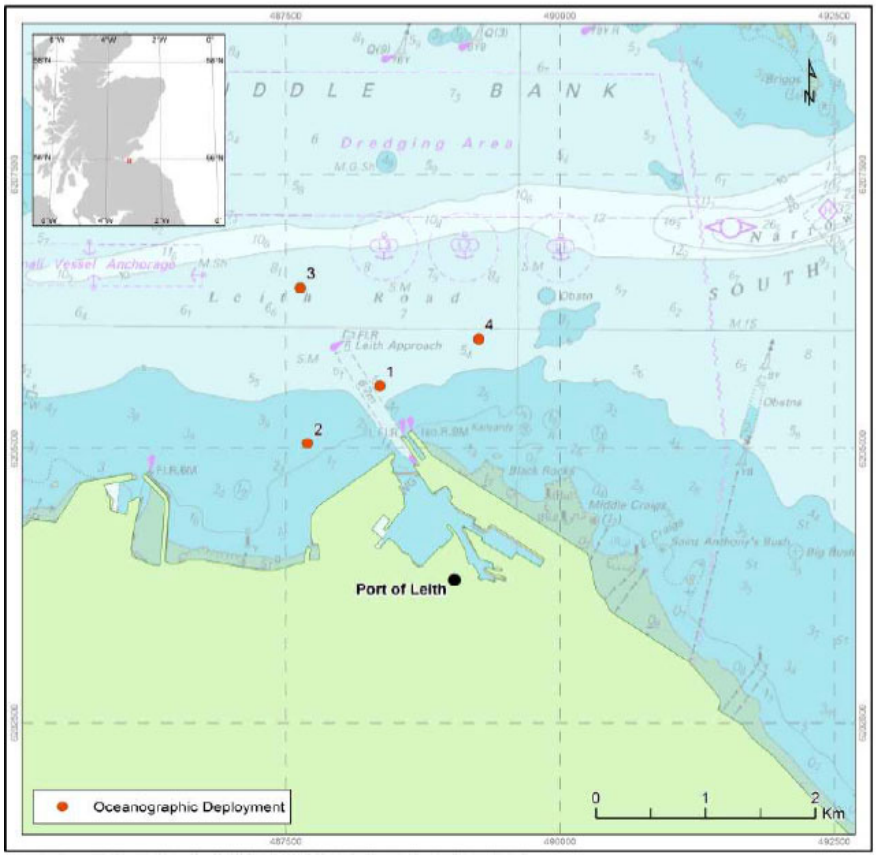

Figure 3: Location where tidal currents measurements were taken by Fugro in 2013

2.1.2 Sediment Dispersion Modelling

We will set up a 3D sediment transport model using MIKE3-MT. The model extent will be identical to the hydrodynamic model, and the two models will be dynamically coupled. The coupled models will be used to simulate the entire dredging and disposal schedule up to three months from which the maximum suspended sediment concentration and deposition depth will be quantified. Sediment data will be provided by the sediment quality survey (see Section 2.2).

For the sediment dispersion simulation, we will apply 1 in 1 year wave condition to take into account of wave agitation effect on suspended sediment. 1 in 1 year wave condition is considered as the threshold wave condition for dredging operation. 1 in 1 year wave data will be provided by running our SWAN model developed for this project.

2.1.3 Sedimentation Modelling

In order to predict the future maintenance dredging requirements following completion of the proposed development, we will set up a sediment transport model using either MIKE21-MT (for mud) or MIKE21-ST (for sand) depending on sediment size expected. The model extent will be identical to the hydrodynamic model, and the two models will be dynamically coupled. The sediment transport model will not be calibrated assuming measured suspended sediment data is not available. However, sensitivity tests will be carried out to quantify model uncertainty. The coupled models will analyse a 3-month period from which annual sedimentation rates will be quantified.

2.2 Marine and Water Sediment Quality

2.2.1 Sediment sampling and analyses

To inform the assessment on marine water and sediment quality, a sediment quality survey was carried out in October 2021. A sediment sampling plan was agreed with Marine Scotland and eight vibrocores were collected from the proposed dredge area as shown in Figure 4. Samples were taken from the top, middle and bottom of the cores and analysed for the following:

- Particle size analysis
- Metals, including Arsenic, Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc
- Polyaromatic hydrocarbons (PAHs), including total hydrocarbons
- Polychlorinated Biphenyls (PCBs)
- Organotins
- Total organic carbon

Figure 4 Sampling location for sediment samples

2.3 Benthic Ecology

A desk study will be undertaken to understand the likely habitats that could be affected by the proposed development. The assessment will be informed by the hydrodynamic (see Section 2.1.1) and sediment dispersion modelling (see Section 2.1.2) and also by the marine water and sediment quality assessment.

2.4 Ornithology

2.4.1 Bird surveys

Bird surveys commenced in March 2021 for a period of 12 months to inform the ornithology assessment. The approach to these surveys were agreed with NatureScot prior to commencement. The surveys comprises:

- Twice-monthly estuarine bird counts within the impounded dock system and nearby coastal / offshore locations between March 2021 and February 2022.
- Twice monthly tern colony counts during May to July 2021 (inclusive), denoting the number of apparently occupied nests (AON) at Imperial Dock Lock Leith Special Protection Area (SPA); and,
- Twice monthly tern flight behaviour surveys during May to July 2021 (inclusive).

In addition, any incidental presence of breeding for notable species (e.g. seabirds, waterfowl and rarer species) are being recorded during survey visits.

2.4.2 Airborne noise modelling

The primary parameter used to assess potential noise impacts on birds is the maximum instantaneous sound level (L_{AMax}). To inform the ornithological assessment, it is necessary to establish the baseline L_{AMax} sound levels which the birds at the SPA are accustomed to, and those which will occur during the construction phase of the proposed development.

The baseline sound levels will be predicted, using a 3-d computational model of the site and surroundings, created in noise modelling software (SoundPLAN). These predictions will utilise sound level measurements undertaken in 2004 of port activities, which have been agreed with Edinburgh City Council as being suitable to use. According to these measurements, the main source of L_{AMax} levels in the port operational sound emissions is ship servicing works by Dales Marine in the dry dock immediately adjacent to the SPA. Hence, measurements of the sound from this activity will be used to predict the baseline L_{Amax} sound levels at the ornithological receptors.

Impact piling is proposed for installation of the sheet and tubular piles for the proposed development, this would be the highest source of L_{AMax} sound levels during construction. Predictions will therefore be undertaken of piling L_{AMax} sound levels using the same computational model outlined above.

Baseline and piling L_{Amax} sound level contours will be provided for use in the ornithological assessment.

2.4.3 Assessment

The potential for an Adverse Effect on site Integrity (AEoI) to occur will be considered further in the AA for the proposed development. This will present detailed information and evidence on the potential effects relevant to each species and SPA. To underpin this assessment, the site specific surveys described in Section 2.4.1 will be used to confirm the numbers and distribution of birds within and close to the proposed development site. When the baseline data collection is complete, a check on the LSE screening will be carried out to confirm the conclusions of the Stage 1 assessment.

Further desk study data and information will also be collated to support the AA, including recent population trends of SPA features screened in for LSE. For the assessment of potential indirect impacts due to changes in water quality and prey availability, this will be based on assessments undertaken on coastal

processes (see Section 2.1), marine water and sediment quality (see Section 2.2), benthic ecology (see Section 2.3, and fish (see Section 2.5).

2.5 Marine Mammals and Fish

2.5.1 Underwater noise modelling

Subacoustech Ltd has been commissioned to undertake site-specific underwater noise modelling to predict underwater noise levels generated by the proposed impact pilling. Piling parameters to be used for the underwater noise modelling include:

- Maximum hammer energy and pile diameter;
- Overall piling duration;
- Number of piles that could potentially be installed within 24 hours (sequential piling); and,
- Number of piles that could potentially installed at the same time (simultaneous piling, on the assumption that more than one piling rig could be used).

Other noise sources that could occur during construction include vessel noise, dredging and placement of rock. Given the short duration of these activities and the existing level of activity at the site, it is not considered necessary to assess these underwater noise sources.

Results will be provided for receptor categories of marine mammal as per Southall *et al.* (2019), and fish as per Popper *et al.* (2014). Results will include SPLpeak, single strike and cumulative SEL metrics required by both sets of guidance, and will include results using a 'fleeing animal' model for cumulative SEL. For the assessment of fish, a 'stationary animal' model will be considered as well as a 'fleeing animal' model for cumulative SEL.

2.5.2 Assessment

A full review of relevant information will be undertaken to inform the underwater noise assessment.

Mitigation measures would be undertaken in line with the Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise[1], and will ensure that the potential impact ranges for instantaneous permanent auditory injury are mitigated for.

Due to the distance between seal haul-out sites and the proposed development, there is not expected to be any potential for direct impact to the sites.

For the potential for indirect impacts due to changes in water quality and prey availability, this will be based on assessments undertaken on coastal processes (see Section 2.1), marine water and sediment quality (see Section 2.2) and benthic ecology (see Section 2.3).

Once the baseline review for marine mammals and fish species is complete, the screening for LSE will be reviewed to ensure conclusions remain valid. If more recent baseline data becomes available, it will be used in addition to the sources referenced within the HRA screening document.

[1] https://data.jncc.gov.uk/data/31662b6a-19ed-4918-9fab-8fbcff752046/JNCC-CNCB-Piling-protocol-August2010-Web.pdf

Appendix A – Graphic representation of the proposed development

Existing view of the berth

Placement of precast beams on the piles

Finished Jetty development

Appendix 8-1 Sediment Sampling Plan

↑ Table of Contents ↑

From:
To:
Cc:
Subject: RE: Notice of Exempted Activity - Leith Site Investigation
Date: 02 August 2021 15:53:33
Attachments: image002.png

Good afternoon,

Thank you for submitting the updated Notice of Exempted Activity form in line with the updated sampling plan. MS-LOT are content with these and advise this email should be taken as approval of the sampling plan submitted on 21 July 2021 and the updated Notice of Exempted Activity submitted 30 July 2021.

MS-LOT confirm receipt of the application for EPS licence. MS-LOT advise that no geophysical surveys can be undertaken until the EPS licence has been determined.

Kind regards,

Marine Licensing Casework Officer
Marine Scotland - Marine Planning & Policy

Scottish Government | Marine Laboratory | 375 Victoria Road | Aberdeen | AB11 9DB

Website: http://www.gov.scot/Topics/marine/Licensing/marine

COVID-19: Marine Scotland - Licensing Operations Team(MS-LOT) is working from home and as a result determination of applications may take longer than our stated timelines. In addition MS-LOT is unable to respond to phone enquiries, please communicate with MS- LOT via email. Email addresses are MS.MarineRenewables@gov.scot for marine renewables correspondence or MS.MarineLicensing@gov.scot for all licensing queries.

From:
Sent: 30 July 2021 13:42
To: MS Marine Licensing <MS.MarineLicensing@gov.scot>
Cc:
Subject: RE: Notice of Exempted Activity - Leith Site Investigation

Good afternoon ,

Many thanks for your response confirming agreement with the updated sediment sampling plan.
As requested, I have attached an updated Notice of Exempted Activity to cover the eight vibrocores.

I have also attached an email provided to yourselves earlier this week, with further detail on the geophysical survey and required EPS licence application form and assessment.

If there is anything else you would need please let me know.

We would be grateful for as fast a response as is possible on this due to the timing of the survey.

Best regards,

From: MS.MarineLicensing@gov.scot <MS.MarineLicensing@gov.scot>
Sent: 30 July 2021 12:52
To:
Subject: RE: Notice of Exempted Activity - Leith Site Investigation

Hi,

Thank you for your updated sampling plan and notice of exempted activity.

I can confirm that the location of the samples appears reasonable and is spread across the proposed dredge area evenly. Regarding the Notice of Exempted Activity, the number of vibrocore samples must be increased from 7 to 8, in line with the sampling plan. MS-LOT would also like to better understand the geophysical surveys you intend to undertake as part of this sampling plan, as an EPS licence may need to be in place before sampling can occur.

Kind regards,

Marine Scotland - Marine Planning & Policy

Scottish Government | Marine Laboratory | 375 Victoria Road | Aberdeen | AB11 9DB

General Queries: +44 (0)300 244 5046
Email: ms.marinelicensing@gov.scot
Website: http://www.gov.scot/Topics/marine/Licensing/marine

From:
Sent: 21 July 2021 17:09
To: MS Marine Licensing <MS.MarineLicensing@gov.scot>
Cc:
Subject: RE: Notice of Exempted Activity - Leith Site Investigation

Good afternoon,

Please see attached for an updated sediment sampling plan, and notice of exemption, in line with your below comments.

I have also attached a further email from NatureScot with regard to a geophysical survey in relation to these works.
We are in the process of completing an EPS Licence for this, and we will provide to you shortly.

Best,

From: MS.MarineLicensing@gov.scot <MS.MarineLicensing@gov.scot>
Sent: 14 July 2021 14:16
To: MS.MarineLicensing@gov.scot **Cc:**

Subject: RE: Notice of Exempted Activity - Leith Site Investigation

Hi ,

Thanks for your email.

On review of your sampling plan, Marine Scotland Licencing Team would request you add an additional vibrocore in the south east corner of the area around point 3.

On your sampling plan and notice of exempted activity, can you please enter the sample co-ordinates as Degree Decimal minutes.

For NatureScots response, did you reply to their question regarding geophysical surveying equipment and Ultra-short baseline acoustic positioning? I would be grateful if this could be addressed.

Many thanks

Marine Licensing Casework Officer
Marine Scotland - Marine Planning & Policy

Scottish Government | Marine Scotland | 375 Victoria Road | Aberdeen | AB11 9DB
Website: http://www.gov.scot/marinescotland

COVID-19: Marine Scotland - Licensing Operations Team(MS-LOT) is working from home and as a result determination of applications may take longer than our stated timelines. In addition MS-LOT is unable to respond to phone enquiries, please communicate with MS- LOT via email. Email addresses are MS.MarineRenewables@gov.scot for marine renewables correspondence or MS.MarineLicensing@gov.scot for all licensing queries.

Frequently Asked Questions

From:
Sent: 13 July 2021 16:59
To: MS Marine Licensing <MS.MarineLicensing@gov.scot>
Cc:
Subject: Notice of Exempted Activity - Leith Site Investigation

Good afternoon,

Please see attached for a Notice of Intention to Carry out an Exempted Activity, for Site Investigation works at the Port of Leith.
Further information can be found within the attached Sediment Sampling Plan, including a location plan with coordinates for the works.

Also attached are the required confirmations from NatureScot, the Maritime and Coastguard Agency,

the Harbour Authority (Forth Ports Ltd) and the Northern Lighthouse Board.

Could you please confirm acceptance of both the Sediment Sampling Plan, and the exempted activity notification.
As stated within the attached note, the works are due to commence at the end of July – we would therefore be grateful if you could please respond as soon as possible.

Best,

Note

HaskoningDHV UK Ltd.
Industry & Buildings

To:	Marine Scotland - Licensing Operations Team
From:	Gemma Starmore
Date:	20 July 2021
Copy:	Forth Ports Ltd
Our reference:	PC2045-RHD-ZZ-XX-NT-Z-0002
Classification:	Project related
Checked by:	Jamie Gardiner

Subject: **Sediment sampling plan: Leith Outer Berth**

This note has been issued to Marine Scotland to confirm the sediment sampling requirements for the proposed dredge and disposal activities associated with Forth Ports' proposed outer berth development at the Port of Leith.

1 Requirement for Dredging

Forth Ports Ltd is in the process of planning and consenting an extension to the outer berth at the Port of Leith, to provide a facility to support the offshore renewables industry. This outer berth will provide berthing for vessels transporting large components associated with the offshore renewables industry that cannot currently transit the locks. In order to accommodate these vessels at the berth, a berth pocket is required to be dredged.

Currently, the navigational channel to the Port of Leith is dredged to a depth of c. -6.7m CD. The proposed berth pocket, which is predominantly located within this maintenance dredge channel, would be required to be dredged to between -9.25 and -10.25m CD (including a 250mm over dredge allowance). The dredge area would be approximately 300m by 60m wide, which, including side slopes, would have a total dredge volume of approximately 100,000m^3.

2 Dredging and Sampling Locations

Following the Marine Scotland '*Pre-disposal Sampling Guidance*'[1], due to the volume of dredging (of up to 100,000m^3), a total of seven sediment sample locations are required within the dredge area, and on request from Marine Scotland, and additional eighth sample location has been added (sample locations are shown on **Figure 1**). The locations of the sediment samples are shown on **Figure 1**. The coordinates for the dredge area are shown in the below table (**Table 1**; coordinate format = WGS84), and the coordinates for the seven sampling locations are in **Table 2** below (coordinate format = WGS84).

Table 1 Coordinates for dredge area

Point ID for dredge area	Lat	Long
1	55° 59.4745	-3° 11.0891
2	55° 59.5022	-3° 11.0158
3	55° 59.3656	-3° 10.8232
4	55° 59.3291	-3° 10.9140

[1] https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2020/02/marine-licensing-applications-and-guidance/documents/guidance/pre-disposal-sampling-guidance/pre-disposal-sampling-guidance/govscot%3Adocument/Pre-disposal%2Bsampling%2Bguidance.pdf

Id	Lat	Long
1	55° 59.4745	-3° 11.0891
2	55° 59.5022	-3° 11.0158
3	55° 59.3656	-3° 10.8232
4	55° 59.3291	-3° 10.9140

Legend:

- Area of dredge

Sampling Locations

- Marine borehole
- Vibrocore

Client:	Project:
Port of Leith	Leith Outer Berth

Title: Ground investigation site location plan

Figure: 1 | Drawing No: PC2045-RHD-ZZ-ZZ-DR-EV-0003

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
05	20/07/2021	JT	GS	A3	1:4,000
04	05/07/2021	JT	GS	A3	1:4,000

Co-ordinate system: British National Grid

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Enhancing Society Together

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Table 2 Coordinates for seven sediment sample locations

Point ID for sediment sample	Lat	Long
VC01	55° 59.4787	-3° 11.0101
VC02	55° 59.4517	-3° 11.0398
VC03	55° 59.4387	-3° 10.9891
VC04	55° 59.4111	-3° 10.9859
VC05	55° 59.4100	-3° 10.9233
VC06	55° 59.3818	-3° 10.9163
VC07	55° 59.3523	-3° 10.9108
VC08	55° 59.3698	-3° 10.8468

Due to the depth of the dredge (of up to 4m below the maintenance dredge level), and in accordance with Marine Scotland's guidance, undisturbed sub-samples will be taken at the surface layer (0-15cm), then at every 50cm thereafter, until the dredge depth is reached for each sample location. All sub-samples will be retained, and sub-samples from the surface, middle, and bottom of the core will be sent for sediment analysis. Undisturbed samples will be collected using a vibro-core (or similar equipment).

The sampling will be undertaken between August and September 2021, as part of the wider marine site investigation.

3 Sampling Analysis

The sediment samples will be sent for analysis following Marine Scotland's guidance, including testing for:

- Particle size analysis
- Metals, including
  - Arsenic
  - Cadmium
  - Chromium
  - Copper
  - Mercury
  - Nickel
  - Lead
  - Zinc
- Polyaromatic hydrocarbons (PAHs), including
  - Acenaphthene
  - Acenaphthylene
  - Anthracene
  - Fluorene
  - Naphthalene
  - Phenanthrene
  - Benzo[a]anthracene
  - Benzo[b]fluoranthene
  - Benzo[k]fluoranthene
  - Benzo[a]pyrene
  - Benzo[g,h,i]perylene
  - Dibenzo[a,h]anthracene

- Chrysene
- Fluoranthene
- Pyrene
- Indeno(1,2,3cd)pyrene
- Total hydrocarbons

- Polychlorinated Biphenyls (PCBs)
- Organotins

In addition, total organic carbon will be included in the analysis.

3.1 Lab to Undertake Analysis

The samples will be sent to a lab that meets the requirements as set out within the Marine Scotland guidelines, including;

- having ISO 17025 accreditation for marine sediment analysis
- meeting the LOD and sensitivity requirements set out in the CSEMP green book
- taking part in intercomparison exercises (e.g. QUASIMEME)

Appendix 10-1 Subacoustech Environmental Report No. P303R0102: Underwater Noise Propagation Modelling

↑ Table of Contents ↑

Submitted to:

Gemma Starmore
HaskoningDHV UK

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Submitted by:

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Underwater noise propagation modelling for construction works at Port of Leith, Scotland

Fergus Midforth, Richard Barham

11 March 2022

Subacoustech Environmental Report No. P303R0102

Document No.	*Date*	*Written*	*Approved*	*Distribution*
P303R0101	*04/03/2022*	*F Midforth*	*T Mason*	*G Starmore (Haskoning)*
P303R0102	*11/03/2022*	*F Midforth*	*T Mason*	*G Starmore (Haskoning)*

This report is a controlled document. The report documentation page lists the version number, record of changes, referencing information, abstract and other documentation details.

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Glossary

Term	Definition
Decibel (dB)	A customary scale commonly used (in various ways) for reporting levels of sound. A difference of 10 dB corresponds to a factor of 10 in sound power. The actual sound measurement is compared to a fixed reference level and the "decibel" value is defined to be $10\log_{10}(actual/reference)$ where $(actual/reference)$ is a power ratio. Because sound power is usually proportional to sound pressure squared, the decibel value for sound pressure is $20\log_{10}(actual\ pressure/reference\ pressure)$. The standard reference for underwater sound is 1 micropascal (µPa). The dB symbol is followed by a second symbol identifying the specific reference value (e.g., re 1 µPa).
Peak pressure	The highest pressure above or below ambient that is associated with a sound wave.
Peak-to-peak pressure	The sum of the highest positive and negative pressures that are associated with a sound wave.
Permanent Threshold Shift (PTS)	A permanent total or partial loss of hearing caused by acoustic trauma. PTS results in irreversible damage to the sensory hair cells of the air, and thus a permanent reduction of hearing acuity
Sound Exposure Level (SEL) Cumulative (SEL_{cum})	The constant sound level acting for one second, which has the same amount of acoustic energy, as indicated by the square of the sound pressure, as the original sound. It is the time-integrated, sound-pressure-squared level. SEL is typically used to compare transient sound events having different time durations, pressure levels, and temporal characteristics. Noise exposure within an extended duration can be captured in a cumulative SEL.
Sound Pressure Level (SPL)	The sound pressure level is an expression of sound pressure using the decibel (dB) scale; the standard frequency pressures of which are 1 µPa for water and 20 µPa for air.
Temporary Threshold Shift (TTS)	Temporary reduction of hearing acuity because of exposure to sound over time. Exposure to high levels of sound over relatively short time periods could cause the same amount of TTS as exposure to lower levels of sound over longer time periods. The mechanisms underlying TTS are not well understood, but there may be some temporary damage to the sensory cells. The duration of TTS varies depending on the nature of the stimulus.
Unweighted sound level	Sound levels which are "raw" or have not been adjusted in any way, for example to account for the hearing ability of a species.
Weighted sound level	A sound level which has been adjusted with respect to a "weighting envelope" in the frequency domain, typically to make an unweighted level relevant to a particular species. Examples of this are the dB(A), where the overall sound level has been adjusted to account for the hearing ability of humans in air, or the filters used by Southall *et al*. (2019) for marine mammals.

1 Introduction

Subacoustech has undertaken underwater noise modelling and analysis to assess the potential impact of underwater noise from the proposed construction of a new berth at the Port of Leith, Scotland, on marine mammals and fish. Construction may involve the installation of tubular and sheet piles by impact and vibration piling, in addition to dredging works. These sources will create noise, which must be suitably assessed.

1.1 Survey area

The modelling location used for this study in the Port of Leith is shown in Figure 1-1. This is understood to be approximately the location of the outermost dolphin that may be constructed for the berth, and represents the worst case scenario location for underwater noise modelling. This is discussed further in section 3.1.

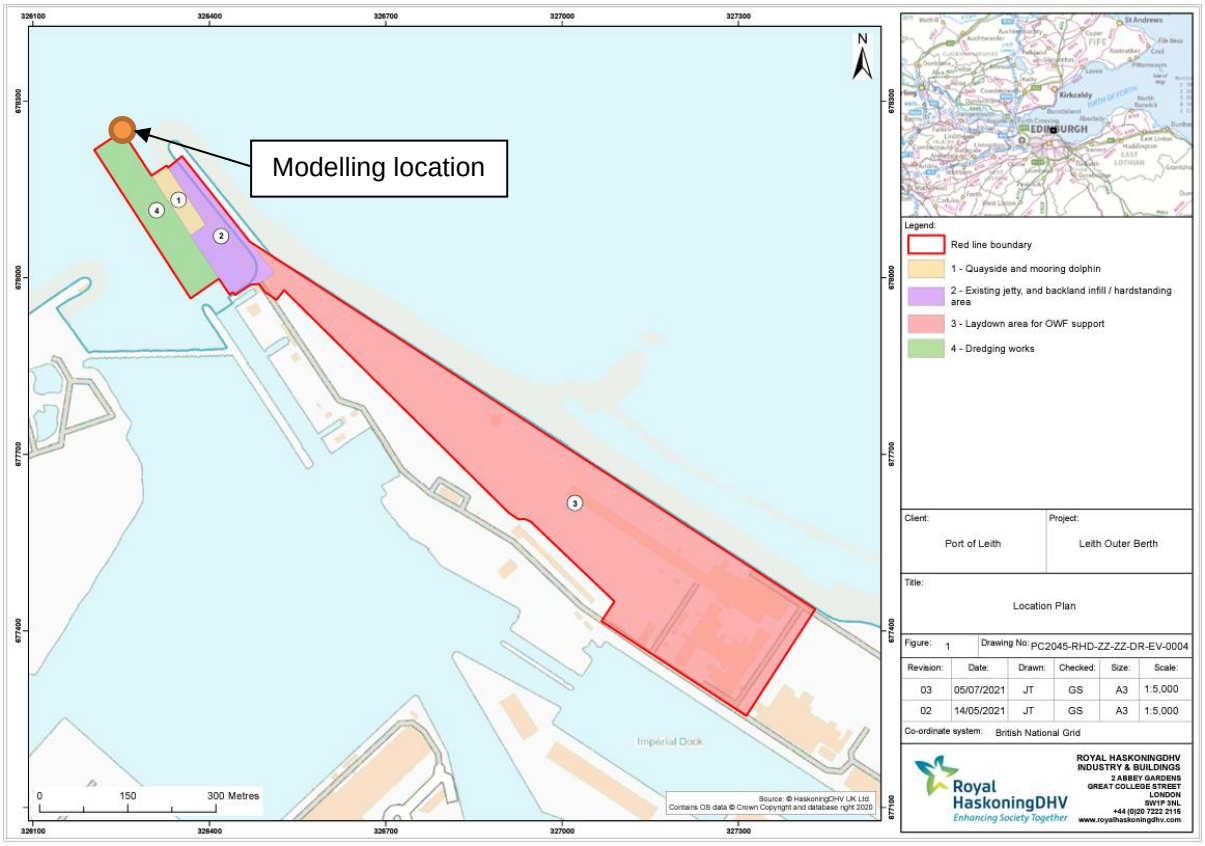

Figure 1-1 Location of proposed construction works at the Port of Leith and the location used for detailed underwater sound propagation modelling

1.2 Assessment overview

In this report impact piling has been assessed using detailed underwater noise modelling. All other construction methods have been assessed using simple modelling methods due to the relatively low noise level produced by these activities for this project.

A detailed assessment of the potential underwater noise from works in the Port of Leith is presented, and covers the following:

- Review of background information on the units for measuring and assessing underwater noise (section 2.1);

- The underwater noise metrics and criteria used to assess the possible environmental effect in marine receptors (section 2.2);
- Discussion of the approach, input parameters and assumptions for the noise modelling undertaken (section 3);
- Presentation of the modelling and interpretation of the results using suitable noise metrics and criteria (section 4); and
- Summary and conclusions (section 5).

2 Measurement of underwater noise

2.1 Underwater noise

Sound travels much faster in water (approximately 1,500 m/s) than in air (340 m/s). Since water is a relatively incompressible, dense medium, the pressure associated with underwater sound tends to be much higher than in air. As an example, background noise levels in the sea of 130 dB re 1 µPa SPL_{RMS} for UK coastal waters are not uncommon (Nedwell *et al*. 2003; Nedwell *et al.* 2007).

It should be noted that stated underwater noise levels should not be confused with noise levels in air, which use a different scale.

2.1.1 Units of measurement

Sound measurements underwater are usually expressed using the decibel (dB) scale, which is a logarithmic measure of sound. A logarithmic scale is used because, rather than equal increments of sound having an equal increase in effect, typically each doubling of sound level will cause a roughly equal increase of "loudness."

Any quantity expressed in this scale is termed a "level." If the unit is sound pressure, expressed on the dB scale, it will be termed a "sound pressure level."

The fundamental definition of the dB scale is given by:

$$Level = 10 \times \log_{10}\left(\frac{Q}{Q_{ref}}\right)$$

where Q is the quantity being expressed on the scale, and Q_{ref} is the reference quantity.

The dB scale represents a ratio. It is therefore used with a reference unit, which expresses the base from which the ratio is expressed. The reference quantity is conventionally smaller than the smallest value to be expressed on the scale so that any level quoted is positive. For example, a reference quantity of 20 µPa is used for sound in air since that is the lower threshold of human hearing.

When used with sound pressure, the pressure value is squared. So that variations in the units agree, the sound pressure must be specified as units of Root Mean Square (RMS) pressure squared. This is equivalent to expressing the sound as:

$$Sound\ pressure\ level = 20 \times \log_{10}\left(\frac{P_{RMS}}{P_{ref}}\right)$$

For underwater sound, a unit of 1 µPa is typically used as the reference unit (P_{ref}); a Pascal is equal to the pressure exerted by one Newton over one square metre, one micropascal equals one millionth of this.

Unless otherwise defined, all noise levels in this report are referenced to 1 µPa.

2.1.2 Sound Pressure Level (SPL)

The Sound Pressure Level (SPL) is normally used to characterise noise and vibration of a continuous nature, such as drilling, boring, continuous wave sonar, or background sea and river noise levels. To calculate the SPL, the variation in sound pressure is measured over a specific period to determine the RMS level of the time-varying sound. The SPL can therefore be considered a measure of the average unweighted level of sound over the measurement period.

Where SPL is used to characterise transient pressure waves, such as that from impact piling, seismic airgun or underwater blasting, it is critical that the period over which the RMS level is calculated is quoted. For instance, in the case of a pile strike lasting a tenth of a second, the mean taken over a tenth

of a second will be ten times higher than the mean averaged over one second. Often, transient sounds such as these are quantified using “peak” SPLs or Sound Exposure Levels (SELs).

Unless otherwise defined, all SPL noise levels in this report are referenced to 1 µPa. It is recognised that ISO 18405 (2017) defines SPL in reference to the unit 1 µPa^2. As the key publications used in this assessment use the unit 1 µPa, this terminology will also be used in this report. This does not affect any results or values.

2.1.3 Peak Sound Pressure Level (SPL_{peak})

Peak SPLs are often used to characterise transient sound from impulsive sources, such as percussive impact piling. SPL_{peak} is calculated using the maximum variation of the pressure from positive to zero within the wave. This represents the maximum change in positive pressure (differential pressure from positive to zero) as the transient pressure wave propagates.

A further variation of this is the peak-to-peak SPL ($SPL_{peak\text{-}to\text{-}peak}$) where the maximum variation of the pressure from positive to negative is considered. Where the wave is symmetrically distributed in positive and negative pressure, the peak-to-peak pressure will be twice the peak level, or 6 dB higher (see section 2.1.1).

2.1.4 Sound Exposure Level (SEL)

When considering the noise from transient sources, the issue of the duration of the pressure wave is often addressed by measuring the total acoustic energy (energy flux density) of the wave. This form of analysis was used by Bebb and Wright (1953, 1954a, 1954b, 1955), and later by Rawlins (1987), to explain the apparent discrepancies in the biological effect of short and long-range blast waves on human divers. More recently, this form of analysis has been used to develop criteria for assessing injury ranges for fish and marine mammals from various noise sources (Popper *et al*., 2014; Southall *et al*., 2019).

The SEL sums the acoustic energy over a measurement period, and effectively takes account of both the SPL of the sound and the duration it is present in the acoustic environment. Sound Exposure (SE) is defined by the equation:

$$SE = \int_0^T p^2(t)dt$$

where p is the acoustic pressure in Pascals, T is the total duration of the sound in seconds, and t is the time in seconds. The SE is a measurement of acoustic energy and has units of Pascal squared seconds (Pa^{2}s).

To express the SE on a logarithmic scale by means of a dB, it must be compared with a reference acoustic energy level (${p^2}_{ref}$) and a reference time (T_{ref}). The SEL is then defined by:

$$SEL = 10 \times \log_{10}\left(\frac{\int_0^T p^2(t)dt}{{p^2}_{ref}T_{ref}}\right)$$

By selecting a common reference pressure (p_{ref}) of 1 µPa for assessments of underwater noise, the SEL and SPL can be compared using the expression:

$$SEL = SPL + 10 \times \log_{10} T$$

where the SPL is a measure of the average level of broadband noise and the SEL sums the cumulative broadband noise energy.

This means that, for continuous sounds of less than one second, the SEL will be lower than the SPL. For periods greater than one second, the SEL will be numerically greater than the SPL (i.e., for a

continuous sound of 10 seconds duration, the SEL will be 10 dB higher than the SPL; for a sound of 100 seconds duration the SEL will be 20 dB higher than the SPL, and so on).

Where a single impulse noise such as the soundwave from a pile strike is considered in isolation, this can be represented by a “single strike" SEL or SEL_{ss}.

2.2 Analysis of environmental effects

2.2.1 Background

Over the last 20 years it has become increasingly evident that noise from human activities in and around underwater environments can have an impact on the marine species in the area. The extent to which intense underwater sound might cause adverse impacts in species is dependent upon the incident sound level, source frequency, duration of exposure, and/or repetition rate of an impulsive sound (see, for example, Hastings and Popper, 2005). As a result, scientific interest in the hearing abilities of aquatic species has increased. Studies are primarily based on evidence from high level sources of underwater noise such as blasting or impact piling, as these sources are likely to have the greatest immediate environmental impact and therefore the clearest observable effects, although interest in chronic noise exposure is increasing.

The impacts of underwater sound on marine species can be broadly summarised as follows:

- Physical traumatic injury and fatality;
- Auditory injury (either permanent or temporary); and
- Disturbance.

The following sections discuss the underwater noise criteria used in this study with respect to species of marine mammals and fish that may be present around the Port of Leith.

The main metrics and criteria that have been used in this study to aid assessment of environmental effects come from three key papers covering underwater noise and its effects:

- Southall *et al*. (2019) marine mammal noise exposure criteria; and
- Popper *et al*. (2014) sound exposure guidelines for fishes and sea turtles.

At the time of writing these include the most up to date and authoritative criteria for assessing environmental effects for use in impact assessments.

2.2.2 Marine mammals

2.2.2.1 Southall et al. (2019) criteria

The Southall *et al*. (2019) paper is effectively an update of the previous Southall *et al.* (2007) paper and provides identical thresholds to those from the National Marine Fisheries Service (NMFS) (2018) guidance for marine mammals.

The Southall *et al*. (2019) guidance groups marine mammals into groups of similar species and applies filters to the unweighted noise to approximate the hearing sensitivities of the receptor in question. The hearing groups given in Southall *et al*. (2019) are summarised in Table 2-1 and Figure 2-1. Further groups for sirenians and other marine carnivores in water are also given, but these have not been used for this study as those species are not commonly found in the Irish Sea.

Table 2-1 Marine mammal hearing groups (from Southall et al., 2019)

Hearing group	Generalised hearing range	Example species
Low-frequency cetaceans (LF)	7 Hz to 35 kHz	Baleen whales
High-frequency cetaceans (HF)	150 Hz to 160 kHz	Dolphins, toothed whales, beaked whales, bottlenose whales (including bottlenose dolphin)
Very high-frequency cetaceans (VHF)	275 Hz to 160 kHz	True porpoises (including harbour porpoise)
Phocid carnivores in water (PCW)	50 Hz to 86 kHz	True seals (including harbour seal)

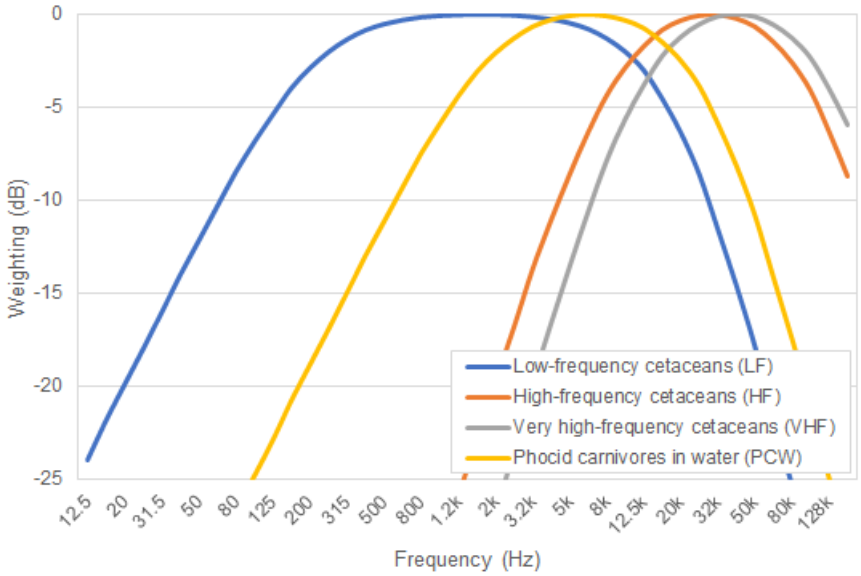

Figure 2-1 Auditory weighting functions for low-frequency cetaceans (LF), high-frequency cetaceans (HF), very high-frequency cetaceans (VHF), and phocid carnivores in water (PCW) (from Southall et al., 2019)

Southall *et al*. (2019) also gives individual criteria based on whether the noise source is considered impulsive or non-impulsive. Southall *et al*. (2019) categorises impulsive noises as having high peak sound pressure, short duration, fast rise-time and broad frequency content at source, and non-impulsive sources as steady-state noise. Explosives, impact piling and seismic airguns are considered impulsive noise sources and sonars, vibropiling, drilling and other low-level continuous noises are considered non-impulsive. A non-impulsive noise does not necessarily have to have a long duration.

Southall *et al*. (2019) presents single strike, unweighted peak criteria (SPL_{peak}) and cumulative weighted sound exposure criteria (SEL_{cum}, i.e., can include the accumulated exposure of multiple pulses) for both permanent threshold shift (PTS), where unrecoverable (but incremental) hearing damage may occur, and temporary threshold shift (TTS), where a temporary reduction in hearing sensitivity may occur in individual receptors. These dual criteria (SPL_{peak} and SEL_{cum}) are only used for impulsive noise: the criteria set giving the greatest calculated range is used as the PTS impact range.

As sound pulses propagate through the environment and dissipate, they also lose their most injurious characteristics (e.g., rapid pulse rise time and high peak sound pressure) and become more like a “non-pulse” at greater distances; Southall *et al*. (2019) briefly discusses this. Active research is currently underway into the identification of the distance at which the pulse can be considered effectively non-impulsive, and Hastie *et al*. (2019) have analysed a series of impulsive data to investigate it. Although

the situation is complex, the paper reported that most of the signals crossed their threshold for rapid rise time and high peak sound pressure characteristics associated with impulsive noise at around 3.5 km from the source. However, research by Martin *et al*. (2020) casts doubt on these findings, showing that noise in this category should be considered impulsive as long as it is above effective quiet, or a noise sufficiently low enough that it does not contribute significantly to any auditory impairment or injury. Non-impulsive criteria from Southall *et al.* (2019) have been included in this study for the clearly continuous-type noise sources.

Although the use of impact ranges derived using the impulsive criteria are recommended for all but the clearly non-impulsive sources (such as drilling), it should be recognised that where calculated ranges are beyond 3.5 km they would be expected to become increasingly less impulsive and harmful, and the impact range is therefore likely to be somewhere between the modelled impulsive and non-impulsive impact range. Where the impulsive impact range is significantly greater than 3.5 km, the non-impulsive range should be considered.Table 2-2 and Table 2-3 present the criteria from Southall *et al*. (2019) for the onset of PTS and TTS risk for each of the key marine mammal hearing groups, considering both impulsive and non-impulsive sources.

Table 2-2 Single strike SPL_{peak} criteria for PTS and TTS in marine mammals (Southall et al., 2019)

Southall *et al*. (2019)	**Unweighted SPL_{peak} (dB re 1 µPa)**	
	Impulsive	
	PTS	**TTS**
Low-frequency cetaceans (LF)	219	213
High-frequency cetaceans (HF)	230	224
Very high-frequency cetaceans (VHF)	202	196
Phocid carnivores in water (PCW)	218	212

Table 2-3 Impulsive and non-impulsive SEL_{cum} criteria for PTS and TTS in marine mammals (Southall et al., 2019)

Southall *et al*. (2019)	**Weighted SEL_{cum} (dB re 1 μPa^2s)**			
	Impulsive		**Non-impulsive**	
	PTS	**TTS**	**PTS**	**TTS**
Low-frequency cetaceans (LF)	183	168	199	179
High-frequency cetaceans (HF)	185	170	198	178
Very high-frequency cetaceans (VHF)	155	140	173	153
Phocid carnivores in water (PCW)	185	170	201	181

Where SEL_{cum} are required, a fleeing animal model has been used for marine mammals. This assumes that a receptor, when exposed to high noise levels, will swim away from the noise source. For this, the following flee speeds have been used for each marine mammal group:

- 2.1 ms^{-1} for low-frequency cetaceans (LF) (SNH, 2016);
- 1.52 ms^{-1} for high-frequency cetaceans (HF) (Bailey and Thompson, 2006);
- 1.4 ms^{-1} for very high-frequency cetaceans (VHF) (SNH, 2016); and

- 1.8 ms^{-1} for phocid carnivores in water (PCW) (SNH, 2016).

