Stromar Offshore Wind Farm

Environmental Impact Assessment: Offshore Scoping Report

Appendix A: Offshore Commitments Register

Proposed Offshore Development

Date: 03 January 2024

Document Number: 08550852

Revision: A

Classification: Public

Contents

1. Glossary and Acronyms

Glossary

Term	Definition
Commitment	A term used interchangeably with mitigation and enhancement measures. The purpose of a commitment is to reduce and/or eliminate Likely Significant Effects in EIA terms. Primary (Design) Commitments or Tertiary (Inherent) Commitments are both embedded within the assessment at the relevant point in the EIA (eg. at Scoping or EIAR). Secondary commitments are incorporated to reduce Likely Significant Effects to environmentally acceptable levels following initial assessment.
Enhancement Commitment	Commitments made by the project to provide broader environmental enhancement across a range of environmental aspects. Enhancement commitments are not required to mitigate environmental impacts.
Mitigation Commitment	Commitments made by the project to reduce or eliminate environmental impacts including avoidance, best practice and design commitments, which are classified into primary or tertiary measures in accordance with the IEMA 'Guide to Shaping Quality Development' (2015) definitions. Mitigation commitments are embedded within the assessment at the relevant point in the EIA (eg. at Scoping or EIAR).
Primary Commitment	Primary (inherent) mitigation is an intrinsic part of the project design – it should be described in the design evolution narrative and included within the project description. For example, reducing the height of a development to reduce visual impact. Definition in accordance with 'Guide to Shaping Quality Development' (IEMA, 2015*).
Secondary Commitment	Secondary (foreseeable) mitigation requires further activity in order to achieve the anticipated outcome – typically, these will be described within the topic chapters of the ES, but often are secured through planning conditions and/or management plans. For example, description of certain lighting limits that will be subject to submission of a detailed lighting layout as a condition of approval. Definition in accordance with 'Guide to Shaping Quality Development' (IEMA, 2015*).
Tertiary Commitment	Tertiary (inexorable) mitigation will be required regardless of any EIA assessment, as it is imposed, for example, as a result of legislative requirements and/or standard sectoral practices. For example, considerate contractor practices that manage activities which have potential nuisance effects. Definition in accordance with 'Guide to Shaping Quality Development' (IEMA, 2015*).
Offshore	Offshore covers seaward of MHWS and includes the intertidal zone which is between MHWS and MLWS.
Onshore	Onshore covers landward of MHWS.

***Guide to Shaping Quality Development (IEMA, 2015) available at https://www.iema.net/download-document/7018**

Acronyms

Acronym	Definition
ANO	Air Navigation Order
AEZ	Archaeological Exclusion Zone
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
DGC	Defence Geographic Centre
EPS	European Protected Species
FLO	Fisheries Liaison Officer
HAT	Highest Astronomical Tide
HSE	Health and Safety Executive
IMO	International Maritime Organisation
INNS	Invasive Non-Native Species
MCA	Maritime Coastguard Agency

Details of relevant documents are included under 2. Relevant Documents tab

1. Glossary and Acronyms

Acronyms

Acronym	Definition
MD-LOT	Marine Directorate-Licensing Operations Team
MGN	Marine Guidance Note
MoD	Ministry of Defence
MMO	Marine Mammal Observer
MPA	Marine Protected Area
NLB	Northern Lighthouse Board
PMF	Priority Marine Features

Acronyms

Acronym	Definition
SAR	Search and Rescue
SNCB	Statutory Nature Conservation Body
SNH	Scottish Natural Heritage (now known as Nature Scot)
SOLAS	Safety Of Life At Sea
UKHO	UK Hydrographic Office
WTG	Wind Turbine Generator

Details of relevant documents are included under 2. Relevant Documents tab

2. Relevant Documents

Document Name	Brief Explanation
Biodiversity Restoration Enhancement Plan (BREP)	Required under National Planning Framework 4 (NPF4) which sets out new requirements for developments to deliver positive effects, primarily under Policy 3 - this states that all development will contribute to the enhancement of biodiversity, including where relevant, restoring degraded habitats
Cable Plan (CaP)	The Cable Plan for the Project is a plan for the network layout (including the location of cables). The Plan will detail cable protection methods, routing, burial and post-installation methods
Cable Burial Risk Assessment (CBRA)	The Cable Burial Risk Assessment is a method to improve the risk management of the laying of subsea cables
Construction Method Statement (CMS)	A Construction Method Statement describes exactly how construction is to be carried out in a way that meets health and safety requirements and includes all control measures
Design Statement (DS)	The design statement sets out the philosophy and assumptions for all analysis and design behind the development proposal
Development Specification and Layout Plan (DSLP)	The DSLP document sets out the proposed design and layout specification for the offshore wind farm and the Offshore Electricity Transmission Infrastructure (OFTI) and forms part of a suite of approved documents that provides the framework for the design and construction process of the development, namely the other consent plans required under the offshore consents, including: CaP, DS, PS and LMP
Emergency Response Cooperation Plan (ERCoP)	The Maritime and Coastguard Agency (MCA) requires that Emergency Response Cooperation Plans be developed and put in place for the construction, operation and decommissioning phases of the Project. This includes fundamental details such as emergency contact numbers to permit rapid contact, information sharing and effective cooperation during an emergency situation
Environmental Impact Assessment Report (EIAR) - various chapters including: Development Description, Consultation, Commercial Fisheries, Marine Archaeology and Cultural Heritage, Marine Mammal, Offshore Ornithology, Shipping and Navigation	The EIAR presents the results of systemic analysis and assessment of the significant impacts of a development, utilising a proportionate approach
Fisheries Management and Mitigation Strategy (FMMS)	The aim of a project specific FMMS is to implement all measures committed to by the offshore wind farm process during the application
Lighting and Marking Plan (LMP)	The overall aims and objectives of the LMP are to set out the lighting and marking scheme that will be implemented for the Project, to include the construction and operational phases; this includes both marine and aviation lighting and marking
Marine Pollution Contingency Plan (MPCP)	The Marine Polution Contingency Plan aims to provide a coordinated response to potential major marine pollution incidents
Marine Mammal Monitoring Plan (MMMP)	The basic premise of the MMMP is to observe for marine mammals in the defined Project area - a Marine Mammal Observer (MMO) will watch for, and identify marine mammals; recording their numbers, distances and reactions to construction operations
Navigational Safety Plan (NSP)	The overall objective of this NSP is to ensure the safe navigation to and from the site for both project and third party vessels - the NSP's primary functions relate to safety measures involving temporary lighting and marking (during construction) and setting out construction exclusion zones, detail anchoring areas and buoyage procedures are in place for the promulgation of info to relevant stakeholders and to ensure that emergency response procedures are in place should an emergency situation arise.
Project Environmental Monitoring Plan (PEMP)	The PEMP is a document submitted to MD-LOT that outlines how the developer will minimise negative environmental impacts of the Project
Piling Strategy (PS)	The PS provides four primary functions - to provide details of the proposed method and anticipated duration of pile-driving at all locations, details of soft-start piling procedures and anticipated maximum piling energy required at each pile location
Safety Zone Statement (SZS)	The statement outlines the legislative requirements relating to an application for safety zones for offshore wind turbines and associated infrastructure under Section 95 of the Energy Act 2004, the developer's approach and scope of work
Stakeholder Management Plan (SMP)	The SMP outlines how the goals and expectations of key stakeholders will be managed during the Project
Vessel Management Plan (VMP)	The VMP sets out the proposed vessel management framework to be applied during the construction and operational phases
Written Scheme of Investigation (WSI)	The WSI relates to the outcome of the archaeological assessment - the WSI contains the details of the archaeological mitigation measures that will be adhered to for the lifetime of the Project

3. Overview

The project has adopted a number of Primary, Secondary and Tertiary Commitments (see glossary for definitions) as part of the EIA process in order to avoid or reduce impacts where possible. This annex details all commitments that are taken forward within an Application and provides details as to how the commitments are secured. A full list of documents which are relevant to and should be read in conjunction with this Commitments Register is set out in Section 2.

Commitments have been informed and will be updated through consultation on the Scoping Report, subsequent informal consultation with a range of key consultees and feedback from members of the public at local events. An overview of the consultation undertaken to date is provided within **Volume X, Chapter X, Consultation**.

The following tables provides an overview of the information contained within the Commitments Register.

Table 1: Commitments Register Explained

Commitment Reference	Each Commitment has a unique ID assigned to it to enable consultees to easily track the evolution of commitments throughout the development of the project.
Commitment Stage	Relates to the stage of the project when the Commitment was made.
Mitigation/Enhancement	Identifies whether the commitment is a Mitigation Commitment or Enhancement Commitment (see Glossary).
Type	Details whether the Commitment is Primary, Secondary or Tertiary (see Glossary).
Commitment	Details the Commitment made by the Project.
Project Phase	Details the project phase the Commitment is relevant to (e.g. construction).
Project Element	Details the project elements the commitment is relevant to (e.g. Array Area).
Offshore Topic Relevance	Details the offshore EIA topics which the Commitment is relevant to. The user can filter by topic to allow all Commitments relevant to a specific topic to be seen. The Commitment will also be detailed within the identified Offshore Chapters of the EIAR.
How is the Commitment Secured?	Details the mechanism for how the Commitment is to be legally secured (e.g. through inclusion of a consent condition).
When is the Commitment Implemented?	Where Commitments are secured though a management strategy or plan this column provides details in relation to the timing for final approval of the plan.
Relevant Application Documents	Where Commitments are secured though a management strategy or plan, the Project has sought to provide an Outline of that Strategy or Plan. Where this is the case this is detailed within this column. An overview of the Strategies and Plans provided in support of the Application can be found in Section 2 of this Register.

Commitment Reference	Commitment Stage	Mitigation or Enhancement	Type	Commitment	Project Phase	Project Element			Offshore Topic Relevance															How is the Commitment secured?	When is the Commitment implemented?	Relevant Application Documents
						Landfall	Offshore ECC	Array Area	Marine and Coastal Processes	Marine Water and Sediment Quality	Benthic & Intertidal Ecology	Fish & Shellfish	Offshore Ornithology	Marine Mammals	Commercial Fisheries	Shipping & Navigation	Marine Archaeology and Cultural Heritage	Military and Civil Aviation	Seascape, Landscape and Visual Impact	Socioeconomics, Tourism and Recreation	Greenhouse Gas and Climate Change	Infrastructure & Other Users			
C-OFF-01	Scoping	Mitigation	Primary	The number of Wind Turbine Generators (WTGs) installed will not exceed 71 WTGs.	**Construction, O & M and decommissioning**			X											X				Development specification and Layout Plan and Construction Method Statement	Pre-commencement of the relevant stage of the development works	Development specification and Layout Plan, Construction Method Statement and EIAR Development Description Chapter
C-OFF-02	Scoping	Mitigation	Primary	Minimum blade clearance of 30 m above Highest Astronomical Tide (HAT). HAT used due to floating nature of turbine technology.	**Construction, O & M and decommissioning**			X					X		X	X				X			X	Construction Method Statement and Development Specification and Layout Plan	Pre-commencement of the relevant stage of the development works	Construction Method Statement and Development Specification and Layout Plan
C-OFF-03	Scoping	Mitigation	Primary	WTGs will have a maximum blade tip height of 385 m above HAT and the rotor diameter will not exceed 320 m	**Construction, O & M and decommissioning**			X											X				Construction Method Statement and Development Specification and Layout Plan	Pre-commencement of the relevant stage of the development works	Construction Method Statement, Development Specification and Layout Plan and EIAR Development Description Chapter
C-OFF-04	Scoping	Mitigation	Primary	The offshore infrastructure will be sited to avoid the deepest sections of the Southern Trench MPA (beyond the 200m depth contour).	**Pre-construction, construction and O & M**		X				X			X										Development Specification and Layout Plan and Project Environmental Monitoring Plan	Pre-commencement of the relevant stage of the development works	Development Specification and Layout Plan, Project Environmental Monitoring Plan and EIAR Development Description Chapter
C-OFF-05	Scoping	Mitigation	Tertiary	Geophysical survey work will commence as far as practicable during the hours of daylight and when visual mitigation is not possible (due to hours of darkness, poor or low visibility or the sea state) passive acoustic monitoring will be implemented.	**Pre-construction**	X	X	X						X										Development Specification and Layout Plan and Project Environmental Monitoring Plan	Pre-commencement of the relevant stage of the development works	Development Specification and Layout Plan, Project Environmental Monitoring Plan and EIAR Development Description Chapter
C-OFF-06	Scoping	Mitigation	Tertiary	Where feasible, during geophysical surveys, USBL and SBP will not operate at full power right away, but will build to full power over a 30 minute period - this will be in accordance with the conditions of the EPS (European Priority Species) licence.	**Pre-construction**	X		X						X										Development Specification and Layout Plan and Project Environmental Monitoring Plan	Pre-commencement of the relevant stage of the development works	Development Specification and Layout Plan, Project Environmental Monitoring Plan and EIAR Development Description Chapter
C-OFF-07	Scoping	Mitigation	Primary	Offshore infrastructure will be micro-sited (where possible) around sensitive seabed habitats including Annex 1 habitats (if present), the Scottish Biodiversity List and Priority Marine Features (PMF) (in consultation with the relevant Statutory Nature Conservation Body (SNCB)), to avoid detrimental impacts to these conservation features.	**Construction**	X	X				X													Development Specification and Layout Plan and Project Environmental Monitoring Plan	Pre-commencement of the relevant stage of the development works	Development Specification and Layout Plan, Project Environmental Monitoring Plan and EIAR Development Description Chapter