These are considered worst case assumptions as marine mammals are expected to be able to swim much faster under stress conditions.

2.2.3 Fish

2.2.3.1 Popper et al. (2014) criteria

The large number of, and variation in, fish species leads to a greater challenge in production of a general noise criterion, or range of criteria, for the assessment of noise impacts. Whereas previous studies applied broad criteria based on limited studies of fish that are not present in UK waters (e.g., McCauley *et al*., 2000) or measurement data not intended to be used as criteria (Hawkins *et al*., 2014), the publication of Popper *et al*. (2014) provides an authoritative summary of the latest research and guidelines for fish exposure to sound and uses categories for fish that are representative of the species present in UK waters.

The Popper *et al*. (2014) study groups species of fish by whether they possess a swim bladder, and whether it is involved in its hearing; a group for fish eggs and larvae is also included. The guidance also gives specific criteria (as both unweighted SPL_{peak} and unweighted SEL_{cum} values) for a variety of noise sources.

For this study, criteria for impact piling and continuous noise sources have been considered; these are summarised in Table 2-4 to Table 2-5.

Table 2-4 Criteria for mortality and potential mortal injury, recoverable injury and TTS in species of fish from impact piling noise (Popper et al., 2014)

Type of animal	Mortality and potential mortal injury	Impairment	
		Recoverable injury	TTS
Fish: no swim bladder	> 219 dB SEL_{cum} > 213 dB peak	> 216 dB SEL_{cum} > 213 dB peak	>> 186 dB SEL_{cum}
Fish: swim bladder is not involved in hearing	210 dB SEL_{cum} > 207 dB peak	203 dB SEL_{cum} > 207 dB peak	> 186 dB SEL_{cum}
Fish: swim bladder involved in hearing	207 dB SEL_{cum} > 207 dB peak	203 dB SEL_{cum} > 207 dB peak	186 dB SEL_{cum}
Sea turtles	> 210 dB SEL_{cum} > 207 dB peak	See Table 2-6	See Table 2-6
Eggs and larvae	> 210 dB SEL_{cum} > 207 dB peak	See Table 2-6	See Table 2-6

Table 2-5 Criteria for recoverable injury and TTS in species of fish from continuous noise sources (including dredging and vibropiling) (Popper et al., 2014)

Type of animal	Impairment	
	Recoverable injury	TTS
Fish: swim bladder involved in hearing	170 dB RMS for 48 hrs	158 dB RMS for 12 hrs

Where insufficient data are available, Popper *et al*. (2014) also gives qualitative criteria that summarise the effect of the noise as having either a high, moderate or low effect on an individual in either the near-field (tens of metres), intermediate-field (hundreds of metres), or far-field (thousands of metres). These qualitative effects are reproduced in Table 2-6 to Table 2-7.

Table 2-6 Summary of the qualitative effects on species of fish from impact piling noise (Popper et al., 2014) (N = Near-field; I = Intermediate-field; F = Far-field)

Type of animal	Impairment			Behaviour
	Recoverable injury	TTS	Masking	
Fish: no swim bladder	See Table 2-4	See Table 2-4	(N) Moderate (I) Low (F) Low	(N) High (I) Moderate (F) Low
Fish: swim bladder is not involved in hearing	See Table 2-4	See Table 2-4	(N) Moderate (I) Low (F) Low	(N) High (I) Moderate (F) Low
Fish: swim bladder involved in hearing	See Table 2-4	See Table 2-4	(N) High (I) High (F) Moderate	(N) High (I) High (F) Moderate
Sea turtles	(N) High (I) Low (F) Low	(N) High (I) Low (F) Low	(N) High (I) Moderate (F) Low	(N) High (I) Moderate (F) Low
Eggs and larvae	(N) Moderate (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) Moderate (I) Low (F) Low

Table 2-7 Summary of the qualitative effects on fish from continuous noise (including dredging and vibropiling) from Popper et al. (2014) (N = Near-field; I = Intermediate-field; F = Far-field)

Type of animal	Mortality and potential mortal injury	Impairment			Behaviour
		Recoverable injury	TTS	Masking	
Fish: no swim bladder	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) High (I) High (F) Moderate	(N) Moderate (I) Moderate (F) Low
Fish: swim bladder is not involved in hearing	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) High (I) High (F) Moderate	(N) Moderate (I) Moderate (F) Low
Fish: swim bladder involved in hearing	(N) Low (I) Low (F) Low	See Table 2-5	See Table 2-5	(N) High (I) High (F) High	(N) High (I) Moderate (F) Low
Sea turtles	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) High (I) High (F) Moderate	(N) High (I) Moderate (F) Low
Eggs and larvae	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) High (I) Moderate (F) Low	(N) Moderate (I) Moderate (F) Low

Both fleeing animal and stationary animal models have been used to cover the SEL_{cum} criteria for fish. It is recognised that there is limited evidence for fish fleeing from high level noise sources in the wild, and it would reasonably be expected that the reaction would differ between species. Most species are likely to move away from a sound that is loud enough to cause harm (Dahl *et al*., 2015; Popper *et al*., 2014), some may seek protection in the sediment and others may dive deeper in the water column. For those species that flee, the speed chosen for this study of 1.5 m/s is relatively slow in relation to data from Hirata (1999) and thus is considered somewhat conservative.

Although it is feasible that some species will not flee, those that are likely to remain are thought more likely to be benthic species or species without a swim bladder; these are the least sensitive species. For example, from Popper *et al*. (2014): "There is evidence (e.g., Goertner *et al*., 1994; Stephenson *et al*., 2010; Halvorsen *et al*., 2012) that little or no damage occurs to fish without a swim bladder except at very short ranges from an in-water explosive event. Goertner (1978) showed that the range from an explosive event over which damage may occur to a non-swim bladder fish is in the order of 100 times less than that for swim bladder fish."

Stationary animal modelling has been included in this study, based on research from Hawkins *et al*. (2014) and other modelling for similar EIA projects. However, basing the modelling on a stationary (zero flee speed) receptor is likely to greatly overestimate the potential risk to fish species, assuming that an individual would remain in the high noise level region of the water column, especially when considering the precautionary nature of the parameters already built into the cumulative exposure calculations.

2.2.3.2 Particle motion

The criteria defined in the above section all define the noise impacts on fishes in terms of sound pressure or sound pressure-associated functions (i.e., SEL). It has been identified by researchers (e.g., Popper and Hawkins (2019), Nedelec *et al*. (2016), Radford *et al.* (2012)) that some species of fish, as well as invertebrates, actually detect particle motion rather than pressure. Particle motion describes the back-and-forth movement of a tiny theoretical 'element' of water, substrate or other media as a sound wave passes, rather than the pressure caused by the action of the force created by this movement. Particle motion is usually defined in reference to the velocity of the particle (often a peak particle velocity, PPV), but sometimes the related acceleration or displacement of the particle is used. Note that species in the "Fish: swim bladder involved in hearing" category, the most sensitive species, are sensitive to sound pressure.

Popper and Hawkins (2018) state that in derivation of the sound pressure-based criteria in Popper *et al.* (2014) it may be the unmeasured particle motion detected by the fish, to which the fish were responding: there is a relationship between particle motion and sound pressure in a medium. This relationship is very difficult to define where the sound field is complex, such as close to the noise source or where there are multiple reflections of the sound wave in shallow water. Even these terms "shallow" and "close" do not have simple definitions.

The primary reason for the continuing use of sound pressure as the criteria, despite particle motion appearing to be the physical measure to which the fish react or sense, is a lack of data (Popper and Hawkins, 2018) both in respect of predictions of the particle motion level as a consequence of a noise source such as piling, and a lack of knowledge of the sensitivity of a fish, or a wider category of fish, to a particle motion value. There continue to be calls for additional research on the levels of and effects with respect to levels of particle motion. Until sufficient data are available to enable revised thresholds based on the particle motion metric, Popper *et al.* (2014) continues to be the best source of criteria in respect to fish impacts (Andersson *et al.,* 2016, Popper and Hawkins*,* 2019).

3 Modelling methodology

To estimate the underwater noise levels likely to arise during the construction works at Port of Leith, predictive noise modelling has been undertaken. The methods described in this section, and used within this report, meet the requirements set by the National Physical Laboratory (NPL) Good Practice Guide 133 for underwater noise measurement (Robinson *et al*., 2014).

Of the those considered, the noise source most important to consider is impact piling due to the noise level and duration it will be present (Bailey *et al*., 2014). As such, the noise related to impact piling activities is the primary focus of this study. As such, a simple modelling approach has been used for noise sources other than piling that may be present during construction works at Port of Leith.

3.1 The INSPIRE model

The modelling of impact piling has been undertaken using the INSPIRE underwater noise model. The INSPIRE model (currently version 5.1) is a semi-empirical underwater noise propagation model based around a combination of numerical modelling, based around a combined geometric and energy flow/hysteresis loss method, and actual measured data. It is designed to calculate the propagation of noise in shallow, mixed water, typical of the conditions around the UK and very well suited to the region around the Port of Leith. The model has been tuned for accuracy using over 80 datasets of underwater noise propagation from monitoring around offshore piling activities.

The model provides estimates of unweighted SPL_{peak}, SEL_{ss}, and SEL_{cum} noise levels, as well as various other weighted noise metrics. Calculations are made along 180 equally spaced radial transects (one every two degrees). For each modelling run a criterion level can be specified allowing a contour to drawn, within which a given effect may occur. These results can then be plotted over digital bathymetry data so that impact ranges can be clearly visualised, as necessary. INSPIRE also produces these contours as GIS shapefiles.

INSPIRE considers a wide array of input parameters, including variations in bathymetry and source frequency to ensure accurate results are produced specific to the location and nature of the piling operation. It should also be noted that the results should be considered conservative as maximum design parameters and worst-case assumptions have been selected for:

- Piling hammer blow energies;
- Soft start, ramp up profile, and strike rate;
- Total duration of piling; and
- Receptor swim speeds.

3.1.1 Modelling parameters

The location selected for modelling is at the northmost extent of the site. This location, summarised in Table 3-1 and illustrated in Figure 1-1, was selected as it has the fewest physical obstructions to noise propagation allowing for the most conservative impact ranges to be calculated.

Table 3-1 Summary of underwater noise location at Port of Leith

Latitude	Longitude	Water depth (mean tide)
55.99154°N	003.18389°W	6.1 m

The impact piling scenario considered in this report considers pile dimension, total piling time duration, and hammer energies used in construction. For this assessment a 1220 mm pile is to be installed using

an IHC S-280 hammer with maximum energy 280 kJ. 5,400 pile strikes occur over 2 hours with three piles installed per day. This scenario is further described in Table 3-2.

Table 3-2 Summary of impact piling scenario, including soft start, for calculating SEL_{cum} using IHC S-280 hammer. Modelling assumes 3 piles installed per day

Hammer energy percentage	20%	40%	60%	80%	100%
Strike energy	56 kJ	112 kJ	168 kJ	224 kJ	280 kJ
Number of strikes	225	225	225	225	4,500
Duration	5	5	5	5	100
Strike rate	45	45	45	45	45

Although these values are indicative for the proposed piling rather than guaranteed, they are expected to represent the worst case that could occur for the activity in terms of the duration of piling, and number of strikes used, especially at maximum energy.

Noise modelling requires knowledge of the source level, which is the theoretical noise level at one metre from the noise source. The INSPIRE model assumes that the noise source – the hammer striking the pile – acts as an effective single point, as it will appear at a distance. The source level is estimated based on the pile diameter and the blow energy imparted on the pile by the hammer. This is adjusted depending on the water depth at the modelling location to allow for the length of pile in contact with the water, which can affect the amount of noise that is transmitted from the pile into its surroundings. It is worth noting that the 'source level' technically does not exist in the context of many shallow water noise sources (Heaney *et al*., 2020). In practice, in underwater noise modelling such as this, it is effectively an 'apparent source level' and simply a value that can be used to produce correct noise levels at range (for a specific model), as required in impact assessments.

The unweighted, single strike SPL_{peak} and SEL_{ss} source levels estimated for this study are provided in Table 3-3. These figures are presented in accordance with typical requests by regulatory authorities, although as indicated above they are not necessarily compatible or comparable with any other model or predicted source levels.

Table 3-3 Summary of maximum unweighted source levels used for modelling

Modelling scenario	SPL_{peak} source level	SEL_{ss} source level
1220 mm diameter pile 280 kJ max hammer energy	226.2 dB re 1 µPa @ 1 m	201.9 dB re 1 μPa^2s @ 1 m

With the inclusion of measured noise propagation data for similar offshore piling operations in UK waters, the INSPIRE model intrinsically accounts for various environmental conditions. This includes the differences that can occur with the temperature and salinity of the water, as well as the sediment type surrounding the site. Data from the British Geological Survey show that the seabed surrounding in and around Port of Leith is generally made up of gravel, mud, and sand.

Digital bathymetry, from the European Marine Observation and Data Network (EMODnet), has been used for this modelling. Mean tidal depth has been used throughout.

3.2 Simple modelling

Although impact piling is expected to be the primary noise source during offshore construction and development (Bailey *et al*., 2014), several other anthropogenic noise sources may be present. Each of these has been considered, and relevant biological noise criteria presented, in this section.

Table 3-4 provides a summary of the various noise producing sources, aside from impact piling, that are expected to be present during the construction works at Port of Leith.

Table 3-4 Summary of the possible noise making activities at Port of Leith other than impact piling

Activity	Description
Dredging	Dredging may be required to remove material and prepare the site for piling operations. Excavators have been specified to carry out dredging operations in the construction methodology, however for this assessment suction dredging has been assumed as a worst-case noise source.
Vibropiling	Vibropiling has been identified as a construction technique for installing sheet piles at the site.

The NPL Good Practice Guide 133 for underwater noise measurements (Robinson *et al*., 2014) indicates that under certain circumstances, a simple modelling approach may be considered acceptable. Such an approach has been used for these noise sources, which are variously either quiet compared to impact piling, or where detailed modelling would imply unjustified accuracy. The high-level overview of modelling that has been presented here is considered sufficient and there would be little benefit in using a more detailed model at this stage. The limitations of this approach are noted, including the lack of frequency or bathymetric dependence.

3.2.1 Modelling parameters

For the purposes of identifying the greatest noise levels, approximate subsea noise levels have been predicted using a simple modelling approach based on measurement data from Subacoustech Environmental's own underwater noise measurement database, scaled to relevant parameters for the site and to the specific noise sources to be used. The calculation of underwater noise transmission loss for the non-impulsive sources is based on an empirical analysis of the noise measurements taken along transects around these sources by Subacoustech Environmental. The predictions use the following principle fitted to the measured data, where R is the range from the source, N is the transmission loss, and α is the absorption loss.

$$Recieved\ level = Source\ level\ (SL) - N \log_{10} R - \alpha R$$

Predicted source levels and propagation calculations for the construction activities are presented in Table 3-5 along with a summary of the number of datasets used in each case.

Table 3-5 Summary of the estimated unweighted source levels and transmission losses for the different construction noise sources considered

Source	Estimated unweighted source level	Approximate transmission loss	Comments
Suction dredging	186 dB re 1 µPa @ 1 m (RMS)	$19 \log_{10} R - 0.0009R$	Based on five datasets from suction and cutter suction dredgers.
Vibropiling	193 dB re 1 µPa @ 1 m (RMS)	$18 \log_{10} R$ (no absorption term)	Based on three datasets of vibropiling activities in rivers and harbours.

For SEL_{cum} calculations, the duration the noise is present also needs to be considered, with all sources operating for a worst-case 12 hours in any given 24-hour period.

To account for the weightings required for modelling using the Southall *et al*. (2019) criteria (Section 2.2.2.1), reductions in source level have been applied to the various noise sources. Figure 3-1 shows the representative noise measurements used, which have been adjusted for the source levels given in

Table 3-5. Table 3-6 presents details of the reductions in source levels for each of the weightings used for modelling.

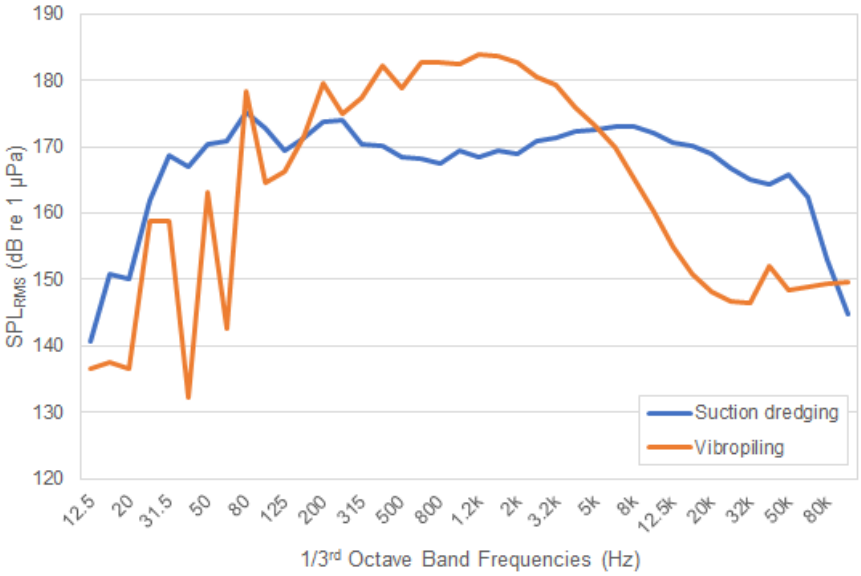

Figure 3-1 Summary of the 1/3rd octave frequency bands used as a basis for the Southall et al. (2019) weightings used in the simple modelling

Table 3-6 Reductions in source level for the different construction noise sources considered when the Southall et al. (2019) weightings are applied

Source	Reduction in source level from the unweighted level (Southall *et al*. 2019)			
	LF	HF	VHF	PCW
Suction Dredging	2.5 dB	7.9 dB	9.6 dB	4.2 dB
Vibropiling	2.4 dB	16 dB	20.8 dB	4.4 dB

4 Modelling results

As discussed in Section 3, two modelling methodologies have been utilised to predict the potential noise and subsequent impacts from the construction works at the Port of Leith. The results from this modelling are presented in the following sections.

For the results presented throughout this section, any predicted ranges smaller than 50 m and areas less than 0.01 km^2 for single strike criteria, and ranges smaller than 100 m and areas less than 0.1 km^2 for cumulative criteria, have not been presented. At ranges this close to the noise source, the modelling processes are unable to model to a sufficient level of accuracy due to acoustic effects near the pile. Ranges are given as “less than” this limit.

4.1 Impact piling (detailed modelling)

Table 4-1 to Table 4-4 present the modelling results in terms of the Southall *et al*. (2019) marine mammal criteria and the Popper *et al*. (2014) fish criteria, covering the parameters described in Section 3.1.1. All SEL_{cum} ranges assume the animal flee speeds in Section 2.2.2.1.

All marine mammal PTS ranges are predicted to be smaller than 100 m. The largest predicted TTS impact ranges are for VHF cetaceans, with maximum predicted impact ranges of up to 780 m.

For fish, the largest recoverable injury ranges (203 dB SEL_{cum} threshold) are predicted out to a maximum of 190 m when considering a stationary animal, which reduces to less than 100 m for fleeing animal calculations. Maximum TTS impact ranges (186 dB SEL_{cum} threshold) are predicted out to 1.2 km for stationary animals, and these ranges also reduce to less than 100 m when considering fleeing animals.

Table 4-1 Summary of the modelled impact ranges using the impulsive Southall et al. (2019) unweighted SPL_{peak} criteria for marine mammals

Southall *et al*. (2019) Unweighted SPL_{peak}		**Area**	**Max range**	**Min range**	**Mean range**
PTS	219 dB (LF)	< 0.01 km^2	< 50 m	< 50 m	< 50 m
	230 dB (HF)	< 0.01 km^2	< 50 m	< 50 m	< 50 m
	202 dB (VHF)	< 0.01 km^2	< 50 m	< 50 m	< 50 m
	218 dB (PCW)	< 0.01 km^2	< 50 m	< 50 m	< 50 m
TTS	213 dB (LF)	< 0.01 km^2	< 50 m	< 50 m	< 50 m
	224 dB (HF)	< 0.01 km^2	< 50 m	< 50 m	< 50 m
	196 dB (VHF)	0.01 km^2	60 m	50 m	50 m
	212 dB (PCW)	< 0.01 km^2	< 50 m	< 50 m	< 50 m

Table 4-2 Summary of the modelled impact ranges using the impulsive Southall et al. (2019) weighted SEL_{cum} criteria for marine mammals assuming a fleeing animal model

Southall *et al*. (2019) Weighted SEL_{cum}		**Area**	**Max range**	**Min range**	**Mean range**
PTS	183 dB (LF)	< 0.1 km^2	< 100 m	< 100 m	< 100 m
	185 dB (HF)	< 0.1 km^2	< 100 m	< 100 m	< 100 m
	155 dB (VHF)	< 0.1 km^2	< 100 m	< 100 m	< 100 m
	185 dB (PCW)	< 0.1 km^2	< 100 m	< 100 m	< 100 m
TTS	168 dB (LF)	< 0.1 km^2	200 m	100 m	130 m
	170 dB (HF)	< 0.1 km^2	<100 m	<100 m	<100 m
	140 dB (VHF)	0.5 km^2	780 m	130 m	340 m
	170 dB (PCW)	< 0.1 km^2	< 100 m	< 100 m	< 100 m

Table 4-3 Summary of the modelled impact ranges using the Popper et al. (2019) unweighted SPL_{peak} impact piling criteria for fish

Popper *et al*. (2014) Unweighted SPL_{peak}	**Area**	**Max range**	**Min range**	**Mean range**
213 dB	< 0.01 km²	< 50 m	< 50 m	< 50 m
207 dB	< 0.01 km²	< 50 m	< 50 m	< 50 m

Table 4-4 Summary of the modelled impact ranges using the Popper et al. (2014) unweighted SEL_{cum} impact piling criteria for fish assuming both fleeing and stationary animal models

Popper *et al*. (2014) Unweighted SEL_{cum}		**Area**	**Max range**	**Min range**	**Mean range**
Fleeing (1.5 ms^{-1})	219 dB	< 0.1 km²	< 100 m	< 100 m	< 100 m
	216 dB	< 0.1 km²	< 100 m	< 100 m	< 100 m
	210 dB	< 0.1 km²	< 100 m	< 100 m	< 100 m
	207 dB	< 0.1 km²	< 100 m	< 100 m	< 100 m
	203 dB	< 0.1 km²	< 100 m	< 100 m	< 100 m
	186 dB	< 0.1 km²	< 100 m	< 100 m	< 100 m
Stationary	219 dB	< 0.1 km²	< 100 m	< 100 m	< 100 m
	216 dB	< 0.1 km²	< 100 m	< 100 m	< 100 m
	210 dB	< 0.1 km²	< 100 m	< 100 m	< 100 m
	207 dB	< 0.1 km²	120 m	100 m	110 m
	203 dB	0.1 km²	190 m	160 m	180 m
	186 dB	1.9 km²	1200 m	260 m	710 m

The relatively low impact ranges seen here are due to the low piling energy and shallow depths at the piling location.

4.2 Other noise sources (simple modelling)

The predicted impact ranges from dredging and vibropiling noise have been assessed using a simple modelling approach, as discussed in Section 3.2. Table 4-5 and Table 4-6 summarise the predicted impact range for these noise sources. All the sources in this section are considered non-impulsive or continuous.

Given the modelled impact ranges, marine mammals would have to be closer than 100 m from the continuous noise source at the start of the activity to acquire the necessary exposure to induce PTS as per Southall *et al*. (2019). The exposure calculation assumes the same receptor swim speed as the impact piling modelling.

For fish, there is a low to negligible risk of any injury or TTS with reference to the SPL_{RMS} guidance for continuous noise sources in Popper *et al*. (2014).

All sources presented here are much quieter than those presented for impact piling in Section 4.1.

Table 4-5 Summary of the impact ranges for the different construction noise sources using the non-impulsive criteria from Southall et al. (2019) for marine mammals

Southall *et al*. (2019) Weighted SEL_{cum}		**Suction dredging**	**Vibropiling**
PTS	199 dB (LF)	< 100 m	< 100 m
	198 dB (HF)	< 100 m	< 100 m
	173 dB (VHF)	< 100 m	< 100 m
	201 dB (PCW)	< 100 m	< 100 m
TTS	179 dB (LF)	< 100 m	< 100 m
	178 dB (HF)	< 100 m	< 100 m
	153 dB (VHF)	250 m	220 m
	181 dB (PCW)	< 100 m	< 100 m

Table 4-6 Summary of the impact ranges for fish from Popper et al. (2014) for shipping and continuous noise, covering the different construction noise sources

Popper *et al*. (2014) Unweighted SPL_{RMS}	**Suction dredging**	**Vibropiling**
Recoverable injury 170 dB (48 hours)	< 50 m	< 50 m
TTS 158 dB (12 hours)	< 50 m	90 m

Note the exposure times required by the criteria for fish exposure to continuous noise.

5 Summary and conclusions

Subacoustech Environmental have undertaken a study on behalf of HaskoningDHV UK to assess the potential underwater noise and its effects during construction works at Port of Leith, Scotland.

The level of underwater noise from impact piling has been estimated using the semi-empirical underwater noise model INSPIRE. The modelling considers a wide variety of input parameters including bathymetry, hammer blow energy, strike rate, and receptor fleeing speed.

A single, representative modelling location was selected as it has the least physical obstructions to noise propagation allowing for the most conservative impact ranges to be calculated.

The modelling results were analysed in terms of relevant noise metrics for marine mammals (Southall *et al*., 2019) and fish (Popper *et al*., 2014). For marine mammals, all PTS impact ranges were predicted to be smaller than 100 m, with maximum TTS impact ranges of up to 780 m predicted for VHF cetaceans. For fish injury, ranges of up to 190 m and TTS ranges of up to 1.2 km are predicted when considering a stationary receptor. These ranges are reduced to less than 100 m when considering a fleeing animal.

Noise from dredging and vibropiling were considered using a high-level, simple modelling approach. The noise levels for these noise sources are predicted to well below those for impact piling noise, could only occur where an individual was less than 100 m from the source.

Vibropiling and dredging are significantly quieter activities than impact piling. Were vibropiling or dredging to occur near to and at the same time as impact piling, the additional noise from vibropiling or dredging will not lead to an increase in total impact range predicted for impact piling alone.

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Appendix 10-2 Marine Mammal and Fish Technical Report for Underwater Noise Impacts

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Report

Port of Leith – Outer Berth

Marine Mammal and Fish Technical Report for Underwater Noise Impacts

Client: Forth Ports Limited

Reference: PC2045-RHD-ZZ-XX-RP-EV-0011

Status: Final/00

Date: 07 April 2022

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Abbreviations

CD	Chart Datum
CEMP	Construction Environmental Management Plan
dB	Decibels
HF	High Frequency Cetaceans
Hz	Hertz
IAMMWG	Inter-Agency Marine Mammal Working Group
JNCC	Joint Nature Conservation Committee
kJ	Kilojoule
km/h	Kilometre per hour
LF	Low Frequency Cetaceans
m	Metre
m/s	Metre per second
MU	Management Unit
MMOs	Marine Mammal Observer(s)
PTS	Permanent Threshold Shift
PCW	Pinnipeds in water
RMS	Root Mean Square
SEL	Sound Exposure Level
SEL_{cum}	Cumulative Sound Exposure Level
SEL_{ss}	Single Strike Sound Exposure Level
SCOS	Special Committee on Seals
SPL	Sound Pressure Level
SPL_{peak}	Peak Sound Pressure Level
TTS	Temporary Threshold Shift
EMODnet	European Marine Observation and Data Network
VHF	Very high Frequency Cetaceans

A1 Introduction

This report details the underwater noise modelling assessments for all underwater noise impacts associated with the outer berth at the Port of Leith (referred to throughout as 'the Proposed Development').

A1.1 Activities of the Project that may cause Underwater Noise

A1.1.1 Construction Phase

The proposed development would include:

- A 125m section of existing berth redevelopment
    - To be piled (both impact piling and vibro-piling will be used)
- Capital dredging to enlarge the existing berth pocket

Piling Works

Piling platforms would be created on the breakwater to enable the crane to hold the piling hammer. Up to 168 tubular piles (6 rows of 28 piles) of approximately 1.2m diameter and 39 tubular piles of diameter 0.76 m would be installed. To support the tubular piles and landward development, sheet piles would also be installed. Details on the parameters required for the underwater noise modelling are provided in **Table 1**.

Table 1 Piling Parameters

Piling Descriptor	Proposed Development Specific Design Information
Pile diameter	1.22m - 6 rows of 28 piles each; 0.76 m 39 piles in front row
Maximum hammer blow energy	Tubular piling: 280kJ (max), 56 kJ (starting) Sheet-piling: 65kJ (max)
Details on the soft start and ramp up	As per JNCC protocol: Soft-start / ramp-up of 20 minutes, starting at 20% hammer energy
Piling duration	2 hours per tubular pile
Overall piling programme	Programme duration for piling: 160 days (but not continuous)
Number of piles that could potentially be installed within 24 hours	Peak production could be 3 piles a day (average less than 2)

Dredging Works

Before the piles can be installed, a dredging campaign is required for excavation of material from revetment slope to remove the overburden and referred as 'pre-works dredge'. In a second dredge campaign, the existing berth pocket would be enlarged by dredging to -9m Chart Datum (CD) (-9.3m CD including a 0.3m over dredge allowance) and be approximately 300m long by 60m wide. The total dredge quantity is 101,000 m^3.

Dredging would be undertaken using a backhoe dredger supported by a barge to take the dredged arisings to the offshore disposal site.

A2 Underwater Noise Modelling

To inform the impact assessment of piling and dredging during the proposed development, underwater noise modelling was carried out by Subacoustech to estimate the noise levels likely to arise during the works. See **Appendix 10-1** of the EIA Report.

A3 Assessment of Underwater Noise Impacts to Marine Mammal Species

The following assessment uses the underwater noise impact ranges and areas, with the known densities and populations of marine mammals at the proposed development as are summarised in **Table 2** below.

Table 2 Marine mammal densities and reference populations used in the underwater noise assessments

Marine mammal species	Density	Source of density estimate	Reference population	Source of reference population
Harbour porpoise	0.599	SCANS-III Survey Block R (Hammond *et al*., 2021)	346,601	North Sea Management Unit (MU) (Inter-Agency Marine Mammal Working Group (IAMMWG), 2021)
Bottlenose dolphin	0.0298	SCANS-III Survey Block R (Hammond *et al*., 2021)	224	Updated population estimate for the Coastal East Scotland (CES) MU (Hammond & Arso Civil, 2021)
White-beaked dolphin	0.243	SCANS-III Survey Block R (Hammond *et al*., 2021)	43,951	Celtic & Greater North Seas (CGNS) MU (IAMMWG, 2021)
Minke whale	0.0387	SCANS-III Survey Block R (Hammond *et al*., 2021)	20,118	CGNS MU (IAMMWG, 2021)
Grey seal	1.063	Russell *et al.*, 2017	3,683; 5,340	East Scotland (ES) MU (Special Committee on Seals (SCOS), 2020); ES & Moray Firth (MF) MU (SCOS, 2020)
Harbour seal	0.336	Russell *et al.*, 2017	343; 1,420	ES MU (SCOS, 2020); ES & MF MU (SCOS, 2020)

A3.1 Tubular Piling

A3.1.1 PTS exposure from Single Strike

The number of marine mammals that could therefore be anticipated to be exposed to the potential for Permanent Threshold Shift (PTS) onset due to a single strike is presented in **Table 3**.

Table 3 Maximum number of individuals (and % of reference population) that could be at risk of PTS from a single piling strike

Potential Impact	Receptor	Criteria and threshold (Southall *et al*., 2019)	Maximum number of individuals (% of reference population)	Magnitude
PTS without mitigation – single strike	Harbour porpoise	202 dB re 1 µPa unweighted SPL_{peak}	0.006 harbour porpoise (0.000002% NS MU) based on the SCANS-III Block R density of 0.599/km^2.	Permanent effect with negligible magnitude (less than 0.001% of the reference population anticipated to be exposed to effect, without mitigation).

Potential Impact	Receptor	Criteria and threshold (Southall *et al*., 2019)	Maximum number of individuals (% of reference population)	Magnitude
	Bottlenose dolphin	230 dB re 1 µPa unweighted SPL_{peak}	0.0003 bottlenose dolphin (0.0001% of updated CES MU) based on the SCANS-III Block R density of 0.0298/km^2.	Permanent effect with negligible magnitude (less than 0.001% of the reference population anticipated to be exposed to effect, without mitigation).
	White-beaked dolphin	230 dB re 1 µPa unweighted SPL_{peak}	0.002 white-beaked dolphin (0.000006% CGNS MU) based on the SCANS-III Block R density of 0.243/km^2.	Permanent effect with negligible magnitude (less than 0.001% of the reference population anticipated to be exposed to effect, without mitigation).
	Minke whale	219 dB re 1 µPa unweighted SPL_{peak}	0.0004 minke whale (0.000002% CGNS MU) based on the SCANS-III Block R density of 0.0387/km^2.	Permanent effect with negligible magnitude (less than 0.001% of the reference population anticipated to be exposed to effect, without mitigation).
	Grey seal	218 dB re 1 µPa unweighted SPL_{peak}	0.01 grey seal (0.0003% of the ES MU; or 0.0002% of the ES & MF MUs) based on the density of 1.06/km^2.	Permanent effect with negligible magnitude (less than 0.001% of the reference population anticipated to be exposed to effect, without mitigation).
	Harbour seal	218 dB re 1 µPa unweighted SPL_{peak}	0.003 harbour seal (0.00098% of the ES MU; or 0.0002% of the ES & MF MUs) based on the density of 0.335/km^2.	Permanent effect with negligible magnitude (less than 0.001% of the reference population anticipated to be exposed to effect, without mitigation).

A3.1.2 PTS Exposure from Cumulative Exposure

The number of marine mammals that could be anticipated to be exposed to the potential for PTS onset, due to cumulative exposure to up to three piles (six hours of piling) per day is presented in **Table 4**.

Table 4 Maximum number of individuals (and % of reference population) that could be at risk of PTS from cumulative exposure

Potential Impact	Receptor	Criteria and threshold (Southall *et al.*, 2019)	Maximum number of individuals (% of reference population)	Magnitude
PTS without mitigation – cumulative exposure	Harbour porpoise	155 dB re 1 µPa^{2}s weighted SEL_{cum}	0.06 harbour porpoise (0.00002% NS MU) based on the SCANS-III Block R density of 0.599/km^2.	Permanent effect with negligible magnitude (less than 0.001% of the reference population anticipated to be exposed to effect, without mitigation).
	Bottlenose dolphin	185 dB re 1 µPa^{2}s weighted SEL_{cum}	0.003 bottlenose dolphin (0.001% of updated CES MU) based on the SCANS-III Block R density of 0.0298/km^2.	Permanent effect with low magnitude (between 0.001% and 0.01% of the reference population anticipated to be

Potential Impact	Receptor	Criteria and threshold (Southall *et al.*, 2019)	Maximum number of individuals (% of reference population)	Magnitude
				exposed to effect, without mitigation).
	White-beaked dolphin	185 dB re 1 µPa^{2}s weighted SEL_{cum}	0.02 white-beaked dolphin (0.00006% CGNS MU) based on the SCANS-III Block R density of 0.243/km^2.	Permanent effect with negligible magnitude (less than 0.001% of the reference population anticipated to be exposed to effect, without mitigation).
	Minke whale	183 dB re 1 µPa^{2}s weighted SEL_{cum}	0.004 minke whale (0.00002% CGNS MU) based on the SCANS-III Block R density of 0.0387/km^2.	Permanent effect with negligible magnitude (less than 0.001% of the reference population anticipated to be exposed to effect, without mitigation).
	Grey seal	185 dB re 1 µPa^{2}s weighted SEL_{cum}	0.1 grey seal (0.003% of the ES MU; or 0.002% of the ES & MF MUs) based on the density of 1.06/km^2.	Permanent effect with low magnitude (between 0.001% and 0.01% of the reference population anticipated to be exposed to effect, without mitigation).
	Harbour seal	185 dB re 1 µPa^{2}s weighted SEL_{cum}	0.034 harbour seal (0.0098% of the ES MU; or 0.002% of the ES & MF MUs) based on the density of 0.335/km^2.	Permanent effect with low magnitude (between 0.001% and 0.01% of the reference population anticipated to be exposed to effect, without mitigation).

A3.1.3 TTS Exposure and Fleeing Response from Single Strike

The number of marine mammals that could therefore be anticipated to be exposed to the potential for TTS onset due to a single strike of a pile is presented in **Table 5**.

Table 5 Maximum number of individuals (and % of reference population) that could be at risk of TTS

Potential Impact	Receptor	Criteria and threshold (Southall *et al.*, 2019)	Maximum number of individuals (% of reference population)	Magnitude
TTS without mitigation – single strike	Harbour porpoise	196 dB re 1 µPa unweighted SPL_{peak}	0.006 harbour porpoise (0.000002% NS MU) based on the SCANS-III Block R density of 0.599/km^2.	Temporary effect with negligible magnitude (less than 1% of the reference population anticipated to be exposed to effect, without mitigation).
	Bottlenose dolphin	224 dB re 1 µPa unweighted SPL_{peak}	0.0003 bottlenose dolphin (0.0001% of updated CES MU) based on the SCANS-III	Temporary effect with negligible magnitude (less than 1% of the reference population anticipated to be

Potential Impact	Receptor	Criteria and threshold (Southall *et al.*, 2019)	Maximum number of individuals (% of reference population)	Magnitude
			Block R density of 0.0298/km^2.	exposed to effect, without mitigation).
	White-beaked dolphin	224 dB re 1 µPa unweighted SPL_{peak}	0.002 white-beaked dolphin (0.000006% CGNS MU) based on the SCANS-III Block R density of 0.243/km^2.	Temporary effect with negligible magnitude (less than 1% of the reference population anticipated to be exposed to effect, without mitigation).
	Minke whale	213 dB re 1 µPa unweighted SPL_{peak}	0.0004 minke whale (0.000002% CGNS MU) based on the SCANS-III Block R density of 0.0387/km^2.	Temporary effect with negligible magnitude (less than 1% of the reference population anticipated to be exposed to effect, without mitigation).
	Grey seal	212 dB re 1 µPa unweighted SPL_{peak}	0.01 grey seal (0.0003% of the ES MU; or 0.0002% of the ES & MF MUs) based on the density of 1.06/km^2.	Temporary effect with negligible magnitude (less than 1% of the reference population anticipated to be exposed to effect, without mitigation).
	Harbour seal	212 dB re 1 µPa unweighted SPL_{peak}	0.003 harbour seal (0.001% of the ES MU; or 0.0002% of the ES & MF MUs) based on the density of 0.335/km^2.	Temporary effect with negligible magnitude (less than 1% of the reference population anticipated to be exposed to effect, without mitigation).

A3.1.4 TTS Exposure and Fleeing Response from Cumulative Exposure

The number of marine mammals that could be anticipated to be exposed to the potential for Temporary Threshold Shift (TTS) onset due to the cumulative exposure of is presented in **Table 6**.

Table 6 Maximum number of individuals (and % of reference population) that could be at risk of TTS from cumulative exposure

Potential Impact	Receptor	Criteria and threshold (Southall *et al.*, 2019)	Maximum number of individuals (% of reference population)	Magnitude
TTS without mitigation – cumulative exposure	Harbour porpoise	140 dB re 1 µPa^{2}s weighted SEL_{cum}	0.30 harbour porpoise (0.0001% NS MU) based on the SCANS-III Block R density of 0.599/km^2.	Temporary effect with negligible magnitude (less than 1% of the reference population anticipated to be exposed to effect, without mitigation).

Potential Impact	Receptor	Criteria and threshold (Southall *et al.*, 2019)	Maximum number of individuals (% of reference population)	Magnitude
	Bottlenose dolphin	170 dB re 1 µPa^{2}s weighted SEL_{cum}	0.003 bottlenose dolphin (0.001% of updated CES MU) based on the SCANS-III Block R density of 0.0298/km^2.	Temporary effect with negligible magnitude (less than 1% of the reference population anticipated to be exposed to effect, without mitigation).
	White-beaked dolphin	170 dB re 1 µPa^{2}s weighted SEL_{cum}	0.02 white-beaked dolphin (0.00006% CGNS MU) based on the SCANS-III Block R density of 0.243/km^2.	Temporary effect with negligible magnitude (less than 1% of the reference population anticipated to be exposed to effect, without mitigation).
	Minke whale	168 dB re 1 µPa^{2}s weighted SEL_{cum}	0.004 minke whale (0.00002% CGNS MU) based on the SCANS-III Block R density of 0.0387/km^2.	Temporary effect with negligible magnitude (less than 1% of the reference population anticipated to be exposed to effect, without mitigation).
	Grey seal	170 dB re 1 µPa^{2}s weighted SEL_{cum}	0.1 grey seal (0.003% of the ES MU; or 0.002% of the ES & MF MUs) based on the density of 1.06/km^2.	Temporary effect with negligible magnitude (less than 1% of the reference population anticipated to be exposed to effect, without mitigation).
	Harbour seal	170 dB re 1 µPa^{2}s weighted SEL_{cum}	0.034 harbour seal (0.01% of the ES MU; or 0.002% of the ES & MF MUs) based on the density of 0.335/km^2.	Temporary effect with negligible magnitude (less than 1% of the reference population anticipated to be exposed to effect, without mitigation).

A3.2 Sheet Piling

A3.2.1 PTS from Cumulative Exposure

The number of harbour porpoise, bottlenose dolphin, white-beaked dolphin, minke whale, grey seal and harbour seal that could be at risk of PTS onset, as a result of underwater noise during sheet-piling activities (**Table 7**) has been assessed based on the number of animals that could be present in each of the modelled impact ranges and areas. The modelling assumes up to 12 hours of sheet piling could be undertaken per day.