Commitment Reference	Commitment Stage	Mitigation or Enhancement	Type	Commitment	Project Phase	Project Element			Offshore Topic Relevance															How is the Commitment secured?	When is the Commitment implemented?	Relevant Application Documents
						Landfall	Offshore ECC	Array Area	Marine and Coastal Processes	Marine Water and Sediment Quality	Benthic & Intertidal Ecology	Fish & Shellfish	Offshore Ornithology	Marine Mammals	Commercial Fisheries	Shipping & Navigation	Marine Archaeology and Cultural Heritage	Military and Civil Aviation	Seascape, Landscape and Visual Impact	Socioeconomics, Tourism and Recreation	Greenhouse Gas and Climate Change	Infrastructure & Other Users			
C-OFF-08	Scoping	Mitigation	Tertiary	A Construction Method Statement (CMS) will be developed, which will detail the proposed construction methods and roles and responsibilities of parties involved.	Construction	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Construction Method Statement	Pre-commencement of the relevant stage of the development works	Construction Method Statement and EIAR Development Description Chapter
C-OFF-09	Scoping	Mitigation	Tertiary	Development of, and adherence to a Cable Plan (CaP). The CaP will confirm planned cable routing, burial and any additional protection and will set out methods for post-installation cable monitoring as secured by Section 36 and Marine Licence consent conditions. The CaP is likely to be supported by a CBRA, whic will outline how external cable protection shall be used and/or minimised, should cable burial be achieved.	Construction, O & M	X	X	X	X	X	X	X			X	X	X					X	Cable Plan	Pre-commencement of the relevant stage of the development works	Cable Plan and EIAR Development Description Chapter
C-OFF-10	Scoping	Mitigation	Tertiary	Where a Project cable crosses or runs parallel to an existing/planned cable/pipeline a crossing agreement will be implemented.	O & M		X	X							X							X	Commercial agreements with pipeline companies and cable operators	Pre-commencement of the relevant stage of the development works	N/A
C-OFF-11	Scoping	Mitigation	Tertiary	Development and adherence to a Construction Method Statement, which will detail the timeline and duration of primary Project construction activities.	Construction	X	X	X	X	X		X	X	X							X		Construction Method Statement	Pre-commencement of the relevant stage of the development works	Construction Method Statement and EIAR Development Description Chapter
C-OFF-12	Scoping	Mitigation	Tertiary	Development of a Project Environmental Monitoring Plan (PEMP), which will set out environmental monitoring in pre-, during, and post-construction phases.	Construction, O & M and decommissioning	X	X	X				X	X	X	X	X					X		Project Environmental Monitoring Plan	Pre-commencement of the relevant stage of the development works	Project Environmental Monitoring Plan
C-OFF-13	Scoping	Mitigation	Tertiary	A Project Environmental Management Plan (PEMP) will be developed, to include a Marine Pollution Contingency Plan and Invasive Non-Native Species (INNS) Management Plan. This PEMP will also include information on chemical usage, dropped objects, and waste management.	Construction, O & M and decommissioning	X	X	X	X	X	X	X	X	X	X	X					X		Project Environmental Monitoring Plan	Pre-commencement of the relevant stage of the development works	Project Environmental Monitoring Plan
C-OFF-14	Scoping	Mitigation	Tertiary	Development of a Marine Pollution Contingency Plan (MPCP), which will identify potential pollution sources and how the Project will respond to these spill events.	Construction, O & M and decommissioning	X	X	X	X	X	X	X	X	X	X	X					X		Project Environmental Monitoring Plan	Pre-commencement of the relevant stage of the development works	Project Environmental Monitoring Plan
C-OFF-15	Scoping	Mitigation	Tertiary	A Pollution Prevention Plan (PPP) will be developed as part of the Project Environmental Monitoring Plan.	Construction, O & M and decommissioning	X	X	X	X	X	X	X	X	X	X	X					X		Project Environmental Monitoring Plan	Pre-commencement of the relevant stage of the	Project Environmental Monitoring Plan
C-OFF-16	Scoping	Mitigation	Tertiary	A Piling Strategy (PS) will be developed and followed, detailing the methods of pile installation and associated noise levels. It will include any mitigation measures to be put in place during piling to manage the effects of underwater noise on sensitive receptors.	Construction and decommissioning		X	X				X	X	X	X					X		X	Piling Strategy	Pre-commencement of the relevant stage of the development works	Piling Strategy and EIAR Development Description Chapter
C-OFF-17	Scoping	Mitigation	Primary	Cable burial risk assessment (CBRA) surveys will be undertaken. Where sufficient burial is not achievable, suitable implementation and monitoring or cable protection will be developed.	Construction, O & M	X	X		X		X	X			X	X						X	Cable Plan	Pre-commencement of the relevant stage of the development works	Cable Plan and EIAR Development Description Chapter

Commitment Reference	Commitment Stage	Mitigation or Enhancement	Type	Commitment	Project Phase	Project Element			Offshore Topic Relevance																How is the Commitment secured?	When is the Commitment implemented?	Relevant Application Documents
						Landfall	Offshore ECC	Array Area	Marine and Coastal Processes	Marine Water and Sediment Quality	Benthic & Intertidal Ecology	Fish & Shellfish	Offshore Ornithology	Marine Mammals	Commercial Fisheries	Shipping & Navigation	Marine Archaeology and Cultural Heritage	Military and Civil Aviation	Seascape, Landscape and Visual Impact	Socioeconomics, Tourism and Recreation	Greenhouse Gas and Climate Change	Infrastructure & Other Users				
C-OFF-18	Scoping	Mitigation	Tertiary	Scour protection to be implemented around foundations and offshore structures. Ideally this will reduce the change to hydrodynamic and sedimentary regimes that may expose archaeological receptors leading to increased rates of deterioration through biological, chemical and physical processes.	O & M	X		X	X	X	X	X							X					Cable Plan and Construction Method Statement	Pre-commencement of the relevant stage of the development works	Cable Plan, Construction Method Statement and EIAR Development Description Chapter
C-OFF-19	Scoping	Mitigation	Primary	The layout of offshore infrastructure will be designed in such a way as to minimise the impacts on offshore ornithology.	Construction, O & M and decommissioning			X					X											Derogation (if required - without prejudice) and Case-Design Mitigation	Pre-commencement of the relevant stage of the development works	N/A
C-OFF-20	Scoping	Mitigation	Tertiary	A dedicated marine mammal observer (MMO) will be utilised to conduct a pre-start search during the planned geophysical surveys to minimise impacts to EPS and basking shark in the vicinity of the survey work.	Pre-construction	X	X	X						X										Development Specification and Layout Plan and Project Environmental Monitoring Plan	Pre-commencement of the relevant stage of the development works	Development Specification and LayoutPlan, Project Environmental Monitoring Plan and EIAR Development Description Chapter
C-OFF-21	Scoping	Mitigation	Tertiary	A Marine Mammal Monitoring Plan (MMMP) will be developed, which will be specific to piling, geophysical surveys, UXO and decommissioning. The mitigation measures within the MMMP will be informed by the following (and updates to explosives, piling and geophysical survey guidance anticipated over the next 12 months): -JNCC (2010b): Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise; -JNCC (2010a): JNCC guidelines for minimising the risk of injury to marine mammals from using explosives; -UK Government Policy paper: Marine environment: unexploded ordnance clearance joint interim position statement (2021, updated 2022) -The design principles of the Project and secured under Section 36 and/or Marine Licence consent conditions; and -JNCC (2017): JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys.	Construction and decommissioning	X	X	X						X										Mammal Marine Monitoring Plan	Pre-commencement of the relevant stage of the development works	Mammal Marine Monitoring Plan and EIAR Marine Mammals Chapter
C-OFF-22	Scoping	Enhancement	Primary	A Biodiversity Restoration Enhancement Plan (BREP) will be developed in accordance with National Planning Framework 4.	Construction	X	X	X																Construction Method Statement.	Pre-commencement of the relevant stage of licensed activities	Biodiversity Enhancement Plan
C-OFF-23	Scoping	Mitigation	Tertiary	The development and implementation of a VMP, secured under Section 36 and/or Marine Licence consent conditions. Vessels shall also act in accordance with the guidelines set out within The Scottish Marine Wildlife Watching Code (SNH 2017) to minimise collision and disturbance risks with marine mammal.	Pre-construction, construction		X	X						X										Vessel Management Plan	Pre-commencement of the relevant stage of the development works	Vessel Management Plan and EIAR Marine Mammal Chapter and Shipping and Navigation Chapter
C-OFF-24	Scoping	Mitigation	Tertiary	When recording marine mammal and protected species presence during surveys, JNCC Standard Forms will be used to report the cetacean presence recorded.	Pre-construction	X		X						X										Development Specification and Layout Plan and Project Environmental Monitoring Plan	Pre-commencement of the relevant stage of the development works	Development Specification and LayoutPlan, Project Environmental Monitoring Plan and EIAR Development Description
C-OFF-25	Scoping	Mitigation	Tertiary	A 500m mitigation zone will be utilised during the planned geophysical surveys, to ensure there are no marine mammals or protected species in the immediate vicinity of the survey works.	Pre-construction	X	X	X						X										European Protected Species licensing tests and Project Environmental Monitoring Plan	Pre-commencement of the relevant stage of the development works	Project Environmental Monitoring Plan, EIARMarine Mammal and Offshore Ornithology Chapters

Commitment Reference	Commitment Stage	Mitigation or Enhancement	Type	Commitment	Project Phase	Project Element			Offshore Topic Relevance														How is the Commitment secured?	When is the Commitment implemented?	Relevant Application Documents
						Landfall	Offshore ECC	Array Area	Marine and Coastal Processes	Marine Water and Sediment Quality	Benthic & Intertidal Ecology	Fish & Shellfish	Offshore Ornithology	Marine Mammals	Commercial Fisheries	Shipping & Navigation	Marine Archaeology and Cultural Heritage	Military and Civil Aviation	Seascape, Landscape and Visual Impact	Socioeconomics, Tourism and Recreation	Greenhouse Gas and Climate Change	Infrastructure & Other Users			
C-OFF-26	Scoping	Enhancement	Primary	Consultation (via appointed FLO) will ensure that potential impacts on commercial fisheries will be understood and reduced where reasonably practicable during the route optioneering and offshore export cable design development.	Pre-construction, construction	X	X	X							X	X				X			Stakeholder Management Plan	Pre-commencement of the relevant stage of the development works	Stakeholder Managemenmt Plan and EIAR Consultation Chapter
C-OFF-27	Scoping	Mitigation	Tertiary	Fisheries Liaison and procedures will adhere to the latest relevant available best practice guidance in the event of interactions between fishing activities and the Project.	Construction, O & M and decommissioning	X	X	X							X	X				X			Fisheries Management and Mitigation Strategy	Pre-commencement of the relevant stage of the development works	Fisheries Management and Mitigation Strategy and EIAR Commercial Fisheries Chapter
C-OFF-28	Scoping	Mitigation	Tertiary	A Fisheries Liaison Officer (FLO) has been appointed to maintain continued consultation with the fishing industry.	Construction, O & M and decommissioning	X		X							X	X							Stakeholder Management Plan	Pre-commencement of the relevant stage of the development works	Stakeholder Management Plan and EIAR Consultation Chapter
C-OFF-29	Scoping	Mitigation	Tertiary	A Fisheries Management and Mitigation Strategy (FMMS) will be implemented, detailing the strategy for fisheries consultation throughout the Project timelIne.	Construction, O & M and decommissioning	X	X	X							X	X				X			Fisheries Management and Mitigation Strategy	Pre-commencement of the relevant stage of the development works	Fisheries Management and Mitigation Strategy, EIAR Commercial Fisheries Chapter
C-OFF-30	Scoping	Mitigation	Tertiary	Participation within commercial fisheries working groups and liaison with Fishing Industry Representatives.	Construction, O & M and decommissioning	X	X	X							X								Fisheries Management and Mitigation Strategy	Pre-commencement of the relevant stage of the development works	Fisheries Management and Mitigation Strategy and EIAR Commercial Fisheries Chapter
C-OFF-31	Scoping	Mitigation	Tertiary	All dropped objects will be reported, and where recovery is possible/ the dropped object may cause a hazard, the object will be retrieved	Construction, O & M and decommissioning		X	X							X								Fisheries Management and Mitigation Strategy	Pre-commencement of the relevant stage of the development works	Fisheries Management and Mitigation Strategy and EIAR Commercial Fisheries Chapter
C-OFF-32	Scoping	Mitigation	Tertiary	In accordance with marine licensing requirements a Development Specification and Layout Plan (DSLP) will be submitted and approved prior to construction. Confirming layout and relevant design parameters, including the maximum height of WTGs and lighting details. The works will be constructed in accordance with the approved DSLP.	Construction, O & M and decommissioning			X	X	X					X	X	X	X	X				Development Specification and Layout Plan	Pre-commencement of the relevant stage of the development works	Development Specification and Layout Plan and EIAR Development Description Chapter
C-OFF-33	Scoping	Mitigation	Tertiary	Development of and adherence to a Lighting and Marking Plan (LMP), which will confirm compliance with legal requirements with regards to shipping, navigation, and aviation.	Construction, O & M and decommissioning	X		X							X	X		X				X	Lighting and Marking Plan	Pre-commencement of the relevant stage of the development works	Lighting and Marking Plan
C-OFF-34	Scoping	Mitigation	Tertiary	The UK Hydrographic Office (UKHO) will be notified of Project works.	Construction, O & M and decommissioning	X	X	X							X	X		X				X	Navigational Safety Plan	Pre-commencement of the relevant stage of the development works	Navigational Safety Plan, EIAR Shipping and Navigation Chapter

Commitment Reference	Commitment Stage	Mitigation or Enhancement	Type	Commitment	Project Phase	Project Element			Offshore Topic Relevance														How is the Commitment secured?	When is the Commitment implemented?	Relevant Application Documents
						Landfall	Offshore ECC	Array Area	Marine and Coastal Processes	Marine Water and Sediment Quality	Benthic & Intertidal Ecology	Fish & Shellfish	Offshore Ornithology	Marine Mammals	Commercial Fisheries	Shipping & Navigation	Marine Archaeology and Cultural Heritage	Military and Civil Aviation	Seascape, Landscape and Visual Impact	Socioeconomics, Tourism and Recreation	Greenhouse Gas and Climate Change	Infrastructure & Other Users			
C-OFF-35	Scoping	Mitigation	Tertiary	A Search and Rescue (SAR) checklist will be carried out in line with MCA Marine Guidance Note (MGN) 654 (MCA, 2021) and its annexes. Consideration will also be given to MGN 543 SAR Annex 5 (MCA, 2018).	**Construction, O & M and decommissioning**	X		X							X	X						X	Cable Plan, Construction Method Statement and Development Specification and Layout Plan	Pre-commencement of the relevant stage of the development works	Cable Plan, Construction Method Statement, Development Specification and Layout Plan and EIAR Development Description Chapter
C-OFF-36	Scoping	Mitigation	Tertiary	An Emergency Response Cooperation Plan (ERCoP) will be developed, prepared in line with MCA guidance. This plan will detail the measures the Project has in place to support any emergency response.	**Construction, O & M and decommissioning**	X		X							X	X		X				X	Emergency Response Cooperation Plan	Pre-commencement of the relevant stage of the development works	Emergency Response Cooperation Plan
C-OFF-37	Scoping	Mitigation	Tertiary	Marine navigation markings and lighting of the Project will be defined in agreement with the NLB, and in accordance with the latest relevant available standard industry guidance for shipping, navigation and aviation marking and lighting.	**Construction, O & M and decommissioning**	X		X							X	X		X				X	Navigational Safety Plan	Pre-commencement of the relevant stage of the development works	Navigational Safety Plan, EIAR Shipping and Navigation Chapter
C-OFF-38	Scoping	Mitigation	Tertiary	Aviation lighting and markings will be installed in line with Article 223 of Civil Aviation Publication (CAP) 393, the UK Air Navigation Order (ANO) 2016, which sets out mandatory requirements for lighting of offshore WTGs.	**Construction, O & M and decommissioning**			X										X	X				Navigational Safety Plan Lighting and Marking Plan	Pre-commencement of the relevant stage of the development works	Navigational Safety Plan Lighting and Marking Plan and EIAR Shipping and Navigation Chapter
C-OFF-39	Scoping	Mitigation	Tertiary	Buoys will be deployed at construction sites in accordance with Nothern Lighthouse Board (NLB) guidance and advice.	**Construction, O & M and decommissioning**	X		X								X							Navigational Safety Plan	Pre-commencement of the relevant stage of the development works	Navigational Safety Plan Lighting and Marking Plan and EIAR Navigation and Shipping Chapter
C-OFF-40	Scoping	Mitigation	Tertiary	The Project will be appropriately marked on aeronautical and admiralty charts, including provisions of the position and height of structures to the UKHO, Civil Aviation Authority (CAA), Ministry of Defence (MoD), and Defence Geographic Centre (DGC).	**O & M**			X							X	X		X					Navigational Safety Plan Lighting and Marking Plan	Pre-commencement of the relevant stage of the development works	Navigational Safety Plan Lighting and Marking Plan and EIAR Navigation and Shipping Chapter
C-OFF-41	Scoping	Mitigation	Tertiary	Compliance with regulatory expectations on moorings for floating wind and marine devides e.g., Maritime Coastguard Agency (MCA) and Health and Safety Executive (HSE), 2017	**Pre-construction, O & M and Decommissioning**	X	X	X							X	X				X		X	Construction Method Statement	Pre-commencement of the relevant stage of the development works	Construction Method Statement and EIAR Development Description Chapter