Table 7 Maximum number of individuals (and % of reference population) that could be at risk of PTS onset as a result of underwater noise associated with sheet piling activities, based on underwater noise modelling

Potential Impact	Receptor	Criteria and threshold (Southall *et al*., 2019)	Maximum number of individuals (% of reference population)	Magnitude
PTS without mitigation – cumulative exposure (over 12 hours)	Harbour porpoise	173 dB re 1 µPa^{2}s weighted SEL_{cum}	0.02 harbour porpoise (0.000005% NS MU) based on the SCANS-III Block R density of 0.599/km^2.	Permanent effect with negligible magnitude (less than 0.001% of the reference population anticipated to be exposed to effect, without mitigation).
	Bottlenose dolphin	198 dB re 1 µPa^{2}s weighted SEL_{cum}	0.0009 bottlenose dolphin (0.0004% of updated CES MU) based on the SCANS-III Block R density of 0.0298/km^2.	Permanent effect with negligible magnitude (less than 0.001% of the reference population anticipated to be exposed to effect, without mitigation).
	White-beaked dolphin	198 dB re 1 µPa^{2}s weighted SEL_{cum}	0.008 white-beaked dolphin (0.00002% CGNS MU) based on the SCANS-III Block R density of 0.243/km^2.	Permanent effect with negligible magnitude (less than 0.001% of the reference population anticipated to be exposed to effect, without mitigation).
	Minke whale	199 dB re 1 µPa^{2}s weighted SEL_{cum}	0.001 minke whale (0.000006% CGNS MU) based on the SCANS-III Block R density of 0.0387/km^2.	Permanent effect with negligible magnitude (less than 0.001% of the reference population anticipated to be exposed to effect, without mitigation).
	Grey seal	201 dB re 1 µPa^{2}s weighted SEL_{cum}	0.03 grey seal (0.0009% of the ES MU; or 0.0006% of the ES & MF MUs) based on the density of 1.06/km^2.	Permanent effect with negligible magnitude (less than 0.001% of the reference population anticipated to be exposed to effect, without mitigation).
	Harbour seal	201 dB re 1 µPa^{2}s weighted SEL_{cum}	0.01 harbour seal (0.003% of the ES MU; or 0.0007% of the ES & MF MUs) based on the density of 0.335/km^2.	Permanent effect with negligible to low magnitude (less than 0.001% to 0.001% to 0.01% of the reference population anticipated to be exposed to effect, without mitigation).

A3.2.2 TTS from Cumulative Exposure

The number of harbour porpoise, bottlenose dolphin, white-beaked dolphin, minke whale, grey seal and harbour seal that could be at risk of TTS onset, as a result of underwater noise during sheet-piling activities (**Table 8**) has been assessed based on the number of animals that could be present in each of the modelled impact ranges and areas. The modelling assumes up to 12 hours of sheet piling could be undertaken per day.

Table 8 Maximum number of individuals (and % of reference population) that could be at risk of TTS onset as a result of underwater noise associated with sheet piling activities, based on underwater noise modelling

Potential Impact	Receptor	Criteria and threshold (Southall *et al*., 2019)	Maximum number of individuals (% of reference population)	Magnitude
TTS without mitigation – cumulative exposure (over 12 hours)	Harbour porpoise	153 dB re 1 µPa^{2}s weighted SEL_{cum}	0.09 harbour porpoise (0.00003% NS MU) based on the SCANS-III Block R density of 0.599/km^2.	Temporary effect with negligible magnitude (less than 1% of the reference population anticipated to be exposed to effect, without mitigation).
	Bottlenose dolphin	178 dB re 1 µPa^{2}s weighted SEL_{cum}	0.0009 bottlenose dolphin (0.0004% CES MU) based on the SCANS-III Block R density of 0.0298/km^2.	Temporary effect with negligible magnitude (less than 1% of the reference population anticipated to be exposed to effect, without mitigation).
	White-beaked dolphin	178 dB re 1 µPa^{2}s weighted SEL_{cum}	0.008 white-beaked dolphin (0.00002% CGNS MU) based on the SCANS-III Block R density of 0.243/km^2.	Temporary effect with negligible magnitude (less than 1% of the reference population anticipated to be exposed to effect, without mitigation).
	Minke whale	179 dB re 1 µPa^{2}s weighted SEL_{cum}	0.001 minke whale (0.000006% CGNS MU) based on the SCANS-III Block R density of 0.0387/km^2.	Temporary effect with negligible magnitude (less than 1% of the reference population anticipated to be exposed to effect, without mitigation).
	Grey seal	181 dB re 1 µPa^{2}s weighted SEL_{cum}	0.03 grey seal (0.0009% of the ES MU; or 0.0006% of the ES & MF MUs) based on the density of 1.06/km^2.	Temporary effect with negligible magnitude (less than 1% of the reference population anticipated to be exposed to effect, without mitigation).
	Harbour seal	181 dB re 1 µPa^{2}s weighted SEL_{cum}	0.01 harbour seal (0.003% of the ES MU; or 0.0007% of the ES & MF MUs) based on the density of 0.335/km^2.	Temporary effect with negligible magnitude (less than 1% of the reference population anticipated to be exposed to effect, without mitigation).

A3.3 Dredging

A3.3.1 PTS from Cumulative Exposure

The number of harbour porpoise, bottlenose dolphin, white-beaked dolphin, minke whale, grey seal and harbour seal that could be at risk of PTS onset, as a result of underwater noise during dredging activities (**Table 9**) has been assessed based on the number of animals that could be present in each of the modelled impact ranges and areas. The modelling assumes up to 12 hours of dredging could be undertaken per day.

Table 9 Maximum number of individuals (and % of reference population) that could be at risk of PTS onset as a result of underwater noise associated with dredging, based on underwater noise modelling

Potential Impact	Receptor	Criteria and threshold (Southall *et al*., 2019)	Maximum number of individuals (% of reference population)	Magnitude
PTS without mitigation – cumulative exposure (over 12 hours)	Harbour porpoise	173 dB re 1 μPa^2s weighted SEL_{cum}	0.02 harbour porpoise (0.000005% NS MU) based on the SCANS-III Block R density of 0.599/km^2.	Permanent effect with negligible magnitude (less than 0.001% of the reference population anticipated to be exposed to effect, without mitigation).
	Bottlenose dolphin	198 dB re 1 μPa^2s weighted SEL_{cum}	0.0009 bottlenose dolphin (0.0004% CES MU) based on the SCANS-III Block R density of 0.0298/km^2.	Permanent effect with negligible magnitude (less than 0.001% of the reference population anticipated to be exposed to effect, without mitigation).
	White-beaked dolphin	198 dB re 1 μPa^2s weighted SEL_{cum}	0.008 white-beaked dolphin (0.00002% CGNS MU) based on the SCANS-III Block R density of 0.243/km^2.	Permanent effect with negligible magnitude (less than 0.001% of the reference population anticipated to be exposed to effect, without mitigation).
	Minke whale	199 dB re 1 μPa^2s weighted SEL_{cum}	0.001 minke whale (0.000006% CGNS MU) based on the SCANS-III Block R density of 0.0387/km^2.	Permanent effect with negligible magnitude (less than 0.001% of the reference population anticipated to be exposed to effect, without mitigation).
	Grey seal	201 dB re 1 μPa^2s weighted SEL_{cum}	0.03 grey seal (0.0009% of the ES MU; or 0.0006% of the ES & MF MUs) based on the density of 1.06/km^2.	Permanent effect with negligible magnitude (less than 0.001% of the reference population anticipated to be exposed to effect, without mitigation).
	Harbour seal	201 dB re 1 μPa^2s weighted SEL_{cum}	0.01 harbour seal (0.003% of the ES MU; or 0.0007% of the ES & MF MUs) based on the density of 0.335/km^2.	Permanent effect with negligible to low magnitude (less than 0.001% to 0.001% to 0.01% of the reference population anticipated to be exposed to effect, without mitigation).

A3.3.2 TTS from Cumulative Exposure

The number of harbour porpoise, bottlenose dolphin, white-beaked dolphin, minke whale, grey seal and harbour seal that could be at risk of TTS onset, as a result of underwater noise during sheet-piling activities (**Table 10**) has been assessed based on the number of animals that could be present in each of the modelled impact ranges and areas. The modelling assumes up to 12 hours of sheet piling could be undertaken per day.

Table 10 Maximum number of individuals (and % of reference population) that could be at risk of TTS onset as a result of underwater noise associated with sheet piling activities, based on underwater noise modelling

Potential Impact	Receptor	Criteria and threshold (Southall *et al.*, 2019)	Maximum number of individuals (% of reference population)	Magnitude
TTS without mitigation – cumulative exposure (over 12 hours)	Harbour porpoise	153 dB re 1 μPa^2s weighted SEL_{cum}	0.12 harbour porpoise (0.00003% NS MU) based on the SCANS-III Block R density of 0.599/km^2.	Temporary effect with negligible magnitude (less than 1% of the reference population anticipated to be exposed to effect, without mitigation).
	Bottlenose dolphin	178 dB re 1 μPa^2s weighted SEL_{cum}	0.0009 bottlenose dolphin (0.0004% CES MU) based on the SCANS-III Block R density of 0.0298/km^2.	Temporary effect with negligible magnitude (less than 1% of the reference population anticipated to be exposed to effect, without mitigation).
	White-beaked dolphin	178 dB re 1 μPa^2s weighted SEL_{cum}	0.008 white-beaked dolphin (0.00002% CGNS MU) based on the SCANS-III Block R density of 0.243/km^2.	Temporary effect with negligible magnitude (less than 1% of the reference population anticipated to be exposed to effect, without mitigation).
	Minke whale	179 dB re 1 μPa^2s weighted SEL_{cum}	0.001 minke whale (0.000006% CGNS MU) based on the SCANS-III Block R density of 0.0387/km^2.	Temporary effect with negligible magnitude (less than 1% of the reference population anticipated to be exposed to effect, without mitigation).
	Grey seal	181 dB re 1 μPa^2s weighted SEL_{cum}	0.03 grey seal (0.0009% of the ES MU; or 0.0006% of the ES & MF MUs) based on the density of 1.06/km^2.	Temporary effect with negligible magnitude (less than 1% of the reference population anticipated to be exposed to effect, without mitigation).
	Harbour seal	181 dB re 1 μPa^2s weighted SEL_{cum}	0.01 harbour seal (0.003% of the ES MU; or 0.0007% of the ES & MF MUs) based on the density of 0.335/km^2.	Temporary effect with negligible magnitude (less than 1% of the reference population anticipated to be exposed to effect, without mitigation).

A4 Assessment of Underwater Noise Impacts to Fish Species

Certain aspects of the construction phase have the potential to impact on fish (both resident and migratory species, including those who migrate within the coastal waters and those who migrate in and out of the Firth of Forth) due to the generation of underwater noise and vibration. This particularly relates to piling activities, but also to noise and vibration generated during dredging.

In the worst-case scenario, excessive noise may lead to temporary behavioural disturbance of resident and migratory fish species and even mortality. Given that the proposed piles are to be installed near to open water, there is potential for noise disturbance to impact on fish migrations along the coast and potentially in and out of the Forth estuary, in addition to causing disturbance to resident species.

A4.1 Tubular Piling

Fish species are mobile and would be expected to vacate the area with the onset of piling, and therefore are of low sensitivity to impacts over the course of piling. In addition, the piling location is very close to open water, and would be unlikely to causes any barrier to movement of species in the vicinity of the proposed development, and into and out of the Forth estuary.

With regard to the underwater noise impacts from piling, all fish species would be at risk of serious injury or fatality, or recoverable injury, due to a single strike of a tubular pile, if they were closer than 50m to the source of the piling noiseError! Reference source not found..

For cumulative exposure from piling (assuming up to three piles could be installed per 12-hour construction day), the most sensitive fish species (those with a swim bladder involved in hearing), would be at risk of fatality and serious injury if they remained within 120m of the piling source for six hours of piling, or recoverable injury if they remained within 190m for six hours of piling. As noted above, this is based on a stationary receptor (i.e., a fish species would not flee from the area), which is unlikely for most species. Based on a fleeing response (with a swim speed of 1.5m/s), the cumulative impact range for fish species with a swim bladder involved in hearing would be 100m. For the other species groups, including eggs and larvae, all potential cumulative impact ranges are less than 100m, meaning individuals would have to remain within 100m of the piling location, for a total of six hours, to be at risk of fatality, serious injury, or recoverable injury. This is considered unlikely, as fish species are more likely to move out of the area at the onset of piling. Considering the very localised area of impact, the short-term nature of the works, and the temporary impact, the potential for recoverable injury is of negligible magnitude.

There is the potential for a TTS in all fish species, as a result of tubular piling (for up to six hours a day), at a distance of up to 1,200m, assuming that the fish remain stationary and do not flee. The results for a fleeing fish (assuming a swim speed of 1.5m/s) are that an individual would be at risk of TTS onset if they were within 100m of the piling location.

In terms of migratory species, the key migratory route for fish is considered to be in and out of the mouth of the estuary. The mouth of the Firth of Forth, where the piling will take place, is approximately 5km wide, considerably larger than any of the predicted impact ranges for fish species. Based on the predicted maximum impact range for mortality and potential mortal injury from impact piling (both peak from impulsive sound and cumulatively over the course of installing one pile for both the stationary and fleeing animal models), it is concluded that such impacts would not extend into the main migratory routes used by fish species. It is therefore concluded that there would be no risk of mortality or mortal injury to migratory fish species, and no impact is predicted.

A4.2 Sheet Piling

The modelling results show that recoverable injury to fish from sheet piling noise could only be expected at very close range to the piling location (<50m for recoverable injury) for fish species with a swim bladder involved in hearing (the most sensitive to noise impacts), and there is the potential for TTS onset for fish that remain within 90m of the piling location, for a period of 12 hours. It is very unlikely that any fish species would remain within either 50m or 90m of the piling location for that period of time.

Given the spatial extent of the noise impacts arising from the proposed dredging, the magnitude of the effect is considered to be low (in the context of the significant areas of coastal waters available for use around the predicted impact zone which offer the same or similar conditions for fish would be unaffected).

Given the width of the Forth of Forth at the piling location, (of approximately 5km), and the spatial extent of the potential impact (of less than 90m), it is concluded that there would be no impact on migratory species

(either moving in or out of the Tees estuary) as a result of the sheet piling. In addition, it is concluded that the predicted highly localised extent of the noise impact would also have no impact on fish species migrating up and down the coastline.

A4.3 Dredging

With regard to the proposed dredging works, the modelling has shown that recoverable injury to fish could only be expected at very close range to the noise sources (distances of less than 50m from the noise source). TTS onset is predicted for fish at distances up to 50m from the dredging. Fish species would have to remain within 50m of the dredger for a period of 12 hours to be at risk of either recoverable injury, or TTS onset, which is considered to be highly unlikely.

Given the spatial extent of the noise disturbance impact arising from the proposed dredging, the magnitude of the effect is considered to be low (in the context of the significant areas of coastal waters available for use around the predicted impact zone which offer the same or similar conditions for fish would be unaffected).

Given the width of the Firth of Forth (approximately 5km), and the spatial extent of the potential impact, it is concluded that there would be no impact on migratory species (either moving in or out of the Forth) as a result of the dredging.

A5 Requirements for Mitigations

A5.1 Piling Activities

A5.1.1 Marine Mammals

As a precautionary procedure, the mitigations will be in place for both tubular and sheet piling and would be included in the Construction Environmental Management Plan (CEMP), to ensure that no marine mammals are exposed to the potential for PTS onset from the piling works. This will be based on the best available information, methodologies, and industry best practice.

The proposed mitigation would therefore be designed to ensure no presence of marine mammal species within 200m (as a precautionary distance) of the piling location. The mitigations will follow best practice guidance for minimising the risk of injury to marine mammals from piling noise detailed by the Joint Nature Conservation Committee (JNCC)[1] (JNCC, 2010).

This would include:

- The establishment of a mitigation zone of 200m from the piling location
    - The JNCC guidance recommends a mitigation zone of 500m, however, due to the small impact ranges predicted for the proposed development (of less than 100m for (PTS), a reduced mitigation zone of 200m will be used.
- Only piling construction operations during the hours of daylight and good visibility (and within the 12-hour construction window).
- Pre–piling search for marine mammals of mitigation zone by Marine Mammal Observer(s) (MMOs).
    - Delay if marine mammals detected within the mitigation zone.

[1] https://data.jncc.gov.uk/data/24cc180d-4030-49dd-8977-a04ebe0d7aca/JNCC-Guidelines-Explosives-Guidelines-201008-Web.pdf

- Soft-start and ramp-up of piling for a period of not less than 20 minutes.
- Pre–construction activity search and soft-start procedure should be repeated before piling recommences, if piling operations pause for a period of greater than 10 minutes.

All mitigation procedures, soft-start and ramp-up, and reporting requirements, are as per the JNCC guidelines, with the exception of the reduced mitigation zone.

A5.1.2 Fish Species

No mitigation measures are considered necessary to manage the potential risks to resident and migratory fish from the proposed dredging works. There would be no residual impact to migratory species.

In order to minimise the risk of mortality, mortal injury or impairment to resident fish from the proposed impact piling, a soft start approach would be adopted in accordance with the JNCC's guidelines ('statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from impact piling'). Although this guidance is strictly focussed on marine mammals, it is concluded that part of the guidance (specifically the adoption of soft start techniques for piling) would allow any resident species to leave the area of greatest disturbance. This would minimise the risk to fish from underwater noise, as fish would be anticipated to move out of the rea (thus avoiding impacts from occurring) prior to the noise from the piling reaching its peak levels.

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Appendix 11-1 Port of Leith Bird Surveys 2021/22

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REPORT

Port of Leith – Outer Berth

Port of Leith Bird Surveys Report 2021-22

Client: Forth Ports Limited

Reference: PC2045-RHD-ZZ-XX-RP-EV-0010
Status: Final/00
Date: 08 April 2022

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Appendix 2 Distribution maps for SPA / Ramsar / SSSI features
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Acronyms

Acronym	Acronym description
AON	Apparently Occupied Nest
BoCC5	Birds of Conservation Concern 5
BTO	British Trust for Ornithology
EIA	Environmental Impact Assessment
HRA	Habitats Regulations Appraisal
MHWS	Mean High Water Springs
OFFSABC	Outer Firth of Forth and St. Andrew's Bay Complex [SPA]
SEPA	Scottish Environmental Protection Agency
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
VP	Vantage Point
WeBS	Wetland Bird Survey

1 Introduction

1.1 Background

Forth Ports Limited ("Forth Ports") is seeking to improve the berth seaward of the lock gates at the entrance to the Port of Leith, Edinburgh ("the Port"), to support vessels that are too wide to pass through the gates, including vessels associated with the offshore renewables energy industry. The proposed development includes improvement of the berth, creation of an area of hardstanding for loading / unloading at the berth, creation of a laydown area for storage / transhipment of renewable energy components and capital dredging to enlarge the existing berth pocket.

Royal HaskoningDHV was commissioned by Forth Ports to co-ordinate an estuarine bird survey at the Port and adjacent coastline for the purpose of providing baseline data ahead of the proposed development. Additionally, an active colony count and flight behaviour survey of the common tern *Sterna hirundo* colony within the Port was commissioned for the purpose of understanding the current breeding season activity within the colony. Survey fieldwork was managed by Tom Edwards, of 3E Services Ltd., an experienced ecologist with prior experience of estuarine bird surveys in the Firth of Forth for Royal HaskoningDHV and Forth Ports.

There were three elements associated with the survey (as agreed with NatureScot, correspondence by email on 28th April 2021 – see **Appendix 1**):

- Twice-monthly estuarine bird counts within the impounded dock system and nearby coastal / offshore locations;
- Twice-monthly common tern colony counts, which were undertaken from May to July 2021 (inclusive), denoting the number of apparently occupied nests (AON) at Imperial Dock Lock, Leith Special Protection Area (SPA); and,
- Twice-monthly common tern flight behaviour surveys at the SPA colony, which were undertaken from May to July 2021 (inclusive).

1.2 Purpose of the Survey Report

This Survey Report describes the results of the above surveys and thereby provides an overall baseline based on a full year of count data (including both the breeding and non-breeding seasons). It presents distribution and count information for the impounded dock system, the coastline to the west of the Port and the coastline along the eastern / northern side of the Port, as well as nearshore and offshore marine areas. It uses that information to indicate the importance of the survey study area in the context of wider species populations in the Firth of Forth.

The survey data and conclusions, supplemented by existing published data, has been used to inform both a Habitats Regulations Appraisal (HRA), undertaken in accordance with the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) ("the Habitats Regulations"), and an Environmental Impact Assessment (EIA), undertaken in accordance with the Marine Works (EIA) Regulations 2007 (as amended), for the Proposed Development.

2 Ornithological nature conservation designations

2.1 Overview of nearby designations

The Imperial Dock Lock, Leith SPA, located within the impounded dock system in the Port, is part of the UK site network, protected for the purpose of nature conservation under the Habitats Regulations and designated in this instance due to a nationally important population of breeding common terns on the dockside. The SPA is located *c.*100m from the Proposed Development at the nearest point.

In addition, the Proposed Development is located adjacent to the Firth of Forth SPA and Ramsar Site and slightly overlaps with the Outer Firth of Forth and St Andrews Bay Complex (OFFSABC) SPA. The Firth of Forth SPA, underpinned in coastal areas by the Firth of Forth Site of Special Scientific Interest (SSSI) and covering an area of *c.*6,320ha (of which 95.4% is marine), was designated in 2010 to protect coastal / intertidal foraging / roosting grounds of non-breeding waterbirds / seabirds. The OFFSABC SPA, covering an area of *c.*272,000ha across the Firths of Forth and Tay, is a marine protected area designated in 2020 to protect the marine areas used by non-breeding waterbirds and both breeding and non-breeding seabirds.

The Port is also approximately 3.5km from the Forth Islands SPA, a seabird breeding colony SPA which lies offshore. This SPA is designated for the breeding populations of seabirds on the islands of Inchmickery, Isle of May, Fidra, The Lamb, Craigleith, Long Craig and Bass Rock, and has no non-breeding features. While the SPA incorporates the core marine foraging grounds for qualifying breeding features, birds from the colonies may also forage throughout the Firth of Forth.

Figure 2.1 illustrates the location of the Proposed Development in relation to the above SPAs.

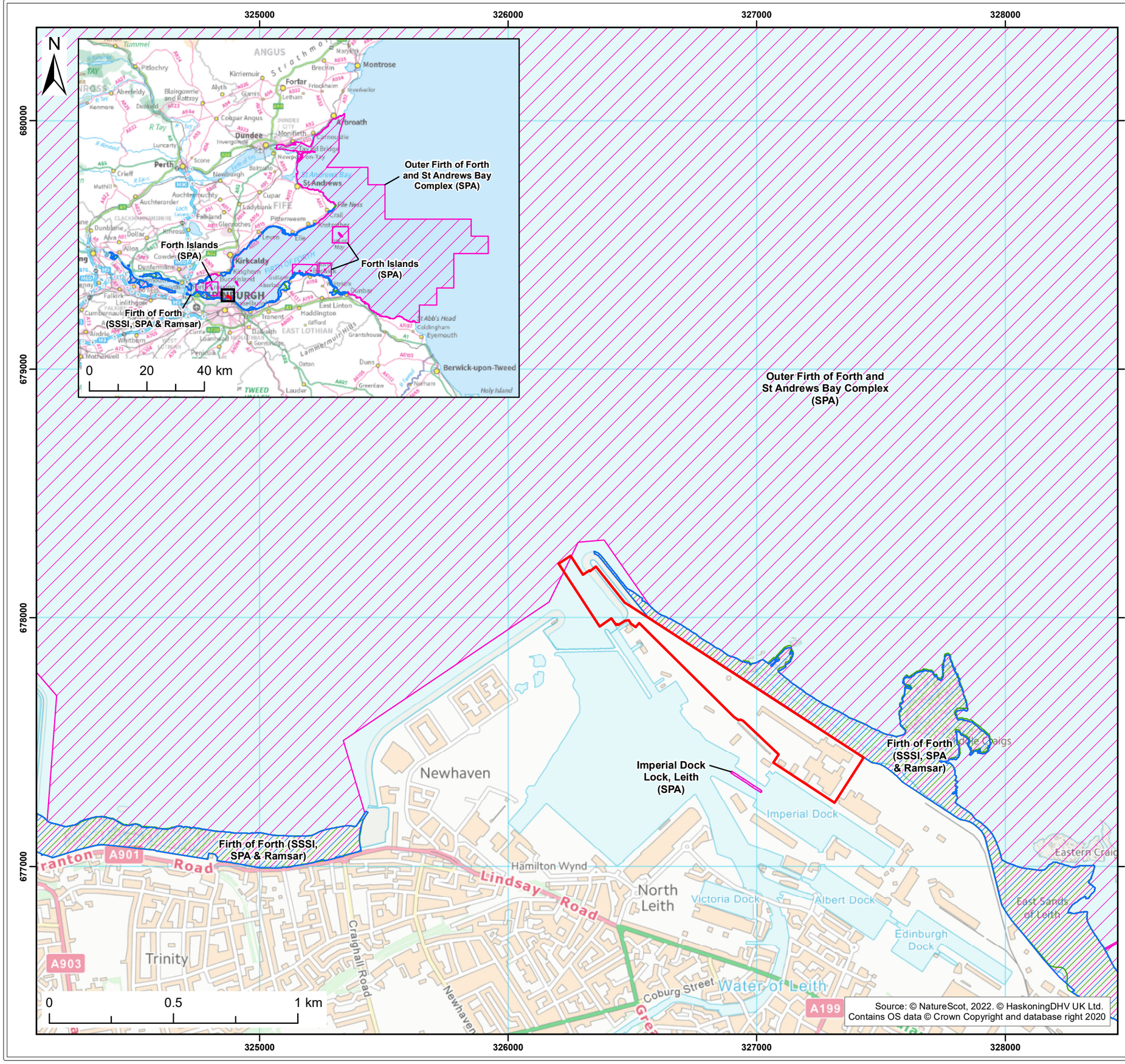
2.2 Ornithological features

Details of the qualifying ornithological features of the SPAs and Ramsar site are described in **Table 2.1**. Features of the underpinning SSSI correspond with those of the Firth of Forth SPA and Ramsar site.

Table 2.1 Qualifying ornithological features of nature conservation designations

Designation	Features
Imperial Dock Lock, Leith SPA (Scottish Natural Heritage, 2004)	**The site qualifies under Article 4.1 of the Wild Birds Directive** as it is used regularly by 1% or more of the GB populations of the following species listed in Annex I in any season*:* • Breeding common tern.
Forth Islands SPA (NatureScot, 2018a)	**The site qualifies under Article 4.1 of the Wild Birds Directive** as it is used regularly by 1% or more of the GB populations of the following species listed in Annex I: • Breeding Sandwich tern *Sterna sandvicensis*, roseate tern *Sterna dougallii*, common tern and Arctic tern *Sterna paradisaea*. **The site qualifies under Article 4.2 of the Wild Birds Directive** as it is used regularly by 1% or more of the biogeographical populations of the following migratory species: • Breeding lesser black-backed gull *Larus fuscus*, puffin *Fratercula arctica*, gannet *Morus bassanus* and shag *Phalacrocorax aristotelis*. **The site also qualifies under Article 4.2** as it is used regularly by more than 20,000 seabirds in the breeding season. The main components of the assemblage include the species listed above, plus nationally important populations of kittiwake *Rissa tridactyla*, herring gull *Larus argentatus*, guillemot *Uria aalge*, razorbill *Alca torda* and cormorant *Phalacrocorax carbo*.
Firth of Forth SPA (NatureScot, 2018b)	**The site qualifies under Article 4.1 of the Wild Birds Directive** as it is used regularly by 1% or more of the Great Britain populations of the following species listed in Annex I in any season:

Designation	Features
	• Non-breeding red throated diver *Gavia stellata*, Slavonian grebe *Podiceps auritus*, golden plover *Pluvialis apricaria* and bar-tailed godwit *Limosa lapponica;* and, • Passage Sandwich tern. **The site qualifies under Article 4.2 of the Wild Birds Directive** as it is used regularly by 1% or more of the biogeographical populations of the following migratory species (other than those listed in Annex I)*:* • Non-breeding pink-footed goose *Anser brachyrhynchus*, shelduck *Tadorna tadorna*, knot *Calidris canutus*, redshank *Tringa totanus* and turnstone *Arenaria interpres.* The site also qualifies under Article 4.2 as it used regularly by 95,000 waterbirds in the non-breeding season. The main components of the assemblage include the species listed above, plus nationally important populations of: great crested grebe *Podiceps cristatus*, cormorant, mallard *Anas platyrhynchos*, wigeon *Anas penelope*, scaup *Aythya marila*, eider *Somateria mollissima*, common scoter *Melanitta nigra*, velvet scoter *Melanitta fusca*, long-tailed duck *Clangula hyemalis*, goldeneye *Bucephala clangula*, red-breasted merganser *Mergus serrator*, oystercatcher *Haematopus ostralegus*, ringed plover *Charadrius hiaticula*, grey plover *Pluvialis squatarola*, lapwing *Vanellus vanellus*, dunlin *Calidris alpina alpina* and curlew *Numenius arquata*.
Firth of Forth Ramsar Site	The site qualifies under Ramsar Criterion 4 by supporting the following waterbird species at a critical stage in their life cycles: • Scaup, great crested grebe, cormorant, curlew, eider, long-tailed duck, common scoter, velvet scoter, red-breasted merganser, oystercatcher, ringed plover, grey plover and dunlin. The site qualifies under Ramsar Criterion 5 by regularly supporting waterbirds in numbers of 20,000 individuals or more. The site qualifies under Ramsar Criterion 6 by regularly supporting 1% or more of the individuals in a population of waterbirds: • Slavonian grebe, pink-footed goose, shelduck, knot, redshank, turnstone, goldeneye, bar-tailed godwit and Sandwich tern.
Outer Firth of Forth and St Andrews Bay Complex SPA (NatureScot, 2020)	**The site qualifies under Article 4.1 of the Wild Birds Directive** as *it is used regularly by 1% or more of the Great Britain populations of the following species listed in Annex I in any season:* • Non-breeding red throated diver, Slavonian grebe and little gull *Hydrocoloeus minutus*; and, • Breeding common tern and Arctic tern. **The site qualifies under Article 4.2 of the Wild Birds Directive** *as it is used regularly by 1% or more of the biogeographical populations of the following migratory species (other than those listed in Annex I):* • Non-breeding eider; and • Breeding shag and gannet. The site qualifies under Article 4.2 as it used regularly by more than 20,000 waterbirds in the non-breeding season. The main components of the assemblage include nationally important populations of common scoter, velvet scoter, long-tailed duck, goldeneye and red-breasted merganser. The site qualifies under Article 4.2 as it used regularly by more than 20,000 seabirds in the non-breeding season. The main components of the assemblage include nationally important populations of black-headed gull *Chroicocephalus ridibundus*, common gull *Larus canus*, herring gull, kittiwake, guillemot and razorbill. The site qualifies under Article 4.2 as it used regularly by more than 20,000 seabirds in the breeding season. The main components of the assemblage include nationally important populations of Manx shearwater *Puffinus puffinus*, herring gull, kittiwake, puffin and guillemot.



Legend:

- Red Line Boundary
- Site of Special Scientific Interest (SSSI)
- Special Protection Area (SPA)
- Ramsar

Client: Forth Ports Limited	Project: Port of Leith - Outer Berth

Title: Ornithological Nature Conservation Designations

Figure: 2.1 | Drawing No: PC2045-RHD-ZZ-ZZ-DR-EV-0017

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	03/03/2022	FC	BH	A3	1:15,000

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3 Estuarine bird survey methodology

3.1 Survey study area

The survey study area, agreed with NatureScot as part of the survey specification and presented in **Figure 3.1**, extended 2km to the east and west of Leith Outer Berth and to a distance of 2km offshore of the Outer Berth. The study area was identified to include areas from which estuarine birds may be disturbed due to construction works during the Proposed Development, plus adjacent areas where disturbed birds may relocate. To facilitate the recording of estuarine birds, the study area was split into three constituent sectors:

- S1: the coastal, intertidal, marine and offshore areas in the western half of the study area;
- S2: the coastal, intertidal, marine and offshore areas in the eastern half of the study area; and
- S3: the impounded dock system and adjacent quaysides / port areas within the Port estate.

3.1.1 Western half of the study area (S1)

The western half of the study area (i.e. west of Leith Outer Berth) extends a distance of 2km west of Leith Outer Berth and incorporates the shoreline adjacent to West Breakwater, Newhaven Harbour and the seafront to the west of Newhaven Harbour, plus an embayment formed between Granton East Harbour and the West Breakwater. The intertidal zone along the Newhaven waterfront extends *c.*100-150m from mean high-water springs (MHWS). The sector is characterised by regular recreational usage as there is public access along this section of coastline, hence regular use of the foreshore and breakwater by walkers (including dog walkers), swimmers, anglers and kayakers. The sector is regularly used by both motorised and non-motorised vessels given its sheltered location and proximity to the Newhaven and Granton Harbours. This sector also encompasses three small scrapes / pools on land just south of the West Breakwater lighthouse.

Habitats within this sector include:

- A man-made promenade and breakwater, with amenity grassland and drainage swales;
- Seawall and revetment with algae;
- Newhaven harbour, a fishing port / marina with quaysides;
- A brownfield area of ruderal vegetation / grassland, with scrub in places and an area of demolition, to the west of the Western Harbour;
- A brownfield area with three small scrapes to the west of the Port Entrance Basin, earmarked for residential development; and
- Intertidal soft sediment (sand and mud), with intertidal rocky outcrops (some of which are algal-covered) and rock pools.

The intertidal area to the west of Newhaven Harbour lies within the Firth of Forth SPA / Ramsar Site. Marine areas within this sector lie within the OFFSABC SPA.

3.1.2 Eastern half of the study area (S2)

To the east, the study area extends a distance of 2km from Leith Outer Berth and incorporates the shoreline adjacent to East Breakwater and the frontage to the Port. The intertidal zone along this stretch is narrow but is interspersed with rocky outcrops such as Martello Rocks, Black Rocks, Middle Craigs and Eastern Craigs, some of which are partly exposed at high tide. At the far east end of the study area, adjacent to the Eastern

Craigs, is a wider expanse of intertidal soft sediment known as the East Sands of Leith. Given that the shoreline along this stretch forms part of the Port boundary, there is limited access and is less likely to be subject to anthropogenic disturbance due to recreational activity such as anglers and dog walkers, although is exposed to port-associated and vessel-related disturbances.

Habitats within this sector include:

- Intertidal soft sediment (sand and mud) with intertidal, algal-covered rocky outcrops and rock pools;
- Sandy beach;
- A man-made East Breakwater; and
- Hardstanding at the Port boundary at the crest of the beach.

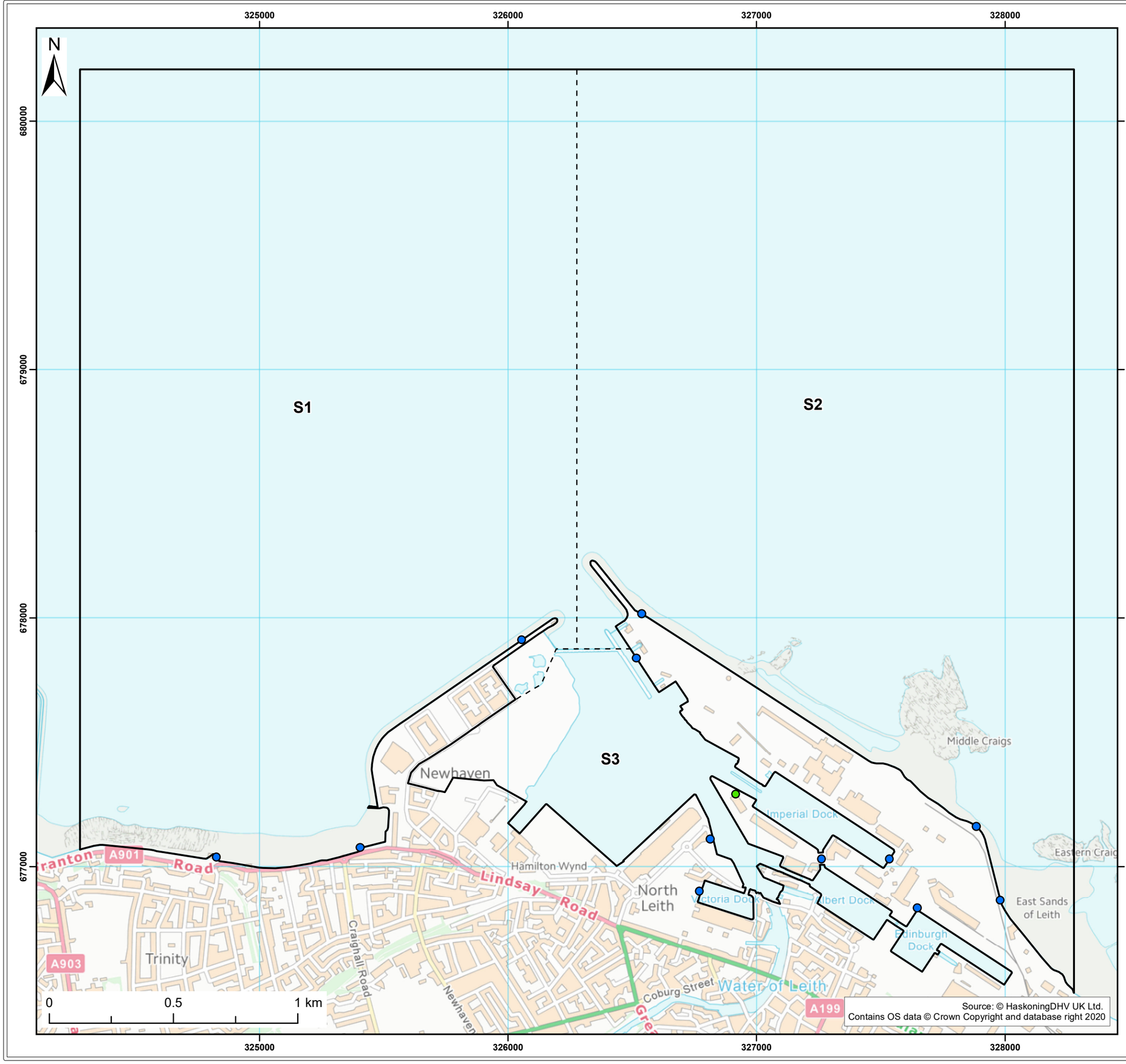
The intertidal component of this sector lies within the Firth of Forth SPA / Ramsar Site. Marine areas within this sector lie within the OFFSABC SPA.

3.1.3 Impounded docks and Port estate (S3)

The sector within the impounded dock system incorporates all docks, including Western Harbour, Imperial Dock, Prince of Wales Dock, Albert Dock, Edinburgh Dock and Victoria Dock, and associated quaysides. The sector extends south to Victoria Bridge, where the Water of Leith enters the Port. This sector is characterised by Port activity, including regular use of vessels, plant and vehicles and the presence of Port workers within the Port estate. The Imperial Dock Lock, Leith SPA is located within this sector.

Habitats within this sector include:

- Quaysides, docks and laydown areas; and
- Saltwater impounded docks, with throughput from the Water of Leith.



Legend:

- Survey Area
- Count Sector Boundary
- Estuarine Bird Survey VP
- Tern Colony Survey VP

Client: Forth Ports Limited	Project: Port of Leith - Outer Berth

Title: 2021/22 Estuarine Bird Survey Area

Figure: 3.1 | Drawing No: PC2045-RHD-ZZ-ZZ-DR-EV-0015

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	03/03/2022	FC	BH	A3	1:15,000

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3.2 Field survey methods

3.2.1 Survey frequency

Two survey visits were scheduled each month, from March 2021 to February 2022 inclusive, with both low tide (+/- 3 hrs) and high tide (+/- 3 hrs) counts undertaken during each visit. This approach was agreed with NatureScot (see **Appendix 1**). In addition, Forth Ports commissioned an additional single survey in March 2022 which, although above and beyond the scope agreed with NatureScot, provides data from a full, continuous overwintering season (classed as October to March, inclusive).

Owing to the size and logistics of the site, it was necessary for each survey visit to be conducted over two days, with the western half of the study area (S1) counted on one day and the eastern half of the study area (S2) counted on the other. Counts in the impounded dock system (S3) took place on either day.

3.2.2 Recording the abundance and distribution of birds

Estuarine bird count methods were based on the British Trust for Ornithology (BTO) Wetland Bird Survey (WeBS) core (high tide) and low tide count methodology (Bibby *et al.*, 2000). Birds were viewed with the assistance of binoculars and a spotting scope from the strategically positioned vantage points (VPs) identified in **Figure 3.1**, which together gave a sufficient view over the entire study area. During each count, estuarine birds within the study area were counted from each VP and their positions and behaviour marked on field maps. Wherever possible, every effort was made to ensure birds were not double-counted from one VP to the next to ensure that peak counts were as accurate as possible.

All species were recorded using standard BTO two-letter codes and behaviour was recorded using registrations representing loafing activity (L), roosting (R), foraging (F) and flying (Y). Definitions for the above activities are as follows:

- **Loafing birds** were inactive but showed alert behaviour such as head turning;
- **Roosting birds** were inactive with no signs of alert behaviour (often with eyes closed or head tucked under the wing);
- **Foraging birds** were those observed actively seeking food resources within the study area; and
- **Flying birds** were those commuting through the site but not interacting directly with the study area when observed.

Although the survey was not designed to act as a detailed breeding bird survey of the site, any incidental observations of breeding / nesting activity when on site were recorded.

3.2.3 Recording disturbances and weather conditions

The distribution of estuarine birds may be affected by anthropogenic disturbance associated, for example, with recreational use (e.g. walking, dog-walking, angling, bait digging) or activities associated with the operation of the Port (e.g. vessel, plant and vehicle movements). During each survey visit, sources of any observable disturbance events were recorded on the survey forms and the comparative magnitude of such disturbances (i.e. ‘low’, ‘medium’, ‘high’) indicated, with low representing very minor behavioural change, medium representing head turning and / or short-distance movement and high representing prolonged or long-distance movement. However, it should be noted that it was not an aim of the survey to study in detail the behavioural responses to disturbance.