Commitment Reference	Commitment Stage	Mitigation or Enhancement	Type	Commitment	Project Phase	Project Element			Offshore Topic Relevance															How is the Commitment secured?	When is the Commitment implemented?	Relevant Application Documents
						Landfall	Offshore ECC	Array Area	Marine and Coastal Processes	Marine Water and Sediment Quality	Benthic & Intertidal Ecology	Fish & Shellfish	Offshore Ornithology	Marine Mammals	Commercial Fisheries	Shipping & Navigation	Marine Archaeology and Cultural Heritage	Military and Civil Aviation	Seascape, Landscape and Visual Impact	Socioeconomics, Tourism and Recreation	Greenhouse Gas and Climate Change	Infrastructure & Other Users			
C-OFF-42	Scoping	Mitigation	Tertiary	A Vessel Management Plan (VMP) will be developed, which will detail the types and numbers of vessels involved in the Project work.	**Construction, O & M**	X	X	X	X		X	X	X	X				X					Vessel Management Plan	Pre-commencement of the relevant stage of the development works	Vessel Management Plan, EIAR Shipping and Navigation Chapter
C-OFF-43	Scoping	Mitigation	Tertiary	Development of a Navigational Safety Plan (NSP), detailing the measures in place for the Project related to navigational safety. This will include Notice to Mariners (via Kingfisher Bulletins or other appropriate methods) of activity in an appropriate timeframe. These notifications will provide details on the positions and nature of the works.	**Construction, O & M and decommissioning**	X	X	X							X	X				X		X	Navigational Safety Plan	Pre-commencement of the relevant stage of the development works	Navigational Safety Plan, EIAR Shipping and Navigation Chapter
C-OFF-44	Scoping	Mitigation	Tertiary	Advance warning and accurate location details of construction, maintenance and decommissioning operations, associated Safety Zones and advisory passing distances will be given via Notices to Mariners and Kingfisher Bulletins.	**Construction, O & M and decommissioning**	X	X	X							X	X				X		X	Navigational Safety Plan	Pre-commencement of the relevant stage of the development	Navigational Safety Plan, EIAR Shipping and Navigation Chapter
C-OFF-45	Scoping	Mitigation	Secondary	Appropriate Safety Zones (e.g., 500m) around offshore substation platforms and wind turbine generators (WTGs) during major works (or up to 200 m during pre-commissioning works) will be applied for and implemented as appropriate.	**Construction, O & M and decommissioning**	X	X	X							X	X						X	Navigational Safety Plan	Pre-commencement of the relevant stage of the development works	Navigational Safety Plan, EIAR Shipping and Navigation Chapter
C-OFF-46	Scoping	Mitigation	Tertiary	Marine navigation markings and lighting of the Project will be defined in agreement with the NLB, and in accordance with the latest relevant available standard industry guidance for shipping, navigation and aviation marking and lighting.	**Construction, O & M and decommissioning**	X		X							X	X		X				X	Navigational Safety Plan	Pre-commencement of the relevant stage of the development works	Navigational Safety Plan and EIAR Shipping and Navigation Chapter
C-OFF-47	Scoping	Mitigation	Tertiary	All Project vessels will comply with international marine regulations (as adopted by the Flag State), notably the International Regulations for Preventing Collisions at Sea (IMO, 1974) and the International Convention for the Safety of Life at Sea (SOLAS) (IMO, 1974).	**Construction, O & M and decommissioning**	X		X							X	X						X	Navigational Safety Plan	Pre-commencement of the relevant stage of the development works	Navigational Safety Plan, EIAR Shipping and Navigation Chapter
C-OFF-48	Scoping	Mitigation	Tertiary	Compliance with Marine Guidance Note (MGN) 654 (MCA, 2021) and its annexes where applicable	**Construction, O & M and decommissioning**	X		X							X	X		X				X	Cable Plan Construction Method Statement and Development Specification and Layout Plan	Pre-commencement of the relevant stage of the development works	Cable Plan, Construction Method Statement, Development Specification and Layout Plan and EIAR Development Description Chapter

Commitment Reference	Commitment Stage	Mitigation or Enhancement	Type	Commitment	Project Phase	Project Element			Offshore Topic Relevance														How is the Commitment secured?	When is the Commitment implemented?	Relevant Application Documents
						Landfall	Offshore ECC	Array Area	Marine and Coastal Processes	Marine Water and Sediment Quality	Benthic & Intertidal Ecology	Fish & Shellfish	Offshore Ornithology	Marine Mammals	Commercial Fisheries	Shipping & Navigation	Marine Archaeology and Cultural Heritage	Military and Civil Aviation	Seascape, Landscape and Visual Impact	Socioeconomics, Tourism and Recreation	Greenhouse Gas and Climate Change	Infrastructure & Other Users			
C-OFF-49	Scoping	Mitigation	Secondary	Effective marine coordination and communication will be implemented to manage Project vessel movements.	**Construction, O & M and decommissioning**	X		X								X							Navigational Safety Plan and Vessel Management Plan	Pre-commencement of the relevant stage of the development works	Navigational Safety Plan and Vessel Management Plan and EIAR Navigation and Shipping Chapter
C-OFF-50	Scoping	Mitigation	Tertiary	The Maritime Coastguard Agency (MCA), NLB Kingfisher, and UKHO will be notified of any damage or decay to cables within 24 hours of discovery.	**O & M**	X	X								X	X							Development Specification and Layout Plan	Pre-commencement of the relevant stage of the development works	Development Specification and Layout Plan and EIAR Development Description Chapter
C-OFF-51	Scoping	Mitigation	Secondary	Utilisation of guard vessels (when necessary) to ensure adherence with Safety Zones, advised passing distances, mitigate potential impacts posing risk to surface navigation.	**Construction, O & M and decommissioning**	X		X							X	X						X	Navigational Safety Plan	Pre-commencement of the relevant stage of the development works	Navigational Safety Plan and EIAR Navigation and Shipping Chapter
C-OFF-52	Scoping	Mitigation	Tertiary	A lighting scheme for the aviation lighting of structures (turbines and offshore support platforms) above 60m in height will be agreed with the relevant authorities and will accord with the Air Navigation Order 2016. Aviation warning lights will have reduced intensity at and below the horizontal and allow a further reduction in lighting intensity when the visibility in all directions from every wind turbine is more than 5 km	**Construction, O & M and decommissioning**	X		X										X							Lighting and Marking Plan	Pre-commencement of the relevant stage of the development works	Lighting and Marking Plan and EIAR Development Description Chapter
C-OFF-53	Scoping	Mitigation	Tertiary	Aviation lighting and markings will be installed in line with Article 223 of Civil Aviation Publication (CAP) 393, the UK Air Navigation Order (ANO) 2016, which sets out mandatory requirements for lighting of offshore WTGs.	**Construction, O & M and decommissioning**			X										X	X				Navigational Safety Plan Lighting and Marking Plan	Pre-commencement of the relevant stage of the development works	Navigational Safety Plan Lighting and Marking Plan and EIAR Shipping and Navigation Chapter
C-OFF-54	Scoping	Mitigation	Tertiary	Advance warning and accurate location details on Project activities associated with Safety Zones and advisory passing distances will be given via Notices to Mariners and Kingfisher Bulletins.	**Construction, O & M and decommissioning**	X		X							X	X				X		X	Navigational Safety Plan Lighting and Marking Plan	Pre-commencement of the relevant stage of the development works	Navigational Safety Plan Lighting and Marking Plan and EIAR Shipping and Navigation Chapter

Commitment Reference	Commitment Stage	Mitigation or Enhancement	Type	Commitment	Project Phase	Project Element			Offshore Topic Relevance																How is the Commitment secured?	When is the Commitment implemented?	Relevant Application Documents
						Landfall	Offshore ECC	Array Area	Marine and Coastal Processes	Marine Water and Sediment Quality	Benthic & Intertidal Ecology	Fish & Shellfish	Offshore Ornithology	Marine Mammals	Commercial Fisheries	Shipping & Navigation	Marine Archaeology and Cultural Heritage	Military and Civil Aviation	Seascape, Landscape and Visual Impact	Socioeconomics, Tourism and Recreation	Greenhouse Gas and Climate Change	Infrastructure & Other Users				
C-OFF-55	Scoping	Enhancement	Secondary	Additional marine surveys: Geophysical and geotechnical survey data acquisition for pre-consent planning purposes will be assessed for indications of archaeology, and the results will be used to supplement the desk-based research gathered to inform the EIA process. Any further geophysical or geotechnical surveys undertaken, for instance post-consent or post-construction, will also be considered for archaeological assessment and the results will be integrated with previous interpretations and reported on accordingly. This includes further investigation to confirm the nature of seabed anomaly receptors where micro-siting is not possible; methods of ground truthing assessment could include ROV or diver survey and could be undertaken in conjunction with other surveys associated with the Proposed Offshore Development, for example UXO or obstruction surveys. Further geotechnical surveys may also be implemented to offset impacts to palaeogeographic features such as palaeochannels and	**Pre-construction, construction, O & M**	X	X	X										X						Additonal geophysical and geotechnical surveys	Pre-commencement of the relevant stage of the development works	EIAR Marine Archaeology and Cultural Heritage Chapter
C-OFF-56	Scoping	Enhancement	Secondary	A walkover survey of the intertidal element of the study area will be undertaken to inform the understanding of the existing marine heritage assets and also the potential for unknown material to be uncovered.	**Pre-construction**	X	X										X						Intertidal survey	Pre-commencement of the relevant stage of the development works	EIAR Marine Archaeology and Cultural Heritage Chapter
C-OFF-57	Scoping	Enhancement	Secondary	Reporting produced as part of this Proposed Offshore Development that contains details of marine archaeological and cultural heritage will be submitted to OASIS for publishing through the Archaeology Data Service ArchSearch catalogue, following confirmation from the Developer.	**Pre-construction**	X	X	X									X						Through submission of data to OASIS (Archaeology Data Service ArchSearch catalogue)	Pre-commencement of the relevant stage of the development works	EIAR Marine Archaeology and Cultural Heritage Chapter
C-OFF-58	Scoping	Enhancement	Secondary	Watching briefs may also be employed in the intertidal or marine areas where any intrusive works are planned. These could include pre-lay grapnel runs or intertidal cable-laying in an excavated trench. The proposed methodology will be presented in a Method Statement and agreed through consultation with the Archaeological Curator, HES, and MD-LOT.	**Construction**	X	X	X									X						Method Statement	Pre-commencement of the relevant stage of the development works	EIAR Marine Archaeology and Cultural Heritage Chapter
C-OFF-59	Scoping	Mitigation	Primary	Offshore Project infrastructure will avoid identified seabed heritage assets (such as protected wrecks) and anthropogenic geophysical anomalies (identified using Archaeological Exclusion Zones (AEZs)), as described in the WSI. AEZs will not be proposed for archaeological receptors of lower archaeological value, however such features will be avoided, where practicable, using micro-siting of the Proposed Offshore Development.	**Construction, O & M and decommissioning**	X		X									X						Development Specification and Layout Plan Written Scheme of Archaeological Specification	Pre-commencement of the relevant stage of the development works	Development Specification and Layout Plan Written Scheme of Archaeological Specification and EIAR Marine Archaeology and Cultural Heritage Chapter
C-OFF-60	Scoping	Mitigation	Tertiary	Geophysical and geotechnical survey data acquisition for pre-consent planning purposes will be assessed for indications of archaeology, and the results will be used to supplement the desk-based research gathered to inform the EIA process. Any further geophysical or geotechnical surveys undertaken, for instance post-consent or post-construction, will also be considered for archaeological assessment and the results will be integrated with previous interpretations and reported on accordingly.	**Pre-construction**	X		X	X								X						Development Specification and Layout Plan, Project Environmental Monitoring Plan	Pre-commencement of the relevant stage of the development works	Development Specification and Layout Plan, Project Environmental Monitoring Plan and EIAR Development Description Chapter

Commitment Reference	Commitment Stage	Mitigation or Enhancement	Type	Commitment	Project Phase	Project Element			Offshore Topic Relevance															How is the Commitment secured?	When is the Commitment implemented?	Relevant Application Documents
						Landfall	Offshore ECC	Array Area	Marine and Coastal Processes	Marine Water and Sediment Quality	Benthic & Intertidal Ecology	Fish & Shellfish	Offshore Ornithology	Marine Mammals	Commercial Fisheries	Shipping & Navigation	Marine Archaeology and Cultural Heritage	Military and Civil Aviation	Seascape, Landscape and Visual Impact	Socioeconomics, Tourism and Recreation	Greenhouse Gas and Climate Change	Infrastructure & Other Users			
C-OFF-61	Scoping	Mitigation	Secondary	An Archaeological Written Scheme of Investigation (WSI) will be developed and implemented that includes the details of agreed mitigation measures, including a Protocol for Archaeological Discoveries (Protocol) based on The Crown Estate's 'Protocol for Archaeological Discoveries: Offshore Renewables Projects' published in 2014. Although the WSI is not considered a mitigation measure in itself, the measures that are detailed within it are often secured through planning conditions requiring the implementation of a WSI (The Crown Estate, 2021: 7). The WSI contains the details of the archaeological mitigation measures that will be adhered to for the lifetime of the Proposed Offshore Development, from planning through to decommissioning. WSIs are also umbrella documents for survey, investigation and assessment required for the Proposed Offshore Development, supported, as required, by Method Statements	**Construction**		X	X									X							Written Scheme of Archaeological Investigation.	Pre-commencement of the relevant stage of licensed activities	Outline Marine Written Scheme of Investigation, EIAR Marine Archaeology and Cultural Heritage Chapter
C-OFF-62	Scoping	Enhancement	Tertiary	Utilisation of local contractors for onshore and offshore construction work where possible, to support the Scottish Supply Chain.	**Pre-construction Construction O&M**	X	X	X													X			Sustainable Supply Chain Statement	Pre-commencement of the relevant stage of the development works	N/A
C-OFF-63	Scoping	Mitigation	Secondary	Development of and adherence to a Decommissioning Plan (DP), secured under section 36 and/or Marine Licence consent conditions.	**Decommissioning**	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Decommissioning Plan	Pre-commencement of the relevant stage of the development works	N/A

Ørsted BlueFloat ENERGY Renantis

STROMAR

Stromar Offshore Wind Farm

Environmental Impact Assessment: Offshore Scoping Report

Appendix B: Offshore Impacts Register

Proposed Offshore Development

Date: 03 January 2024

Document Number: 08550853

Revision: A

Classification: Public

Contents

1. Impacts Register Explained

STROMAR

Description

Table 1.