During each survey visit, weather conditions were recorded on the survey forms. Details recorded included wind speed (Beaufort scale), wind direction, rainfall (none, light, moderate or heavy), cloud cover (%) and visibility.

3.2.4 Survey limitations

As noted above, it was necessary for each survey visit to be conducted over two days. While it is acknowledged that there would be some variation in the distribution of estuarine birds in the study area from day to day, twice monthly visits reduce the risk that this would carry and such variations would not significantly detract from the overall conclusions of the study. Wherever possible, the two-day survey visits were planned to be undertaken over consecutive dates when conditions remained consistent.

Visibility challenges in the study area relate to sea fog (or 'haar'), which is periodically present in the Firth of Forth, particularly early in the morning, and increased sea state. While VPs were suitably spaced to easily view the shoreline and nearshore areas even in poor visibility, offshore areas to a distance of 2km are less easy to view during rougher seas or periods of haar. However, surveys were planned in advance to avoid, whenever possible, non-conducive conditions (noting that sometimes it was unforeseen, or unavoidable given light / tide constraints) and the repetition of surveys (i.e. two surveys a month) increases the reliability of counts. Again, this limitation is not considered to significantly detract from the conclusions of the study.

3.2.5 Evaluation of data

The field map registrations have been digitised to present distribution maps for birds of conservation interest (i.e. SPA / Ramsar / SSSI features) that were regularly present during the surveys and / or were present in significant numbers (i.e. in numbers exceeding 1% of the regional reference populations – see below for further detail). These distribution maps are presented in **Appendix 2** and have been used to illustrate the areas of usage within the Port and wider study area and identify key locations. Each individual distribution map presents all records of the species in question throughout the entire survey period (i.e. from March 2021 to March 2022). The maps do not present the maximum number of birds present at any one time – information on peak counts in the study area are instead detailed in **Section 5**.

Peak counts of SPA / Ramsar / SSSI features, defined as the maximum number of a given feature present in any single count of the study area, have been set into the context of reference populations to provide an indication of the importance of the study area for those features at a regional scale. The peak count data supplement WeBS data and have been used in the EIA and HRA for the proposed development. This is standard practice for ornithological assessments as the peak count / mean peak is considered to give a conservative indication of the population within a given area. Peak counts presented in this report did not include flying birds, as defined above, as they were not observed directly using the study area (this is consistent with the approach used for WeBS core counts).

For the purpose of this study, populations across the entire Firth of Forth are deemed to be appropriate regional receptor populations for contextual reference for the numbers present in the study area. For waterbird species, regional receptor populations used are one or both of the following:

- The latest WeBS five-year mean peaks (2015/16 to 2019/20) from the 'Forth Estuary' site; and
- SPA populations as per the relevant citations (NatureScot, 2018a, 2018b and 2020) or the abundance figures presented in NatureScot's (then Scottish Natural Heritage) *Habitats Regulations Appraisal (HRA) on the Firth of Forth: A Guide for developers and regulators* (SNH, 2016).

WeBS data tend not to include counts (or have only partial counts) of seabirds (including gulls and terns), hence for seabird species the reference SPA populations have been applied as the regional receptor populations.

Following convention, if the peak count of a given species exceeds 1% of the regional population, the study area is evaluated as having regional importance for that species. For the most part, the regional importance is categorised as 'low' if the peak count represents between 1% and 5% of the regional population, 'moderate' if it represents between 5% and 20% of the regional population and 'high' if it represents more than 20%. If the peak count does not exceed 1% of the regional total the study area is evaluated as having no regional importance (i.e. it is of local importance only). In some instances, mitigating circumstances (such as the seasonality of peak counts, or the documented distribution of a given species within the Firth of Forth) have been taken into account when concluding the level of regional importance.

4 Tern survey methodology

Common tern surveys were undertaken twice monthly from May to July 2021, inclusive, and at different times of the day to account for any daily variation. Colony counts and flight behaviour surveys were undertaken during each visit.

4.1 Colony counts

Colony counts were undertaken from a suitable VP to the south of the colony (see **Figure 3.1**) using the Census Method One ('Count of Apparently Incubating Adults') for tern species, taken from JNCC's *Seabird Monitoring Handbook* (Walsh *et al.*, 1995). A count of AON, based on the presence of apparently incubating adults, was undertaken during each visit.

4.2 Flight surveys

A generally established protocol for tern flight surveys was not available at the time of undertaking; however, it was agreed with NatureScot (see **Appendix 1**) that a methodology employed for common tern flight surveys undertaken at the Port in 2008-10 (Jennings, 2012) was appropriate. The study area was divided into four sectors, shown in **Figure 4.1**. Working from each sector in turn, the surveyor undertook 20-minute counts of common tern flights passing through each sector heading both towards (inbound) and away from (outbound) the colony. Flight heights were recorded in the categories 0-5m, 5-10m, 10-20m and 20m+, with buildings and other structures used as a visual reference. The data obtained from the survey was used to provide an estimate of the flight rate (i.e. number of flights per hour) through a given sector and at a given height.

Sector 1 formed the only route to sea that did not involve traversing over the Port estate and encompassed birds that flew in and out through the mouth of the Port. Sectors 2, 3 and 4 in **Figure 4.1** encompassed the east / north side of the Port estate. Sector 3 forms the shortest route between the colony and the open sea.

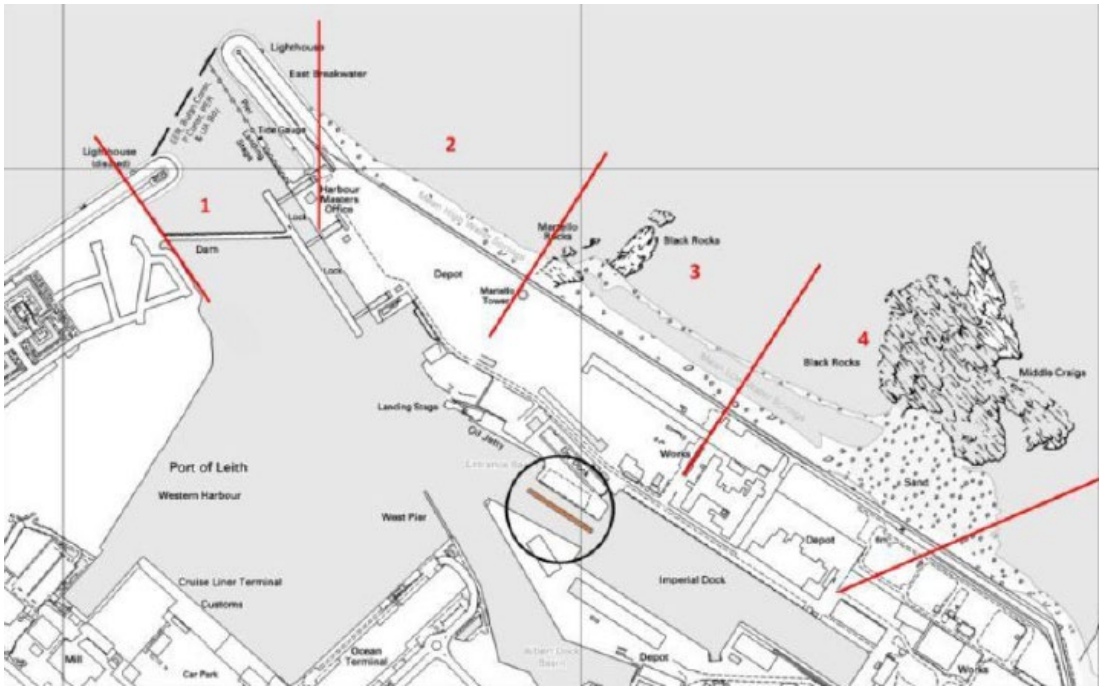

Figure 4.1 Common tern flight survey sectors at Port of Leith (taken from Jennings, 2012)

5 Estuarine bird survey results

5.1 Survey dates and conditions

The survey visits were undertaken twice a month with at least one week between the first and second visit. Dates and weather conditions for each survey are listed in **Table 5.1**.

Wherever possible, survey dates were timed to coincide with favourable weather conditions; however, given the inaccuracies in advance forecasting and the limitations imposed by coinciding hours of daylight and target tides (particularly during winter months) this was not always possible. For the most part, visibility was recorded in the 1-5km, 5-10km and 10km+ range and was noted as sufficient for surveying the entire study area from the identified VPs, although occasionally sea state may have impaired counts at the most offshore extent of the study area. During a small number of survey visits, early morning visibility was reduced due to 'haar' or sea fog, which caused difficulty in counting birds at a distance of more than a few hundred metres offshore but cleared up for counts later in the day and did not affect counts of birds using the shoreline or nearshore area. On all occasions, weather conditions were broadly consistent over the two days of a given survey visit.

Average spring tidal ranges in the outer Firth of Forth are around 4 to 5m, compared with neap tidal ranges of around 2 to 3m, hence availability of intertidal habitat may vary throughout the lunar cycle. However, by undertaking twice-monthly surveys at least one week apart, different phases of the moon are encompassed by the study.

Table 5.1 Dates and weather conditions for each site visit, Mar. 2021 to Feb. 2022

Month (visit #)	Date	Low tide count (+/- 3hr.)			High tide count (+/- 3 hr.)		
		Beaufort scale	Rain	Visibility (km)	Beaufort scale	Rain	Visibility (km)
Mar. '21 (1)	28/03	8-9 WSW	None	5-10	9 SW	None	5-10
	29/03	9 SW	None	5-10	9 SW	None	5-10
Mar. '21 (2)	30/03	7 SW	None	5-10	7 SW	None	5-10
	31/03	2-4 N	None	5-10	4 NE	Light	5-10
Apr. '21 (1)	12/04	2 NW	None	10+	2 WNW	None	10+
	13/04	1	None	10+	1	None	10+
Apr. '21 (2)	19/04	0	None	5-10	0	None	1-5
	20/04	2 WNW	None	5-10	2 WNW	None	5-10
May '21 (1)	01/05	1 ENE	None	10+	1 ENE	None	10+
	02/05	4 W	None	10+	2 W	None	10+
May '21 (2)		2 NE	None	1-5	2 NE	None	1-5
		1 NE	None	<1	2 NE	None	5-10
Jun. '21 (1)	10/06	6 SW	None	5-10	6 SW	None	10+
	11/06	7 W	None	5-10	7 W	None	5-10
Jun. '21 (2)	19/06	2-3 E	Light	5-10	2-3 E	None	5-10
	20/06	2-3 WSW	None	5-10	1 WNW	None	5-10
Jul. '21 (1)	03/07	1 SE	None	1-5	2 SE	Light	1-5
	04/07	1 SE	None	<1	1 SE	None	1-5

Month (visit #)	Date	Low tide count (+/- 3hr.)			High tide count (+/- 3 hr.)		
		Beaufort scale	Rain	Visibility (km)	Beaufort scale	Rain	Visibility (km)
Jul. '21 (2)	17/07	5 SW	None	10+	4 SW	None	10+
	18/07	3 SW	None	10+	2 SW	None	10+
Aug. '21 (1)	06/08	5 SW	Moderate	1-5	5 SE	Light	1-5
	07/08	3-6 NE	None	5-10	5 SE	None	5-10
Aug. '21 (2)	23/08	2 NE	None	1-5	3 NE	None	1-5
	24/08	1 NE	None	<1	3-4 NE	None	1-5
Sep. '21 (1)	05/09	2 SE	None	5-10	3-4 S	None	5-10
	06/09	4-6 SW	Light	1-5	7 SW	None	1-5
Sep. '21 (2)	16/09	5 W	None	5-10	5 W	None	5-10
	17/09	5 SSE	None	5-10	5 SSW	None	5-10
Oct. '21 (1)	04/10	2 SW	None	10+	3 SW	None	10+
	05/10	4 NW	Moderate	1-5	4 N	Moderate	1-5
Oct. '21 (2)	16/10	1 SW	None	5-10	1 E	None	5-10
	17/10	2 NE	Moderate	<1	1 NE	Light	1
Nov. '21 (1)	06/11	8-9 SW	Heavy	<1	8-9 WSW	Heavy	1-5
	07/11	8 W	None	5-10	7 WNW	None	5-10
Nov. '21 (2)	13/11	1-2 W	None	5-10	2 WSW	None	5-10
	14/11	2 S	None	5-10	1 S	None	5-10
Dec. '21 (1)	06/12	3-4 WSW	None to heavy	5-10	3 WSW	None	10+
	07/12	3 ESE	None	10+	5 ESE	Moderate	1-5
Dec. '21 (2)	12/12	1 S	None	5-10	1 S	None	10+
	13/12	2 WSW	None	10+	2 WSW	None	5-10
Jan. '22 (1)	11/01	3 SW	None	10+	3 SW	None	10+
	12/01	3-4 WSW	None	5-10	3-4 WSW	None	5-10
Jan. '22 (2)	18/01	2 SW	None	5-10	3 SW	None	5-10
	19/01	3 W	None	10+	3 W	None	10+
Feb. '22 (1)	02/02	2 SW	None	5-10	3 WSW	None	5-10
	03/02	4-5 SW	None	10+	4-5 WSW	None	5-10
Feb. '22 (2)	24/02	5 SW	None	5-10	4 SSW	Brief snow	1-5
	26/02	3 SW	None	10+	2 SW	None	10+
Mar. '22 (1)	19/03	2 NW	None	10+	4 NE	None	5-10
	20/03	2 SW	None	10+	3 SW	None	10+

5.2 Overview of count data

Over the course of the 25 survey visits, a total of 43 estuarine bird species were recorded interacting directly with the study area (i.e. they used the study area for foraging / roosting / loafing, as opposed to commuting through the study area without stopping).

Species recorded included:

- 12 wildfowl species (mute swan, eider, shelduck, mallard, teal, [Redacted] surf scoter, [Redacted] long-tailed duck, goosander, red-breasted merganser and [Redacted]);
- Great crested grebe;
- 11 wader species (oystercatcher, common sandpiper, [Redacted] [Redacted] curlew, [Redacted] turnstone, knot, sanderling, dunlin and redshank);
- 6 gull species (kittiwake, black-headed gull, common gull, great black-backed gull, herring gull and lesser black-backed gull);
- 3 tern species (Sandwich tern, common tern [Redacted]
- Arctic skua;
- 3 auk species (guillemot, razorbill and puffin);
- [Redacted]
- Fulmar;
- Gannet;
- 2 cormorant species (cormorant and shag); and
- Grey heron.

Table 5.2, **Table 5.3** and **Table 5.4** present peak low tide and high tide counts of the estuarine bird species recorded in each of the three sectors. The tables indicate the months in which peak counts were recorded. **Table 5.5** presents the peak low tide and high tide counts across the entirety of the study area.

Table 5.2 Peak counts in western half of study area (S1), March 2021 to March 2022

Species		Low tide (+/- 3 hr.)		High tide (+/- 3 hr.)	
		Peak count	Month	Peak count	Month
Mute swan	*Cygnus olor*	5	Jan.	9	Jan.
Eider	*Somateria mollissima*	97	Mar. '21	68	Feb.
Mallard	*Anas platyrhynchos*	47	Oct.	46	Oct.
Teal	*Anas crecca*	3	Dec.	2	Jan.
Surf scoter	*Melanitta perspicallata*	0	-	1	Apr.
Long-tailed duck	*Clangula hyemalis*	1	Jan.	0	-
Goosander	*Mergus merganser*	12	Sep.	10	Sep.
Red-breasted merganser	*Mergus serrator*	10	Mar. '21	6	Mar. '21
[Redact					
Great crested grebe	*Podiceps cristatus*	1	Jan.	2	Jan.
Oystercatcher	*Haematopus ostralegus*	29	Feb.	35	Jan.
Common sandpiper	*Actitis hypoleucos*	1	Jul.	0	-
[Redacted]					
[Redacted]					
Curlew	*Numenius arquata*	3	Feb.	0	-
Turnstone	*Arenaria interpres*	14	Dec.	14	Jan.
Redshank	*Tringa totanus*	5	Mar. '21	5	Nov.
Kittiwake	*Rissa tridactyla*	5	Apr.	1	Apr.
Black-headed gull	*Chroicocephalus ridibundus*	141	Sep.	84	Feb.
Common gull	*Larus canus*	6	Sep.	8	Sep.
Great black-backed gull	*Larus marinus*	16	Sep.	5	Feb.
Herring gull	*Larus argentatus*	699	Sep.	270	Aug.
Lesser black-backed gull	*Larus fuscus*	254	Sep.	78	Sep.
Sandwich tern	*Sterna sandvicensis*	20	Aug.	29	Aug.
Common tern	*Sterna hirundo*	9	May	1	Jul.
Arctic skua	*Stercorarius parasiticus*	1	Oct.	0	-
Guillemot	*Uria aalge*	227	Aug.	272	Aug.
Razorbill	*Alca torda*	170	Aug.	130	Aug.
Puffin	*Fratercula arctica*	3	Sep.	3	Jul.
[Redacted]					
Gannet	*Morus bassanus*	8	Apr.	6	Apr.
Shag	*Phalacrocorax aristotelis*	4	Jan.	7	Feb.
Cormorant	*Phalacrocorax carbo*	21	Aug.	8	Aug.; Oct.
Grey heron	*Ardea cinerea*	3	Oct.	1	Dec.

Table 5.3 Peak counts in eastern half of study area (S2), March 2021 to March 2022

Species		Low tide (+/- 3 hr.)		High tide (+/- 3 hr.)	
		Peak count	Month	Peak count	Month
Mute swan	*Cygnus olor*	1	Dec.	1	Jan.
Eider	*Somateria mollissima*	611	Jun.	963	Aug.
Shelduck	*Tadorna tadorna*	2	Mar. '21; Apr; Feb	4	Feb.
Mallard	*Anas platyrhynchos*	38	Nov.	15	Feb.
[Redacted]					
Goosander	*Mergus merganser*	7	Sep.	8	Sep.
Red-breasted merganser	*Mergus serrator*	28	Mar. '21	11	Mar. '21
[Redact					
Great crested grebe	*Podiceps cristatus*	2	May	0	-
Oystercatcher	*Haematopus ostralegus*	284	Mar. '21	287	Nov.
Common sandpiper	*Actitis hypoleucos*	0	-	2	Jul.
[Redacted]					
[Redacted]					
Curlew	*Numenius arquata*	10	Jul.	10	Apr.
[Redacted]					
Turnstone	*Arenaria interpres*	18	Feb.	41	Jan.
Knot	*Calidris canutus*	48	Mar. '21	47	Dec.
Sanderling	*Calidris alba*	2	Jul.	10	Dec.
Dunlin	*Calidris alpina*	270	Nov.	136	Nov.
Redshank	*Tringa totanus*	145	Dec.	187	Nov.
Kittiwake	*Rissa tridactyla*	52	Sep.	57	Sep.
Black-headed gull	*Chroicocephalus ridibundus*	790	Nov.	943	Nov.
Common gull	*Larus canus*	27	Apr.	3	Jul.
Great black-backed gull	*Larus marinus*	49	Dec.	50	Sep.
Herring gull	*Larus argentatus*	577	May	768	Sep.
Lesser black-backed gull	*Larus fuscus*	256	Sep.	363	Aug.
Sandwich tern	*Sterna sandvicensis*	58	Sep.	70	Sep.
Common tern	*Sterna hirundo*	323	Aug.	350	Aug.
Guillemot	*Uria aalge*	824	Sep.	739	Sep.
Razorbill	*Alca torda*	100	Sep.	181	Sep.
Puffin	*Fratercula arctica*	1	Jul.	0	-
[Redacted]					
Fulmar	*Fulmarus glacialis*	3	Jan.	3	Apr.

Species		Low tide (+/- 3 hr.)		High tide (+/- 3 hr.)	
		Peak count	Month	Peak count	Month
Gannet	*Morus bassanus*	45	Sep.	1	Several
Shag	*Phalacrocorax aristotelis*	53	Sep.	28	Sep.
Cormorant	*Phalacrocorax carbo*	119	Sep.	123	Sep.
Grey heron	*Ardea cinerea*	1	Apr; Sep; Jan	0	-

Table 5.4 Peak counts at S3: impounded docks and Port estate, March 2021 to March 2022

Species		Low tide (+/- 3 hr.)		High tide (+/- 3 hr.)	
		Peak count	Month	Peak count	Month
Mute swan	*Cygnus olor*	6	Nov.; Jan.	7	Jan.
Eider	*Somateria mollissima*	237	Mar. '21	242	Mar. '22
Shelduck	*Tadorna tadorna*	2	May	2	May
Mallard	*Anas platyrhynchos*	47	Oct.	40	Mar. '21
Goosander	*Mergus merganser*	6	Jul.	2	Oct.
Red-breasted merganser	*Mergus serrator*	0	-	1	Feb.
[Redact					
Oystercatcher	*Haematopus ostralegus*	3	Nov.	61	Jul.
Common sandpiper	*Actitis hypoleucos*	2	Jul.	0	-
[Redacted]					
Kittiwake	*Rissa tridactyla*	38	Aug.	44	Aug.
Black-headed gull	*Chroicocephalus ridibundus*	364	Dec.	586	Dec.
Common gull	*Larus canus*	3	Dec.	3	Dec.
Great black-backed gull	*Larus marinus*	21	Dec.	35	Oct.
Herring gull	*Larus argentatus*	689	Dec.	597	Nov.
Lesser black-backed gull	*Larus fuscus*	42	Apr.	50	Jun.
Sandwich tern	*Sterna sandvicensis*	0	-	16	Jul.
Common tern	*Sterna hirundo*	800	Jul.	*c.*2,000	May
[Redacted					
Guillemot	*Uria aalge*	6	Oct.	7	Oct.
Razorbill	*Alca torda*	5	Sep.	9	Sep.
Shag	*Phalacrocorax aristotelis*	1	Oct.; Nov.	3	Jul.
Cormorant	*Phalacrocorax carbo*	16	Nov.	23	Jul.
Grey heron	*Ardea cinerea*	2	Jul.	2	Nov.

Table 5.5 Peak counts across the entire study area, March 2021 to March 2022

Species		Low tide (+/- 3 hr.)		High tide (+/- 3 hr.)	
		Peak count	Month	Peak count	Month
Mute swan	*Cygnus olor*	8	Dec.; Jan.	17	Jan.
Eider	*Somateria mollissima*	651	Jun.	976	Aug.
Shelduck	*Tadorna tadorna*	3	May	4	Feb.
Mallard	*Anas platyrhynchos*	81	Nov.	71	Oct.
Teal	*Anas crecca*	3	Dec.	2	Jan.
[Redacted]					
Surf scoter	*Melanitta perspicallata*	0	-	1	Apr.
[Redacted]					
Long-tailed duck	*Clangula hyemalis*	1	Jan.	0	-
Goosander	*Mergus merganser*	12	Sep.	10	Sep.
Red-breasted merganser	*Mergus serrator*	38	Mar. '21	17	Mar. '21
[Redact					
Great crested grebe	*Podiceps cristatus*	2	May	2	Jan.
Oystercatcher	*Haematopus ostralegus*	284	Mar. '21	289	Nov.
Common sandpiper	*Actitis hypoleucos*	2	Jul.	2	Jul.
[Redacted]					
Curlew	*Numenius arquata*	12	Jul.	10	Apr.
[Redacted]					
Turnstone	*Arenaria interpres*	26	Dec.	43	Jan.
Knot	*Calidris canutus*	48	Mar. '21	47	Dec.
Sanderling	*Calidris alba*	2	Jul.	10	Dec.
Dunlin	*Calidris alpina*	270	Nov.	136	Nov.
Redshank	*Tringa totanus*	146	Dec.	192	Nov.
Kittiwake	*Rissa tridactyla*	52	Sep.	57	Sep.
Black-headed gull	*Chroicocephalus ridibundus*	1,177	Nov.	1,534	Nov.
Common gull	*Larus canus*	27	Apr.	8	Sep.
Great black-backed gull	*Larus marinus*	72	Dec.	70	Dec.
Herring gull	*Larus argentatus*	1,303	Sep.	1,108	Sep.
Lesser black-backed gull	*Larus fuscus*	523	Sep.	441	Aug.
Sandwich tern	*Sterna sandvicensis*	69	Sep.	84	Aug.
Common tern	*Sterna hirundo*	839	Aug.	*c.*2,000	May
[Redacted]					
Arctic skua	*Stercorarius parasiticus*	1	Oct.	0	-

Species		Low tide (+/- 3 hr.)		High tide (+/- 3 hr.)	
		Peak count	Month	Peak count	Month
Guillemot	*Uria aalge*	995	Sep.	826	Sep.
Razorbill	*Alca torda*	200	Aug.	209	Aug.
Puffin	*Fratercula arctica*	3	May	3	Jul.
[Redacted]					
Fulmar	*Fulmarus glacialis*	3	Jan.	3	Apr.
Gannet	*Morus bassanus*	48	Sep.	6	Apr.
Shag	*Phalacrocorax aristotelis*	53	Sep.	28	Sep.
Cormorant	*Phalacrocorax carbo*	141	Sep.	139	Sep.
Grey heron	*Ardea cinerea*	3	Oct.	2	Nov.; Dec.

The most numerous species recorded was common tern (peak count of *c*.2,000 individuals), which is unsurprising given the presence of the active breeding colony within the study area at Imperial Dock Lock, Leith SPA. Other abundant species recorded included gull species, notably black-headed gull (peak count of 1,534 individuals) and herring gull (1,303 individuals), eider (976 individuals) and, during the post-migration breeding period, auks (particularly guillemot; peak count of 995 individuals). Oystercatcher was the most abundant wader species recorded in the study area (peak count of 289 individuals).

5.3 Species accounts for SPA / Ramsar / SSSI features

Of the species recorded in the study area, 32 are species that either qualify in their own right as features of the SPAs / Ramsar Site (and underpinning SSSI) listed in **Table 2.1** or are named components of qualifying assemblages. This section provides further detail on the counts and distribution of such species. Note that common tern is not included in this section; full detail for this species is instead provided in **Section 6** of this report.

Where reference is made to distribution maps, these are **Figures A.1** to **A.26** in **Appendix 2**.

[Redacted]

5.3.2 Black-headed gull

Moderate to high numbers of black-headed gulls were recorded throughout the survey period (see **Table 5.7**). Highest numbers were recorded between October and February and lowest numbers between April and July. A peak count of 1,534 individuals was recorded during the second November high tide count. Distribution of this species across the overall study area, plus an indication of the behaviour observed, is illustrated in **Figure A.2**.

Black-headed gulls were recorded across the site, though loafing / roosting behaviour was particularly prominent during high tide (+/-3 hrs) counts within the impounded dock system and on quaysides within the Port, including use of the East Breakwater and the existing structure at Leith Outer Berth. Loafing / roosting behaviour was also frequently recorded on the intertidal areas in the far west (Newhaven seafront) and far east (East Sands of Leith) of the study area. Foraging activity was concentrated around the East Sands of Leith during low tide (+/-3 hr) counts, with large groups foraging at this location. Notable numbers were also observed foraging along the Newhaven seafront.

In the context of regional numbers, the peak count of 1,534 individuals represents 5.7% of the OFFSABC SPA reference population (26,835 individuals; NatureScot, 2020). Although the peak count represents more than 5% of the reference population, black-headed gull is known to be widespread and numerous throughout the Firth of Forth (SNH, 2016) and, as such, it is unlikely that the study area would have any particular importance in the context of the wider area. As such, the study area is considered to have **low regional importance** for black-headed gull.

Table 5.7 Monthly peak counts of black-headed gull, March 2021 to March 2022

Sector	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
S1	0	0	0	0	18	47	141	58	71	101	74	125	0
S2	145	1	5	7	81	179	385	684	943	647	527	537	13
S3	0	0	0	0	35	92	142	415	556	586	264	495	8
All	**145**	**1**	**5**	**7**	**100**	**236**	**489**	**1,107**	**1,534**	**871**	**755**	**851**	**20**

5.3.3 Common gull

Very low to low numbers of common gulls were recorded throughout the survey period (see **Table 5.8**). Distribution of this species across the study area and an indication of the behaviour observed is illustrated in **Figure A.3**.

Observations were principally in the east half of the study area, with very small numbers present in the impounded dock system and a small group of up to eight individuals recorded in the west half of the study area in September. A peak count of 27 individuals was recorded during the second April low tide count, which was considerably higher than any other month. This group was recorded primarily loafing / roosting at the East Sands of Leith.

Foraging behaviour was only recorded on five occasions, mostly at the East Sands of Leith and each time by groups of 1 to 3 individuals.

Common gull is widespread and numerous throughout the Firth of Forth (SNH, 2016) and, in the context of regional numbers, the peak count represents 0.2% of the OFFSABC SPA reference population (14,647 individuals; NatureScot, 2020). As such, the study area is considered to have **no regional importance** for common gull (i.e. local importance only).

Table 5.8 Monthly peak counts of common gull, March 2021 to March 2022

Sector	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
S1	0	0	0	0	0	0	8	0	0	0	0	0	0
S2	0	27	1	0	4	0	0	0	0	2	3	1	2
S3	0	0	0	0	1		1	0	0	3	2	0	0
All	**0**	**27**	**1**	**0**	**4**	**0**	**8**	**0**	**0**	**4**	**4**	**1**	**2**

5.3.4 Common scoter

Common scoters were only recorded on a single occasion, which comprised a group of 22 individuals loafing offshore in the eastern half of the study area (S2) during the second August low tide count. Given that this was an isolated record, it is likely that it was an incidental sighting of migrating individuals. Regardless, in the context of regional numbers, the peak count represents 0.8% of the Firth of Forth SPA reference population (2,880 individuals; NatureScot, 2018b) and 0.6% of the WeBS 5-year mean peak in the Forth Estuary (3,575 individuals; 2015/16 to 2019/20). As such, the study area is considered to have **no regional importance** for common scoter (i.e. local importance only).

Common scoter is also a named feature of the qualifying non-breeding waterbird assemblages of the OFFSABC SPA. The peak count of 22 individuals represents 0.5% of the SPA reference population (4,677 individuals; NatureScot, 2020).

5.3.5 Cormorant

Cormorants were recorded in varying numbers throughout the survey period (see **Table 5.9**). Counts in August (107 individuals) and September (141 individuals) were significantly higher than all other months; lowest counts were recorded between December and May. Distribution of this species across the study area and an indication of behaviour observed is illustrated in **Figure A.5**.

The highest counts were of loafing / roosting birds recorded in the east half of the survey, particularly in the far east area (East Sands of Leith and Eastern Craigs), at the Middle Craigs and along the beach to the east of the East Breakwater. Smaller numbers were recorded in the dock system, although an old wooden pier structure near the entrance to the Victoria and Albert Docks was regularly used for loafing / roosting.

By comparison, foraging activity was recorded at a relatively low intensity, and was distributed throughout most of the marine area.

During the breeding season (April to August; Furness, 2015), a peak count of 107 individuals was recorded during the second August survey visit. In the context of regional numbers, 107 birds represent 26.8% of the Forth Islands SPA breeding season reference population (200 pairs; SNH 2016).

During the non-breeding season (September to March; Furness, 2015), a peak count of 141 individuals was recorded during the second September survey visit. The peak count represents 20.7% of the Firth of Forth

SPA non-breeding season reference population (682 individuals; NatureScot, 2018b) and 27% of the WeBS 5-year mean peak in the Forth Estuary (522 individuals; 2015/16 to 2019/20).

Monthly peaks in August and September were significantly higher than all other counts (the next highest count was 65 individuals in November). Given that August and September are at the height of the post-breeding migration period (Furness, 2015), numbers are likely to be considerably elevated by migrating birds from other regions. As such, and given the fact that cormorant is known to be widespread and common throughout the Firth of Forth (SNH, 2016), the study area is considered to have **moderate regional importance** for this species despite the peak count representing more than 20% of the reference population.

Table 5.9 Monthly peak counts of cormorant, March 2021 to March 2022

Sector	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
S1	5	3	5	5	4	21	8	8	5	4	3	3	1
S2	10	9	13	38	47	103	123	43	48	10	5	11	2
S3	0	0	1	4	23	0	14	10	16	1	2	1	4
All	**15**	**10**	**16**	**43**	**51**	**107**	**141**	**46**	**65**	**12**	**8**	**15**	**6**

5.3.6 Curlew

Very low to low numbers of curlew were recorded throughout the survey period (see **Table 5.10**), with absence in some months. A peak count of 12 loafing / foraging individuals was recorded during the second July low tide count. Distribution of this species across the study area and an indication of the behaviour observed is illustrated in **Figure A.6**.

Observations were almost entirely in the eastern half of the survey (very small numbers were recorded at the west end of the study area). Generally speaking, at high tide birds were recorded along the upper foreshore of the beach between East Breakwater and Middle Craigs. At low tide, birds were predominantly recorded foraging on the intertidal rock and soft sediment at Middle Craigs and East Sands of Leith, in the far east of the study area.

Curlew is widespread and numerous throughout the Firth of Forth (SNH, 2016). In the context of regional numbers, the peak count of 12 individuals represents 0.6% of the Firth of Forth SPA reference population (1,928 individuals; SNH, 2016) and 0.4% of the WeBS 5-year mean peak in the Forth Estuary site (3,392 individuals; 2015/16 to 2019/20). As such, the study area is considered to have **no regional importance** for curlew.

Table 5.10 Monthly peak counts of curlew, March 2021 to March 2022

Sector	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
S1	0	0	0	0	2	0	0	0	0	0	0	3	0
S2	2	10	1	0	10	0	6	6	6	2	7	4	7
All	**2**	**10**	**1**	**0**	**12**	**0**	**6**	**6**	**6**	**2**	**7**	**7**	**7**

5.3.7 Dunlin

Dunlin was absent from the site for most of the year. Very low to low numbers were present in September and December. In November, however, a large group of 270 individuals was recorded during the second count of the month (see **Table 5.11**). Distribution of this species across the study area and an indication of the behaviour observed is illustrated in **Figure A.7**.

Dunlin were recorded almost exclusively from the East Sands of Leith, at the far east of the study area. Foraging groups were recorded at low tide on the intertidal soft sediment, whilst at high tide (+/-3 hrs) the groups were recorded loafing / roosting at the Eastern Craigs.

Dunlin are known to be widespread and numerous throughout the Firth of Forth (SNH, 2016, and in the context of regional numbers, the peak count of 270 individuals represents 2.8% of the Firth of Forth SPA reference population (9,514 individuals; SNH, 2016) and 4.5% of the WeBS 5-year mean peak in the Forth Estuary (6,061 individuals; 2015/16 to 2019/20). As such, the study area is considered to have **low regional importance** for dunlin.

Table 5.11 Monthly peak counts of dunlin, March 2021 to March 2022

Sector	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
S2	0	0	0	0	0	0	16	0	270	2	0	0	0
All	**0**	**0**	**0**	**0**	**0**	**0**	**16**	**0**	**270**	**2**	**0**	**0**	**0**

5.3.8 Eider

Eider were ubiquitous throughout the survey period and were the most abundant waterfowl species recorded (see **Table 5.12**). Highest numbers were observed from June to September, with numbers then reducing over the winter months. A peak count of 976 roosting, loafing and foraging individuals was recorded at high tide (+/- 3 hrs) during the first August survey visit. Distribution of this species across the study area and an indication of the behaviour observed is illustrated in **Figure A.8**.

Eider sightings were distributed across the entirety of the study area, in offshore, nearshore and intertidal habitats as well as within the impounded dock system. Large groups of loafing / roosting eider were recorded regularly around the East Breakwater, along the Middle Craigs and Eastern Craigs, and at the East Sands of Leith. Comparatively large numbers were also recorded loafing / roosting in sheltered waters within the Port, particularly at Imperial Dock.

Foraging activity was mainly recorded offshore, at a distance of *c*.500m or more offshore, generally in the eastern half of the study area, with only small groups or individuals recorded foraging in nearshore areas.

In the context of regional numbers, the peak count represents 10.4% of the Firth of Forth SPA reference population (9,400 individuals; NatureScot, 2018b) and 19.4% of the WeBS 5-year mean peak in the Forth Estuary (5,018 individuals; 2015/16 to 2019/20). As such, the study area is considered to have **moderate regional importance** for eider; however, eider is known to be common in the outer Firth of Forth and, furthermore, counts in late summer / early autumn are likely to be inflated by the presence of young birds (SNH, 2016).

Eider is a named component of the qualifying non-breeding waterbird assemblage of the OFFSABC SPA. The peak count of 976 individuals represents 4.5% of the SPA reference population (21,546 individuals; NatureScot, 2020).

Table 5.12 Monthly peak counts of eider, March 2021 to March 2022

Sector	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
S1	97	52	28	17	18	35	22	20	5	48	45	69	88
S2	198	120	171	666	456	963	522	96	18	237	156	107	237
S3	237	36	58	45	147	35	17	9	3	4	7	8	242
All	**414**	**154**	**213**	**703**	**542**	**976**	**540**	**105**	**21**	**255**	**182**	**135**	**495**

5.3.9 Gannet

Very low to moderate numbers of gannet were recorded in April, August, September and October (coinciding with migration periods), and were absent at all other times (see **Table 5.13**). Distribution of this species across the study area and an indication of the behaviour observed is illustrated in **Figure A.9**.

Gannets were generally recorded at a distance of *c.*1km or more offshore, either loafing on the water or foraging. Small numbers were recorded in nearshore areas, particularly around the Middle Craigs in the eastern side of the study area.

A peak count of 48 loafing individuals was recorded at high tide (+/- 3 hrs) during the first September survey visit. Gannet is locally numerous in the outer Firth of Forth (SNH, 2016), and in the context of regional numbers the peak count represents 0.1% of the Forth Islands SPA reference population (21,600 pairs; SNH, 2016) and 0.4% of the OFFSABC SPA reference population (10,945 individuals; NatureScot, 2020). As such, the study area is considered to have **no regional importance** for gannet (i.e. local importance only).

Table 5.13 Monthly peak counts of gannet, March 2021 to March 2022

Sector	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
S1	0	8	0	0	0	0	3	0	0	0	0	0	0
S2	0	0	0	0	0	6	45	1	0	0	0	0	1
All	**0**	**8**	**0**	**0**	**0**	**6**	**48**	**1**	**0**	**0**	**0**	**0**	**1**

5.3.10 Goldeneye

Although absent throughout much of the year, reasonably high numbers of goldeneye were present in the study area over the wintering months (November to February) (see **Table 5.14**). A peak count of 413 (primarily loafing) individuals was recorded at high tide (+/- 3 hrs) during the first January survey visit. Distribution of this species across the study area and an indication of the behaviour observed is illustrated in **Figure A.10**.

Few goldeneye were recorded in the eastern half of the study area. Generally, groups of goldeneye were recorded loafing in nearshore / offshore areas in the western half of the study area, within the embayment formed by the Newhaven promenade / West Breakwater and Granton Harbour, and within the impounded dock system. The largest groups were recorded in Imperial Dock. Foraging activity was not recorded in the dock system; instead, most of the foraging activity observed during the survey period was in the embayment in the western half of the study area, with sightings of foraging individuals also recorded offshore.

In the context of regional numbers, the peak count of 413 individuals represents 13.7% of the Firth of Forth SPA reference population (3,004 individuals; NatureScot, 2018b) and 26.2% of the WeBS 5-year mean peak in the Forth Estuary site (1,577 individuals; 2015/16 to 2019/20). As such, the study area is considered to have **moderate to high regional importance** for goldeneye during the winter months (November to February).

Goldeneye is also a named component of the qualifying non-breeding waterbird assemblage of the OFFSABC SPA. The peak count of 413 individuals represents 70.1% of the SPA reference population (589 individuals; NatureScot, 2020).

Table 5.14 Monthly peak counts of goldeneye, March 2021 to March 2022

Sector	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
S1	0	2	0	0	0	0	0	0	160	183	174	108	0
S2	0	0	0	0	0	0	0	0	0	56	11	28	0
S3	0	0	0	0	0	0	0	0	115	60	236	82	0
All	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**160**	**245**	**413**	**150**	**0**

5.3.11 Great crested grebe

Very low numbers of great crested grebe were recorded loafing and foraging offshore in May, December and January (see **Table 5.15**). In the west half of the study area (S1) a peak count of two (one foraging, one loafing) was recorded during the second January high tide count. In the east half of the study area (S2) the only record was two loafing individuals during the second low tide count in May. In the context of regional numbers, the peak count represents 0.3% of the Firth of Forth SPA reference population (720 individuals; SNH, 2016) and 2.4% of the WeBS 5-year mean peak in the Forth Estuary site (85 individuals; 2015/16 to 2019/20). As such, the study area is considered to have **no to low regional importance** for great crested grebe.

Table 5.15 Monthly peak counts of great crested grebe, March 2021 to March 2022

Sector	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
S1	0	0	0	0	0	0	0	0	0	1	2	0	0
S2	0	0	2	0	0	0	0	0	0	0	0	0	0
All	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**2**	**0**	**0**

5.3.12 Guillemot

For most of the year, guillemot were either absent from the study area or present only in low to very low numbers (see **Table 5.16**). However, high numbers were recorded during the months of August and September, which coincides with the post-migration breeding season. A peak count of 995 individuals, primarily loafing offshore, was recorded at low tide (+/- 3 hrs) during the first September survey visit. Distribution of this species across the study area and an indication of the behaviour observed is illustrated in **Figure A.11**.

Almost all guillemot recorded in the study area were displaying loafing behaviour. Sightings were distributed across the marine area out to a distance of c.1km offshore, though it may be that birds further offshore were difficult to see. Large groups of guillemot together on the sea were most regularly recorded in the central part of the study area near to the entrance to the Port, although reasonably sized groups were seen in marine areas both in the west and east of the study area.

Guillemot is locally numerous in the outer Firth of Forth (SNH, 2016), and in the context of regional numbers the peak count represents 2.6% of the Forth Islands SPA reference population (16,000 pairs; SNH, 2016) and 2.9% of the OFFSABC SPA reference population (28,123 individuals; NatureScot, 2020). August and September are at the height of the post-breeding migration period in UK waters (Furness, 2015), when numbers are likely to be considerably elevated by migrating birds from other regions. Outside of these months, abundance in the study area was very low. As such, the study area is considered to have **no to low regional importance** for guillemot.

Table 5.16 Monthly peak counts of guillemot, March 2021 to March 2022

Sector	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
S1	0	0	1	0	2	272	167	13	3	0	0	0	0
S2	0	1	1	0	0	132	824	8	1	0	0	0	0
S3	0	0	0	0	0	0	6	7	0	0	0	0	0
All	**0**	**0**	**2**	**0**	**2**	**404**	**995**	**26**	**4**	**0**	**0**	**0**	**0**

5.3.13 Herring gull

Herring gulls were ubiquitous throughout the survey period and were present in reasonably high numbers each month (see **Table 5.17**). A peak count of 1,303 individuals was recorded during the first September survey visit. Distribution of this species across the study area and an indication of the behaviour observed is illustrated in **Figure A.12**.

Loafing / roosting birds were observed on a regular basis across the entirety of the shoreline and nearshore in the study area and within all areas of the impounded dock system. Groups of birds were present on the quaysides and within the Port estate itself. Large numbers were also recorded loafing in offshore areas.

Foraging activity was concentrated in intertidal / nearshore areas at Middle Craigs, Eastern Craigs and the East Sands of Leith at low tide (+/-3 hrs), all of which are near to the eastern boundary of the study area. Lower intensity foraging activity was also recorded along the shoreline at Newhaven, in the western half of the study area. Reasonably large groups of birds were also recorded foraging in offshore areas.

During the breeding season (March to August; Furness, 2015), a peak count of 879 individuals was recorded during the second August survey visit. In the context of regional numbers, 879 birds represents 6.6% of the Forth Islands SPA breeding season reference population (6,600 pairs; SNH 2016). During the non-breeding season (September to February; Furness, 2015), a peak count of 1,303 individuals was recorded during the first September survey visit. The peak count represents 10.6% of the OFFSABC SPA non-breeding season reference population (12,313 individuals; NatureScot, 2020). Although the peak count represents more than 5% of the reference population, herring gull is known to be widespread and numerous throughout the Firth of Forth (SNH, 2016) and, as such, it is unlikely that the study area would have any particular importance in the context of the wider area. As such, the study area is considered to have **low regional importance** for herring gull.

Table 5.17 Monthly peak counts of black-headed gull, March 2021 to March 2022

Sector	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
S1	119	75	74	52	64	270	699	76	166	93	48	68	78
S2	144	201	577	357	260	560	768	145	409	316	316	123	448
S3	64	45	55	135	28	105	113	113	597	689	410	386	497
All	**302**	**303**	**666**	**419**	**345**	**879**	**1,303**	**299**	**973**	**847**	**632**	**577**	**953**

5.3.14 Kittiwake

Kittiwakes were absent, or present in low to very low numbers, throughout most of the year (see **Table 5.18**); however, higher numbers were recorded specifically in August and September (which coincides with the post-breeding migration season (Furness, 2015). A peak count of 57 roosting / loafing individuals was recorded during the first September survey visit. Distribution of this species across the study area and an indication of the behaviour observed is illustrated in **Figure A.13**.

When present in August and September, kittiwake abundance was, for the most part, accounted for by groups of resting birds present on the existing structures at Leith Outer Berth and along the western wall of the entrance lock to the Port, at both high and low tide. It is likely that these structures were used as a resting point for groups of post-breeding passage birds. Foraging activity was mainly recorded in low numbers offshore.

Kittiwake is widespread and locally numerous in the outer Forth Estuary (SNH, 2016) and, in the context of regional numbers, the peak count of 57 individuals represents 0.3% of the Forth Islands SPA reference population (8,400 pairs; SNH, 2016). As such, the study area is considered to have **no regional importance** for kittiwake (i.e. local importance only).

Kittiwake is a named component of the qualifying breeding and non-breeding seabird assemblages of the OFFSABC SPA. The peak count during the breeding season (March to August; Furness, 2015) represents 0.4% of the SPA breeding season reference population (12,020 individuals; NatureScot, 2020). The peak count during the non-breeding season (September to February; Furness, 2015) represents 1.8% of the SPA non-breeding season reference population (3,191 individuals; NatureScot, 2020).

Table 5.18 Monthly peak counts of kittiwake, March 2021 to March 2022

Sector	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
S1	0	5	0	0	0	0	0	2	0	0	0	0	0
S2	0	33	7	0	0	0	57	0	0	0	0	0	0
S3	0	0	0	0	0	44	0	0	0	0	0	0	0
All	**0**	**34**	**7**	**0**	**0**	**44**	**57**	**2**	**0**	**0**	**0**	**0**	**0**

5.3.15 Knot

Knot were recorded in varying numbers in Mar, April, July and December, and were absent at all other times (see **Table 5.19**). A peak count of 48 foraging individuals was recorded at low tide (+/-3 hrs) during the second March survey visit. Distribution of this species across the study area and an indication of the behaviour observed is illustrated in **Figure A.14**.

Observations were exclusively in the eastern half of the survey, with almost all recorded at East Sands of Leith (in the far east of the study area). At high tide, birds were recorded along the upper shore, while at low tide birds were recorded foraging on the intertidal soft sediment.

Knot is widespread and locally numerous in the Firth of Forth (SNH), and in the context of regional numbers the peak count of 48 individuals represents 0.5% of the Firth of Forth SPA reference population (9,258 individuals; SNH, 2016) and 1.4% of the WeBS 5-year mean peak in the Forth Estuary (3,370 individuals; 2015/16 to 2019/20). As such, the study area is considered to have **no to low regional importance** for knot.

Table 5.19 Monthly peak counts of knot, March 2021 to March 2022

Sector	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
S2	48	11	0	0	2	0	0	0	0	47	0	0	13
All	**48**	**11**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**47**	**0**	**0**	**13**

5.3.16 Lesser black-backed gull

Lesser black-backed gull numbers recorded in the study area were highly variable throughout the survey period (see **Table 5.20**). During the main winter months of December to February, this species was absent. Low to moderate numbers were present in spring, early summer and autumn; however, significantly higher numbers were present in August (441 individuals) and September (523 individuals). Distribution of this species across the study area and an indication of the behaviour observed is illustrated in **Figure A.15**.

Lesser black-backed gulls were observed across the entirety of the study area, particularly in nearshore and coastal areas, as well as within the impounded dock system. Distribution of roosting / loafing birds appeared to be fairly even across the study area, although notably large groups were present within the dock system, particularly Edinburgh Dock and the Western Harbour, on the Middle Craigs rocky outcrop and the beach at East Sand of Leith, and along the East Breakwater.

Foraging numbers were lower, and mostly recorded at low tide. The distribution of foraging activity was concentrated around the intertidal habitat at the East Sands of Leith, Middle Craigs and Eastern Craigs, near to the eastern boundary of the study area.

During the breeding season (April to August; Furness, 2015), a peak count of 441 individuals was recorded during the second August survey visit. In the context of regional numbers, 441 birds represents 14.7% of the Forth Islands SPA reference population (1,500 pairs; SNH 2016). During the non-breeding season (September to February; Furness, 2015), a peak count of 523 individuals was recorded during the first September survey visit, representing 17.4% of the reference population. While these counts exceed 5% of the regional reference population, monthly peaks in August and September were significantly higher than all other counts and, given that this is the height of the post-breeding migration period in UK waters (Furness, 2015), numbers are likely to be considerably elevated by migrating birds from other regional populations. As such, and given the fact that lesser black-backed gull is known to be widespread and numerous throughout the Forth Estuary (SNH, 2016), the study area is considered to have **low regional importance** for this species.

Table 5.20 Monthly peak counts of lesser black-backed gull, March 2021 to March 2022

Sector	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
S1	4	6	16	14	5	34	254	6	3	0	0	0	0
S2	28	51	52	42	11	363	256	22	0	0	0	0	1
S3	7	42	27	50	31	44	33	20	3	0	0	0	13
All	**35**	**75**	**62**	**76**	**35**	**441**	**523**	**43**	**6**	**0**	**0**	**0**	**13**

5.3.17 Long-tailed duck

A single long-tailed duck was recorded foraging on the sea off Newhaven during the second January low tide count. Given that this was an isolated record, it is likely that it was an incidental sighting of a migrating individual. Regardless, in the context of regional numbers, the peak count represents 0.1% of the Firth of Forth SPA reference population (1,045 individuals; SNH, 2016) and 0.6% of the WeBS 5-year mean peak in the Forth Estuary (181 individuals; 2015/16 to 2019/20). As such, the study area is considered to have **no regional importance** for long-tailed duck (i.e. local importance only).

Although a named feature of the qualifying non-breeding waterbird assemblage of the OFFSABC SPA, one individual represents 0.05% of the SPA reference population (1,948 individuals; NatureScot, 2020).

5.3.18 Mallard

Low to moderate numbers of mallard were recorded year-round, with a peak count of 81 individuals recorded at low tide (+/- 3 hrs) during the second November survey visit (see **Table 5.21**). Distribution of this species across the study area and an indication of the behaviour observed is illustrated in **Figure A.16**.

Mallards were mainly recorded within the impounded dock system, with observations of loafing / roosting individuals in Edinburgh Dock, Victoria Dock, Imperial Dock and particularly Albert Dock and the Western Harbour. Foraging and resting mallards were also regularly associated with the small scrapes on the brownfield land just to the south of the West Breakwater lighthouse. Mallards were rarely recorded along the shoreline outside of the Port, although a group of 38 individuals was recorded together on the intertidal soft sediment habitat near to Middle Craigs, in the eastern half of the study area, during the second November survey visit.

In the context of regional numbers, the peak count of 81 individuals represents 3.2% of the Firth of Forth SPA reference population (2,564 individuals; SNH, 2016). While 81 individuals represents 7.0% of the WeBS 5-year mean peak in the Forth Estuary (1,164 individuals; 2015/16 to 2019/20), mallard is widespread and common throughout the Firth of Forth (SNH, 2016). As such, the study area is considered to have **low regional importance** for mallard.

Table 5.21 Monthly peak counts of mallard, March 2021 to March 2022

Sector	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
S1	6	8	13	22	11	17	45	47	41	36	31	25	6
S2	0	0	0	0	0	0	0	8	38	0	0	15	1
S3	40	1	14	8	26	0	0	47	33	13	2	30	8
All	**44**	**9**	**25**	**28**	**34**	**17**	**45**	**75**	**81**	**48**	**31**	**55**	**15**

5.3.19 Oystercatcher

Moderate to relatively high numbers of oystercatcher were present in the survey year-round (see **Table 5.22**), with the highest numbers recorded during the wintering season. A peak count of 289 roosting / loafing individuals was recorded at high tide (+/- 3 hrs) during the first November survey visit. Distribution of this species across the study area and an indication of behaviour observed is illustrated in **Figure A.17**.

Oystercatchers were recorded along the shoreline across most the study area. The largest numbers recorded were at high tide (+/-3 hrs), when loafing / roosting behaviour was the main activity observed. Resting birds, including large groups of birds, were distributed mainly along the foreshore in the eastern half of the study area, between East Breakwater and the eastern boundary of the study area. The highest densities were recorded at the East Sands of Leith (near the eastern boundary).

Foraging activity was primarily recorded on soft sediment and rocky outcrop habitats at low tide (+/-3 hrs). The most regularly used habitats were those at East Sands of Leith and Middle and Eastern Craigs, near the eastern boundary of the study area. Foraging birds were also present in smaller numbers along the Newhaven shoreline (in the western half of the study area) as well as on the beach to the east of East Breakwater.

Oystercatcher is widespread and numerous throughout the Firth of Forth (SNH, 2016) and, in the context of regional numbers, the peak count of 289 individuals represents 3.7% of the Firth of Forth SPA reference population (7,846 individuals; SNH, 2016) and 4.2% of the WeBS 5-year mean peak in the Forth Estuary

(6,782 individuals; 2015/16 to 2019/20). As such, the study area is considered to have **low regional importance** for oystercatcher.

Table 5.22 Monthly peak counts of oystercatcher, March 2021 to March 2022

Sector	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
S1	3	2	3	2	5	18	12	8	11	26	35	29	0
S2	284	90	71	67	131	138	271	208	287	197	163	147	164
S3	0	0	0	0	61	1	0	0	3	0	2	0	0
All	**284**	**90**	**74**	**69**	**131**	**156**	**277**	**214**	**289**	**197**	**198**	**168**	**164**

5.3.20 Puffin

Very low numbers of puffins were recorded loafing offshore in May and July (see **Table 5.23**). In the west half of the study area (S1) a peak count of three was recorded in both months. In the east half of the study area (S2) a single loafing individual was recorded during the first low tide count in July. Although a qualifying breeding feature of the Forth Islands SPA, the peak count of three individuals represents 0.01% of the SPA reference population (14,000 pairs; NatureScot, 2018a). Puffin is also a named component of the qualifying breeding seabird assemblage of the OFFSABC SPA; however, three individuals represent less than 0.01% of the SPA reference population (61,086 individuals; NatureScot 2020). The study area is considered to have **no regional importance** for puffin.

Table 5.23 Monthly peak counts of puffin, March 2021 to March 2022

Sector	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
S1	0	0	3	0	3	0	0	0	0	0	0	0	0
S2	0	0	0	0	1	0	0	0	0	0	0	0	0
All	**0**	**0**	**3**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

5.3.21 Razorbill

Razorbills were present in relatively high numbers during the post-breeding migration period (August and September), and much lower numbers at all other times of the year (see **Table 5.24**). They were absent from the site during the migration-free breeding period (May to July; Furness, 2015). A peak count of 209 individuals, primarily loafing offshore, was recorded at high tide (+/- 3 hrs) during the second August survey visit. Distribution of this species across the study area and an indication of the behaviour observed is illustrated in **Figure A.18**.

Almost all birds recorded were loafing on the water, with very few observed foraging. Observations were distributed across the study area, with groups present in both offshore and nearshore areas. Highest concentrations were recorded near the entrance to the Port and off the West Breakwater. Small numbers were recorded in the impounded dock system, in the western harbour.

Razorbill is locally numerous in the outer Firth of Forth (SNH, 2016), and in the context of regional numbers the peak count represents 7.5% of the Forth Islands SPA reference population (1,400 pairs; SNH, 2016) and 3.8% of the OFFSABC SPA reference population (5,481 individuals; NatureScot, 2020). August and September are at the height of the post-breeding migration period in UK waters (Furness, 2015), when numbers are likely to be considerably elevated by migrating birds from other regions. Outside of these months, abundance in the study area was very low. As such, the study area is considered to have **no to low regional importance** for razorbill.

Table 5.24 Monthly peak counts of razorbill, March 2021 to March 2022

Sector	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
S1	0	19	0	0	0	170	19	18	1	1	0	0	1
S2	0	1	0	0	0	79	181	0	2	2	0	0	3
S3	0	0	0	0	0	0	9	3	0	0	0	0	0
All	**0**	**19**	**0**	**0**	**0**	**209**	**203**	**21**	**3**	**2**	**0**	**0**	**4**

5.3.22 Red-breasted merganser

Red-breasted merganser were absent from the study area between May and September and were present in low numbers in April and October to December. Higher counts were recorded between January and March, with a peak of 38 roosting / loafing individuals recorded at low tide (+/- 3 hrs) during the second March survey visit (see **Table 5.25**). Distribution of this species across the study area and an indication of the behaviour observed is illustrated in **Figure A.19**.

Both foraging and loafing / roosting activity was recorded in nearshore and offshore areas throughout the study area, although with concentrations notably increasing towards the east and west boundaries of the study area (perhaps to avoid vessel traffic to and from the Port). In nearshore areas, resting and foraging individuals were recorded in highest numbers between Middle Craigs and Eastern Craigs.

Red-breasted merganser is widespread across the Firth of Forth (SNH, 2016); however, in the context of regional numbers, the peak count of 38 individuals represents 5.7% of the Firth of Forth SPA reference population (670 individuals; SNH, 2016) and 12.8% of the WeBS 5-year mean peak in the Forth Estuary site (296 individuals; 2015/16 to 2019/20). As such, the study area is considered to have **moderate regional importance** for red-breasted merganser.

Red-breasted merganser is a named component of the qualifying non-breeding waterbird assemblage of the OFFSABC SPA. The peak count of 38 individuals represents 8.8% of the SPA reference population (431 individuals; NatureScot, 2020).

Table 5.25 Monthly peak counts of red-breasted merganser, March 2021 to March 2022

Sector	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
S1	10	4	0	0	0	0	0	0	2	5	4	4	7
S2	28	1	0	0	0	0	0	8	8	3	21	6	2
S3	0	0	0	0	0	0	0	0	0	0	0	1	0
All	**38**	**5**	**0**	**0**	**0**	**0**	**0**	**8**	**8**	**6**	**24**	**9**	**7**

5.3.23 Redshank

Redshank were recorded in varying numbers throughout the survey period, and in some months were absent from the site (see **Table 5.26**). A peak count of 192 foraging individuals was recorded at high tide (+/- 3 hrs) during the second November survey visit. Distribution of this species across the study area and an indication of the behaviour observed is illustrated in **Figure A.20**.

Although redshank were recorded along much of the coastline in the study area, including small numbers along the foreshore near to Newhaven, the vast majority of individuals – notably large groups of 100+ birds – were recorded at the East Sands of Leith (in the far east of the study area). Elsewhere, birds were recorded singly or in very small groups. Foraging activity was primarily recorded at low tide (+/-3 hrs) on intertidal soft

sediment and rocky outcrops such as Eastern Craigs. Loafing / roosting activity was generally recorded at high tide (+/-3 hrs) with the highest numbers observed along the upper shore at East Sands of Leith.

Redshank are widespread and numerous throughout the Firth of Forth (SNH, 2016) and, in the context of regional numbers, the peak count of 192 individuals represents 4.4% of the Firth of Forth SPA reference population (4,341 individuals; SNH, 2016) and 3.9% of the WeBS 5-year mean peak in the Forth Estuary site (4,932 individuals; 2015/16 to 2019/20). As such, the study area is considered to have **low regional importance** for redshank.

Table 5.26 Monthly peak counts of redshank, March 2021 to March 2022

Sector	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
S1	5	0	0	0	0	4	0	1	5	1	1	2	0
S2	80	80	0	0	0	4	52	139	187	145	66	111	23
All	**80**	**80**	**0**	**0**	**0**	**4**	**52**	**139**	**192**	**146**	**66**	**111**	**23**

5.3.24 Red-throated diver

Very low numbers of red-throated diver were recorded during the survey period, principally during the winter period (October to February), and were absent during most months (see **Table 5.27**). A peak count of two individuals was recorded in May and November. Distribution of this species across the study area and an indication of behaviour observed is illustrated in **Figure A.21**.

Birds were recorded in both nearshore and offshore areas in the west and east of the study area, and in all instances displayed foraging behaviour. None were recorded within the dock system.

Red-throated diver are widespread but scarce in the Firth of Forth (SNH, 2016); however, in the context of regional numbers, the peak count of two individuals only represents 2.2% of the Firth of Forth SPA reference population (90 individuals; NatureScot, 2018b) and 0.2% of the OFFSABC SPA reference population (851 individuals; NatureScot, 2018b). As such, the study area is considered to have **no to low regional importance** for red-throated diver.

Table 5.27 Monthly peak counts of red-throated diver, March 2021 to March 2022

Sector	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
S1	0	0	0	0	0	0	0	1	1	1	0	0	0
S2	0	0	2	0	0	0	0	0	2	0	0	1	0
All	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**1**	**2**	**1**	**0**	**1**	**0**

5.3.25 Ringed plover

Ringed plover were only recorded sporadically during the survey period, and, when present, were noted in varying numbers (see **Table 5.28**). A peak count of 35 loafing individuals was recorded at high tide (+/- 3 hrs) during the second September survey visit; however, this was more than double the number of birds recorded in any other month. Distribution of this species across the study area and an indication of the behaviour observed is illustrated in **Figure A.22**.

Higher numbers were generally recorded loafing / roosting at high tide, most notably along the upper shore of the beach between East Breakwater and the rocky outcrop at Middle Craigs. Foraging numbers were lower and were generally recorded on intertidal soft sediment along the same stretch of beach at low tide (+/-3 hrs).

In the context of regional numbers, the peak count of 35 individuals represents 10.7% of the Firth of Forth SPA reference population (328 individuals; SNH, 2016) and 11.3% of the WeBS 5-year mean peak in the Forth Estuary site (310 individuals; 2015/16 to 2019/20). While this exceeds the 5% threshold, it is a count that is approximately double the count of the next most abundant month and coincides with the peak passage period when numbers across the estuary are inflated (SNH, 2016). Given that this is a widespread species across the entire Firth of Forth (SNH, 2016), the study area is considered to have **low to moderate regional importance** for ringed plover.

Table 5.28 Monthly peak counts of ringed plover, March 2021 to March 2022

Sector	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
S1	0	0	0	0	2	0	0	0	0	0	0	0	0
S2	0	5	2	0	15	0	35	0	0	0	18	14	6
S3	0	0	2	0	1	0	0	0	0	0	0	0	0
All	**0**	**5**	**2**	**0**	**15**	**0**	**35**	**0**	**0**	**0**	**18**	**14**	**6**

5.3.26 Roseate tern

A single roseate tern was recorded within the common tern breeding colony during the second May high tide count. Although a breeding feature of the Forth Islands SPA, this species has not been recorded nesting in the SPA (or elsewhere in Scotland) since 2009. As such, the individual present in May 2021 is considered to be an incidental sighting and not a regular user of the study area. The study area is considered to be of **no regional importance** for roseate tern.

5.3.27 Sandwich tern

Sandwich terns were only recorded in summer / early autumn (July to October), with significantly higher counts in August (84 individuals) and September (70 individuals) (see **Table 5.29**). Distribution of this species across the study area and an indication of the behaviour observed is illustrated in **Figure A.23**.

Most birds were recorded loafing / roosting at high tide (+/-3 hrs) on the upper shore at East Sands of Leith, with smaller numbers recorded loafing along the shoreline near Newhaven. There were no records of loafing / roosting activity within the Port estate or near to Leith Outer Berth. Foraging activity was recorded nearshore throughout the study area, but generally in very low numbers. Slightly larger groups were recorded foraging in the far west of the study area.

During the return migration period and the migration-free breeding season (March to May and June, respectively; Furness, 2015), Sandwich terns were absent from the study area. The highest counts, in the second August survey visit and first September survey visit, fell within the post-breeding migration period. In the context of regional numbers, the peak count of 84 individuals represents 5.2% of the Firth of Forth SPA passage reference population (1,617 individuals; SNH 2016). Although marginally above the 5% threshold, Sandwich terns are common and widespread in the outer Firth of Forth (SNH, 2016), hence the study area is considered to have **low regional importance** for this species.

Table 5.29 Monthly peak counts of Sandwich tern, March 2021 to March 2022

Sector	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
S1	0	0	0	0	1	29	11	4	0	0	0	0	0
S2	0	0	0	0	0	55	70	4	0	0	0	0	0
S3	0	0	0	0	16	0	0	0	0	0	0	0	0
All	**0**	**0**	**0**	**0**	**16**	**84**	**70**	**4**	**0**	**0**	**0**	**0**	**0**

5.3.28 Shag

Shag were present in varying numbers throughout the year, although generally relatively low in abundance. However, a peak count of 53 individuals, recorded during the first September survey visit, was considerably greater than in any other month (see **Table 5.30**). Distribution of this species across the study area and an indication of the behaviour observed is illustrated in **Figure A.24**.

Foraging activity was widely spread across the entire marine extent within the study area (including a couple of instances within the impounded dock system) and was recorded during both low tide and high tide counts. Roosting / loafing birds tended to frequent the eastern half of the study area, particularly on the rocky outcrops at Middle Craigs and Eastern Craigs but also along the shoreline near to the East Breakwater.

Shag is a qualifying breeding feature of the Forth Islands SPAs and the OFFSABC SPA. It is also a named component of the qualifying non-breeding seabird assemblage of the OFFSABC SPA.

During the breeding season (February to August; Furness, 2015), a peak count of eight individuals was recorded in February and March. In the context of regional numbers, eight birds represent 0.2% of the Forth Islands SPA breeding season reference population (2,400 pairs; SNH 2016). As such, the study area is considered to have **no regional importance** during the breeding season.

During the non-breeding season (September to March; Furness, 2015), a peak count of 53 individuals was recorded during the first September survey visit. The peak count represents 2.2% of the OFFSABC SPA non-breeding season reference population (2,426 individuals; NatureScot, 2020). As such, and given the fact that shag is known to be widespread and common in the outer Firth of Forth, particularly in late summer when moulting birds are present in the estuary (SNH, 2016), the study area is considered to have **no to low regional importance** for this species during the non-breeding season.

Table 5.30 Monthly peak counts of shag, March 2021 to March 2022

Sector	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
S1	0	3	1	0	0	0	0	0	0	3	4	7	1
S2	8	4	2	2	3	0	53	20	8	12	14	8	1
S3	0	0	0	0	3	0	0	1	1	0	0	0	0
All	**8**	**7**	**2**	**2**	**3**	**0**	**53**	**21**	**9**	**15**	**15**	**11**	**2**

5.3.29 Shelduck

Shelduck was only recorded in very low numbers between March and June, and again in January and February, and was absent at all other times of the year (see **Table 5.31**). A peak count of only four individuals was recorded at high tide (+/- 3 hrs) during the second February survey visit. Distribution of this species across the study area and an indication of the behaviour observed is illustrated in **Figure A.25**.

Apart from two birds loafing within the western harbour, all were recorded in the eastern half of the study area, primarily at or seaward of the East Sands of Leith (located in the far east of the study area). Most were recorded loafing, with some displaying foraging activity on the intertidal soft sediment at low tide (+/-3 hrs).

Shelduck are widespread and numerous in the Firth of Forth (SNH, 2016) and, in the context of regional numbers, the peak count of four individuals represents 0.1% of the Firth of Forth SPA reference population (4,509 individuals; SNH, 2016) and 0.1% of the WeBS 5-year mean peak in the Forth Estuary (3,628 individuals; 2015/16 to 2019/20). As such, the study area is considered to have **no regional importance** for shelduck (i.e. local importance only).

Table 5.31 Monthly peak counts of shelduck, March 2021 to March 2022

Sector	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
S2	2	2	1	1	0	0	0	0	0	0	1	4	0
S3	0	0	2	0	0	0	0	0	0	0	0	0	0
All	**2**	**2**	**3**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**4**	**0**

5.3.30 Turnstone

Turnstone were recorded in varying numbers throughout the survey period, but were largely absent from the site during the summer months of May to August (see **Table 5.32**). A peak count of 43 roosting / loafing individuals was recorded at high tide (+/-3 hrs) during the first January survey visit. Distribution of this species across the study area and an indication of the behaviour observed is illustrated in **Figure A.26**.

Turnstone were recorded along most of the shoreline in the study area, although were absent from the promenade / West Breakwater and within the dock system. Areas of activity included the foreshore at Newhaven, the beach to the east of the East Breakwater and the East Sands of Leith. The latter, in the far east of the study area, was where the largest groups were recorded. Foraging was the predominant activity displayed. Highest numbers were generally recorded at high tide, when both foraging and loafing activity was exhibited. At low tide, birds were generally recorded foraging.

Turnstone is locally common in the outer Firth of Forth (SNH, 2016). In the context of regional numbers, the peak count represents 5.0% of the Firth of Forth SPA reference population (860 individuals; SNH, 2016) and 6.3% of the WeBS 5-year mean peak in the Forth Estuary site (680 individuals; 2015/16 to 2019/20). As such, the study area is considered to have **low to moderate regional importance** for turnstone.

Table 5.32 Monthly peak counts of turnstone, March 2021 to March 2022

Sector	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
S1	2	12	1	0	0	0	3	7	2	14	14	8	6
S2	5	8	3	0	1	0	19	35	12	16	41	18	8
All	**5**	**14**	**4**	**0**	**1**	**0**	**19**	**42**	**14**	**26**	**43**	**25**	**8**

5.3.31 Velvet scoter

Velvet scoters were only recorded on a single survey visit, which comprised a group of 27 individuals loafing offshore in the eastern half of the study area (S2) at both high and low tide during the first March survey visit. In the context of regional numbers, the peak count represents 4.3% of the Firth of Forth SPA reference population (635 individuals; NatureScot, 2018b) and 3.1% of the WeBS 5-year mean peak in the Forth Estuary site (3,392 individuals; 2015/16 to 2019/20). However, given that this was an isolated record, it is likely that it was an incidental sighting of migrating individuals and the study area is of **no regional importance** for velvet scoter.

Velvet scoter is a named feature of the qualifying non-breeding waterbird assemblage of the OFFSABC SPA, and the peak count of 27 individuals represents 3.5% of the SPA reference population (775 individuals; NatureScot, 2020).

5.4 Summary of importance in a regional context

As described in the species-specific accounts, several SPA / Ramsar Site features (and named component species of qualifying assemblages) were recorded in the study area in numbers that are considered to have some level of regional importance (i.e. low, medium or high importance). A summary of the distribution,

seasonality and importance (in a regional context) of those species is presented in **Table 5.33**. The table excludes species that were present in numbers of no regional importance (i.e. species that were present in numbers that represented less than 1% of regional totals).

Table 5.33 Summary of importance (in a regional context) of the study area for species recorded in the 2021-22 survey

Species	Abundance (min to max.)	Main distribution and behaviour when present	Seasons present in notable numbers	Importance in regional context (see Appendix 11.1)
Bar-tailed godwit	0 – 27	Loafing and foraging at East Sands of Leith.	Spring passage (Apr.)	Low
Black-headed gull	1 – 1,534	Loafing / roosting across the study area, including Port areas. Foraging concentrated around East Sands of Leith.	All year	Low
Cormorant	8 – 141	Loafing / roosting mainly in coastal habitat along the eastern shoreline. Low intensity foraging activity.	All year (highest numbers during post-breeding migration (Aug. to Sep.))	Moderate
Dunlin	0 – 270	Almost exclusively foraging / loafing at East Sands of Leith	Autumn passage (Nov.)	Low
Eider	21 – 976	Loafing / roosting activity across the study area, particularly around East Breakwater and the eastern shoreline. Foraging activity focused offshore.	All year (highest numbers during breeding season (Jun. to Sep.))	Moderate
[Redacted]				
Herring gull	302 – 1,303	Loafing / roosting across the study area, including Port areas. Foraging concentrated around East Sands of Leith and offshore.	All year	Low
Lesser black-backed gull	0 – 441	Loafing / roosting across the study area, including Port areas. Foraging concentrated around East Sands of Leith.	Mar. to Oct. (highest numbers during post-breeding migration (Aug. to Sep.))	Low
Mallard	9 – 81	Loafing / roosting within the impounded dock system, plus associated with three small scrapes near West Breakwater.	All year	Low
Oystercatcher	74 – 289	Resting and foraging mainly in coastal habitat along the eastern shoreline, particularly at East Sands of Leith.	All year (highest numbers Jul. to Mar.)	Low
Red-breasted merganser	0 – 38	Loafing and foraging activity concentrated both nearshore	Non-breeding season (Oct. to Apr.)	Moderate

Species	Abundance (min to max.)	Main distribution and behaviour when present	Seasons present in notable numbers	Importance in regional context (see Appendix 11.1)
		and offshore towards the west and east boundaries of the study area.		
Redshank	0 – 192	Resting and foraging mainly in coastal habitat along the eastern shoreline, particularly at East Sands of Leith.	Passage and wintering season (Sep. to Apr.)	Low
Ringed plover	0 – 35	Resting and foraging mainly in coastal habitat along the eastern shoreline, particularly near to East Breakwater.	All year	Low to moderate
Sandwich tern	0 – 84	Loafing / roosting at East Sands of Leith and the Newhaven foreshore. Low intensity foraging activity offshore.	Post-breeding migration (Aug. to Sep.)	Low
Shag (non-breeding)	0 – 53	Loafing / roosting mainly in coastal habitat along the eastern shoreline. Low intensity foraging activity across the marine area.	Post-breeding migration (Sep. to Oct.)	Low
Turnstone	0 – 41	Resting and foraging mainly in coastal habitat along the eastern shoreline, particularly at East Sands of Leith.	Passage and wintering season (Oct. to Jan.)	Low to moderate

5.5 Other notable species of conservation interest

Alongside the SPA / Ramsar site / SSSI features documented in **Sections 5.3** and **5.4**, above, a number of other estuarine species of conservation interest were recorded using the study area between March and September 2021. This included one Annex I and Schedule 1 species[1]:

- Purple sandpiper (recorded on three occasions, with a peak count of four individuals in March 2022)

A single peregrine (listed as an Annex I and Schedule 1 species) was recorded flying through the study area in September, though did not interact with the site.

Additionally, a single Arctic skua was recorded foraging offshore during the first October survey visit and is likely to be an incidental sighting. This is not an Annex I or Schedule 1 species; however, it is on the red list of the Birds of Conservation Concern 5 (BoCC5) (Stanbury *et al.*, 2021).

5.6 Incidental records of potential nesting activity

While the estuarine bird survey was not intended as (nor should it be interpreted as) a survey of nesting activity within the Port (common tern colony counts notwithstanding), the timing of the surveys between March and September was such that incidental observations indicating breeding / nesting activity could also be recorded.

[1] *Afforded protection under Annex I of Directive 2009/147/EC on the conservation of wild birds ('the Birds Directive') and Schedule 1 to the Wildlife and Countryside Act 1981, as amended.*

The following observations were noted:

- From May to September, a pair of mute swans with four cygnets were regularly recorded in the freshwater pools at Lighthouse Park, near to the West Breakwater;
- A further mute swan with six cygnets was recorded in Albert Dock Basin in May;
- In May and June, mallards with ducklings were recorded in the freshwater pools at Lighthouse Park, near to the West Breakwater; and,
- Two eiders, each with ducklings, were recorded in the Outer Harbour / Western Harbour in June.

6 Tern survey results

Colony counts and flight surveys at Imperial Dock Lock, Leith SPA, within the Port, were undertaken twice a month from May to July 2021. Survey dates are listed in **Table 6.1**.

Table 6.1 Common tern survey dates

Survey Month	Visit 1	Visit 2
May 2021	1st / 2nd	29th / 30th
June 2021	10th / 11th	19th / 20th
July 2021	3rd / 4th	17th / 18th

6.1 Colony counts

During the 2021 common tern survey, breeding activity was first recorded at the colony during the survey visit on 1-2nd May, when eight AONs were recorded. By the time of the second colony count, undertaken on 30-31st May, there were 264 AONs, which represented the peak count over the entire survey period. The number of AONs recorded decreased through June and July, with approximately 14 AONs remaining during the final colony count on 17-18th July. The peak count of 264 AONs is below the SPA citation population of 558 pairs; however, NatureScot and the Scottish Environmental Protection Agency (SEPA) currently class the SPA as being in 'favourable' condition[2].

During the estuarine bird surveys, an offshore count of 17 individuals was the highest count of foraging birds in the study area (there was no foraging activity within the dock system itself), indicating that most birds from the colony appeared to commute outside the study area to forage. Common terns have a mean-maximum flight range of 17.6km (standard deviation of 9.1km), with a maximum flight range from the Imperial Dock Lock colony of c.21km (Wilson et al., 2014; Woodward *et al.*, 2019).

Following completion of the tern colony survey, common terns were still recorded in the estuarine bird counts. While a peak count of 2,000 individuals was recorded at the height of the breeding period in May, a count of 839 roosting / loafing birds were present in the Port during the first survey visit of August (although no AONs were present by this point), which may have also included post-breeding migrants from other colonies. By September, very few common terns were observed, and the species was absent from October onwards.

6.2 Common tern observations in the estuarine bird survey

Common terns were recorded in the estuarine bird survey from May to September (see **Table 6.2**). A peak count of around 2,000 individuals was recorded during the second May count, which coincided with the peak count of AONs. Distribution of this species across the study area and an indication of the behaviour observed is illustrated in **Figure A.4**.

Throughout the breeding period, common terns were almost exclusively recorded near to the colony at Imperial Dock. During August, however, once birds had started to leave the colony post-breeding, a number of loafing individuals were recorded elsewhere in the Port, including near to the East Breakwater and on the western wall of the entrance lock. As noted above, records of foraging activity in the survey area were sporadic and low intensity.

[2] *Protected Nature Sites (sepa.org.uk)*

Table 6.2 Monthly peak counts of common tern

Sector	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.
S1	0	0	9	0	1	1	6	0	0	0	0	0
S2	0	0	17	0	8	350	0	0	0	0	0	0
S3	0	0	*c.*2,000	700	802	516	0	0	0	0	0	0
All	**0**	**0**	***c.*2,000**	**700**	**802**	**839**	**6**	**0**	**0**	**0**	**0**	**0**

6.3 Flight surveys

Full results of the flight survey are published in **Appendix 3** and summarised in **Table 6.3**, which describes the peak flight rate (i.e. the maximum number of movements per hour) recorded into and out of each sector across the entire survey period. The highest peak flight rates were recorded in Sector 3, particularly at heights of 10-20m (a peak of 522 inbound and 594 outbound flights per hour), followed by flights above 20m (a peak of 249 inbound and 231 outbound flights per hour). Sector 1 (i.e. through the mouth of the Port) was the second busiest flight sector, again mostly at heights of 10-20m (a peak of 126 inbound and 96 outbound flights per hour) and 20m+ (a peak of 189 inbound and 90 outbound flights per hour).

In all sectors, peak flight rates were generally recorded during the second June visit or the two July visits, correlating with periods when chick feeding requirements are likely to be greatest. During the second June survey, it was reported by the surveyor that c.70% of all inbound terns were carrying fish.

Table 6.3 Peak rates of inbound and outbound common tern flights

Sector No.	Inbound flights (per hour)				Outbound flights (per hour)			
	0-5m	5-10m	10-20m	20m+	0-5m	5-10m	10-20m	20m+
1	21	45	126	189	75	75	96	90
2	3	69	54	123	15	60	51	69
3	9	96	522	249	39	114	594	231
4	9	39	36	156	9	75	51	48

The peak flight rates are representative of the month-by-month trend, which is presented in **Figure 6.1.** The figure clearly indicates that in each month Sector 3, which is the shortest route between the colony and the Firth of Forth, is the busiest sector (accounting for around 45-55% of all flights each month), followed by Sector 1, which provides a relatively unobstructed route to sea through the mouth of the Port (around 25% of all flights). Sector 4 is generally the least used as a flight path.

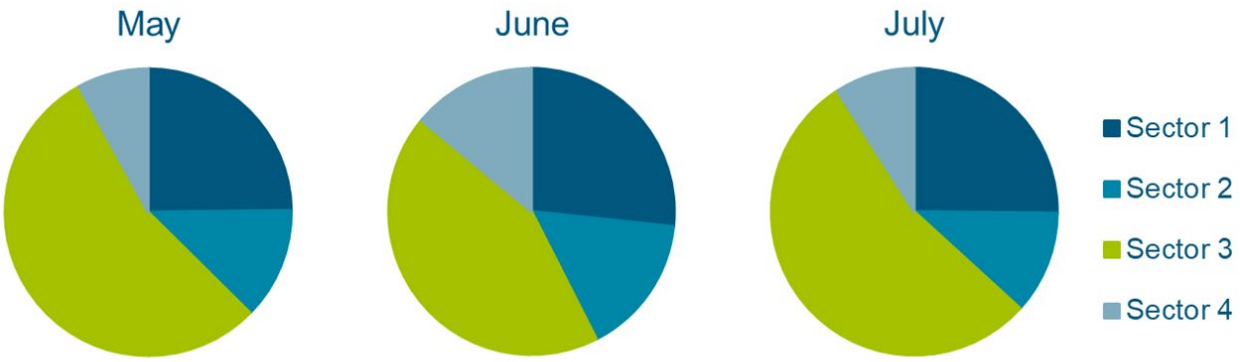

Figure 6.1 Proportion of monthly flights within each sector

Figure 6.2 demonstrates the proportion of total flights (i.e. all flights recorded during the survey period) within each flight height category. In most of the sectors, including the sectors with the busiest flight activity (Sectors 1 and 3), flight heights in the 0-5m and 5-10m categories were comparatively few, with around 75-85% of flights split relatively evenly between the 10-20m and 20m+ categories. In the less-traversed Sector 4, most flights (around 60%) were at an altitude of more than 20m, which is likely reflective of the fact that there is a greater number of taller structures / buildings present in this sector.

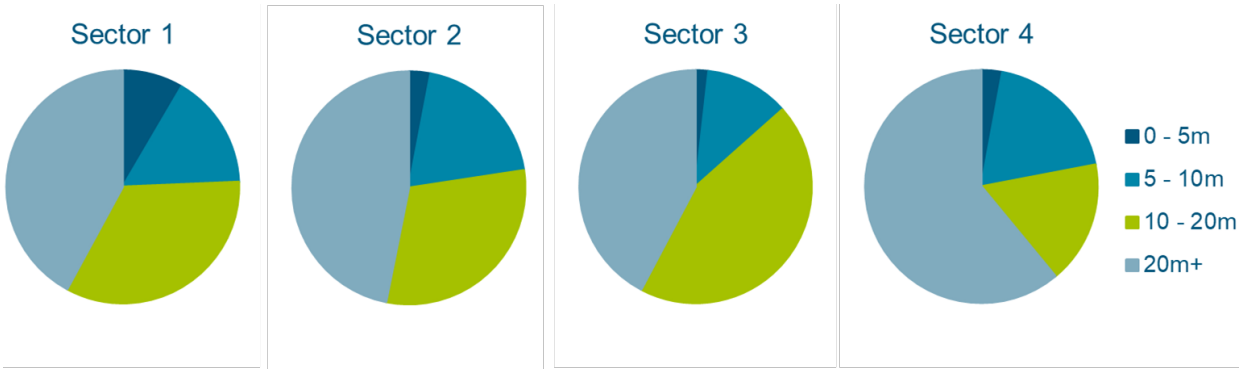

Figure 6.2 Proportion of total flights (May to July) within each flight height category

Similar methodology was undertaken for establishing common tern flight paths from the colony in 2008, 2009 and 2010 (Jennings, 2012). The key findings of the 2008-10 study were as follows:

- Greater numbers of flights were recorded during the chick-rearing periods than during incubation (i.e. later in the season);
- Sector 3 was by far the most frequently used, followed by Sector 1; and
- The most frequent flight height category was 10-20m, with the least frequent being 0-5m.