Impact Background					EIA Scoping	
ID	**Project Element**	**Project Phase**	**Project Activity and Impact**	**Commitments**	**Likely Significant Effect at Scoping (LSE, Possible LSE, No LSE)**	**Approach to Assessment**
Unique ID for each impact which can be used to refer between those impacts in the Scoping Report/EIAR and those in the Impact Register.	Identifies that part of the Stromar development where the impact is anticipated to arise. This may include WTGs, inter-array and interconnector cables, export cables, landfall '**All offshore**' includes all of these elements '**Array area**' includes WTGs, inter-array and interconnector cables '**Offshore ECC**' includes export cables and landfall	Identifies the phase of the Stromar development. I.e when the impact is anticipated to arise.	The impact and the activity that the impact arises from.	Commitments that are relevant to reduce and/or eliminate Likely Significant Effects (LSE). Primary (Design) or Tertiary (Inherant) are commitments that are embedded within the assesment at the relevant point in the EIA. Secondary commitments are incorportated to reduce LSE to acceptable levels following assessment. **Scoping impacts are identified after the application of primary/tertiary mitigation.**	Results of the Proportionate EIA approach to Scoping assessment. LSE without secondary mitigation - impact will be subject to a detailed assessment and Scoped In to the EIAR. Possible LSE without secondary mitigation - impacts may be subject to detailed or simple assessment, or excluded from further assessment if no LSE is concluded. No LSE without secondary mitigation - impact will be excluded from further assesment and Scoped Out of the EIAR.	Present a summary/justification of the proposed approach to assessment. If LSE concluded - outline the detailed assessment to be undertaken. If possible LSE concluded - identify the further evidence or information that would be used post-Scoping to determine and agree with consultees the potential for LSE, and therefore the level of assessment needed in the EIAR.
Example						
I-O-01	*Array area* *Export cables*	*Operation*	*Colonisation of the WTGs and scour/ cable protection may affect benthic ecology and biodiversity.*	*None*	***No likely significant effect identified at Scoping - Scoped Out***	***Impact Scoped Out of EIAR.*** ***The infrastructure provides a small area of hard substrate within predominantly sedimentary habitats.***

Table 1. Key to Project position at EIA Scoping

	Likely significant effect without secondary mitigation - Detailed assessment (Scoped In to EIAR)
	Possible likely significant effect without secondary mitigation - Detailed assessment/Simple assessment/No further assessment- TBC (Scoped In at Scoping, Scoped In/Out at EIAR - TBC)
	No likely significant effect identified at Scoping - No further assessment (Scoped Out of EIAR)

Link to Stromar EIA Scoping Report

Key to Project position at EIA Scoping - Explained

Scoped In at Scoping for full assessment in the EIAR, and presented in impact register.

Assessment of impact/justification will be presented in the EIAR and/or impact register.

The impact will not be included in the EIAR, but will be presented in the impact register.

2.Marine Coastal Processes

Impact Background					EIA Scoping	
ID	Project Element	Project Phase	Project Activity and Impact	Commitments	Likely Significant Effect at Scoping (LSE, Possible LSE, No LSE)	Approach to Assessment
I-C-01	All offshore	Construction and Decommissioning	Increases in Suspended Sediment Concentrations (SSCs) and changes to seabed levels.	C-OFF-10 C-OFF-09 C-OFF-13 C-OFF-10 C-OFF-67	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Temporary elevations in SSCs due to construction activities, for example cable installation. This could in turn result in changes to the underlying seabed/coastal bed levels, through deposition of the suspended material and changes to the surficial sediment type. Increase in SSC and associated deposition may have indirect, adverse impacts on other receptor groups including Chapter 9: Benthic and Intertidal Ecology, Chapter 10: Fish and Shellfish Ecology, Chapter 12: Marine Mammals and Chapter 13: Commercial Fisheries. Decommissioning activities, such as foundation and cable removal (if required) can cause increases in SSC as a result of seabed disturbance. The transport of the disturbed material and the eventual deposition could in turn result in variations in bed levels and changes to the sediment type.
I-C-02	All offshore	Construction and Decommissioning	Potential impacts to seabed morphology (sandbanks, sandwave areas and notable bathymetry depressions).	C-OFF-10 C-OFF-09 C-OFF-13 C-OFF-18 C-OFF-67	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Activities such as seabed preparation, sandwave levelling and cable trenching have the potential to directly disturb the seabed morphology. This disturbance may have adverse impacts on other receptor groups including Chapter 9: Benthic and Intertidal Ecology, Chapter 10: Fish and Shellfish Ecology and Chapter 13: Commercial Fisheries. Decommissioning activities relating to the removal of infrastructure (if required) have the potential to directly disturb the local seabed morphology.
I-C-03	Landfall	Construction and Decommissioning	Modifications to littoral transport and coastal behaviour (erosion), including at landfall.	C-OFF-10 C-OFF-09 C-OFF-13 C-OFF-18 C-OFF-67	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Where the offshore export cable makes landfall, it must transition through the intertidal and coastal zones. The methods available for installing cables in such environments may physically disturb or disrupt the coastal morphology to differing degrees depending on the construction methods employed, the duration and any structures installed, for example cofferdams within the intertidal. At the time of construction, any disturbance is likely to be localised to the landfall site. This disturbance may have adverse impacts on other receptor groups including Chapter 9: Benthic and Intertidal Ecology. There is also the potential to impact the Fraserburgh to Rosehearty SSSI, potentially impacting on the designated features. The methods identified for removing or decommissioning the cable and/or cable protection aspects may physically disturb the local morphology.
I-C-04	All offshore	Operation and Maintenance	Potential impacts to seabed morphology.	C-OFF-19 C-OFF-22	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	There is the potential for the introduction of localised seabed abrasion associated with wind farm infrastructure that moves, for example anchor or mooring chains, under the influence of waves, currents, and movement of the turbines (Maxwell et al., 2022). This could result in localised change to seabed morphology. In addition, the Offshore ECC Study Area will cross the Southern Trench NC MPA. The presence of the cable and any cable protection in this offshore area and along the Offshore ECC has the potential to change the form and function of the seabed locally, potentially impacting on the designated features of the NC MPA.
I-C-05	All offshore	Operation and Maintenance	Modifications to the wave and tidal regime, and associated impacts to morphological features.	C-OFF-07	**No likely significant effect at Scoping - Scoped Out**	The interaction between the planned infrastructure, for example the WTGs and offshore substation (OSS) and reactive compensation substation (RCS) foundations, cable protection or cable crossings, and the baseline metocean regime (waves; tides) may result in localised changes to tidal current speeds, wave energy and turbulence. These changes may, in turn, impact on adjacent physical features, both offshore and along the coast. It is considered that the impacts potentially introduced by floating offshore structures will be greatly reduced relative to fixed offshore structures, due to the vertical cross section of infrastructure in the water column being much less. Impact assessments for previous offshore wind developments, based on fixed turbine foundations, have demonstrated that there are no significant impacts on waves and tidal regime (Repsol and EDP Renewables, 2013; Moray Offshore Renewables Limited (MORL), 2014a). In combination with generally low tidal currents in the area, with mean peak spring flows in the Array Area modelled as approximately 0.4 m/s, as well as the distance offshore (approximately 45 km), these impacts are considered unlikely to significantly impact adjacent morphological features or the coast and are therefore proposed to be scoped out of further assessment.
I-C-06	All offshore	Operation and Maintenance	Seabed scouring.	C-OFF-19 C-OFF-22	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	The wind farm infrastructure has the potential to cause localised seabed scouring, resulting in bathymetric changes and localised alterations to sediment transport patterns. This is likely to occur both around foundations for OSSs and RCSs, as well as around anchors and clump weights that may be part of floating WTG infrastructure.

I-C-07	Array Area	Operation and Maintenance	Modifications to stratification and frontal features.	n/a	**No likely significant effect at Scoping - Scoped Out**	Interactions between planned infrastructure and the baseline metocean regime (waves, tides) may result in localised changes to tidal currents speeds, wave energy and turbulence. These changes result in the generation of localised turbulent wakes (Dorrell et al., 2022). However, floating offshore wind farms in deeper water are expected to be less disruptive to current and wave regimes (and hence seasonal stratification) than fixed turbines in shallower waters (Farr et al., 2021). The frontal features in the region are predominately coastal (Figure 8.7) thus due to distance from these features, the Array Area is expected to have limited impact on stratification. The detailed assessment of the frontal feature, as previously presented, indicates that, due to its location, the Project is unlikely to influence the front's formation and structure (SAMS, 2023).
I-C-08	All offshore	Cumulative Effects	Detail to be added post-Scoping	Detail to be added post-Scoping	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Detail to be added post-Scoping
I-C-09	All offshore	Transboundary Effects	Detail to be added post-Scoping	Detail to be added post-Scoping	**No likely significant effect at Scoping - Scoped Out**	Detail to be added post-Scoping

3.Marine Water & Sediment Quality

Impact Background					EIA Scoping	
ID	Project Element	Project Phase	Project Activity and Impact	Commitments	Likely Significant Effect at Scoping (LSE, Possible LSE, No LSE)	Approach to Assessment
I-C-10	All offshore	Construction and Decommissioning	Deterioration in water quality due to the suspension of sediments.	C-OFF-10 C-OFF-14 C-OFF-19 C-OFF-67	Likely significant effect without secondary mitigation - Scoped In	Sediment disturbance and resuspension arising from construction and decommissioning activities are likely. This may result in adverse effects on water quality, due to the potential for increased nutrients, decreased dissolved oxygen, and a reduction in water clarity. This may arise as a result of cofferdam installation/removal, cable installation and repair works, and installation and repair activities in the Array Area.
I-C-11	All offshore	Construction and Decommissioning	Release of sediment-bound contaminants from disturbance of sediments.	C-OFF-10 C-OFF-14	Likely significant effect without secondary mitigation - Scoped In	Sediment disturbance associated with the construction and decommissioning phases may result on adverse effects on water quality (including potential cofferdam installation/removal). This can be caused by temporary re-suspension and redistribution of previously contaminated sediments.
I-C-12	All offshore	Construction and Decommissioning	Deterioration in water clarity due to the release of drilling mud.	C-OFF-10 C-OFF-14 C-OFF-15 C-OFF-67	Likely significant effect without secondary mitigation - Scoped In	If there is a requirement to undertake Horizontal Directional Drilling (HDD) at the landfall, an inert drilling mud (such as bentonite) will be needed. This may result in the release of drilling mud at the punch-out point, which may result in increased turbidity and reduced bacterial mortality in the water column (as opposed to a contamination issue). Dependent on foundation anchors, drilling may also be undertaken for piled/micro-piled anchors, which may lead to a similar release of drilling mud.
I-C-13	All offshore	Construction and Decommissioning	Accidental release or spills of materials/chemicals.	C-OFF-14 C-OFF-15 C-OFF-67	No likely significant effect at Scoping - Scoped Out	There is potential for some substances to be accidentally released into the marine environment (such as grease, fuel, oil, anti-fouling paints, etc.). There are no planned chemical discharges (either continuous or intermittent) for the Proposed Offshore Development which may be toxic to the receiving environment. Any impacts associated with accidental release of construction materials or chemicals are anticipated to be short-lived and localised, as hydrocarbons would be rapidly dispersed or diluted. All vessels associated with the Proposed Offshore Development will be required to comply with strict environmental protocol set out in the Project Environmental Monitoring Programme (PEMP) and MPCP, which will minimise the initial risks and detail response procedures for dealing with spills and accidental releases. Due to the implementation of such controls, and the low quantities of hydrocarbons and chemicals, it is proposed for this impact to be Scoped Out of the subsequent EIA.
I-C-14	All offshore	Construction and Decommissioning	Deterioration in the status of WFD transitional and/or coastal waterbody.	C-OFF-10 C-OFF-14 C-OFF-15 C-OFF-67	Likely significant effect without secondary mitigation - Scoped In	The seabed disturbance associated with construction and decommissioning activities would result in in a deterioration of status of designated transitional and coastal waterbodies. Given that the boundaries of WFD coastal waterbodies only extend up to 1 nm from the low water mark, potential impacts will be associated with landfall and ECC works. A WFD compliance assessment will be produced within the subsequent EIA.
I-C-15	All offshore	Construction and Decommissioning	Deterioration in Bathing Water quality.	C-OFF-10 C-OFF-14 C-OFF-15 C-OFF-67	Likely significant effect without secondary mitigation - Scoped In	A deterioration in Bathing Water classifications may result from construction and decommissioning activities associated with the Proposed Offshore Development. Increased turbidity associated with sediment plumes (e.g., from cable installation) may lead to reduced bacterial mortality, impacting the bathing season. It is anticipated that potential impacts will be limited to landfall and Offshore ECC works (due to the coastal locations of the Bathing Waters).