It is evident that the outcome of the 2021 survey correlates with the findings of the 2008-10 surveys and is therefore likely to be representative of the typical situation during the breeding season at the Port. One minor difference is the increased proportion of flights within the 20m+ flight height category – in 2021, 40-60% of flights were within this category (dependent on Sector), whilst in 2008-10, 10-40% of flights were within this category.

7 Human disturbances

Disturbances from anthropogenic activities were noted during a number of counts, the sources of which are presented in **Table 7.1**.

Table 7.1 Disturbances recorded during survey visits

Survey	Location	Source of disturbance
Mar. '21 (1)	S1	Walkers and dogs on foreshore
	S3	Vehicle activity
Mar. '21 (2)	S1	Walkers and dogs on foreshore
Apr. '21 (1)	S1	Walkers, dogs and anglers on foreshore, motorised and unmotorised vessels in harbour
	S2 and S3	Large vessel left Port; motorised and unmotorised vessels offshore
Apr. '21 (2)	S1	Fishing boat in harbour, anglers on foreshore
May '21 (1)	S1 and S2	Motorised vessel commuting through study area
	S1	Swimmers and kayak off foreshore, anglers along breakwater
May '21 (2)	All sectors	Motorised and unmotorised vessel activity
	S1	Dredging at Newhaven Marina; walkers along foreshore; fishing vessel in harbour
Jun. '21 (1)	S1	Walkers and dogs along foreshore
	S3	Vehicle and worker activity
Jun. '21 (2)	All sectors	Vessels commuting through study area
	S1	Walkers and dogs along foreshore
Jul. '21 (1)	S1 and S2	Motorised and unmotorised vessels commuting through study area
Jul. '21 (2)	S1	Harbour busy with sailboats, kayakers, paddle boarders; walkers / dogs and anglers present along the foreshore
	S1 and S2	Motorised and unmotorised vessels commuting through study area
Aug. '21 (1)	Sector 1	Walkers, dogs and anglers on foreshore
	S3	Vehicle activity
Aug. '21 (2)	S1	Walkers, dogs and shell fishers on foreshore
	S2	Bait diggers / shell fishers on foreshore
	S3	Vehicle and worker activity
Sep. '21 (1)	S1	Walkers, dogs and anglers on foreshore
	S2	Walkers on foreshore
	S2 and S3	Vessel and vehicle activity
Sep. '21 (2)	S1	Motorised vessel in harbour, walkers and dogs on foreshore
	S3	Motorised vessels entering port
Oct. '21 (2)	S1	Walkers and dogs on foreshore
	S2 and S3	Vehicles and worker activity
Nov. '21 (1)	S1	Walkers and dogs on foreshore
	S3	Vehicles and vessel activity

Survey	Location	Source of disturbance
Nov. '21 (2)	S1	Walkers, dogs and anglers, motorised vessels in harbour
	S2 and S3	Vehicles and vessel activity
Dec. '21 (1)	S1	Walkers and dogs on foreshore
	S3	Vessel entering port
Dec. '21 (2)	S1	Walkers, fishing vessel in harbour
	S2	Kayakers near shore
Jan. '22 (1)	S1	Fishing vessel commuting through harbour, walkers and dog on foreshore
Jan. '22 (2)	S1	Walker on foreshore, motorised vessel commuting through sector
	S3	Construction traffic
Feb. '22 (1)	S3	Vessel activity
Feb. '22 (2)	S1	Swimmers, walkers and dogs along shoreline. Kayak nearshore plus two motorised vessels commuting through sector
Mar. '22 (1)	S1	Walkers and dogs on foreshore, anglers, and motorised and unmotorised vessels
	S2 and S3	Vehicles and vessel activity

Whilst the above disturbances may have resulted in minor displacement / redistribution of birds or temporary behavioural modification, none of the disturbances would be considered atypical for the study area therefore the 'representativeness' of the counts is not considered to have been compromised.

There is public access to Newhaven foreshore and the West Breakwater (S1), hence there was regular disturbance from walkers / dogs, anglers, swimmers and other recreational users. The most common source of disturbance in this sector was the presence of walkers / dog walkers along the foreshore and breakwater, which was recorded on most survey visits.

There was less recorded disturbance in the eastern half of the study area (S2), as there is limited public access along the shorefront. However, at the far east end of the study area, near to East Sands of Leith, there was occasional disturbance from walkers and bait diggers.

Within the dock system (S3) there was regular recorded activity by vehicles (including heavy goods vehicles) and dock workers, as well as vessel movements within and into / out of the Port. Generally, such activities did not result in anything other than a 'low' level of disturbance to the birds present.

The presence of vessels in nearshore and offshore areas across the study area was also regularly recorded. While much of this was port-associated traffic, there was also regular presence of non-motorised and motorised vessels (including active fishing vessels) associated with Newhaven and Granton Harbours. Vessel activity was concentrated offshore, although there was regular nearshore activity by sailing vessels and kayaks at Newhaven.

8 Summary of important habitats within the study area

The estuarine bird surveys and tern-specific surveys described in this document indicate the following key habitats within the study area:

- The quayside at the Imperial Dock Lock, Leith SPA hosts a large number of nesting common terns during the breeding season (May to July). Post-breeding (August), terns from the colony were also observed used other quayside areas within the Port for loafing / roosting, including the Imperial Dock quayside and the western wall of the entrance lock to the Port. Dockside areas, particularly around Imperial Dock, supported large numbers of roosting / loafing gulls throughout the year.
- Intertidal habitats in the eastern half of the study area, namely the East Sands of Leith and adjacent rocky outcrops (Eastern Craigs and Middle Craigs) were the most regularly used habitats by estuarine birds, including waders such as oystercatcher, dunlin, turnstone, redshank and bar-tailed godwit and other waterbirds / seabirds, such as roosting Sandwich terns, eider, shag and cormorant.
- The foreshore adjacent to the East Breakwater appeared to be the favoured foraging / roosting habitat for non-breeding ringed plover. Large eider roosts / loafing areas were also regularly recorded at this location, although comparably-sized groups of roosting / loafing eider were also recorded in the impounded dock system (particularly Imperial Dock) and at the East Sands of Leith.
- The sheltered waters available both within the impounded dock system (notably Western Harbour and Imperial Dock) and in the embayment in the western half of the study area supported overwintering goldeneye in numbers of high regional importance (November to February).

The above have been identified as key sensitivities based on the fact that SPA / Ramsar Site features, numbers of which may be of regional importance, appeared to show preference for those habitats during the surveys described in this document (see distribution maps in **Appendix 11.1**).

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Appendix 1 Consultation with NatureScot regarding the surveys

Ben Hughes

From: Malcolm Fraser <[redacted]>
Sent: 28 April 2021 16:07
To: Ben Hughes
Subject: RE: Port of Leith bird survey consultation

This message was sent from an **e-mail domain unknown to Royal HaskoningDHV**. Please be cautious.

Hello Ben –

I'm going to provide our advice by email to save a little time, I hope that's acceptable to you.

Summary
The surveys planned are suitable for establishing a baseline against which to assess the effect of the proposed development.

Estuarine bird surveys
The vantage point (VP) surveys appear to follow standard protocols, and the tern surveys will use methods developed in the seabird monitoring handbook. We note that the survey area extends 2km either side, and out into the Firth of Forth, from the point of noise generation from piling. The surveys therefore cover all the area where significant response to noise would be expected.

The methodology does not appear to encompass the effects of night-time working under lights, and nor are any dredging effects which may include noise and possibly increased water turbidity. This may be because these effects are expected to be much more local to the worksite?

The plan discusses 'bird redistribution' within the survey area. If there is no other suitable roost location within 2km when a preferred roost site is disturbed, birds may have to move a greater distance to find a roost. Without identifying all roost sites and feeding sites within a much larger area it is probably not possible to state that all likely redistribution areas have been covered. However, we do note that the likely disturbance areas are covered which is the key aspect of the study.

One final point is that 2km range is likely to be the limit that birds can be identified from a VP location even with the aid of modern optics. The plan does not acknowledge this, and it is only likely to be a factor in the offshore water bird counts. There is no obvious remedy so we do not propose a change to the protocols, but acknowledge that a species such as Slavonian Grebe will not be reliably detected at 2km range. A shift offshore from 1km to 2km would affect counts within the zone.

Breeding Tern counts
Forth Ports should be able to supply you with a history of breeding success from Imperial Dock Lock, Leith SPA, as they have worked in collaboration with Lothians Ringing Group here for many years. We encourage you to liaise with that group to ensure you both get the data you need whilst minimising disturbance to the breeding birds.

Common tern flight behaviour
Only the tern flight line surveys do not have a generally established protocol, but will follow methods used for a previous study in the area, and so should be compatible with some already collected information.

I hope these comments are useful – get back in touch if you would like to discuss.

All the best.

--
Malcolm Fraser (he/ him)| Area Officer – Forth
NatureScot | Silvan House, 3rd Floor East, 231 Corstorphine Road, Edinburgh, EH12 7AT | [redacted]
nature.scot | @nature_scot | *Scotland's Nature Agency* | *Buidheann Nàdair na h-Alba*

From: Ben Hughes <[redacted]>
Sent: 26 April 2021 09:31
To: Malcolm Fraser <[redacted]>
Subject: RE: Port of Leith bird survey consultation

Hi Malcolm,

Thanks for getting back to me so quickly.
Top line is noted, and I look forward to receiving the comments.

Thanks again,

Ben

Ben Hughes MSc
Consultant | Environment

T [redacted]
E [redacted] | **W** www.royalhaskoningdhv.com
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From: Malcolm Fraser <[redacted]>
Sent: 26 April 2021 09:29
To: Ben Hughes <[redacted]>
Subject: RE: Port of Leith bird survey consultation

This message was sent from an **e-mail domain unknown to Royal HaskoningDHV**. Please be cautious.

Hello Ben –

Yes I have some comments back from our ornithology advisors, and I'll send them on to you asap.

Our top line is that the surveys you have planned are suitable for establishing a baseline against which to assess the effect of the proposed development.

All the best.

--
Malcolm Fraser (he/ him)| Area Officer – Forth
NatureScot | Silvan House, 3rd Floor East, 231 Corstorphine Road, Edinburgh, EH12 7AT | [redacted]
nature.scot | @nature_scot | *Scotland's Nature Agency* | *Buidheann Nàdair na h-Alba*

From: Ben Hughes <[redacted]>
Sent: 26 April 2021 09:27
To: Malcolm Fraser <[redacted]>
Subject: RE: Port of Leith bird survey consultation

Hi Malcolm,

Hope all is well.
I was just wondering if there was any update on the progress of the below request?

Thanks,

Ben

Ben Hughes MSc
Consultant | Environment

T [redacted]
E [redacted] **| W** www.royalhaskoningdhv.com
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From: Malcolm Fraser <[redacted]>
Sent: 15 April 2021 11:32
To: Ben Hughes <[redacted]>
Subject: RE: Port of Leith bird survey consultation

This message was sent from an **e-mail domain unknown to Royal HaskoningDHV**. Please be cautious.

Hello Ben –

Thanks for contacting us about survey methods and schedule at Port of Leith.

I note that you've already started estuarine bird surveys, and that tern surveys are due to start in May.

I'll be your point of contact at NatureScot. I've just asked my ornithology colleagues for advice on your proposal, and will get back to you as soon as I can. My contact details are below if you need to get in touch.

All the best.

--
Malcolm Fraser (he/ him)| Area Officer – Forth
NatureScot | Silvan House, 3rd Floor East, 231 Corstorphine Road, Edinburgh, EH12 7AT | [redacted]
nature.scot | @nature_scot | *Scotland's Nature Agency* | *Buidheann Nàdair na h-Alba*

From: Ben Hughes <[redacted]>
Sent: 13 April 2021 11:00
To: FORTH <[redacted]>
Cc: Jamie Gardiner <[redacted]>
Subject: Port of Leith bird survey consultation

To whom it may concern,

I hope this email finds you well. I have been directed to this address by the NatureScot switchboard.

I am a consultant representing a developer who is in the early stages of a potential port-based development application at the Port of Leith, Edinburgh. As part of the work preceding the application process, the developer is undertaking a year-long programme of bird surveys running from March 2021 to February 2022, which will be used to inform future environmental assessment / HRA. We are seeking to consult with Nature Scot on the scope of those surveys. The survey area encompasses parts of the Outer Firth of Forth and St Andrews Bay Complex pSPA, the Firth of Forth SPA and the Imperial Dock Lock Leith SPA.

The proposed methodology, including information on the study area and the count techniques to be employed, is provided in the attached Survey Specification document. As stated in the attached document, the study area has been based on an assumption that impact piling at the development site is a potential requirement. As you will note, we are proposing three types of survey in the area – estuarine bird surveys, tern colony counts at Imperial Dock Lock Leith SPA, and tern flight behaviour surveys. Due to time constraints, the first of the estuarine bird surveys have been undertaken; however, we invite comment for the surveys going forward / confirmation on their suitability. As stated above, the purpose of these surveys is to provide sufficient baseline information on the use of the area by SPA features and other estuarine birds for undertaking HRA and other necessary environmental assessments.

Given that the tern surveys are proposed for May to July, we unavoidably have a tight timeframe in which to finalise the scope of those surveys. As such, I would greatly appreciate NatureScot's views on the proposed survey methodology as quickly as possible. Please do not hesitate to contact me if there are any questions that would facilitate the consultation process.

Thanks and regards,

Ben Hughes MSc
Consultant | Environment

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Appendix 2 Distribution maps for SPA / Ramsar Site / SSSI features

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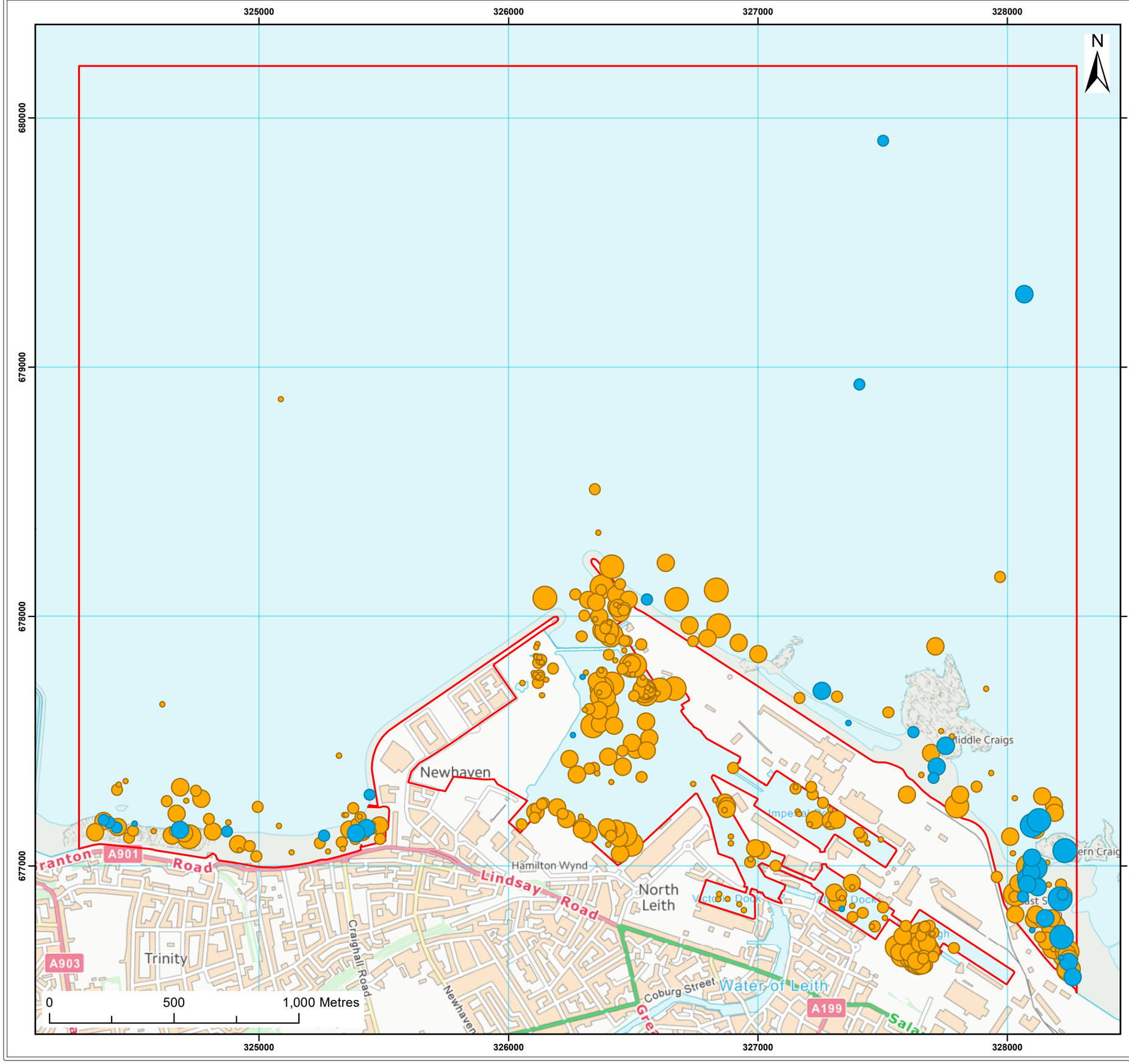

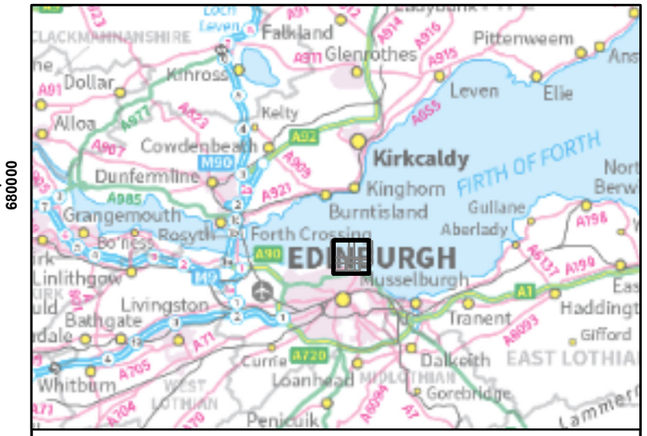

Legend:

Study Area

Foraging Black-headed gull (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

Loafing/Roosting Black-headed gull (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

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Title:

Distribution map of Black-headed gull recorded during estuarine surveys, March 2021 to March 2022

Figure:	Drawing No:
A.2	PC2045-RHD-ZZ-ZZ-DR-EV-0020

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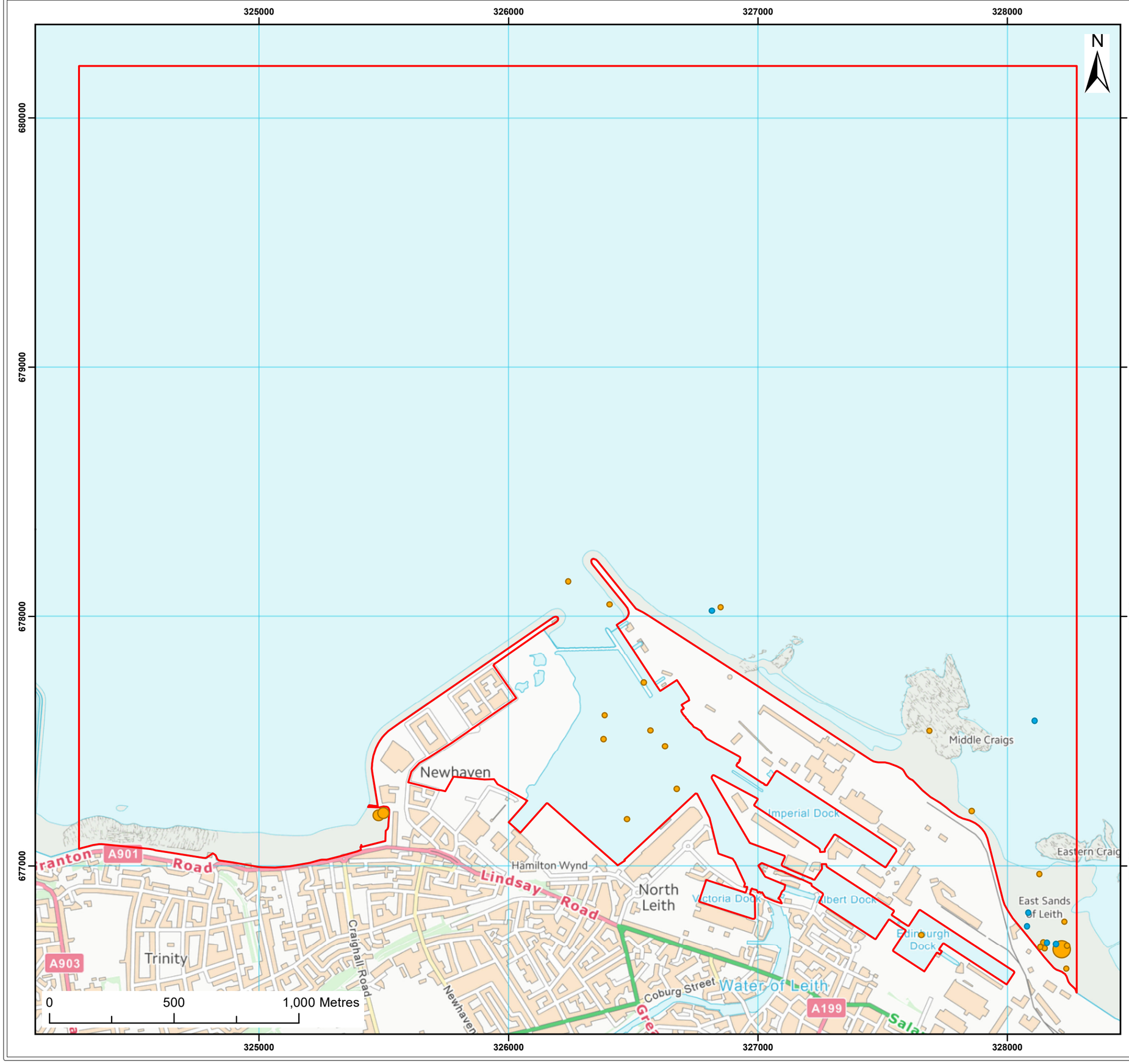

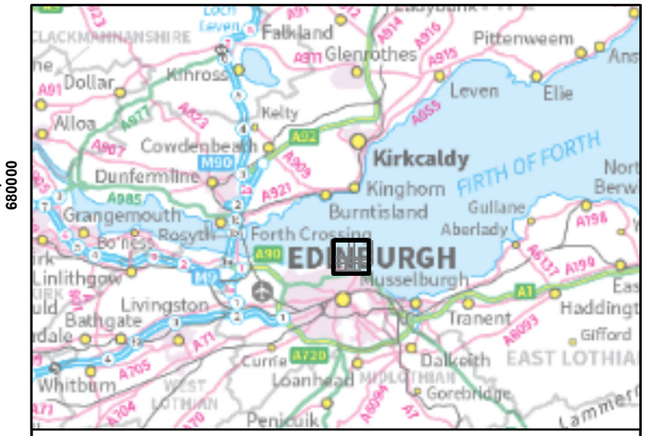

Legend:

Study Area

Foraging Common gull (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

Loafing/Roosting Common gull (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

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Title:

Distribution map of Common gull recorded during estuarine surveys, March 2021 to March 2022

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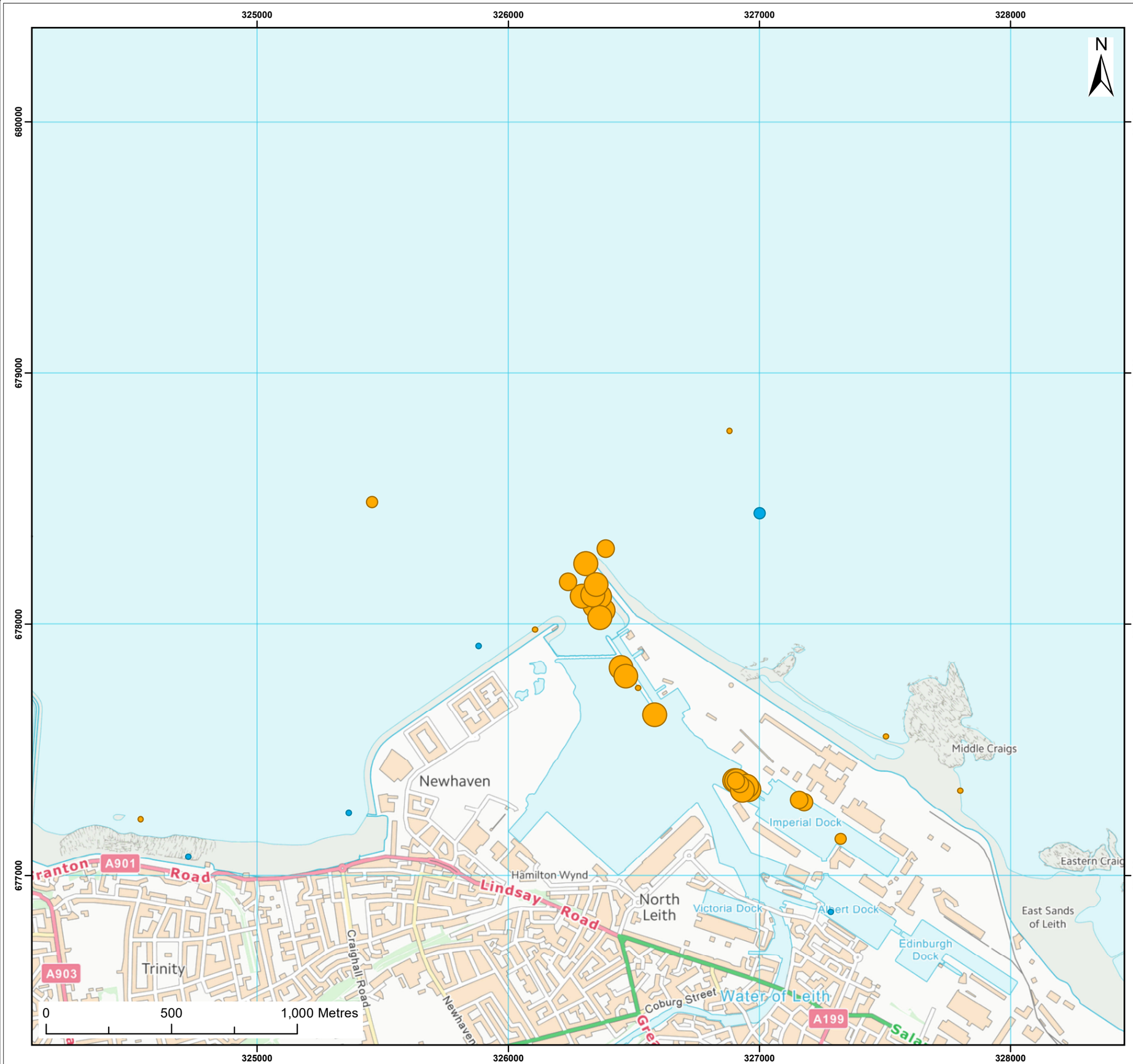

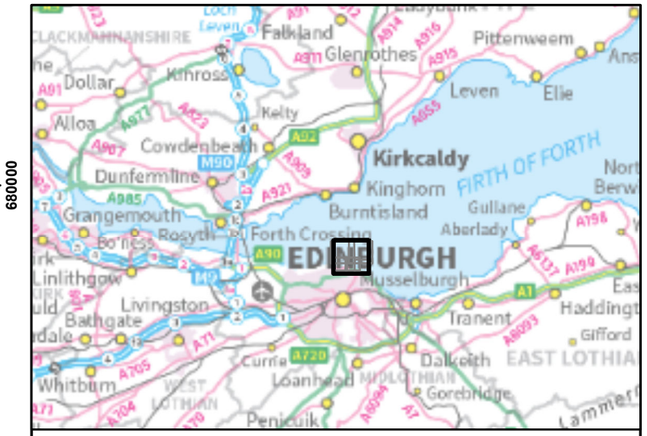

Legend:

Foraging Common tern (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

Loafing/Roosting Common tern (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

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Title:

Distribution map of Cormmon tern recorded during estuarine surveys, March 2021 to March 2022

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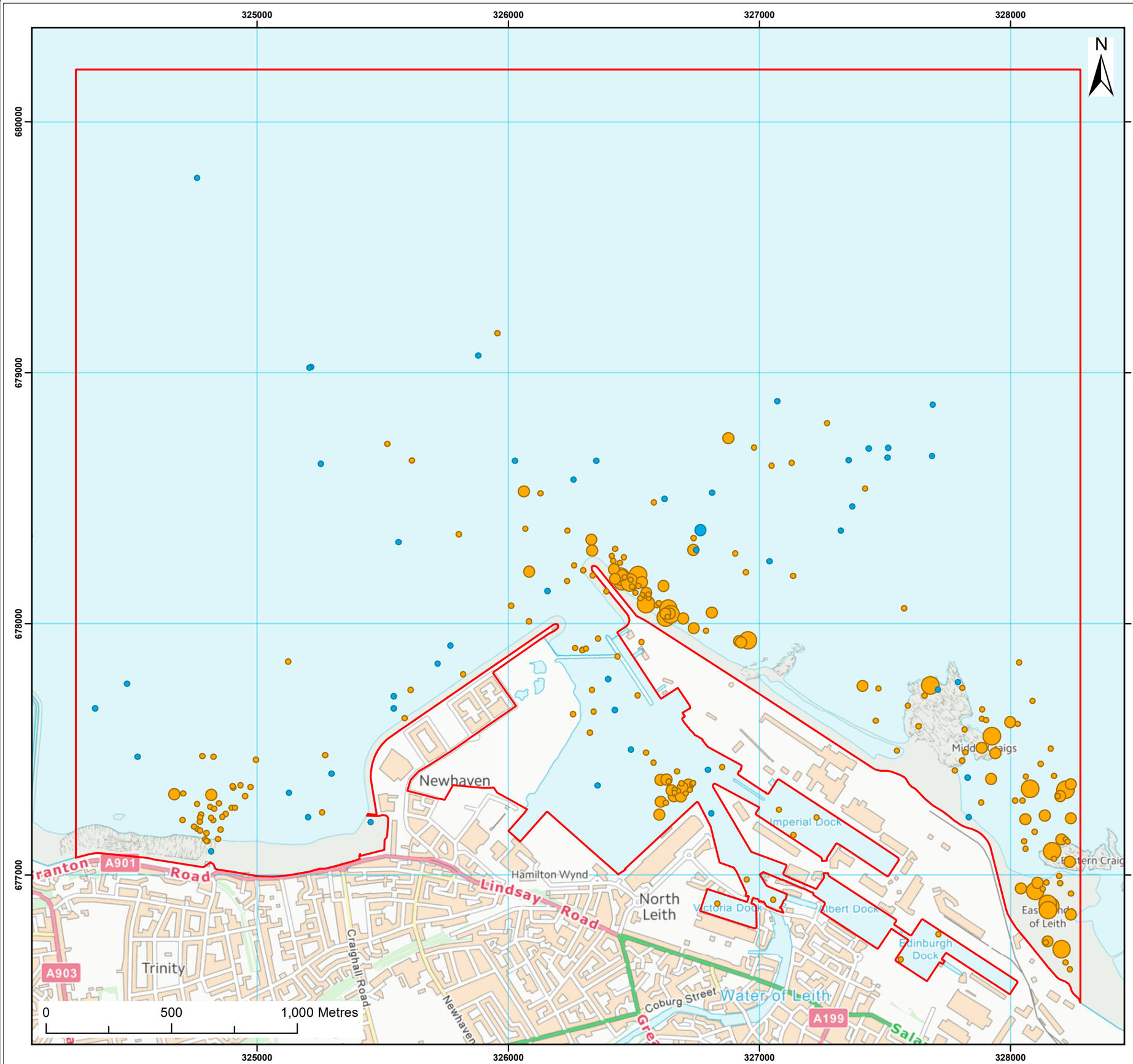

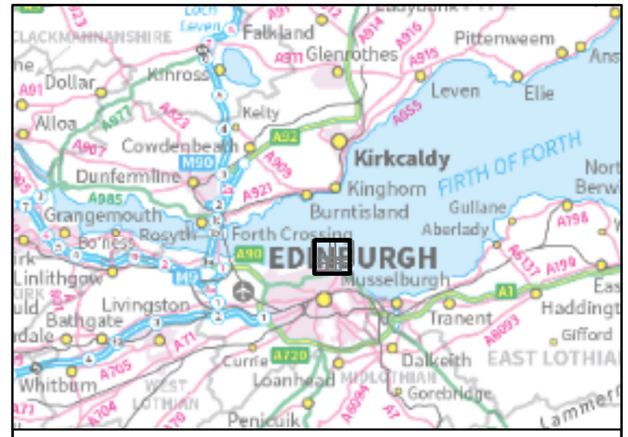

Legend:

Study Area

Foraging Cormorant (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

Loafing/Roosting Cormorant (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

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Title:

Distribution map of Cormorant recorded during estuarine surveys, March 2021 to March 2022

Figure: A.5 | Drawing No: PC2045-RHD-ZZ-ZZ-DR-EV-0023

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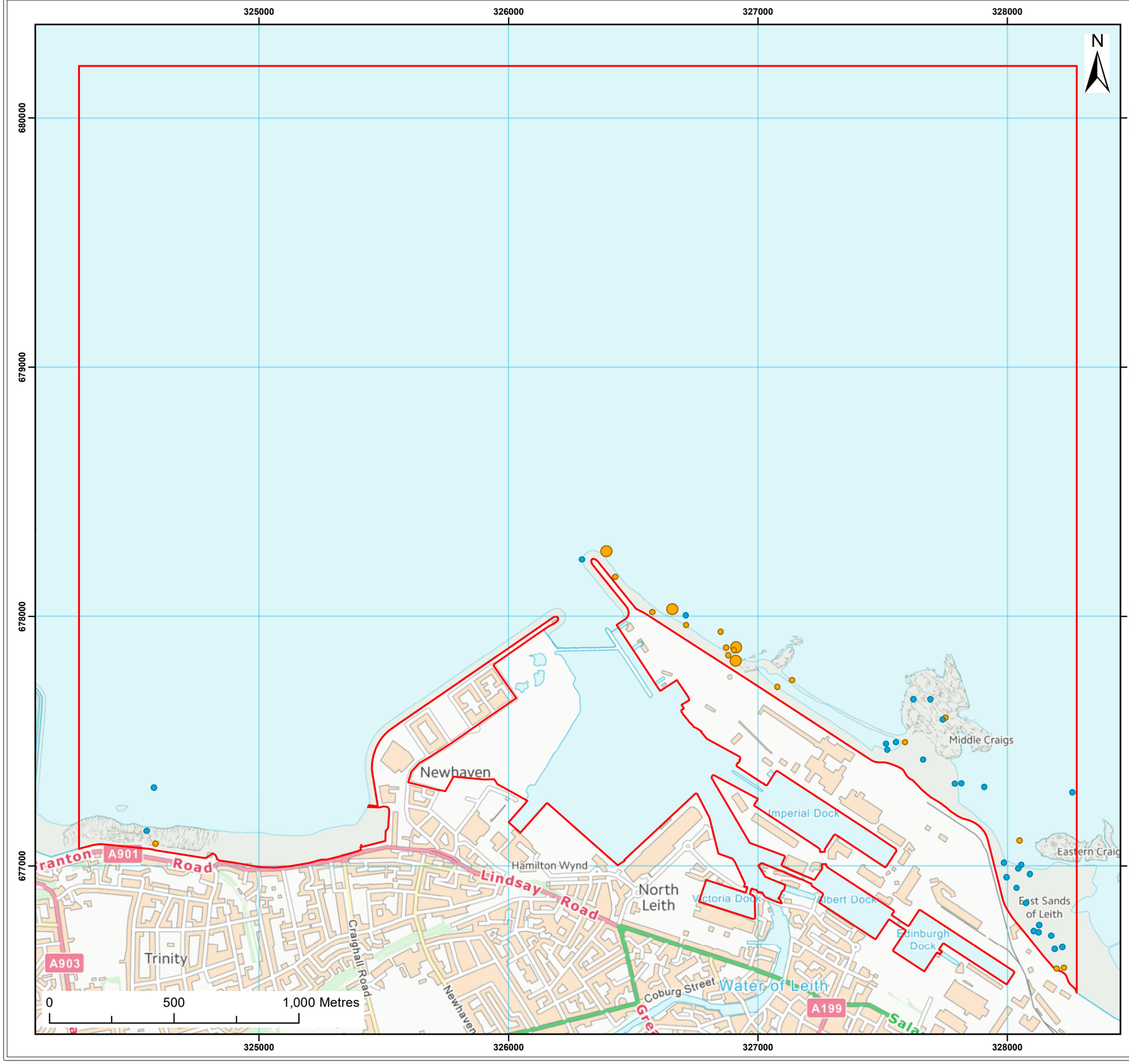

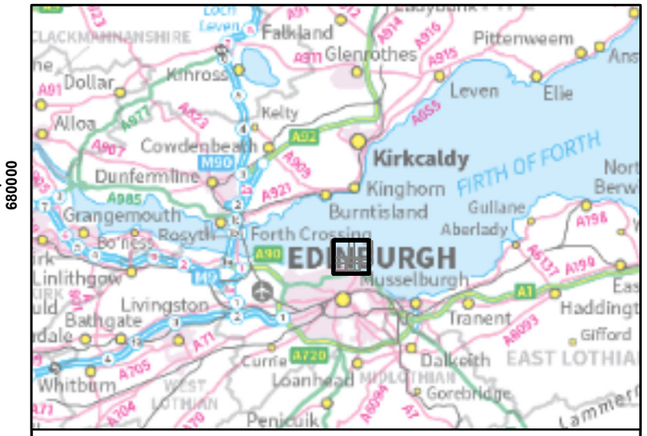

Legend:

Study Area

Foraging Curlew (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

Loafing/Roosting Curlew (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

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Title:

Distribution map of Curlew recorded during estuarine surveys, March 2021 to March 2022

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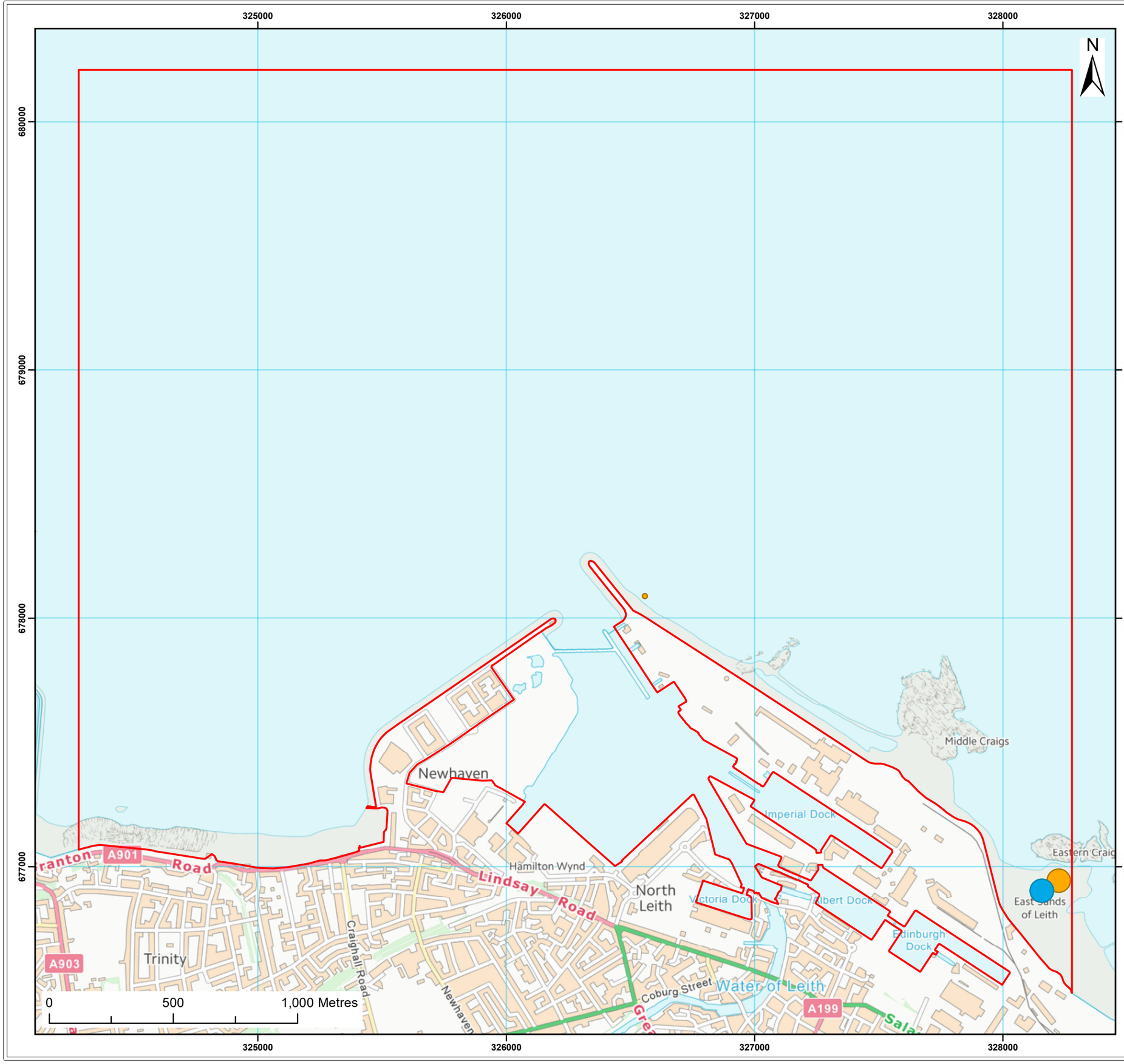

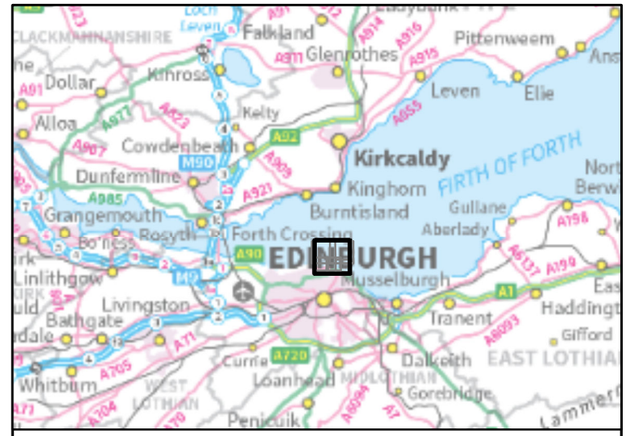

Legend:

Study Area

Foraging Dunlin (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

Loafing/Roosting Dunlin (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

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Title:

Distribution map of Dunlin recorded during estuarine surveys, March 2021 to March 2022

Figure:	Drawing No:
A.7	PC2045-RHD-ZZ-ZZ-DR-EV-0025

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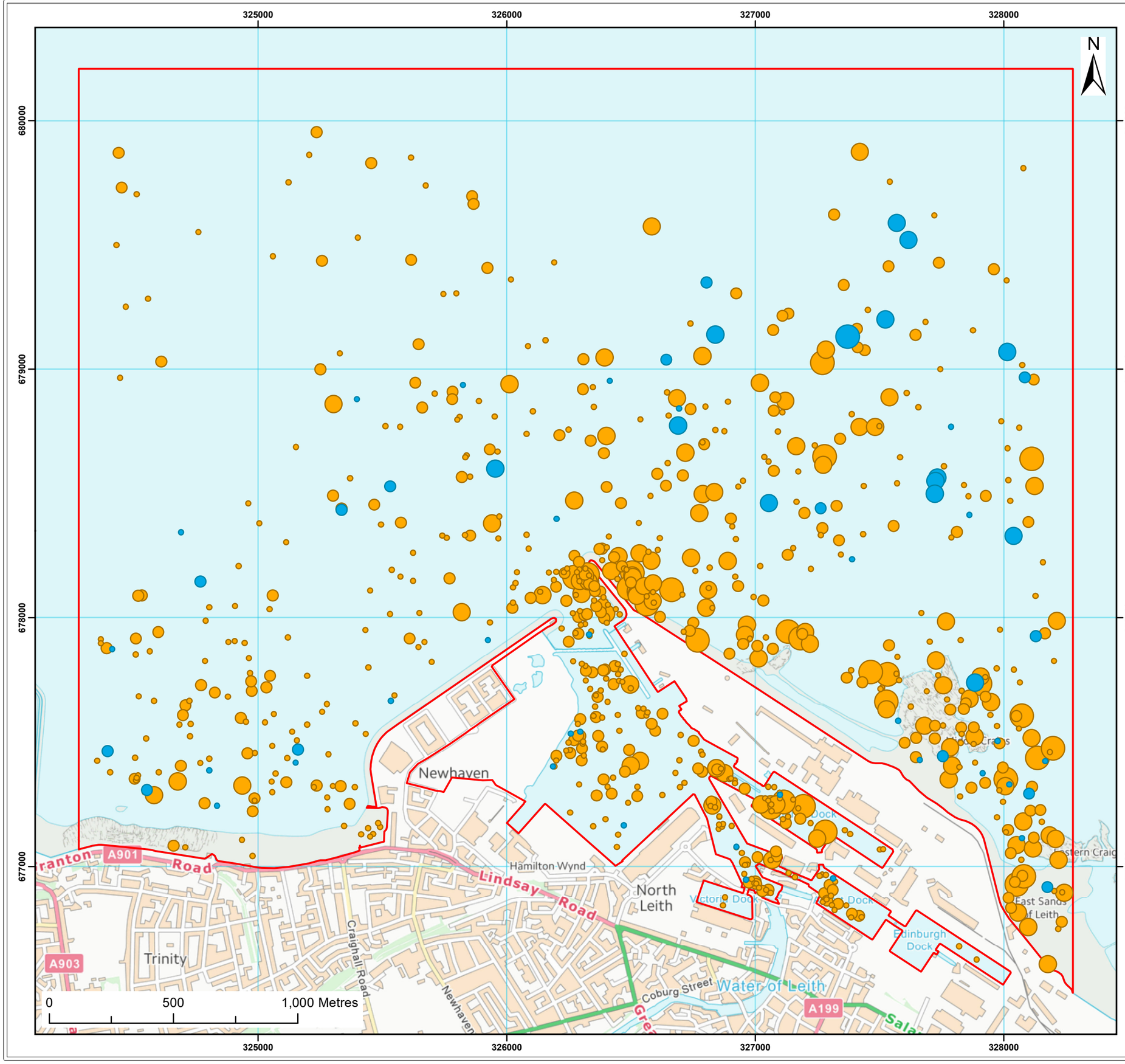

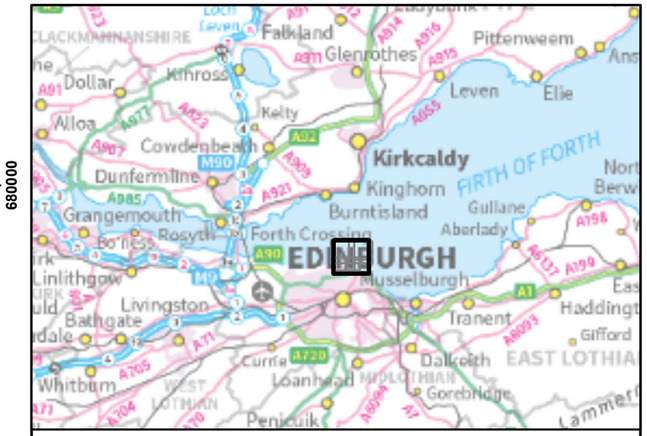

Legend:

Study Area

Foraging Eider (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

Loafing/Roosting Eider (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

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Title:

Distribution map of Eider recorded during estuarine surveys, March 2021 to March 2022

Figure:	Drawing No:
A.8	PC2045-RHD-ZZ-ZZ-DR-EV-0026

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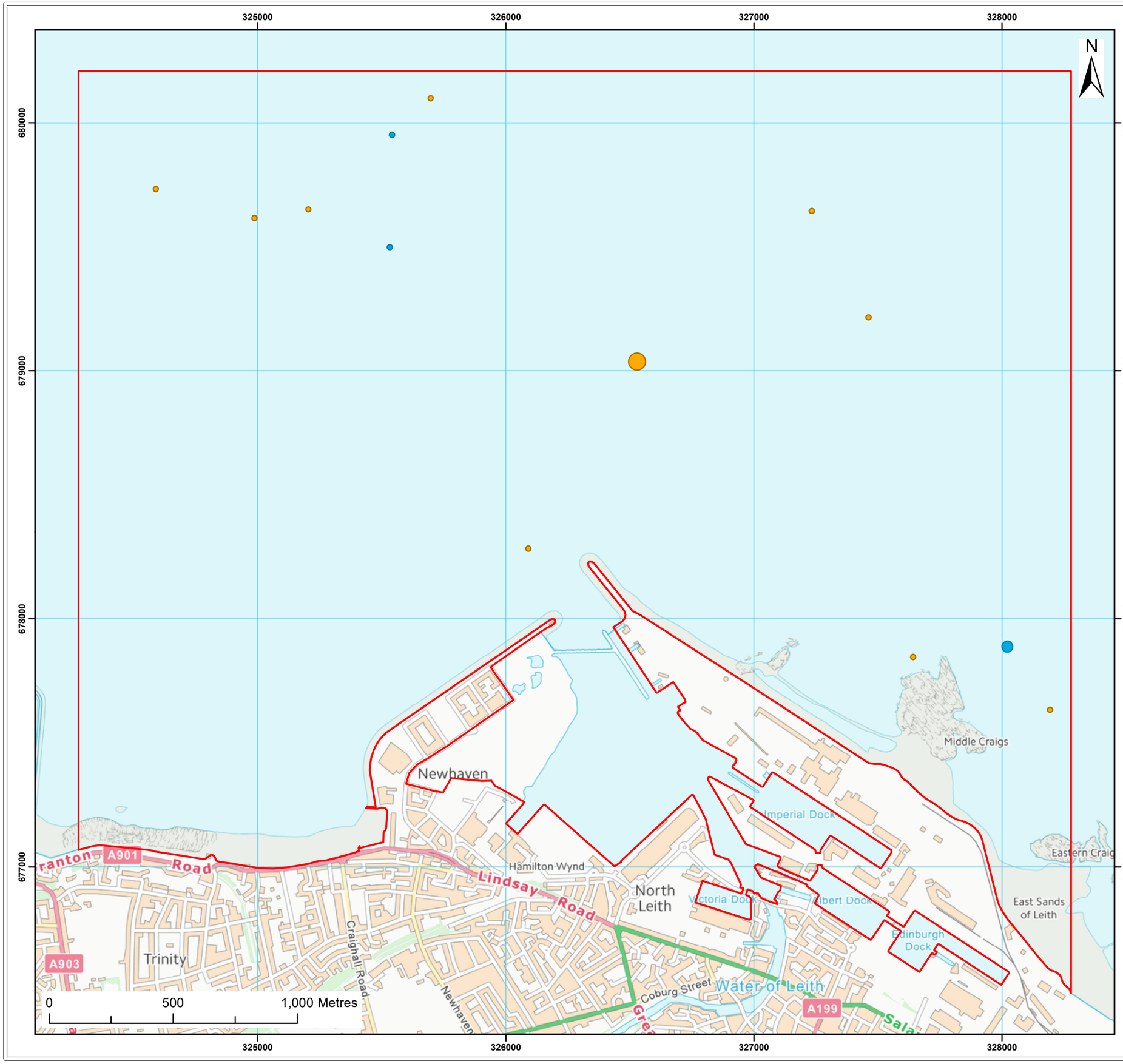

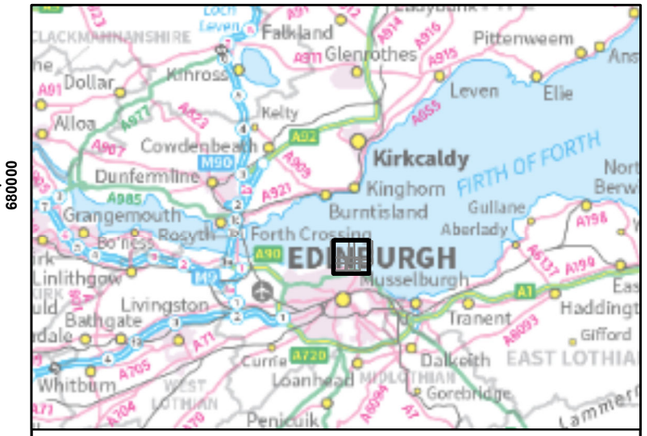

Legend:

Study Area

Foraging Gannet (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

Loafing/Roosting Gannet (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

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Title:

Distribution map of Gannet recorded during estuarine surveys, March 2021 to March 2022

Figure:	Drawing No:
A.9	PC2045-RHD-ZZ-ZZ-DR-EV-0027

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

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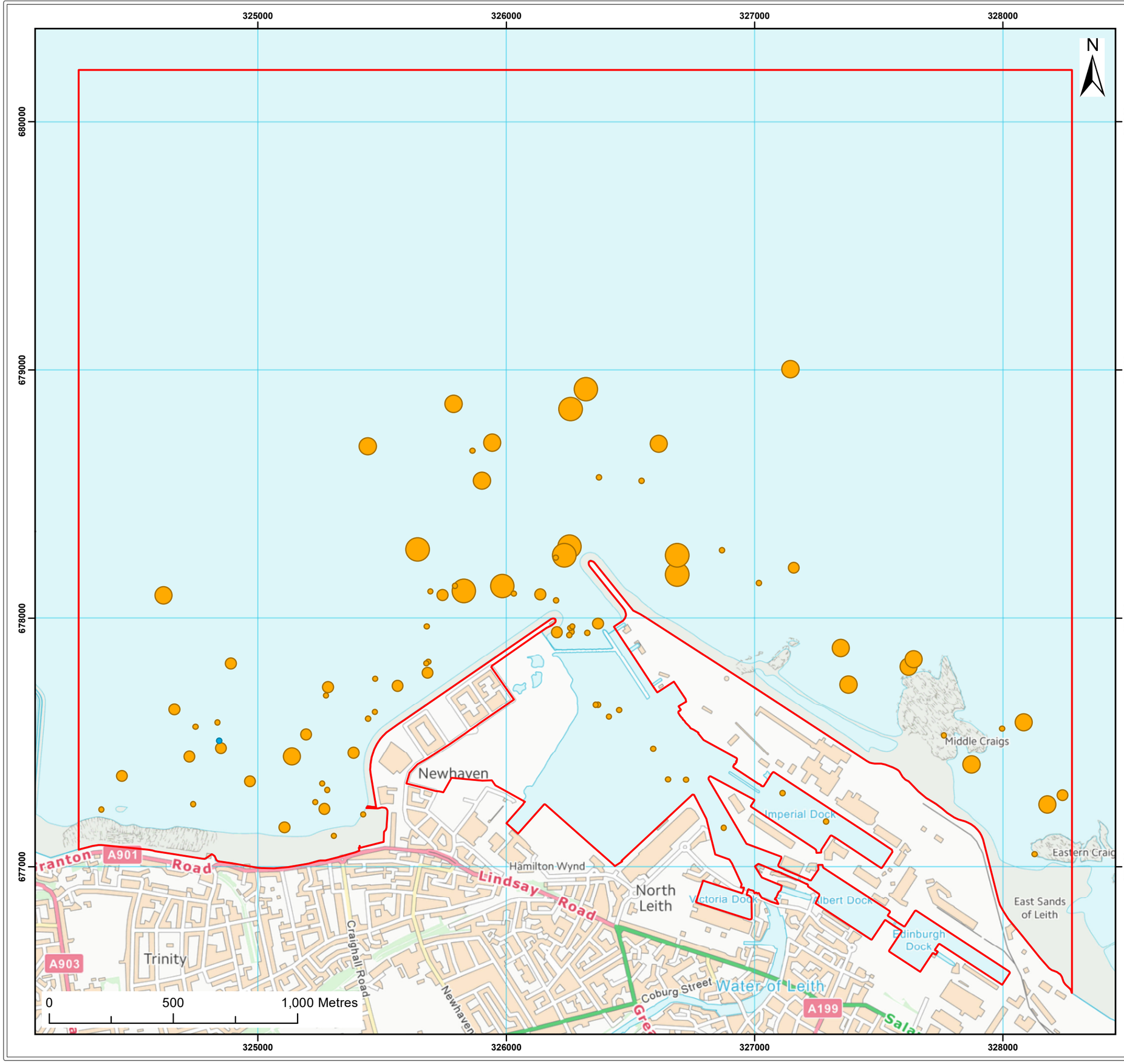

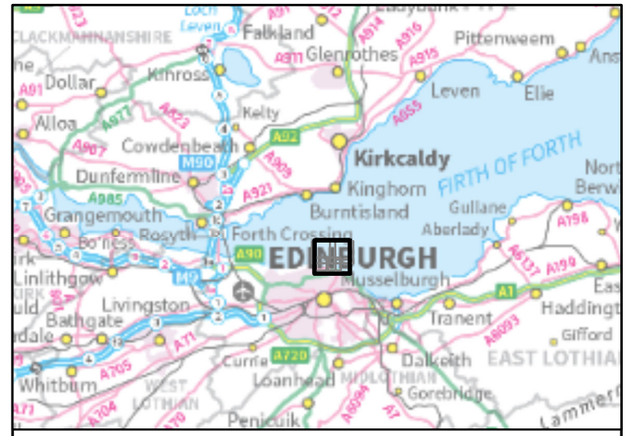

Legend:

Study Area

Foraging Guillemot (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

Loafing/Roosting Guillemot (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

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Title:

Distribution map of Guillemot recorded during estuarine surveys, March 2021 to March 2022

Figure:	Drawing No:
A.11	PC2045-RHD-ZZ-ZZ-DR-EV-0029

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	03/03/2022	JR	BH	A3	1:15,000

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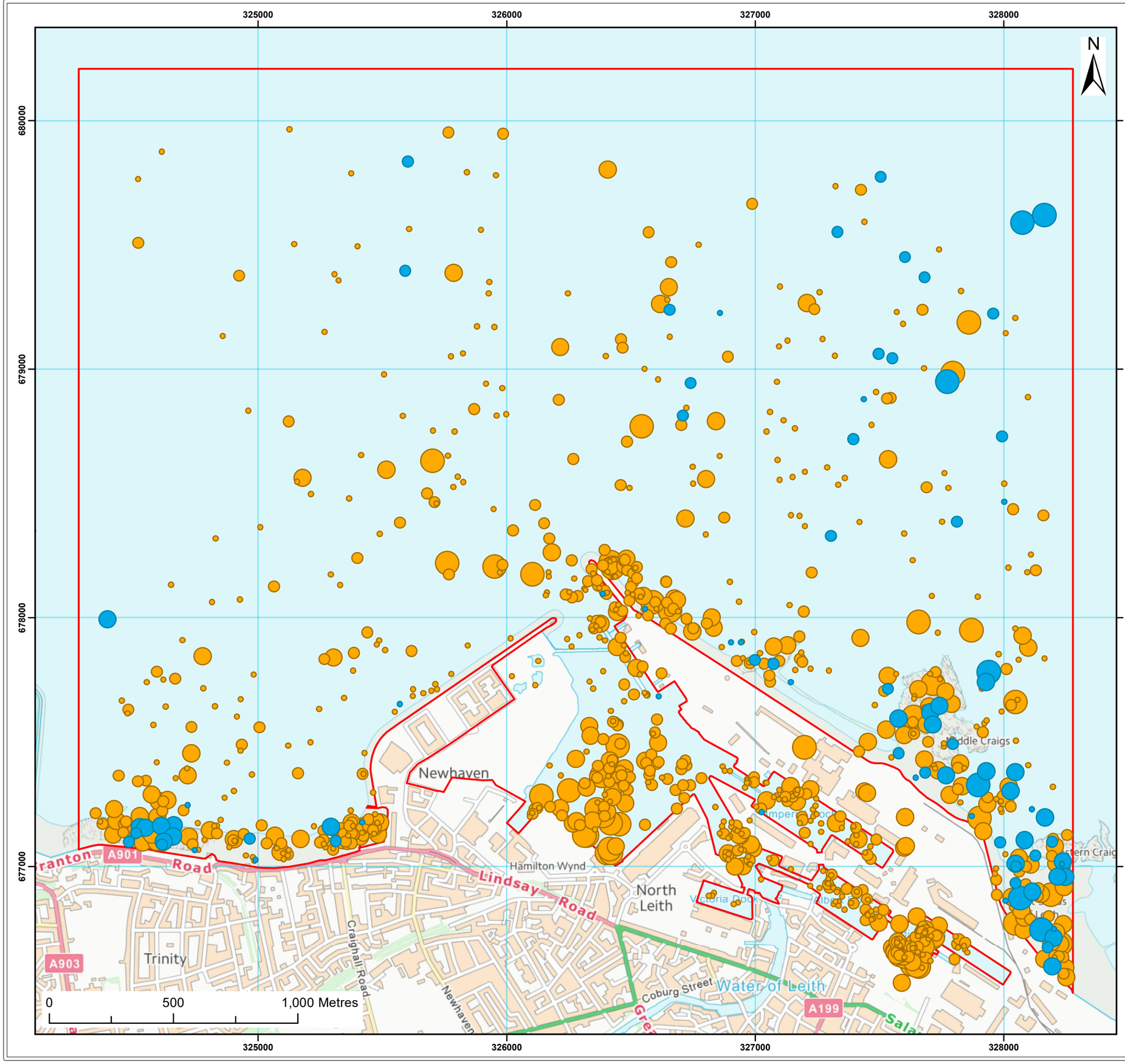

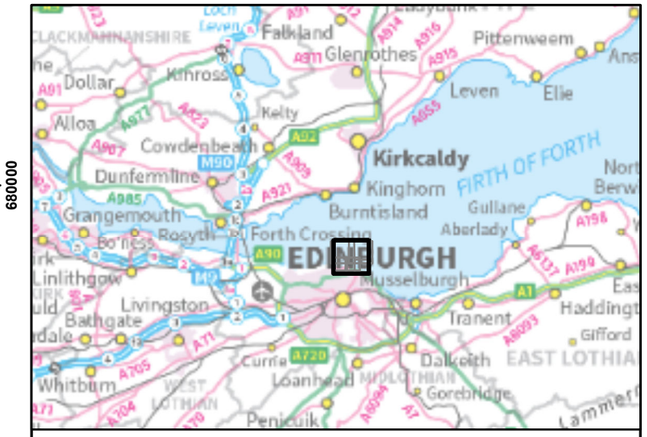

Legend:

Study Area

Foraging Herring gull (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

Loafing/Roosting Herring gull (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

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Title:

Distribution map of Herring gull recorded during estuarine surveys, March 2021 to March 2022

Figure:	Drawing No:
A.12	PC2045-RHD-ZZ-ZZ-DR-EV-0030

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

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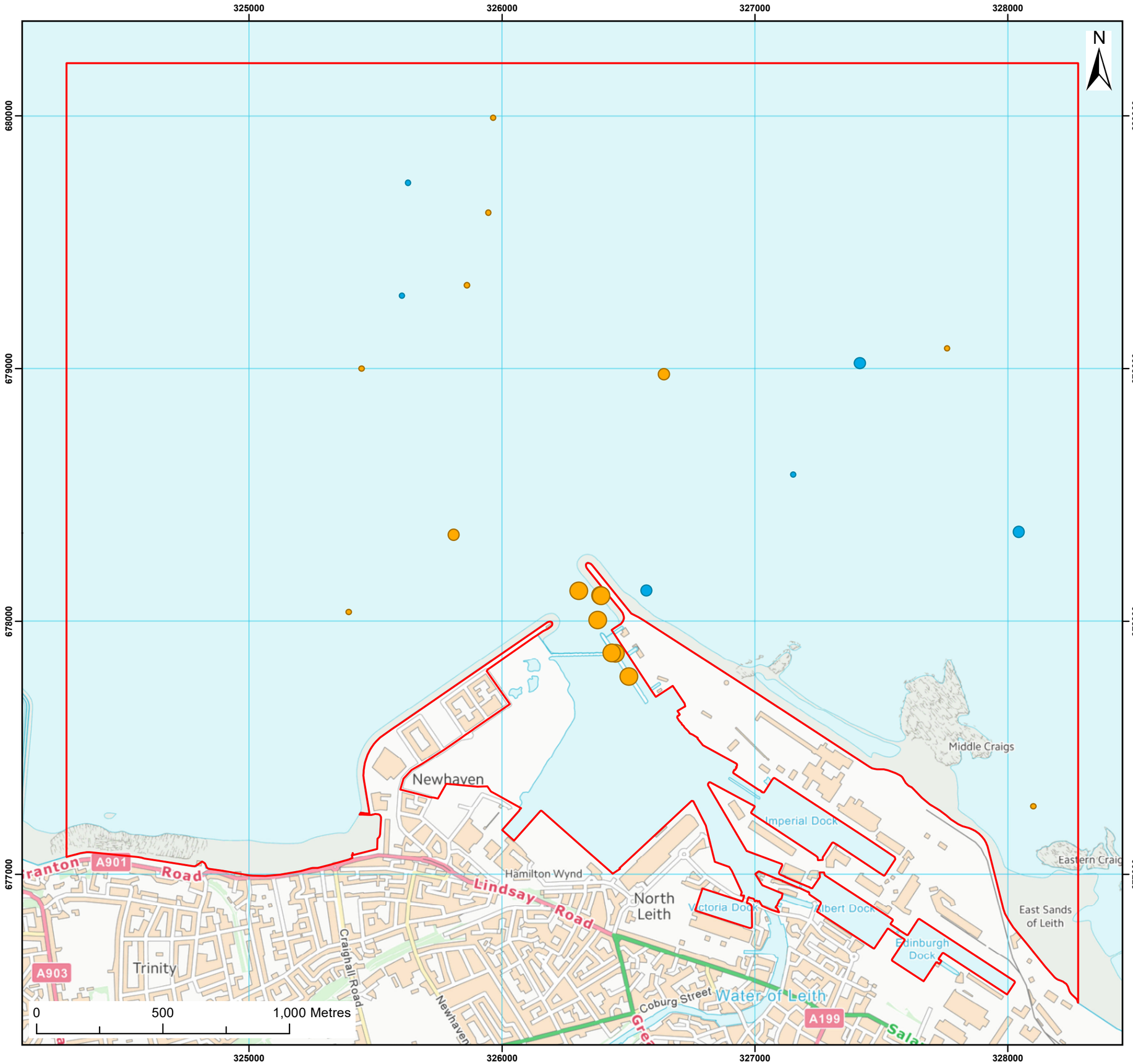

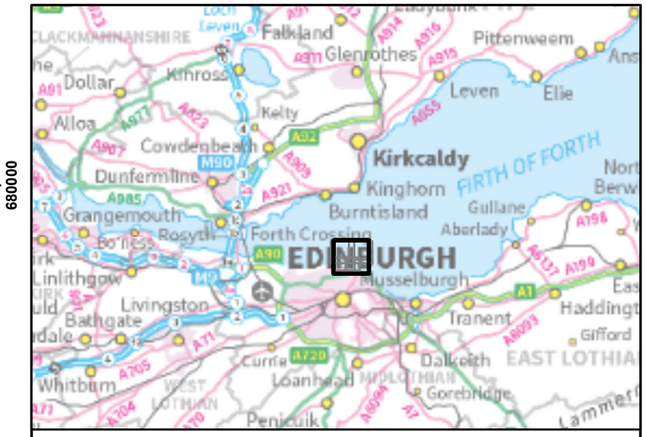

Legend:

Study Area

Foraging Kittiwake (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

Loafing/Roosting Kittiwake (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

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Title:

Distribution map of Kittiwake recorded during estuarine surveys, March 2021 to March 2022

Figure:	Drawing No:
A.13	PC2045-RHD-ZZ-ZZ-DR-EV-0031

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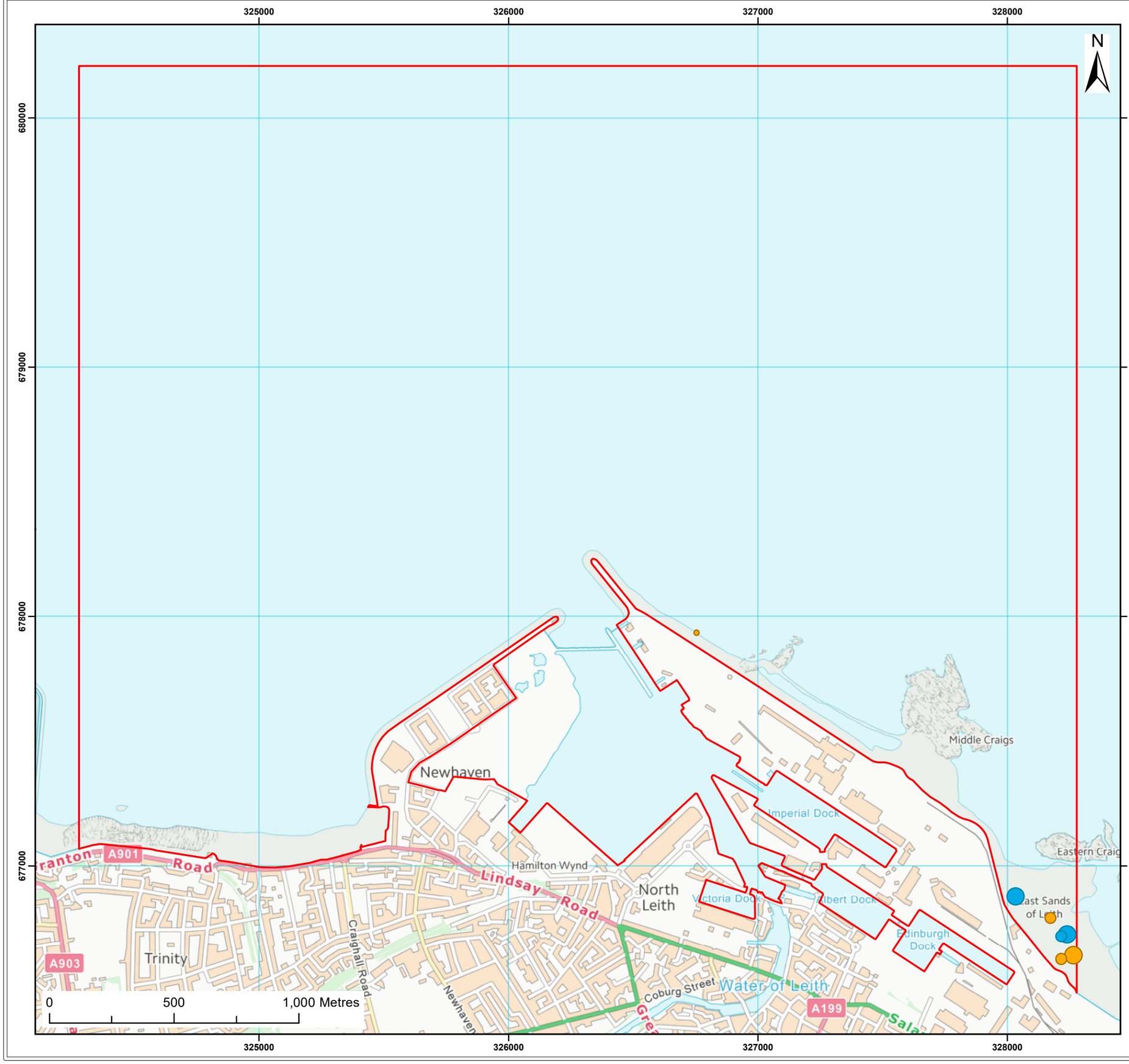

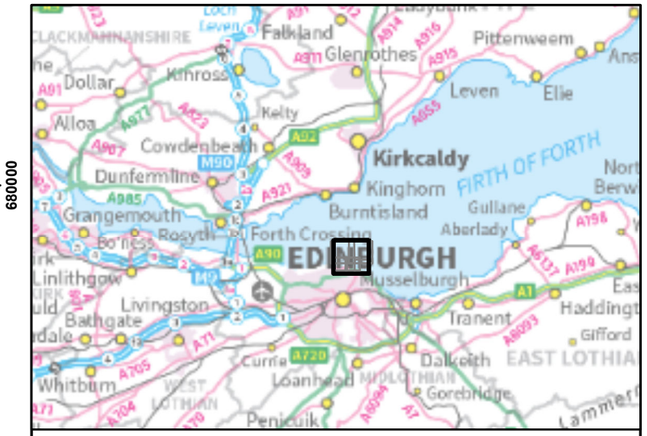

Legend:

Study Area

Foraging Knot (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

Loafing/Roosting Knot (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

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Title:

Distribution map of Knot recorded during estuarine surveys, March 2021 to March 2022

Figure:	Drawing No:
A.14	PC2045-RHD-ZZ-ZZ-DR-EV-0032

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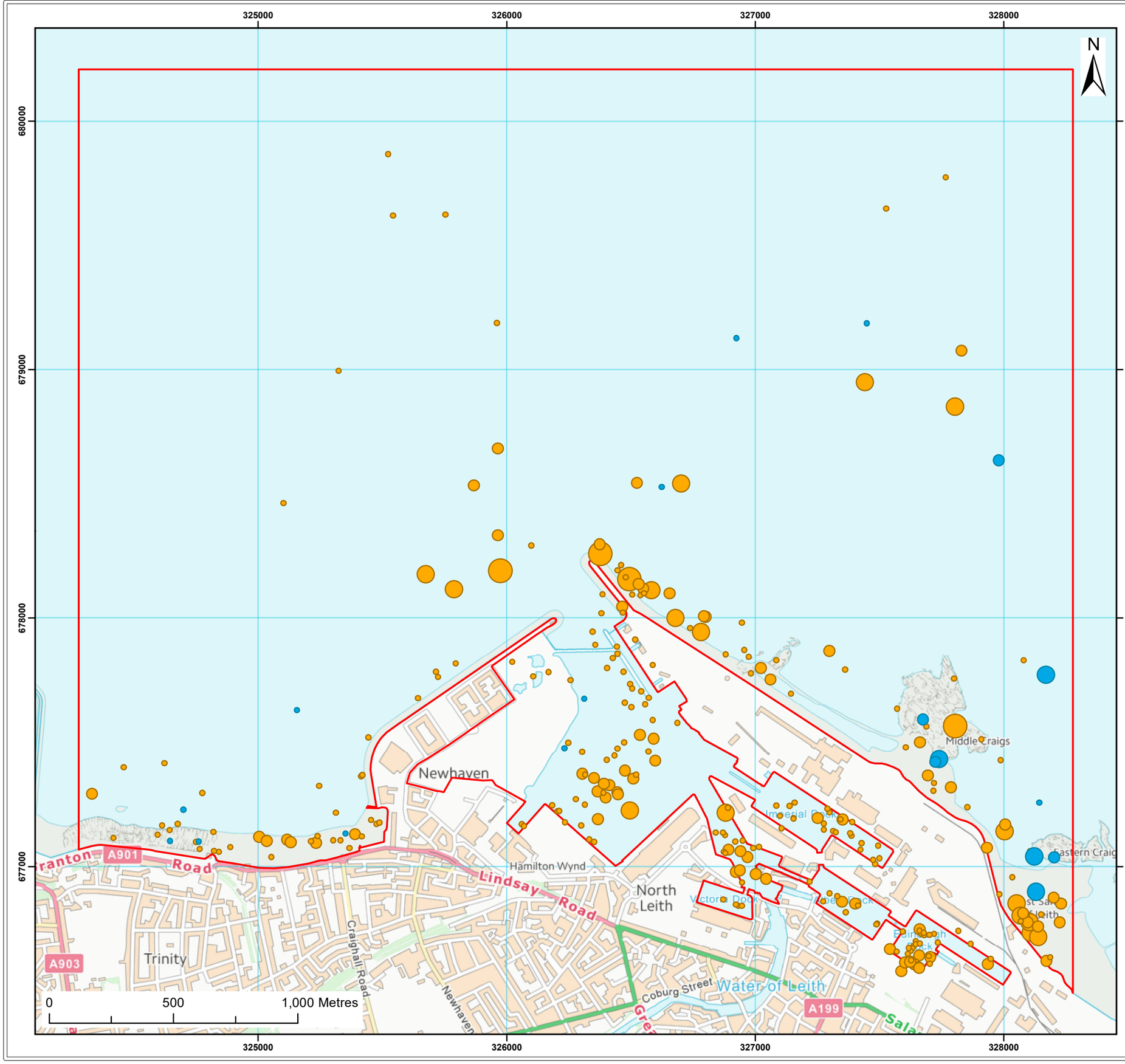

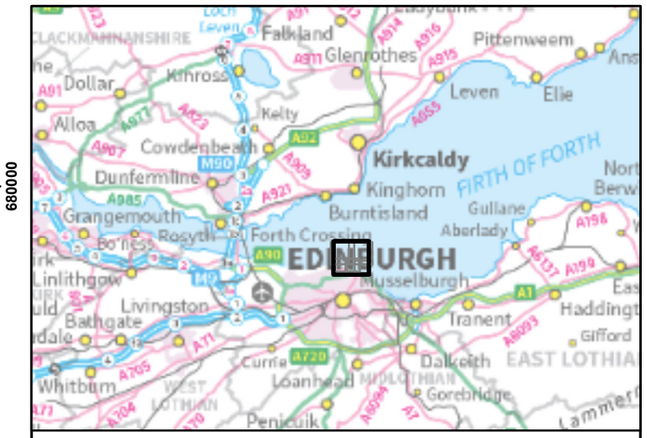

Legend:

Study Area

Foraging Lesser black-backed gull (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

Loafing/Roosting Lesser black-backed gull (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

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Title:

Distribution map of Lesser black-backed gull recorded during estuarine surveys, March 2021 to March 2022

Figure:	Drawing No:
A.15	PC2045-RHD-ZZ-ZZ-DR-EV-0033

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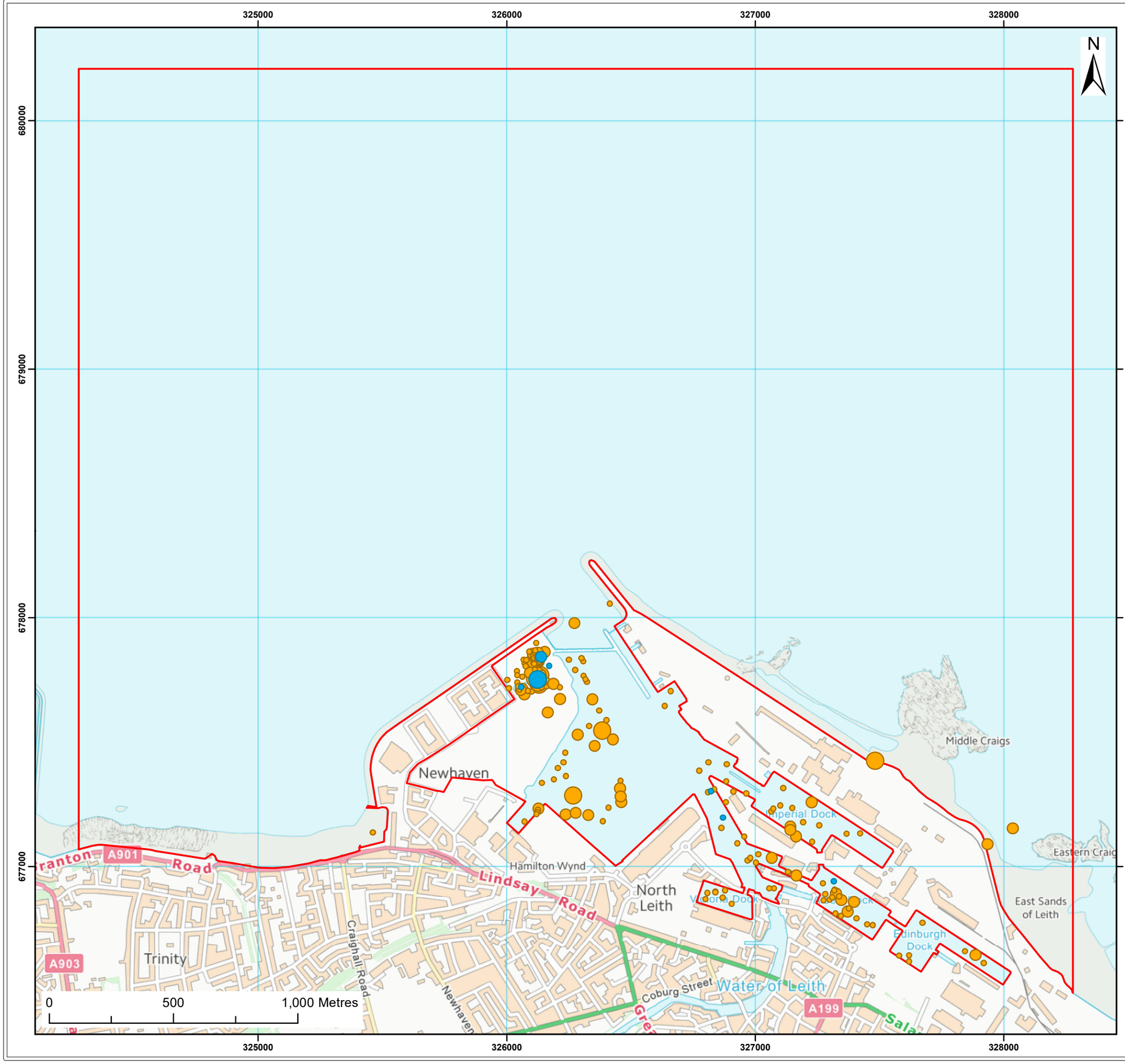

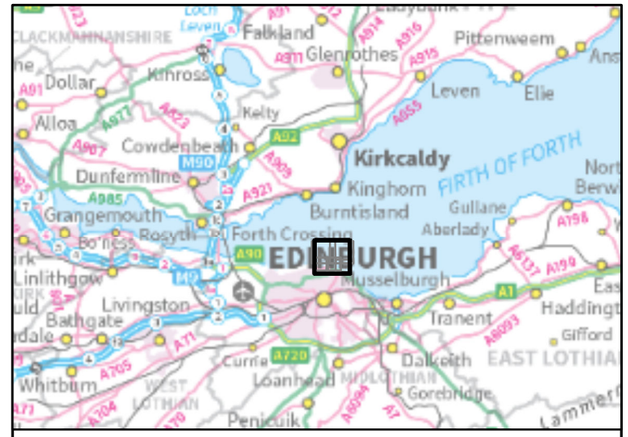

Legend:

Study Area

Foraging Mallard (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

Loafing/Roosting Mallard (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

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Title:

Distribution map of Mallard recorded during estuarine surveys, March 2021 to March 2022