I-C-16	All offshore	Operation and Maintenance	Deterioration in water quality due to the suspension of sediments.	C-OFF-10 C-OFF-14 C-OFF-19 C-OFF-67	**Likely significant effect without secondary mitigation - Scoped In**	Should a section of cabling become damaged or exposed, remedial burial/replacement work would be required. This would be undertaken with similar techniques to those used for the initial cable installation.
I-C-17	All offshore	Operation and Maintenance	Accidental release or spills of materials/chemicals.	C-OFF-14 C-OFF-15 C-OFF-67	**No likely significant effect at Scoping - Scoped Out**	As with the construction/decommissioning phases, there is potential for accidental release or spills of material from vessels associated with the O&M of the Proposed Offshore Development. These impacts would likely be short-lived and localised, with released hydrocarbons being rapidly dispersed and diluted. All vessels associated with the Proposed Offshore Development will be required to comply with strict environmental protocol set out in the PEMP and MPCP, which will minimise the initial risks and detail response procedures for dealing with spills and accidental releases. Due to the implementation of such controls, and the low quantities of hydrocarbons and chemicals, it is proposed for this impact to be Scoped Out of the subsequent EIA.
I-C-18	All offshore	Operation and Maintenance	Deterioration in water quality due to re-suspension and redistribution of sediments from scour.	C-OFF-01 C-OFF-14 C-OFF-19	**No likely significant effect at Scoping - Scoped Out**	There is potential for sediment resuspension to be associated with the Proposed Offshore Development scour infrastructure, although this would likely be a smaller magnitude than that resuspension associated with construction/decommissioning. It is proposed for this impact to be Scoped Out of the subsequent EIA for these reasons. The effects would be associated with mobile sediments, so would be highly localised, with mobile sediment and contaminant volumes considered within the range of natural variability.
I-C-19	All offshore	Operation and Maintenance	Changes in water and sediment quality associated with infrastructure cleaning.	C-OFF-14 C-OFF-15	**No likely significant effect at Scoping - Scoped Out**	The routine maintenance activities for infrastructure have potential to result in reduced water and sediment quality (in the immediate vicinity). This operational cleaning work may release anti-fouling paints into the marine environment, although impacts from such events are considered likely to be temporary, short-lived, small-scale, and highly localised. The Proposed Offshore Development will manage risks through embedded mitigation measures, including use of anti-biofouling paints which are not harmful the marine environment.
I-C-20	All offshore	Operation and Maintenance	Deterioration in the status of WFD transitional and/or coastal waterbody.	C-OFF-10 C-OFF-14 C-OFF-15 C-OFF-67	**Likely significant effect without secondary mitigation - Scoped In**	There is potential for some O&M activities to result in deterioration of status in coastal/transitional waterbodies (e.g., seabed disturbance from cable repair/maintenance activities). Given that the boundaries of WFD coastal waterbodies only extend up to 1 nm from the low water mark, potential impacts will be associated with landfall and ECC works. A WFD compliance assessment will be produced within the subsequent EIA.
I-C-21	All offshore	Operation and Maintenance	Deterioration in Bathing Water quality.	C-OFF-10 C-OFF-14 C-OFF-15 C-OFF-67	**Likely significant effect without secondary mitigation - Scoped In**	Activities associated with the O&M phase have the potential to result in the deterioration of status of designated Bathing Waters in the vicinity of the works. The boundaries of designated WFD waterbodies only extend out to one nm, meaning only activities associated with the Landfall Development Zone and Offshore ECC Study Area would be relevant. A WFD compliance assessment will be produced alongside the EIAR, to fully assess potential impacts to WFD waterbodies and protected areas.
I-C-22	All offshore	Cumulative Effects	Detail to be added post-Scoping	Detail to be added post-Scoping	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Detail to be added post-Scoping
I-C-23	All offshore	Transboundary Effects	Detail to be added post-Scoping	Detail to be added post-Scoping	**No likely significant effect at Scoping - Scoped Out**	Detail to be added post-Scoping

4.Benthic & Intertidal Ecology

Impact Background					EIA Scoping	
ID	Project Element	Project Phase	Project Activity and Impact	Commitments	Likely Significant Effect at Scoping (LSE, Possible LSE, No LSE)	Approach to Assessment
I-C-24	All offshore	Construction and Decommissioning	Temporary increases in Suspended Sediment Concentrations (SSCs) and changes to seabed levels.	C-OFF-10 C-OFF-18	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Temporary elevations in SSCs due to construction (i.e., cable installation) activities. This could in turn result in changes to the underlying seabed/coastal bed levels, through deposition of the suspended material and changes to the surficial sediment type. Increases in SSC and associated deposition may have indirect, adverse impacts upon other receptor groups including, Chapter 10: Fish and Shellfish Ecology and Chapter 13: Commercial Fisheries.
I-C-25	All offshore	Construction and Decommissioning	Temporary habitat disturbance	C-OFF-44	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	There is potential for temporary, direct habitat disturbance during construction activities in the Array Area and along the Offshore ECC Study Area due to seabed preparation, cable laying (including the installation of cofferdams in the intertidal area), foundation installation and the use of jack up vessels or vessel anchoring.
I-C-26	All offshore	Construction and Decommissioning	Direct and indirect seabed disturbance leading to release of sediment contaminants	C-OFF-07 C-OFF-14	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Seabed disturbance during construction could lead to the mobilisation of existing sediment contaminants that could have an impact on the benthos. Effects on Benthic and Intertidal Ecology as a result of changes in water quality will be informed by the conclusions of the marine and sediment quality assessments.
I-C-27	All offshore	Construction and Decommissioning	Permanent and/or long-term habitat loss/alteration due to the removal of infrastructure	C-OFF-07 C-OFF-67	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Following the decommissioning of Proposed Offshore Development there is potential for long-term habitat loss or alteration directly associated with the removal of infrastructure.
I-C-28	All offshore	Construction and Decommissioning	Accidental pollution events during construction or decommissioning activity	C-OFF-14 C-OFF-15 C-OFF-16 C-OFF-67	**No likely significant effect at Scoping - Scoped Out**	Chemical and oil inventories on vessels working during construction and decommissioning stages will be small in size. In the event of an accidental chemical or oil spill, hydrocarbons would rapidly be dispersed or diluted. As well as this, all vessels on the project will be required to comply with strict environmental controls set out in the EMP which will minimise the risk and set out provisions for responding to spills during construction or decommissioning. Due to the implementation of control measures and small quantities of hydrocarbons and chemicals it is proposed to scope this impact out of further consideration within the EIA.
I-C-29	All offshore	Operation and Maintenance	Permanent and/or long-term habitat loss/alteration due to the addition of infrastructure to the area	C-OFF-22	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Following the construction of the Proposed Offshore Development there is potential for long-term habitat loss or alteration directly associated with the presence of, for example, Wind Turbine Generator (WTG) and Offshore Substation Platform foundations, scour and cable protection.
I-C-30	All offshore	Operation and Maintenance	Temporary habitat disturbance	C-OFF-18 C-OFF-44 C-OFF-22	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	There is the potential for direct habitat disturbance of the seabed during planned and unplanned maintenance through (e.g., the use of jack up vessels or cable repair or replacement).
I-C-31	All offshore	Operation and Maintenance	Colonisation of hard substrates	C-OFF-19 C-OFF-22	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Man-made substructures such as WTG and Offshore Substation Platform foundations and any associated scour/cable protection on the seabed are expected to be colonised by marine organisms. This colonisation is expected to then result in an increase in local biodiversity and alterations to the near field benthic ecology of the area.

I-C-32	All offshore	Operation and Maintenance	Changes in physical processes resulting from the presence of the Proposed Offshore Development's subsea infrastructure (e.g., scour effects, changes in wave/tidal current regimes and resulting effects on sediment transport)	C-OFF-18 C-OFF-19 C-OFF-22	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	With embedded mitigation measures implemented it is unlikely there will be significant impacts to benthic ecology features from changes in physical processes as any impact will be spatially and temporally minimal. Physical processes modelling of other OWF projects has predicted small, local impacts on benthic communities from disturbances of this nature. However, this impact will be fully assessed.
I-C-33	All offshore	Operation and Maintenance	Accidental pollution events during O&M activity	C-OFF-14 C-OFF-15 C-OFF-16 C-OFF-22	**No likely significant effect at Scoping - Scoped Out**	See justification described for accidental pollution events during construction and decommissioning activity above.
I-C-34	All offshore	Operation and Maintenance	Increased risk of introduction and/or spread of INNS	C-OFF-14 C-OFF-22	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	This impact is proposed to be scoped out in consideration of the mitigation and control of invasive species measures in line with International Maritime Organization (IMO, 2019). These standards and procedures will be incorporated into the EMP and are embedded in the project design and as such ensure that no significant effects arise from INNS.
I-C-35	All offshore	Operation and Maintenance	Electromagnetic field (EMF) effects generated by inter-array and export cables. This may have indirect effects on benthic ecology.	C-OFF-10	**No likely significant effect at Scoping - Scoped Out**	EMF may impact sensitive species, including invertebrates which are thought to be magneto-sensitive, with this being used for navigational purposes (Scott et al., 2018; Scott et al., 2021, Tricas & Gill, 2011) The magnitude of this impact will depend in part on the project design and the burial and cable protection measures which are utilised. For floating foundations, EMF effects will be considered for suspended cables in the water column. It is acknowledged that there is limited, but emerging research on EMF impacts on benthic ecological species, especially for dynamic cables. The impact assessment will draw on the latest relevant available literature on this impact. With embedded mitigation measures implemented it is unlikely there will be significant impacts to benthic ecology features from EMF. However, this impact will be fully assessed.
I-C-36	All offshore	Cumulative Effects	Detail to be added post-Scoping	Detail to be added post-Scoping	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Detail to be added post-Scoping
I-C-37	All offshore	Transboundary Effects	Detail to be added post-Scoping	Detail to be added post-Scoping	**No likely significant effect at Scoping - Scoped Out**	Detail to be added post-Scoping

5.Fish & Shellfish Ecology

Impact Background					EIA Scoping	
ID	**Project Element**	**Project Phase**	**Project Activity and Impact**	**Commitments**	**Likely Significant Effect at Scoping (LSE, Possible LSE, No LSE)**	**Approach to Assessment**
I-C-38	All offshore	Construction and Decommissioning	Increases in suspended sediment concentration (SSC) and changes to seabed levels.	C-OFF-10 C-OFF-09 C-OFF-13 C-OFF-18 C-OFF-67	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Temporary elevations in SSCs have the potential to occur during construction (i.e., cable and foundation installation) activities and decommissioning activities. This could in tum lead to smothering of slow moving or sessile species and also localised changes in sediment type which may potentially impact seabed dependent species (e.g., sandeel and herring).
I-C-39	All offshore	Construction and Decommissioning	Temporary habitat disturbance	C-OFF-09 C-OFF-13 C-OFF-17 C-OFF-67	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	There is potential for temporary, direct habitat disturbance during construction activities in the Array Area and along the Offshore ECC due to seabed preparation, cable laying (including the installation of cofferdams in the intertidal area), foundation installation and the use of jack up vessels or vessel anchoring. Temporary habitat disturbance has the potential to negatively impact species that are dependent on the seabed for some or all of their life cycle.
I-C-40	All offshore	Construction and Decommissioning	Direct and indirect seabed disturbance leading to release of sediment contaminants	C-OFF-14 C-OFF-15 C-OFF-16 C-OFF-67	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Seabed disturbance during construction could lead to the mobilisation of existing sediment contaminants that could have an impact on fish and shellfish receptors. Effects on fish and shellfish ecology as a result of changes in water quality will be informed by the conclusions of the marine and sediment quality assessments.
I-C-41	All offshore	Construction and Decommissioning	Direct damage (e.g., crushing) and disturbance to mobile demersal and pelagic fish and shellfish species	C-OFF-09 C-OFF-13 C-OFF-67	**No likely significant effect at Scoping - Scoped Out**	There is potential for direct damage to occur during construction activities in the Array Area and along the Offshore ECC due to seabed preparation, cable laying, foundation installation and the use of jack up vessels or vessel anchoring. There is also the potential for direct damage to occur as a result of decommissioning activities. Affected species are however likely to be mobile and can move away from disturbance, furthermore, crushing impacts on stationary receptors will be small scale, and will not result in population level effects.
I-C-42	All offshore	Construction and Decommissioning	Mortality, injury, behavioural impacts and auditory masking arising from noise and vibration from the installation of infrastructure and UXO clearance	C-OFF-09 C-OFF-13 C-OFF-17 C-OFF-67	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Potential effects from construction activities may arise from noise and vibrations from pile-driving for the installation of Offshore Substation Platform foundations (with the potential for anchor/mooring piling for floating foundations). Cable laying (including the installation of cofferdams in the intertidal), dredging and vessel movements also have the potential to result in underwater noise. Noise from piling has the potential to cause significant impacts to fish and shellfish species ranging from lethal trauma to behavioural changes in susceptible fish species. Underwater noise modelling will be undertaken as part of the EIA in line with worst case scenarios.
I-C-43	All offshore	Construction and Decommissioning	Accidental pollution during construction or decommissioning activity	C-OFF-14 C-OFF-15 C-OFF-16 C-OFF-67	**No likely significant effect at Scoping - Scoped Out**	Accidental releases of pollutants may arise as a result of accidental spills from vessels or other equipment and have detrimental effects on fish and shellfish. However, the risk and impact of accidental releases of hazardous substances will be reduced through the implementation of the EMP, including measures for compliance with international requirements of the International Convention for the Prevention of Pollution from Ships MARPOL) convention, as well as best practice for works in the marine environment (e.g., preparation of Shipboard Oil Pollution Emergency Plans (SOPEP)). In this manner, accidental release of potential contaminants from construction vessels will be strictly controlled and procedures will be in place to minimum the impact of any accidental release if it occurs, and hence the impact has been scoped out of the EIA.