Figure: A.16

Drawing No: PC2045-RHD-ZZ-ZZ-DR-EV-0034

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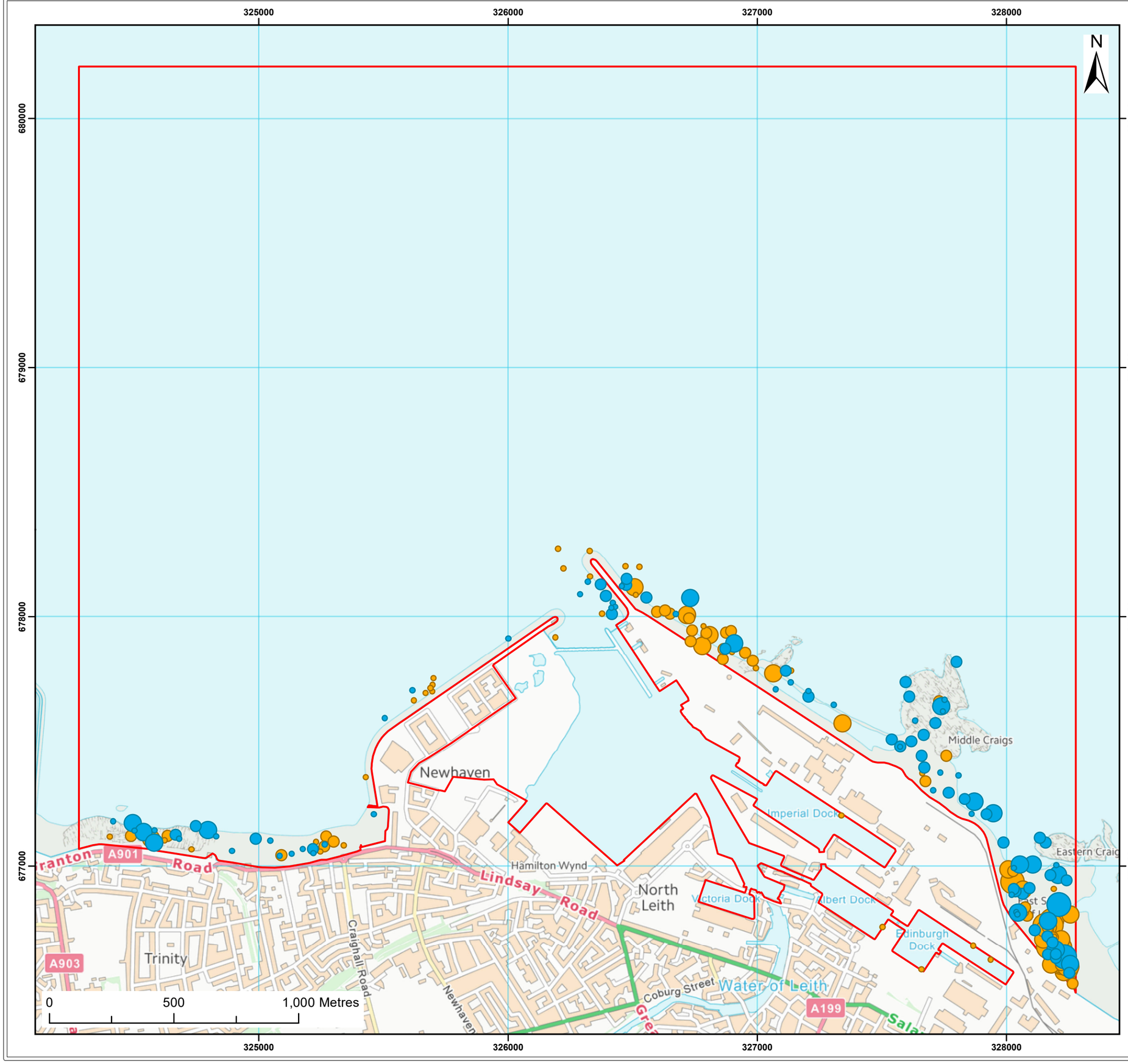

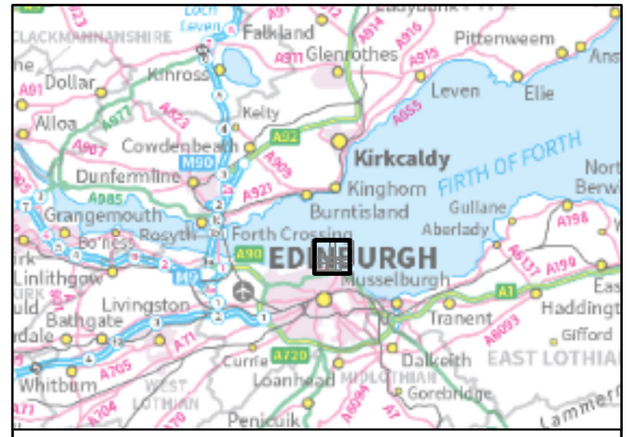

Legend:

Study Area

Foraging Oystercatcher (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

Loafing/Roosting Oystercatcher (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

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Title:

Distribution map of Oystercatcher recorded during estuarine surveys, March 2021 to March 2022

Figure: A.17

Drawing No: PC2045-RHD-ZZ-ZZ-DR-EV-0035

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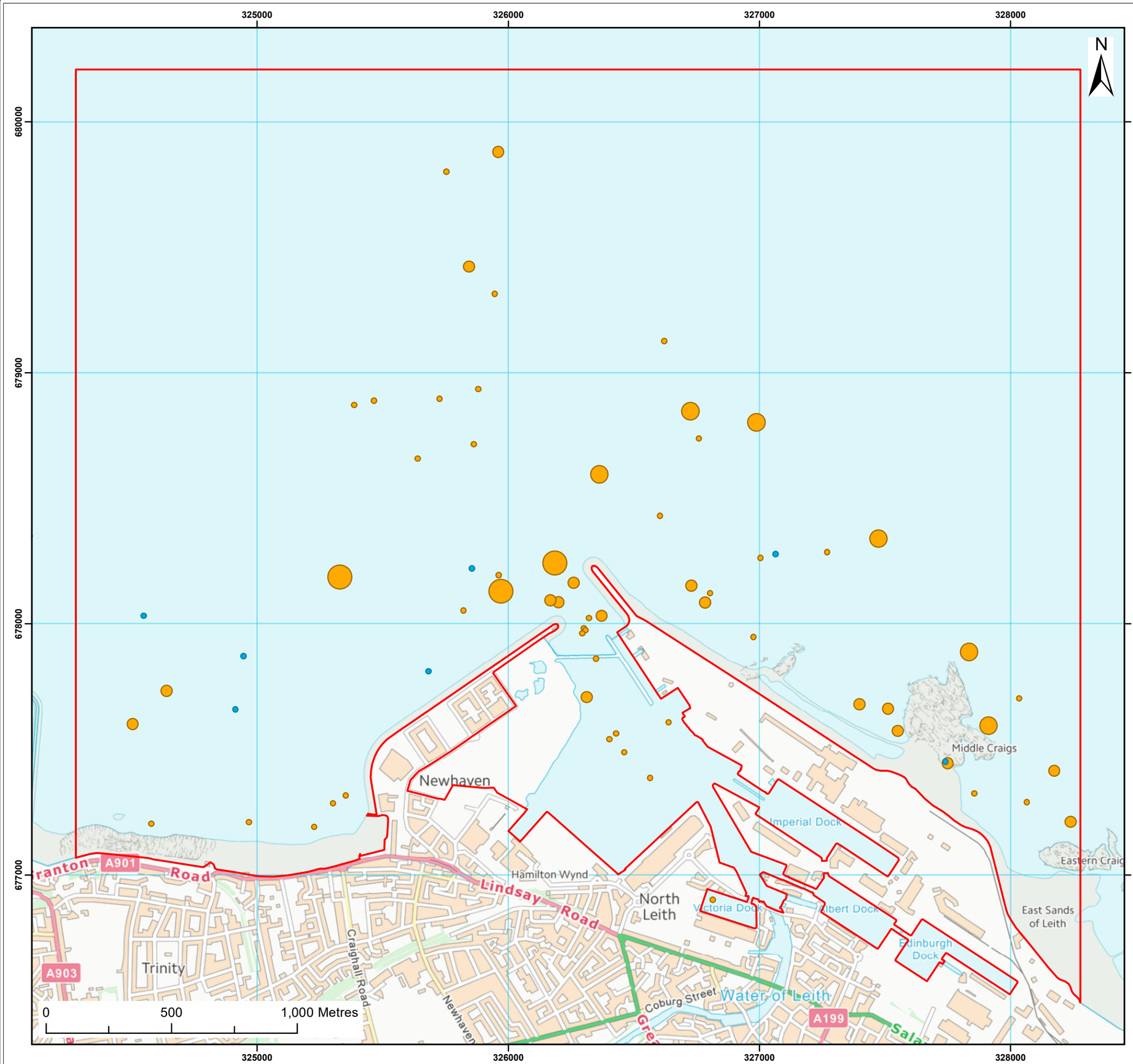

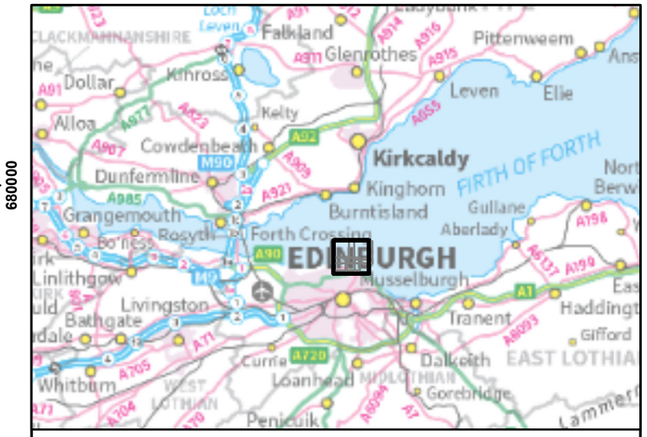

Legend:

Study Area

Foraging Razorbill (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

Loafing/Roosting Razorbill (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

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Distribution map of Razorbill recorded during estuarine surveys, March 2021 to March 2022

Figure:	Drawing No:
A.18	PC2045-RHD-ZZ-ZZ-DR-EV-0036

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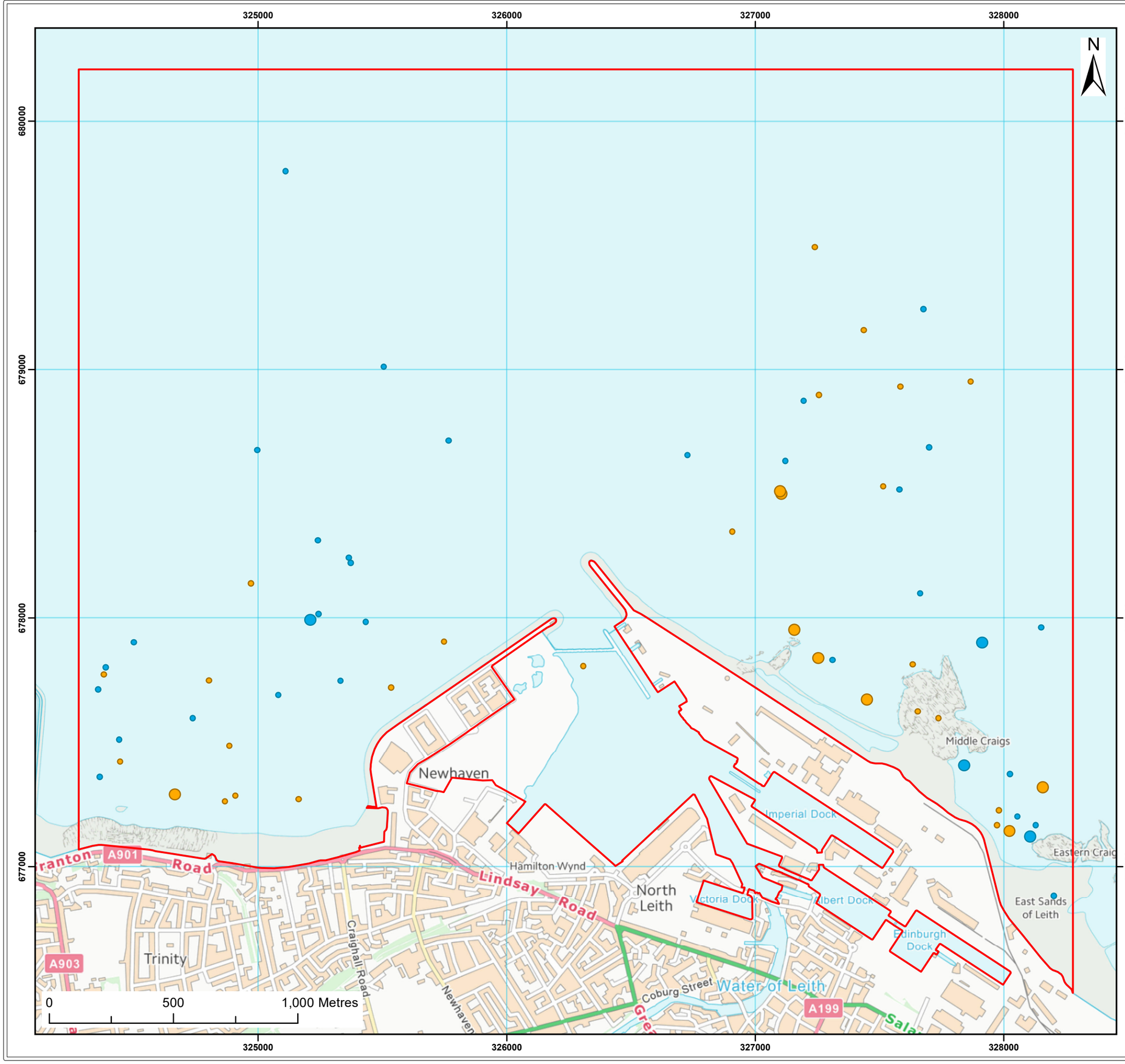

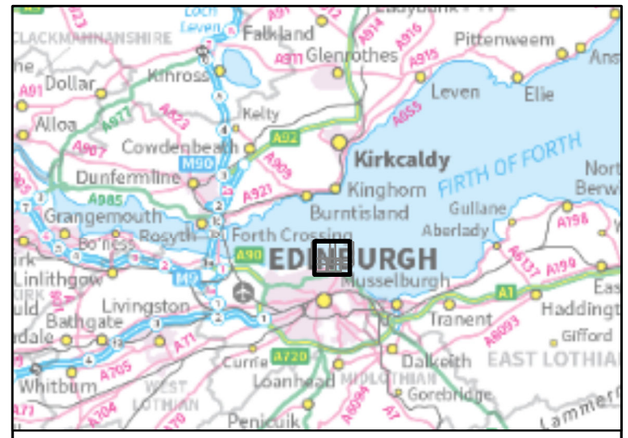

Legend:

Study Area

Foraging Red-breasted merganser (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

Loafing/Roosting Red-breasted merganser (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

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Distribution map of Red-breasted merganser recorded during estuarine surveys, March 2021 to March 2022

Figure:	Drawing No:
A.19	PC2045-RHD-ZZ-ZZ-DR-EV-0037

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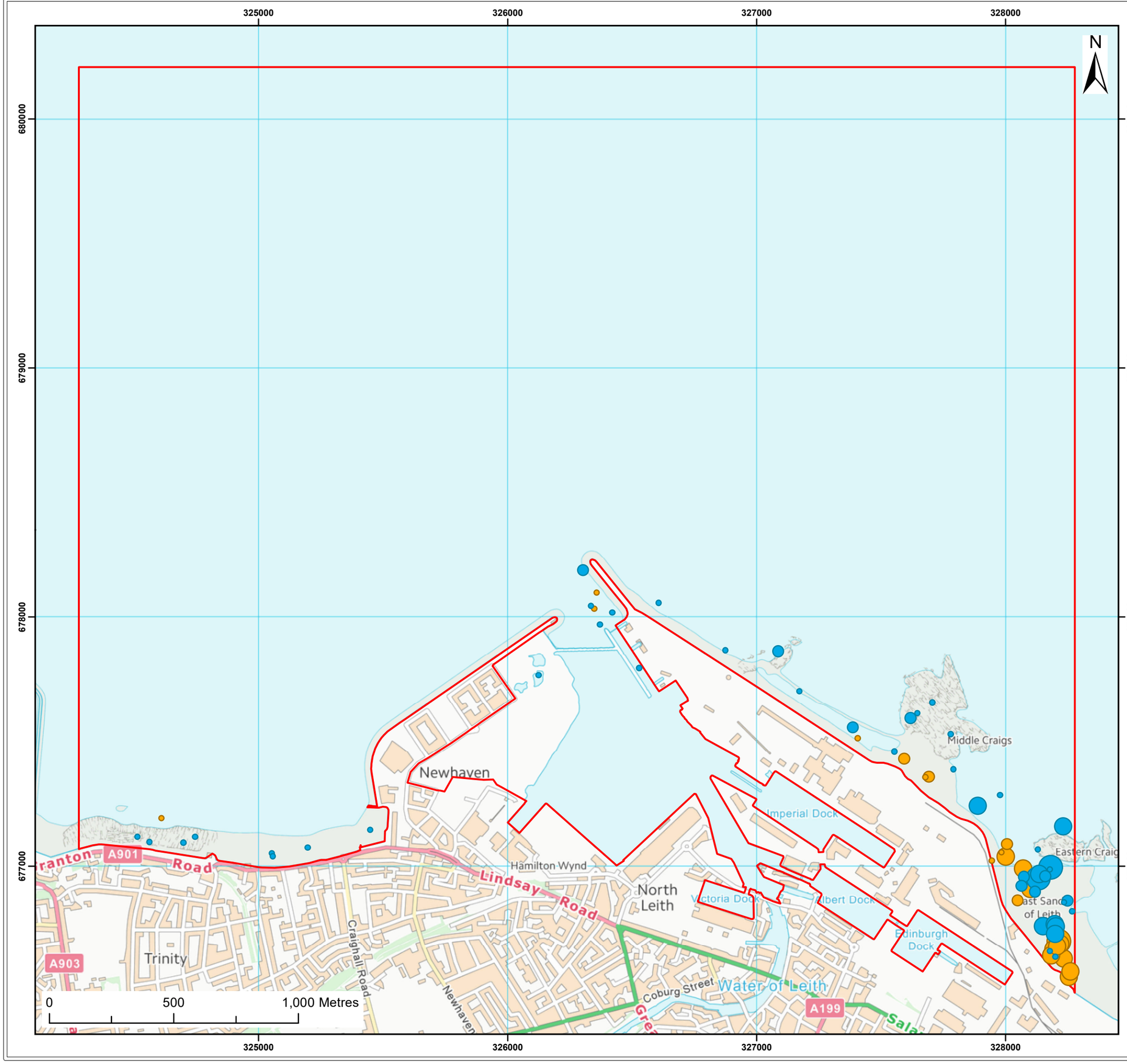

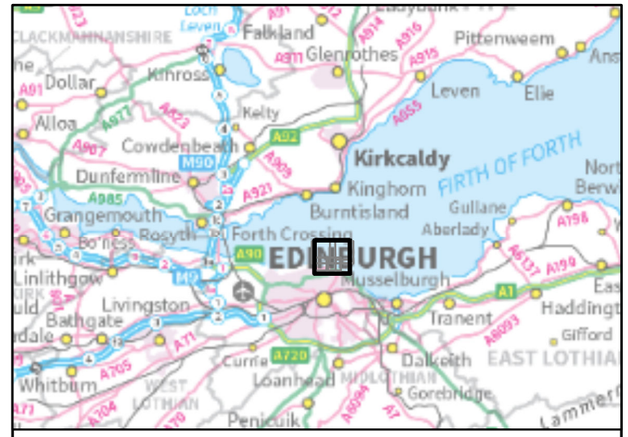

Legend:

Study Area

Foraging Redshank (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

Loafing/Roosting Redshank (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

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Distribution map of Redshank recorded during estuarine surveys, March 2021 to March 2022

Figure: A.20 | Drawing No: PC2045-RHD-ZZ-ZZ-DR-EV-0038

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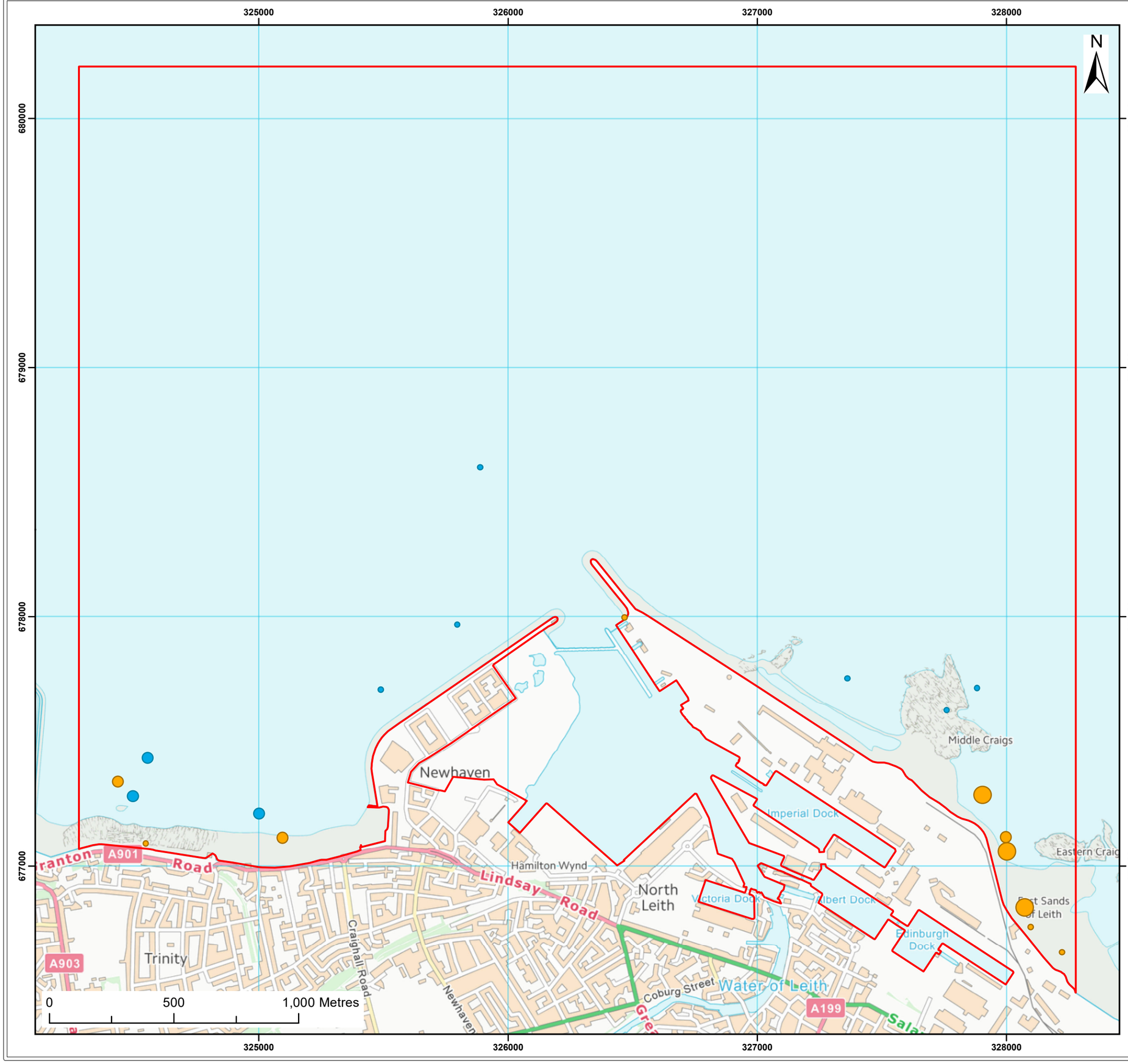

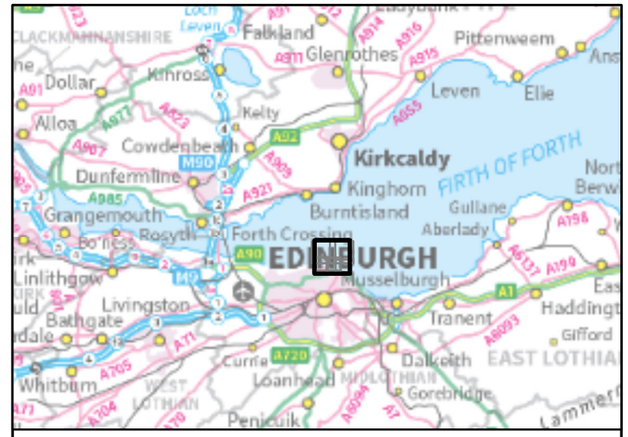

Legend:

Study Area

Foraging Sandwich tern (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

Loafing/Roosting Sandwich tern (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

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Distribution map of Sandwich tern recorded during estuarine surveys, March 2021 to March 2022

Figure:	Drawing No:
A.23	PC2045-RHD-ZZ-ZZ-DR-EV-0041

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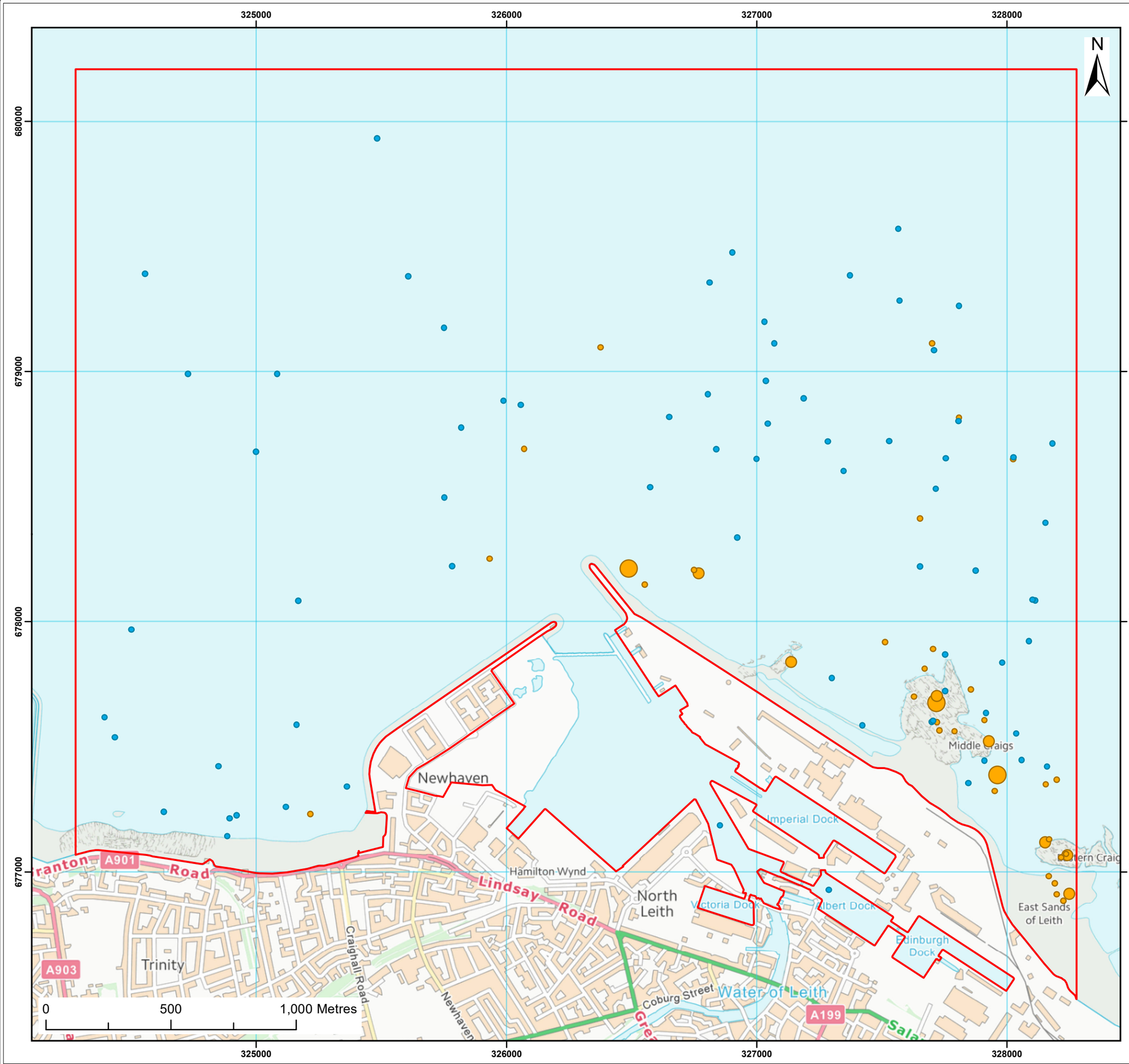

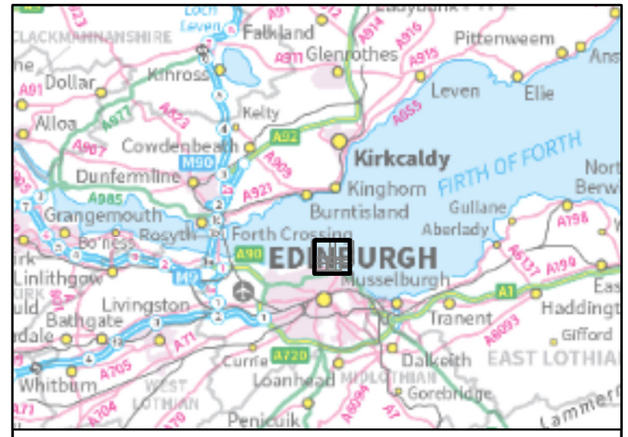

Legend:

Study Area

Foraging Shag (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

Loafing/Roosting Shag (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

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Title:

Distribution map of Shag recorded during estuarine surveys, March 2021 to March 2022

Figure:	Drawing No:
A.24	PC2045-RHD-ZZ-ZZ-DR-EV-0042

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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02	23/03/2022	JR	BH	A3	1:15,000

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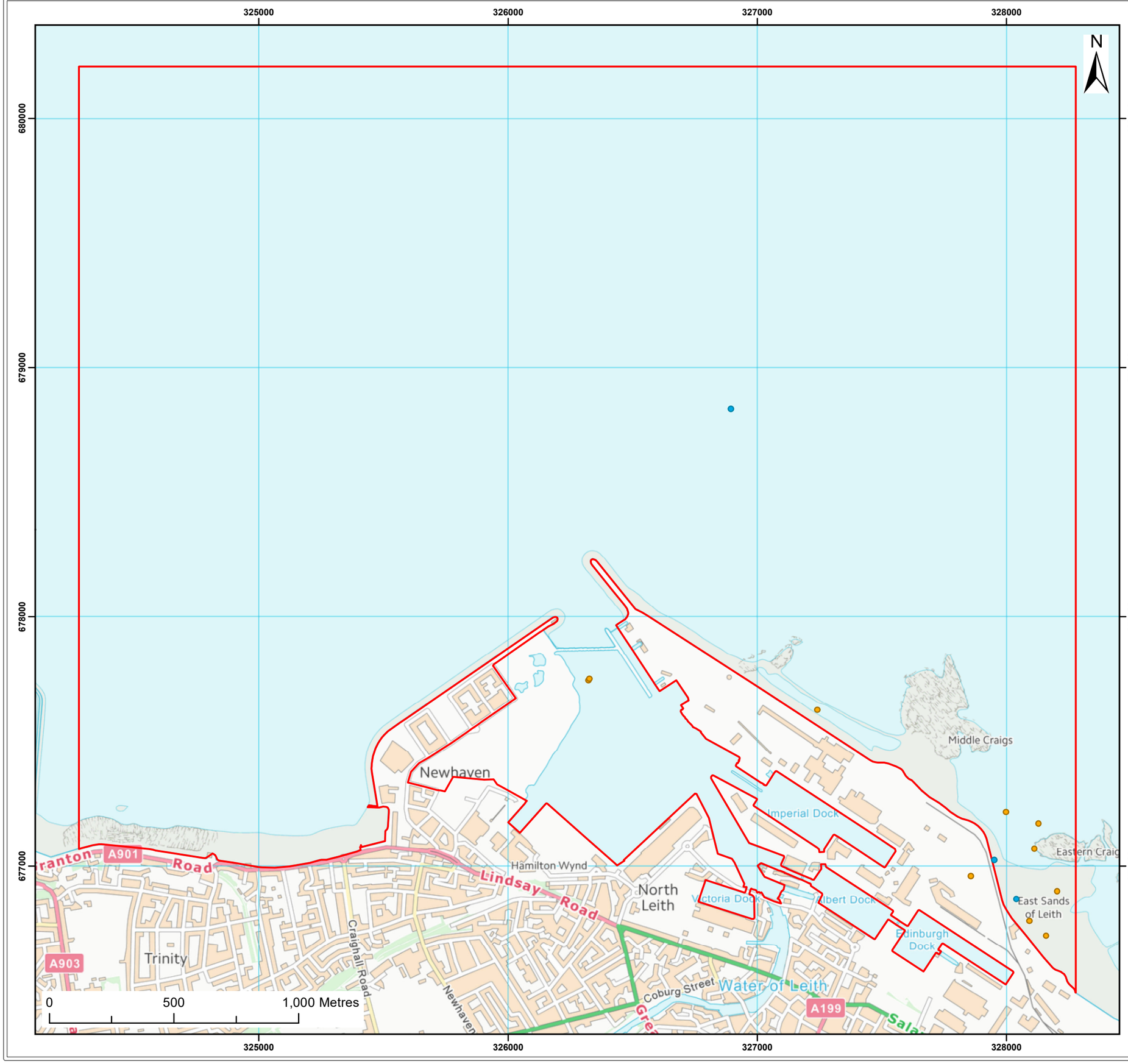

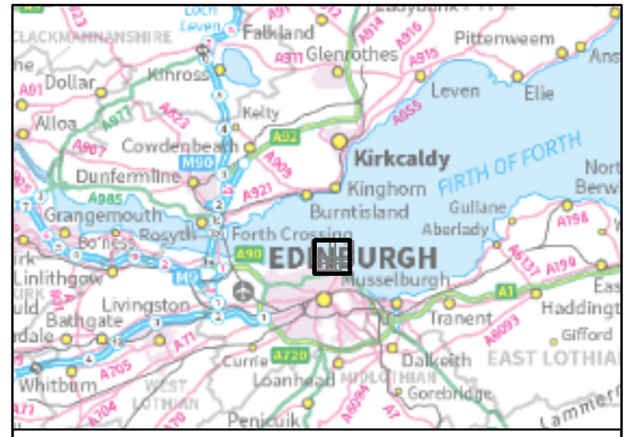

Legend:

Study Area

Foraging Shelduck (Count Range)

1 - 5

6 - 20

21 - 100

101 +

Loafing/Roosting Shelduck (Count Range)

1 - 5

6 - 20

21 - 100

101 +

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Title:

Distribution map of Shelduck recorded during estuarine surveys, March 2021 to March 2022

Figure:	Drawing No:
A.25	PC2045-RHD-ZZ-ZZ-DR-EV-0043

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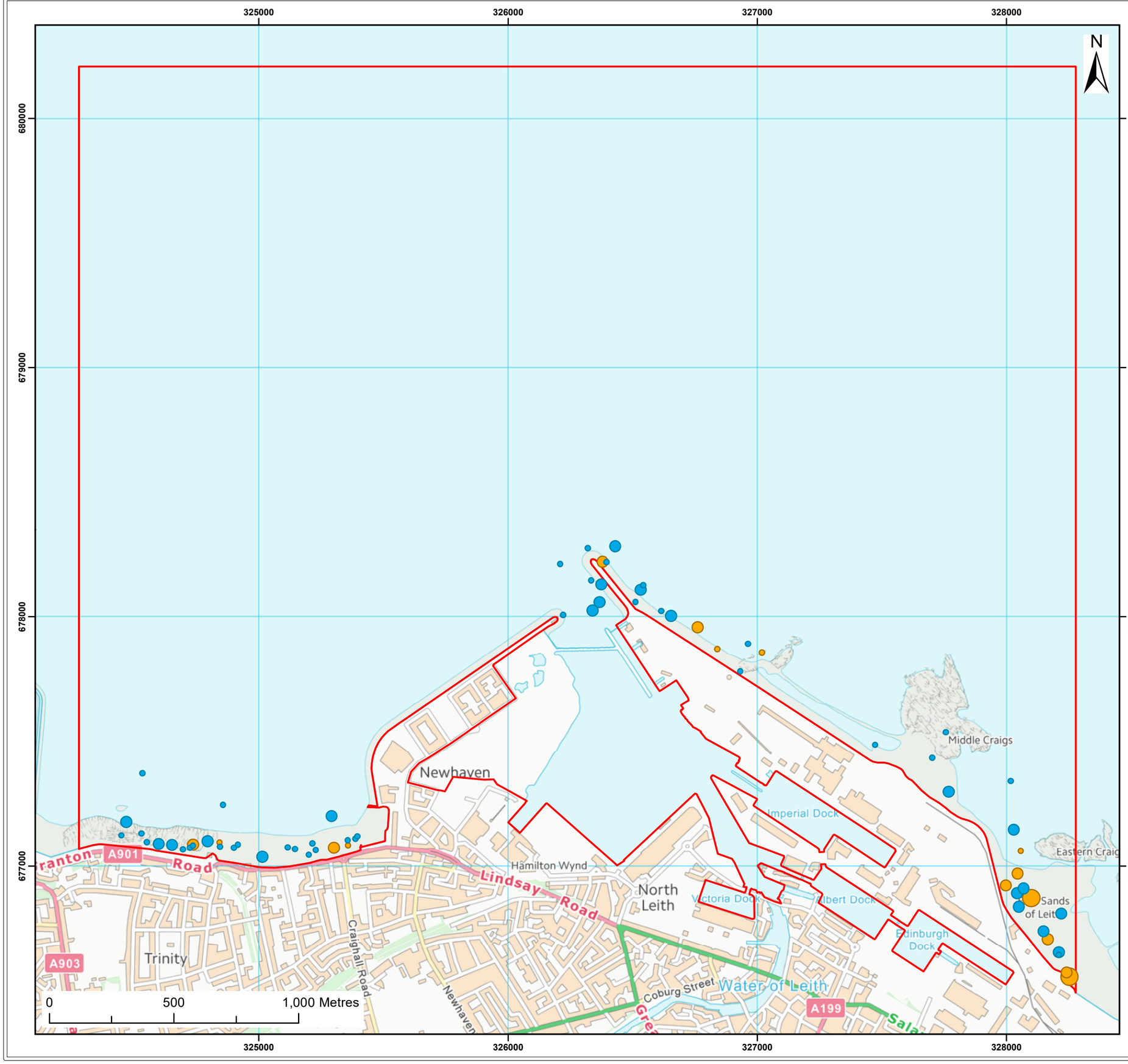

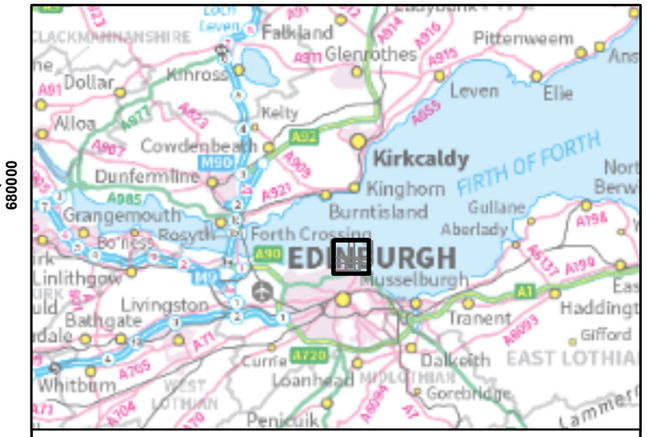

Legend:

- Study Area

Foraging Turnstone (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

Loafing/Roosting Turnstone (Count Range)

- 1 - 5
- 6 - 20
- 21 - 100
- 101 +

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Client:	Project:
Forth Ports Limited	Port of Leith - Outer Berth

Title:

Distribution map of Turnstone recorded during estuarine surveys, March 2021 to March 2022

Figure: A.26 | Drawing No: PC2045-RHD-ZZ-ZZ-DR-EV-0044

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	03/03/2022	JR	BH	A3	1:15,000
02	23/03/2022	JR	BH	A3	1:15,000

Co-ordinate system: British National Grid

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Appendix 3 Tern flight surveys

Table A 1 *Rate of inbound and outbound common tern flights through flight sector 1*

Survey visit number		Inbound flights (per hour)				Outbound flights (per hour)			
		0-5m	5-10m	10-20m	20m+	0-5m	5-10m	10-20m	20m+
May	1	0	0	9	6	0	6	9	3
	2	6	33	30	33	0	21	33	6
June	1	21	45	30	63	36	12	69	75
	2	6	9	27	36	0	3	63	66
July	1	0	21	126	123	0	36	96	90
	2	6	21	39	189	75	75	66	57

Table A 2 *Rate of inbound and outbound common tern flights through flight sector 2*

Survey visit number		Inbound flights (per hour)				Outbound flights (per hour)			
		0-5m	5-10m	10-20m	20m+	0-5m	5-10m	10-20m	20m+
May	1	0	0	0	6	0	0	0	6
	2	0	0	9	66	0	0	0	12
June	1	0	9	0	24	0	6	15	9
	2	3	69	54	15	6	60	51	12
July	1	3	15	36	54	15	15	30	27
	2	0	3	54	123	0	0	27	69

Table A 3 *Rate of inbound and outbound common tern flights through flight sector 3*

Survey visit number		Inbound flights (per hour)				Outbound flights (per hour)			
		0-5m	5-10m	10-20m	20m+	0-5m	5-10m	10-20m	20m+
May	1	0	0	0	39	0	0	0	60
	2	0	0	3	180	0	0	18	129
June	1	0	3	24	111	0	0	36	231
	2	9	96	102	21	39	114	108	21
July	1	0	42	522	249	0	96	594	213
	2	9	12	6	63	0	9	0	30

Table A 4 *Rate of inbound and outbound common tern flights through flight sector 4*

Survey visit number		Inbound flights (per hour)				Outbound flights (per hour)			
		0-5m	5-10m	10-20m	20m+	0-5m	5-10m	10-20m	20m+
May	1	0	0	0	6	0	0	0	9
	2	0	0	0	12	0	0	0	36
June	1	0	0	0	12	0	0	0	42
	2	3	39	36	9	9	75	51	18
July	1	0	0	9	156	0	3	21	48
	2	9	12	6	63	0	9	0	30


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