I-C-44	All offshore	Construction and Decommissioning	Increased risk of introduction and/or spread of INNS	C-OFF-09 C-OFF-14 C-OFF-67	**No likely significant effect at Scoping - Scoped Out**	This impact is being proposed to be scoped out in consideration of the mitigation and control of invasive species measures in line with International Maritime Organization (IMO, 2019). These standards and procedures will be incorporated into the EMP and are embedded in the project design and as such ensure that no significant effects arise from INNS. Increased risk of introduction or spread of Marine INNS due to increased vessel movements during construction (e.g., ballast water) may facilitate the spread of non-native species and may subsequently impact biodiversity and Fish and Shellfish ecology of the area. Invasive non-native plant and animal species (INNS) can be spread inadvertently in soil which is moved around the construction site and on machinery etc which is moved between construction sites, which may result in an offence under wildlife legislation and negative impacts on the ecosystems to which the species are transferred.
I-C-45	All offshore	Operation and Maintenance	Permanent and/or long-term habitat loss/alteration due to the addition of infrastructure to the area	C-OFF-13 C-OFF-10 C-OFF-22	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Potential effects during the operational phase will mostly result from the physical presence of infrastructure (i.e., anchors, foundations, scour and cable protection above the seabed) which will result in long-term habitat loss. For floating foundations, abrasion from the mooring lines/anchor chains may also result in long-term habitat disturbance and will be considered. These effects have the potential for impacts on substrate dependent fish and shellfish, in particular those that have substrate specific spawning behaviours (e.g., sandeel, herring), or those with designated conservation status. Furthermore, the introduction of infrastructure has the potential to alter the fish and shellfish assemblage ecology within the area due to disturbance and/or removal of feeding grounds for these species and the subsequent changes in prey availability. Impacts on sensitive fish and shellfish species will be considered in terms of long-term loss of spawning habitats and impacts on species of conservation importance. The area of
I-C-46	All offshore	Operation and Maintenance	Direct disturbance resulting from maintenance during operational phase	C-OFF-22	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	There is the potential for direct habitat disturbance of the seabed during planned and unplanned maintenance activities (e.g., the use of jack up vessels or cable repair or replacement). However, affected fish and shellfish species are likely to be mobile and can move away from disturbance.
I-C-47	All offshore	Operation and Maintenance	EMF effects arising from cables during operational phase	C-OFF-22 C-OFF-18 C-OFF-10	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	EMF may impact sensitive species, including elasmobranchs, teleost fish (i.e., flat fish, salmonids and gadoids) and crustaceans (e.g. brown crab (Scott et al., 2018; Scott et al., 2021, Tricas & Gill, 2011)) by altering foraging or migratory behaviour (Hutchison et al., 2020). The magnitude of this impact will depend in part on the project design and the burial and cable protection measures which are utilised. For floating foundations, EMF effects will be considered for suspended cables in the water column. It is acknowledged that there is limited, but emerging research on EMF impacts on fish and shellfish, especially for dynamic cables. The impact assessment will draw on the latest relevant available literature on this impact.
I-C-48	All offshore	Operation and Maintenance	Introduction of new hard substrates and potential for fish aggregation	C-OFF-19 C-OFF-22	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Installed infrastructure may introduce new hard substrate for colonisation by encrusting marine organisms, including by marine fauna that are not currently found in the existing environment. The EMP will include measures to reduce the spread of invasive species. Offshore infrastructure may act as a Fish Aggregation Device (FAD), providing refuge for some species and also habitat for some shellfish and benthic species, whilst also potentially attracting larger predators which could indirectly increase entanglement or collision risk for both fish and marine mammal species.
I-C-49	All offshore	Operation and Maintenance	Accidental pollution events during O&M activity	C-OFF-14 C-OFF-15 C-OFF-16 C-OFF-22	**No likely significant effect at Scoping - Scoped Out**	See justification described for accidental pollution events during construction and decommissioning activity above.

I-C-50	All offshore	Operation and Maintenance	Increased risk of introduction and/or spread of INNS	C-OFF-14 C-OFF-22	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Increased risk of introduction or spread of Marine INNS due to the presence of the subsea infrastructures and increased vessel movements may facilitate the spread of non-native species and may subsequently impact biodiversity and assemblages of Fish and Shellfish ecology of the area. The potential introduction or spread of Marine INNS and subsequent impact to local Fish and Shellfish ecology receptors will be assessed based on current industry understanding, available literature and expert knowledge. The assessment will take into consideration the mitigation and control of invasive species measures that will be incorporated into a EMP. Consideration of the mitigation and control of invasive species measures in line with IMO will be given (IMO, 2019). These standards and procedures will be incorporated into the
I-C-51	All offshore	Operation and Maintenance	Underwater noise as a result of operational turbines	C-OFF-13 C-OFF-22	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Underwater noise as a result of operational turbines, has a relatively low frequency and pressure level (Andersson et al., 2011). A desk-based literature review of existing data and past studies of underwater noise associated with operational OWFs will be conducted to gain an understanding of the likely magnitude of the effect on Fish and Shellfish communities within the EIAR. It is important to note, operational noise generated from maintenance vessel traffic is likely to be low would only have an impact on fish species if they remained in close proximity to the vessel for hours.
I-C-52	All offshore	Operation and Maintenance	Ghost fishing due to lost fishing gear becoming entangled in installed infrastructure	n/a	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	There is the potential for lost gear to become entangled within mooring lines and suspended cables associated with floating substructures, if this technology is utilised, leading to ghost fishing which may negatively impact fish and shellfish.
I-C-53	All offshore	Cumulative Effects	Detail to be added post-Scoping	Detail to be added post-Scoping	**Likely significant effect without secondary mitigation - Scoped In**	Detail to be added post-Scoping
I-C-54	All offshore	Transboundary Effects	Detail to be added post-Scoping	Detail to be added post-Scoping	**No likely significant effect at Scoping - Scoped Out**	Detail to be added post-Scoping

6.Offshore Ornithology

Impact Background					EIA Scoping	
ID	**Project Element**	**Project Phase**	**Project Activity and Impact**	**Commitments**	**Likely Significant Effect at Scoping (LSE, Possible LSE, No LSE)**	**Approach to Assessment**
I-C-55	Offshore ECC	Construction and decommissioning	Disturbance and displacement (offshore ECC).	C-OFF-07 C-OFF-13 C-OFF-21 C-OFF-44	**Likely significant effect without secondary mitigation - Scoped In**	Construction activities associated with export cable installation may lead to disturbance and displacement of species within the ECC Study Area and potentially within surrounding buffers to a lower extent. This includes the potential use of cofferdams which are not expected to increase displacement impacts to a greater extent than vessel activity. Potential impacts also limited temporally due to limited duration of the construction phase.
I-C-56	Array Area	Construction and decommissioning	Disturbance and displacement (Array Area).	C-OFF-07 C-OFF-13 C-OFF-21 C-OFF-44	**Likely significant effect without secondary mitigation - Scoped In**	Construction activities associated with the Array Area installation (foundations and WTGs) may lead to disturbance and displacement of species within the Array Area and potentially within surrounding buffers to a lower extent. Potential impacts also limited spatially to a small number of foundations/WTGs being constructed at any one time. Impacts are also limited temporally due to the limited duration of the construction (and decommissioning) phase. As per NatureScot guidance (NatureScot, 2023f), this assessment accounts for all potential distributional responses (i.e., disturbance and displacement and barrier effects).
I-C-57	Wet storage	Construction and decommissioning	Disturbance and displacement from wet storage for floating WTGs.	C-OFF-22 C-OFF-44	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	The presence of WTGs in wet storage may lead to disturbance and displacement of species within this area. Potential impacts will be temporally limited due to the limited duration of wet storage during the construction phase. As per NatureScot guidance (NatureScot, 2023f), this assessment accounts for all potential distributional responses (i.e., disturbance and displacement and barrier effects).
I-C-58	All offshore	Construction and decommissioning	Collision risk from wet storage for floating WTGs.	C-OFF-02 C-OFF-22	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	There is a risk of birds in flight colliding with WTG during wet storage for maintenance and during turbine testing. The susceptibility of species to collision risk depends upon morphological and behavioural characteristics of the species, in addition to the project design specifications. Impacts are expected to be spatially and temporally limited in comparison to the operation and maintenance phase, with a limited number of WTGs in wet storage, and turbines being present in wet storage for a limited time period. Collision risk will be assessed for seabird species that may interact with WTGs in wet
I-C-59	All offshore	Construction and decommissioning	Indirect impacts due to impacts on prey species.	C-OFF-17 C-OFF-22	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Impacts include those resulting from underwater noise (e.g., during piling) or the generation of suspended sediments (e.g., during preparation of the seabed for foundations) that may alter the distribution, physiology or behaviour of bird prey species and thereby have an indirect effect. These mechanisms could potentially result in less prey being available in the area adjacent to active construction works to foraging seabirds.

I-C-60	All offshore	Construction and decommissioning	Impacts resulting from accidental pollution during construction	C-OFF-09 C-OFF-14	**No likely significant effect at Scoping - Scoped Out**	Spills and contaminant release associated with accidental pollution during the construction of infrastructure and the use of supply/service vessels may result in direct mortality of birds or reduction in prey availability, impacting species' survival rates. During consent applications for other OWFs, it has been agreed with stakeholders that with the implementation of an appropriate CoP, direct mortality within the wind farm Array Area plus buffer is very unlikely to occur, and a major incident that may impact any species at a population level is considered extremely unlikely. It has been predicted for other OWFs that any impact would be of local spatial extent, short term duration, and not significant in EIA terms. This is therefore considered equally applicable to the Project, for which construction will be comparable in scale and operation and within the same environment, whilst implementing an appropriate CoP. Proposed construction methods and roles and responsibilities of parties involved will be detailed in a Construction Method Statement (CMS). Therefore, subject to consultation with the stakeholders and feedback received on this Offshore Scoping Report, it is intended to Scope Out this impact pathway from further consideration within the EIA.
I-C-62	All offshore	Construction and decommissioning	Impacts resulting from artificial light	C-OFF-35	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Impacts resulting from artificial light are expected to be minimal and not requiring further assessment. Although, there is some evidence that Manx shearwater and European storm petrel can be impacted by artificial light, both were recorded in low numbers in site-specific surveys to date. However, this will be considered further when full baseline survey data is available.
I-C-63	Offshore ECC	Operations and maintenance	Disturbance and displacement (offshore ECC).	C-OFF-07 C-OFF-21 C-OFF-13 C-OFF-44	**Likely significant effect without secondary mitigation - Scoped In**	Activities associated with the maintenance of the ECC, namely vessels, may disturb and displace species within the ECC Study Area. This impact is likely to be both spatially and temporally restricted, with maintenance being temporary and only being undertaken on restricted areas of the ECC Study Area. As per NatureScot guidance (NatureScot, 2023f), this assessment accounts for all potential distributional responses (i.e., disturbance and displacement and barrier effects).
I-C-64	Array Area	Operations and maintenance	Disturbance and displacement (Array Area).	C-OFF-07 C-OFF-21 C-OFF-13 C-OFF-44	**Likely significant effect without secondary mitigation - Scoped In**	Activities associated with the O&M of WTGs and the presence of WTGs themselves may disturb and displace species within the Array Area and potentially within surrounding buffers to a lower extent. As per NatureScot guidance (NatureScot, 2023f), this assessment accounts for all potential distributional responses (i.e., disturbance and displacement and barrier effects).
I-C-65	All offshore	Operations and maintenance	Collision risk.	C-OFF-02 C-OFF-07 C-OFF-22	**Likely significant effect without secondary mitigation - Scoped In**	There is a risk of birds in flight colliding with rotating WTG blades. The susceptibility of species to collision risk depends upon morphological and behavioural characteristics of the species, in addition to the project design specifications. Collision risk will be assessed for seabird species with regular connectivity with the Array Area (e.g., during the breeding season) and separately for migratory seabird and non-seabird species that may pass through the array during migration.
I-C-66	All offshore	Operations and maintenance	Indirect impacts due to impacts on prey species.	C-OFF-21 C-OFF-17	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	The presence of turbines may alter the distribution, physiology or behaviour of bird prey species and thereby have an indirect effect on prey availability. These mechanisms could potentially result in less prey being available in the area adjacent to the Array Area impacting foraging seabirds.

I-C-67	All offshore	Operations and maintenance	Barrier effects.	C-OFF-07 C-OFF-13 C-OFF-21 C-OFF-44	**No likely significant effect at Scoping - Scoped Out**	For the purposes of assessment of displacement for resident birds, it is usually not possible to distinguish between displacement and barrier effects. For example, to define where individual birds may have intended to travel to, or beyond an offshore wind farm, even when tracking data are available. Within the displacement assessment, both sitting and flying birds will be included. The inclusion of sitting birds within the analysis provides for an assessment of those individuals potentially displaced from an area of sea in which they reside, whilst the inclusion of flying birds provides an assessment of any potential barrier effects to birds moving through the area of interest. Therefore, in the impact assessment the effects of displacement and barrier effects on resident IOFs are considered together, with the impacts from barrier effects alone not considered further. This is also supported in NatureScot guidance (NatureScot, 2023f), with the assessment undertaken for displacement considered to cover distributional responses (i.e., both displacement and barrier effects). The small energetic cost to migrating birds resulting from flying around rather than through the WTG array of an offshore wind farm is considered a potential barrier effect but has been Scoped Out of the assessment. Masden et al. (2010, 2012) and Speakman et al. (2009) calculated that the costs of one-off avoidances during migration were small, accounting for less than 2% of available fat reserves. Therefore, the impacts on birds that only migrate through the ornithological study area (including seabirds, waders and waterbirds on passage) are considered negligible and consequently Scoped Out.
I-C-68	All offshore	Operations and maintenance	Impacts resulting from artificial light.	C-OFF-35	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Impacts resulting from artificial light are expected to be minimal and not requiring further assessment. Although, there is some evidence that Manx shearwater and European storm petrel can be impacted by artificial light, both were recorded in low numbers in site-specific surveys to date. However, this will be considered further when full baseline survey data is available.
I-C-69	All offshore	Cumulative Effects	Detail to be added post-Scoping	Detail to be added post-Scoping	**Likely significant effect without secondary mitigation - Scoped In**	Detail to be added post-Scoping
I-C-70	All offshore	Transboundary Effects	Detail to be added post-Scoping	Detail to be added post-Scoping	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Detail to be added post-Scoping

7.Marine Mammals

Impact Background					EIA Scoping	
ID	**Project Element**	**Project Phase**	**Project Activity and Impact**	**Commitments**	**Likely Significant Effect at Scoping (LSE, Possible LSE, No LSE)**	**Approach to Assessment**
I-C-71	All offshore	Construction and decommissioning	Noise-related impacts associated with construction and decommissioning activities resulting in permanent auditory injury (i.e., permanent threshold shifts (PTS)).	C-OFF-23	**Likely significant effect without secondary mitigation - Scoped In**	Underwater noise associated with anchor piling, cofferdam piling, UXO clearance, pre-construction geophysical surveys, other construction related activities (cable laying, dredging, trenching etc) and decommissioning activities all have the potential to cause permanent auditory injury. The impacts of underwater noise on marine mammals therefore require further consideration. This will also allow the embedded commitments, specifically the MMMP, to be appropriately informed and developed proportionate to the risks of underwater noise to marine mammal as a result of the construction and decommissioning of the Proposed Offshore Development. Within the Offshore ECC Study Area, specific consideration will be given to impacts on coastal species such as bottlenose dolphin, and to the Southern Trench NCMPA designated for minke whale.
I-C-72	All offshore	Construction and decommissioning	Noise-related impacts associated with construction and decommissioning activities resulting in temporary auditory injury (i.e., temporary threshold shifts (TTS)).	C-OFF-23	**No likely significant effect at Scoping - Scoped Out**	The ranges at which TTS onset occurs do not allow assessment of the magnitude or significance of the likely consequences for individuals and ultimately populations of the predicted extent over which any TTS might occur. Therefore, TTS cannot adequately be assessed using the current TTS onset thresholds. Current TTS onset thresholds are inappropriate to determine a biologically significant level of TTS. Note: TTS will only be used as a proxy for disturbance in the UXO assessment due to the absence of disturbance thresholds for UXO clearance activities.
I-C-73	All offshore	Construction and decommissioning	Noise related impacts associated with construction and decommissioning activities resulting in disturbance and/or displacement of individuals (including barrier effects).	C-OFF-23	**Likely significant effect without secondary mitigation - Scoped In**	Underwater noise associated with anchor piling, cofferdam piling, UXO clearance, pre-construction geophysical surveys, other construction related activities (cable laying, dredging, trenching etc) and decommissioning activities all have the potential to have an impact on the behaviour, habitat use and distribution of marine mammals either at individual or population level. The impacts of underwater noise on marine mammals therefore require further consideration. Within the ECC Study Area, specific consideration will be given to impacts on coastal species such as bottlenose dolphin, and to the Southern Trench NCMPA designated for minke whale.
I-C-74	All offshore	Construction and decommissioning	Indirect impacts associated with construction and decommissioning resulting in marine mammal prey item disturbance and/or displacement.	C-OFF-09 C-OFF-13 C-OFF-67	**Likely significant effect without secondary mitigation - Scoped In**	Changes in prey abundance and distribution resulting from construction and decommissioning activities may impact on the ability of marine mammals to forage in the area. These impacts can arise from underwater noise emissions (i.e., during pile driving, UXO clearance, geophysical surveys etc) which cause disturbance to fish populations (as prey species of marine mammals). The scale of the impact to marine mammals will be informed by the assessment presented in **Chapter 10: Fish and Shellfish Ecology**.
I-C-75	All offshore	Construction and decommissioning	Collision risk impacts associated with increased vessel traffic in the Proposed Offshore Development during construction and decommissioning.	C-OFF-44	**No likely significant effect at Scoping - Scoped Out**	It is not expected that increased localised vessel traffic associated with the Proposed Offshore Development will increase the risk of collision to marine mammals. Vessel movements will be managed in a way such that no significant impact is expected to marine mammals, including: •Vessel activities will fall under standard transit speeds as outlined within the VMP; •Vessels will follow prescribed routes (non-random movement) as outlined within the VMP; and •Vessels shall also act in accordance with the guidelines set out within The Scottish Marine Wildlife Watching Code (SNH, 2017), to minimise collision risks with marine mammals.
I-C-76	All offshore	Construction and decommissioning	Disturbance impacts associated with increased vessel traffic in the Array Area and ECC during construction and decommissioning.	C-OFF-44	**Likely significant effect without secondary mitigation - Scoped In**	Relatively high levels of vessel traffic (passenger, cargo, and other vessel activities) within the area form part of the existing baseline. Increased vessel traffic during construction and decommissioning may increase the risk of disturbance to marine mammals. Within the ECC Study Area, specific consideration will be given to impacts on coastal species such as bottlenose dolphin, the Southern Trench NCMPA designated for minke whale, and seal haul-out sites.

I-C-77	All offshore	Construction and decommissioning	Changes in water quality relating to various construction activities such as vessel movements and cable laying/trenching and decommissiong activities.	C-OFF-10 C-OFF-14 C-OFF-15 C-OFF-18	**No likely significant effect at Scoping - Scoped Out**	Activities relating to the construction and decommissioning of the Proposed Offshore Development may influence water quality as a result of sediment disturbance and the accidental release of fuels, oils and/or hydraulic fluids. These impacts are expected to be localised and short-lived. With regards to the accidental release of fuels, oils and/or hydraulic fluids, the impact of pollution is associated with the construction of infrastructure and use of supply/service vessels may lead to direct mortality of marine mammals or a reduction in prey availability either of which may affect species' survival rates. However, with implementation of an appropriate PEMP and MPCP, a major incident that may impact any species at a population level is considered very unlikely. When considering sediment disturbance, marine mammals often migrate through waters where conditions are turbid for extended periods without significant impacts to species biology or behaviour. Evidence that turbidity affects cetaceans directly is not evident in the literature (Todd et al., 2015) and pinnipeds often live in dark and turbid waters, where their mystacial vibrissae, or whiskers, play an important role in orientation, discriminating objects by direct touch, or to analyse water movements (Hanke et al., 2010). Any impact on sediment suspension is therefore predicted to be of local spatial extent, short-term duration, intermittent frequency and reversible, within the context of regional and localised marine mammal populations and therefore not significant in terms of the EIA.
I-C-78	All offshore	Construction and decommissioning	Disturbance to designated seal haul-out sites	C-OFF-10 C-OFF-14 C-OFF-15 C-OFF-18 C-OFF-23 C-OFF-44	**No likely significant effect at Scoping - Scoped Out**	Activities associated with cable trenching and laying, and vessel movements all have the potential to cause disturbance to seals at their haul-out sites. As the closest seal haul-out sites to the Array Area are the Pentland Skerries (~ 36 km away) and Duncansby Head (~ 43 km away) for grey seals, and the Offshore ECC Study Area is ~ 55km east of the closest seal haul-out sites Findhorn (for both grey and harbour seals) and Gills Bay (~48 km) for harbour seals, it is unlikely that these haul-out sites may experience disturbance from the activities associated with laying the cable and the landfall activities, and from the vessels involved in these activities. As such there is expected to be no significant impact to marine mammals.
I-C-79	All offshore	Operations and maintenance	Noise related impacts associated with the O&M of floating wind turbine generators (WTGs)	n/a	**Likely significant effect without secondary mitigation - Scoped In**	Existing evidence suggests that operational noise associated with fixed-bottom offshore wind farms is likely to be considerably less than that of construction noise. In addition, reviews have concluded that operational, fixed-bottom wind farm noise will have negligible effects on marine mammals. However, due to the early stage of floating offshore wind technology and limited existing monitoring data of noise from operational floating wind farms, it is difficult to ascertain the potential impact of an operational floating wind farm noise. As such, this impact has been Scoped In. In addition, it is noted that NatureScot's representation towards a recent Scoping Opinion for a floating OWF is that operational noise of floating OWFs should be assessed (Marine Scotland, 2023b).
I-C-80	All offshore	Operations and maintenance	Indirect impacts associated with the O&M of floating WTGs resulting in marine mammal prey item disturbance and/or displacement.	C-OFF-09 C-OFF-13 C-OFF-67	**Likely significant effect without secondary mitigation - Scoped In**	Existing evidence suggests that operational noise of fixed-bottom WTGs is not likely to generate significant levels of noise that would result in disturbance of migratory or sensitive fish species (as prey species of marine mammals). However, due to the early stage of floating offshore wind technology and limited existing monitoring data of noise from operational floating wind farms, it is difficult to ascertain the potential impact of an operational floating wind farm noise. As such, this impact has been Scoped In.
I-C-81	All offshore	Operations and maintenance	Risk of injury or death resulting from entanglement of marine mammals within mooring lines or cables of WTGs, and the secondary interactions with derelict fishing gears wrapped around WTG mooring lines.	n/a	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping (Primary Entabglement)** **Likely significant effect without secondary mitigation - Scoped In (Secondary Engtanglement)**	The effects of marine renewable energy mooring devices on marine mammals are poorly understood. It is predicted that the introduction of dynamic lines or cables introduces a potential entanglement risk (Benjamins *et al.*, 2014) and could increase the risk of derelict fishing gear items (secondary entanglement) from being entangled within mooring systems; however, the likelihood and severity of such an impact occurring is currently unknown. It is noted that, in recent consultation feedback on other relevant OWF projects, Marine Scotland Science have requested that the potential for entanglement in debris caught up in mooring lines be included in any EIA Report (Marine Scotland, 2021a, 2023b). As such, further consideration needs to be given to the risk of injury or death resulting from entanglement of marine mammals within attached derelict gear and as such, this impact has been Scoped In. With regards to primary entanglement, this relates to the possibility that marine mammals could be directly entangled within the OWF floating structure mooring lines themselves. However, this shall be dependent upon the engineering design of the floating structures (i.e., the probability that the mooring line tension is such that loops could be created within the systems which would increase the risk of marine mammal entanglement). In line with the Proportionate EIA approach, this impact pathway is provisionally Scoped In as a Possible LSE at Scoping. Prior to the EIAR, discussions will be had with the engineers to determine whether the mooring line and array cable dimensions, configurations and loads could enable loops to be created to clarify whether primary entanglement impacts can be disregarded. Should the engineers confirm that the mooring line and cable design is such that direct marine mammal entanglement cannot occur, a technical note will be drafted and shared with Consultees, with the intention of gaining agreement to Scope Out this impact from the EIAR.

I-C-82	All offshore	Operations and maintenance	Risk of injury resulting from collision of marine mammals with WTG structures.	n/a	**Likely significant effect without secondary mitigation - Scoped In**	Although spar, semi-submersible/barge and tension leg platform WTG structures are being proposed, the floating substructure is still to be defined. Designs with the greatest total submerged volumes (such as semi-submersible) are more likely to generate a collision risk with marine mammals. Collision risk with floating structures is poorly understood and further consideration of the potential risks is recommended. It is also noted that, in recent consultation feedback on other relevant OWF projects, NatureScot and Marine (Scotland) Directorate have expressed that that impacts related to the risk of marine mammal collisions with WTG structures be scoped in to any EIA report (Marine Scotland, 2021b,)
I-C-83	All offshore	Operations and maintenance	Disturbance related impacts associated with increased vessel traffic in the Array Area and ECC during O&M.	C-OFF-22	**Likely significant effect without secondary mitigation - Scoped In**	Relatively high levels of vessel traffic (passenger, cargo, and other vessel activities) within the area form part of the existing baseline. Increased vessel traffic during operations and maintenance may increase the risk of disturbance to marine mammals. Within the Offshore ECC Study Area, specific consideration will be given to impacts on coastal species such as bottlenose dolphin, the Southern Trench NCMPA designated for minke whale, and seal haul-out sites.
I-C-84	All offshore	Operations and maintenance	Collision risk related impacts associated with increased vessel traffic in the Array Area and ECC during O&M.	C-OFF-22	**No likely significant effect at Scoping - Scoped Out**	The small number of vessels required for O&M activities is unlikely to generate an increase in collision risk against the existing baseline of shipping activity. The development and implementation of a VMP shall help minimise risks of marine mammal-vessel collisions to negligible levels.
I-C-85	All offshore	Operations and maintenance	Changes in water quality relating to accidental release of pollutants.	C-OFF-14 C-OFF-15	**No likely significant effect at Scoping - Scoped Out**	The accidental release of pollutants is limited to oils and fluids contained within the WTGs and vessels. The potential for full inventory release from a turbine is considered extremely remote and would occur as a slow release, which would be almost undetectable and immediately dispersed, limiting the potential interactions between pollutants and marine mammals. For these reasons, localised, temporary changes to water quality will not have a significant impact on marine mammals.
I-C-86	All offshore	Operations and maintenance	Impacts on marine mammals from electromagnetic fields (EMF) due to presence of offsea cabling.	n/a	**No likely significant effect at Scoping - Scoped Out**	EMFs are emitted along the lengths of subsea cables. Existing evidence suggests that the levels of EMFs emitted by offshore renewable energy export cables are at a level low enough that there is no potential for direct significant impacts on marine mammals (Copping and Hemery, 2020). Given that marine mammals are known to closely associate with offshore wind farm structures (Scheidat *et al.* , 2011, Russell *et al.* , 2014), it is predicted that the magnitude and vulnerability score for this impact would be negligible.
I-C-87	All offshore	Operations and maintenance	Impacts on marine mammal prey items from EMF due to presence of subsea cabling.	C-OFF-22 C-OFF-18 C-OFF-10	**Likely significant effect without secondary mitigation - Scoped In**	Potential EMF impacts on prey species may impact foraging success for marine mammals. The scale of the indirect impact to marine mammals will be informed by the assessment presented in **Chapter 10: Fish and Shellfish Ecology**.
I-C-88	All offshore	Operations and maintenance	Long term habitat changes, displacement and/or effects due to presence of WTGs within the Array Area. This includes the potential for changes in future foraging opportunities.	n/a	**Likely significant effect without secondary mitigation - Scoped In**	The introduction of new infrastructure into the marine environment can potentially result in displacement or exclusion from habitats. This impact will require further consideration as this impact pathway is poorly understood for offshore floating renewable energy developments. In addition, changes in prey abundance and distribution may occur due to offshore wind farm infrastructure. Marine Scotland Science have also previously agreed with the need to assess the potential operational impacts of floating offshore wind farm barrier effects (Marine Scotland, 2021b).
I-C-89	All offshore	Cumulative Effects	Detail to be added post-Scoping	Detail to be added post-Scoping	**Likely significant effect without secondary mitigation - Scoped In**	Detail to be added post-Scoping
I-C-90	All offshore	Transboundary Effects	Detail to be added post-Scoping	Detail to be added post-Scoping	**Likely significant effect without secondary mitigation - Scoped In**	Detail to be added post-Scoping

8. Commercial Fisheries

Impact Background					EIA Scoping	
ID	**Project Element**	**Project Phase**	**Project Activity and Impact**	**Commitments**	**Likely Significant Effect at Scoping (LSE, Possible LSE, No LSE)**	**Approach to Assessment**
I-C-91	All offshore	Construction and decommissioning	Reduction in access to, or exclusion from established fishing grounds.	C-OFF-58 C-OFF-28 C-OFF-10 C-OFF-29 C-OFF-30 C-OFF-55 C-OFF-46 C-OFF-33	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Construction and decommissioning activities have potential to create loss of fishing opportunities. This effect is expected to be localised and short term; furthermore, the operational range of relevant fleets will not typically be limited to the Proposed Offshore Development. This effect will be subject to detailed assessment in the EIAR. To confirm the LSE of the effect, further and more detailed analysis of baseline data sources will be undertaken alongside engagement with stakeholders to understand fishing activity in the Proposed Offshore Development.
I-C-92	All offshore	Construction and decommissioning	Displacement leading to gear conflict and increased fishing pressure on adjacent grounds	C-OFF-14 C-OFF-31	**Likely significant effect without secondary mitigation - Scoped In**	Any reduced access to fishing grounds creates the potential for displacement of fishing activity. This effect is expected to be short-term and localised, and the operational range of relevant fleets will not typically be limited to the Proposed Offshore Development. This effect will be subject to detailed assessment in the EIAR. To confirm the LSE of the effect, further and more detailed analysis of baseline data sources will be undertaken alongside engagement with stakeholders to understand fishing activity in and around the Proposed Offshore Development.
I-C-93	All offshore	Construction and decommissioning	Disturbance of commercially important fish and shellfish resources leading to displacement or disruption of fishing activity.	C-OFF-14	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Construction and decommissioning activities may lead to disturbance of commercially important fish and shellfish resources and therefore displace or disrupt a range of fishing activity. To confirm the LSE of this effect, further assessment is required; assessment will be informed by the outcomes of the impact assessment in Fish and Shellfish Ecology chapter and it will be assumed that commercial fisheries will be affected as a result of any loss of resources.
I-C-94	All offshore	Construction and decommissioning	Increased vessel traffic associated with the Proposed Offshore Development within fishing grounds leading to interference with fishing activity.	C-OFF-18 C-OFF-44	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Movement of vessels associated with the Proposed Offshore Development adding to the existing volume of marine traffic in the area, may lead to interference of fishing activity. To confirm the LSE of this effect, further assessment is required. Assessment will be informed by the outcomes of the shipping and navigation impact assessment and Navigational Risk Assessment (NRA).
I-C-95	All offshore	Construction and decommissioning	Additional steaming to alternative fishing grounds for vessels that would otherwise fish within the Proposed Offshore Development.	C-OFF-18 C-OFF-44	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	This effect will be localised to Safety Zones and therefore limited deviations to steaming routes are expected. Given adequate notification, it is expected that vessels, which typically have an operational range beyond that of the Proposed Offshore Development (as indicated by VMS data presented above), will be in a position to avoid temporary construction/decommissioning areas with no or minimal impact on their steaming times. With embedded mitigation measures in place (Section 13.4), no LSE is expected but reflecting feedback received from the Scottish Fishermen's Federation during scoping workshop engagement, the impact is scoped in.

I-C-96	All offshore	Operation and maintenance	Reduction in access to, or exclusion from established fishing grounds.	C-OFF-58 C-OFF-28 C-OFF-10 C-OFF-29 C-OFF-30 C-OFF-34 C-OFF-31 C-OFF-33 C-OFF-46 C-OFF-18 C-OFF-33	**Likely significant effect without secondary mitigation - Scoped In**	Accessibility within the Array Area will be dependent on turbine spacing, turbine layout and foundation type. In particular, mooring systems of floating foundations may affect the ability of commercial fishing fleets in deploying certain gears. This effect will be subject to detailed assessment in the EIAR. To confirm the LSE of the effect, further and more detailed analysis of baseline data sources will be undertaken alongside engagement with stakeholders to understand fishing activity in the Proposed Offshore Development.
I-C-97	All offshore	Operation and maintenance	Displacement leading to gear conflict and increased fishing pressure on adjacent grounds	C-OFF-31 C-OFF-14	**Likely significant effect without secondary mitigation - Scoped In**	Any reduced access to fishing grounds creates the potential for displacement of fishing activity. This effect is expected to be localised and the operational range of relevant fleets will not typically be limited to the Proposed Offshore Development. This effect will be subject to detailed assessment in the EIAR. To confirm the LSE of the effect, further and more detailed analysis of baseline data sources will be undertaken alongside engagement with stakeholders to understand fishing activity in and around the Proposed Offshore Development.
I-C-98	All offshore	Operation and maintenance	Disturbance of commercially important fish and shellfish resources leading to displacement or disruption of fishing activity	C-OFF-14	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	O&M of the Proposed Offshore Development may lead to disturbance of commercially important fish and shellfish resources, including electromagnetic fields from subsea cables, and changes to habitat, and therefore displace or disrupt a range of fishing activity. To confirm the LSE of this effect, further assessment is required;; assessment will be informed by the outcomes of the fish and shellfish ecology impact assessment (Chapter 10: Fish and Shellfish Ecology) and it will be assumed that commercial fisheries will be affected as a result of any loss of resources.
I-C-99	All offshore	Operation and maintenance	Increased vessel traffic associated with the Proposed Offshore Development within fishing grounds leading to interference with fishing activity	C-OFF-44 C-OFF-18	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Movement of vessels associated with O&M of the Proposed Offshore Development adding to the existing volume of marine traffic in the area, may lead to interference of fishing activity. To confirm the LSE of this effect, further assessment is required; assessment will be informed by the outcomes of the shipping and navigation impact assessment (Chapter 14: Shipping and Navigation) and NRA.
I-C-100	All offshore	Operation and maintenance	Additional steaming to alternative fishing grounds for vessels that would otherwise fish within the Proposed Offshore Development	C-OFF-44 C-OFF-18	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	This effect will be localised to safety zones associated with temporary maintenance works on installed structures and therefore limited deviations to steaming routes are expected. Given adequate notification, it is expected that vessels, which typically have an operational range beyond that of the Proposed Offshore Development (as indicated by VMS and ScotMap data presented above), will be in a position to avoid temporary maintenance areas around installed infrastructure with no or minimal impact on their steaming times. With embedded mitigation measures in place (Section 13.4), no LSE is expected but reflecting feedback received from the Scottish Fishermen's Federation during scoping workshop engagement, the impact is scoped in.
I-C-101	All offshore	Operation and maintenance	Physical presence of infrastructure and potential exposure of that infrastructure leading to gear snagging.	C-OFF-58 C-OFF-18 C-OFF-33	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Standard industry practice and protocol (e.g., seabed infrastructure will be buried and/or marked on nautical charts) will minimise the risk of gear snagging, but it remains likely to be an area of industry concern. To confirm the LSE of this effect, further assessment is required, which will be informed by engagement with stakeholders. Safety aspects associated with this impact, including damage to property and vessel stability, will be considered within the shipping and navigation impact assessment (Chapter 14: Shipping and Navigation) and NRA.

I-C-102	All offshore	Cumulative Effects	Detail to be added post-Scoping	Detail to be added post-Scoping
I-C-103	All offshore	Transboundary Effects	Detail to be added post-Scoping	Detail to be added post-Scoping

Likely significant effect without secondary mitigation - Scoped In	Detail to be added post-Scoping
Possible likely significant effect without secondary mitigation - Scoped In at Scoping	Detail to be added post-Scoping

9. Shipping & Navigation

Impact Background					EIA Scoping	
ID	Project Element	Project Phase	Project Activity and Impact	Commitments	Likely Significant Effect at Scoping (LSE, Possible LSE, No LSE)	Approach to Assessment
I-C-104	All offshore	All phsaes (construction, operation and maintenance, decommissioning)	Increased vessel to vessel collision risk resulting from displacement (third party to third party). Displacement will also consider increased journey times and distances.	C-OFF-51 C-OFF-18 C-OFF-02 C-OFF-46 C-OFF-50 C-OFF-14 C-OFF-55	Likely significant effect without secondary mitigation - Scoped In	Baseline vessel traffic data indicates that certain vessels are likely to deviate to pass around the Array Area or buoyed construction/decommissioning area, and as such collision risk in the area may increase. Non-AIS traffic will need to be considered and quantitative modelling undertaken to assess the risk.
I-C-105	All offshore	All phsaes (construction, operation and maintenance, decommissioning)	Increased vessel to vessel collision risk resulting in displacement (third party to Project vessel).	C-OFF-51 C-OFF-18 C-OFF-02 C-OFF-46 C-OFF-52 C-OFF-50 C-OFF-14 C-OFF-55	Likely significant effect without secondary mitigation - Scoped In	The increased levels of vessel traffic in the area associated with the construction, O&M and decommissioning of the Array Area may lead to increased collision risk (third party vessel to Project vessel).
I-C-106	All offshore	All phsaes (construction, operation and maintenance, decommissioning)	Vessel to structure Allision risk.	C-OFF-51 C-OFF-42 C-OFF-18 C-OFF-02 C-OFF-35 C-OFF-14 C-OFF-55	Likely significant effect without secondary mitigation - Scoped In	The presence of surface structures will create new Allision risk to vessels under power or Not Under Command. Non-AIS traffic will need to be considered and quantitative modelling undertaken to assess the risk.
I-C-107	All offshore	All phsaes (construction, operation and maintenance, decommissioning)	Reduced access to local ports and harbours.	C-OFF-51 C-OFF-18 C-OFF-02 C-OFF-50	Likely significant effect without secondary mitigation - Scoped In	Project vessel transits and activities may impact access to local ports and harbours.
I-C-108	All offshore	Operations and maintenance	Reduction of under keel clearance as a result of subsea infrastructure.	C-OFF-51 C-OFF-18 C-OFF-35 C-OFF-55	Likely significant effect without secondary mitigation - Scoped In	The presence of subsea infrastructure (e.g. cable protection) may lead to an increase in under keel interaction risk. Non-AIS traffic will need to be considered.
I-C-109	All offshore	Operations and maintenance	Anchor and fishing gear interaction (navigation safety) with subsea cables.	C-OFF-51 C-OFF-42 C-OFF-18 C-OFF-14 C-OFF-55	Likely significant effect without secondary mitigation - Scoped In	The presence of subsea cables may lead to an increase in anchor and fishing gear interaction risk. Non-AIS traffic will need to be considered.
I-C-110	All offshore	Operations and maintenance	Anchor and fishing gear (navigation safety only) with mooring lines.	C-OFF-51 C-OFF-42 C-OFF-18 C-OFF-14 C-OFF-43 C-OFF-55	Likely significant effect without secondary mitigation - Scoped In	The presence of mooring lines may lead to an increase in anchor and fishing gear interaction risk. Non-AIS traffic will need to be considered.
I-C-111	All offshore	Operations and maintenance	Loss of station.	C-OFF-51 C-OFF-42 C-OFF-18 C-OFF-43 C-OFF-55	Likely significant effect without secondary mitigation - Scoped In	In the event of mooring line failure, the floating structures would create a collision risk to passing traffic.

I-C-112	All offshore	Operations and maintenance	Interference with navigation, communications, and position-fixing equipment.	C-OFF-51 C-OFF-18	**Likely significant effect without secondary mitigation - Scoped In**	The Array Area infrastructure (e.g. WTGs, subsea cables) may impact on equipment onboard vessels, including potential effects of electromagnetic interference from cables.
I-C-113	All offshore	Operations and maintenance	Reduction of SaR capability.	C-OFF-51 C-OFF-50 C-OFF-18	**Likely significant effect without secondary mitigation - Scoped In**	There may be an increase in incident rates associated with the Array Area which may lead to a reduction in SaR capability. The layout of the structures may also impact access for SaR responders in the area.
I-C-114	All offshore	Cumulative Effects	Detail to be added post-Scoping	Detail to be added post-Scoping	**Likely significant effect without secondary mitigation - Scoped In**	Detail to be added post-Scoping
I-C-115	All offshore	Transboundary Effects	Detail to be added post-Scoping	Detail to be added post-Scoping	**Likely significant effect without secondary mitigation - Scoped In**	Detail to be added post-Scoping

10. Archaeology & Cultural Heritage

Impact Background					EIA Scoping	
ID	**Project Element**	**Project Phase**	**Project Activity and Impact**	**Commitments**	**Likely Significant Effect at Scoping (LSE, Possible LSE, No LSE)**	**Approach to Assessment**
I-C-116	All offshore	Construction and decommissioning	Physical disturbance activities causing direct damage and/or loss to known and/or potential prehistoric landscapes, deposits, features or finds on or under the seabed.	C-OFF-10 C-OFF-34 C-OFF-65 C-OFF-63 C-OFF-19 C-OFF-22 C-OFF-67 C-OFF-60 C-OFF-61	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Any of the pre-installation clearance activities, installation of proposed infrastructure, decommissioning activities and cables or vessel usage that impact the seabed, sub-seabed or intertidal zone in any manner have the potential to result in the damage/loss of submerged prehistoric landscape deposits, features or finds, if present. Effects are considered to be permanent. To confirm the LSE of this impact, a full suite of high quality marine geophysical and geotechnical surveys must be undertaken and archaeologically assessed to understand the known resource on the seabed (nature, extent and archaeological value). This must be followed with appropriate mitigation measures in place including those stipulated in a WSI as agreed with the Archaeological Curator, including a Protocol for Archaeological Discoveries.
I-C-117	All offshore	Construction and decommissioning	Physical disturbance activities causing direct damage and/or loss to known and recorded marine (including maritime and aviation receptors) and intertidal heritage receptors and/or anomalies of likely/possible anthropogenic origin on or under the seabed.	C-OFF-10 C-OFF-34 C-OFF-65 C-OFF-63 C-OFF-19 C-OFF-22 C-OFF-67 C-OFF-60 C-OFF-61	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Any of the pre-installation clearance activities, installation of proposed infrastructure, decommissioning activities, and cables or vessel usage that impact the seabed, sub-seabed or intertidal zone in any manner have the potential to result in the damage/loss of known or potential marine and intertidal sites, features or finds, if present. Effects are considered to be permanent. To confirm the LSE of this impact, a full suite of high quality marine geophysical and geotechnical surveys must be undertaken and archaeologically assessed to understand the known resource on the seabed (nature, extent and archaeological value). This must be followed with appropriate mitigation measures in place including those stipulated in a WSI as agreed with the Archaeological Curator, including Archaeological Exclusion Zones and micro-siting.
I-C-118	All offshore	Construction and decommissioning	Physical disturbance activities causing direct damage and/or loss to potential, currently unrecorded marine (including maritime and aviation receptors) and intertidal heritage receptors on or under the seabed.	C-OFF-10 C-OFF-34 C-OFF-65 C-OFF-63 C-OFF-19 C-OFF-22 C-OFF-67 C-OFF-60 C-OFF-61	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Any of the pre-installation clearance activities, installation of proposed infrastructure, decommissioning activities, and cables or vessel usage that impact the seabed, sub-seabed or intertidal zone in any manner have the potential to result in the damage/loss of known or potential marine and intertidal sites, features or finds, if present. Effects are considered to be permanent. To confirm the LSE of this impact, a full suite of high quality marine geophysical and geotechnical surveys must be undertaken and archaeologically assessed to understand the known resource on the seabed (nature, extent and archaeological value). This must be followed with appropriate mitigation measures in place including those stipulated in a WSI as agreed with the Archaeological Curator, including a Protocol for Archaeological Discoveries.
I-C-119	All offshore	Construction and decommissioning	Physical disturbance activities causing indirect changes to hydrodynamic and sedimentary regimes leading to sediment reduction on the seabed.	C-OFF-34 C-OFF-65 C-OFF-19	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Any of the pre-installation clearance activities, installation of proposed infrastructure, decommissioning activities, and cables or vessel usage may cause indirect changes to hydrodynamic and sedimentary regimes leading to sediment reduction on the seabed and scour, potentially exposing receptors leading to increased rates of deterioration through biological, chemical and physical processes. The LSE of this impact is to be confirmed following review of the Physical Processes assessment.

I-C-120	All offshore	Construction and decommissioning	Physical disturbance activities causing indirect changes to hydrodynamic and sedimentary regimes leading to sediment accretion on the seabed.	C-OFF-34 C-OFF-65 C-OFF-19	**Likely significant effect without secondary mitigation - Scoped In**	Any of the pre-installation clearance activities, installation of proposed infrastructure, decommissioning activities, and cables or vessel usage may cause indirect changes to hydrodynamic and sedimentary regimes may cause sediment to cover receptors inhibiting a range of biological, chemical and physical degradation processes (beneficial effect). The LSE of this impact is to be confirmed following review of the Physical Processes assessment.
I-C-121	All offshore	Construction and decommissioning	Temporary or permanent change to the setting of known heritage assets (sites with identified and named vessels or aircraft).	C-OFF-10 C-OFF-34 C-OFF-65 C-OFF-63 C-OFF-22 C-OFF-67 C-OFF-61	**Likely significant effect without secondary mitigation - Scoped In**	The setting of known and named wreck (and aviation) sites may be impacted by activities associated with the device designs, the offshore export cable and other infrastructure, and in turn this could potentially affect the significance of such seabed features. Effects could be temporary or permanent. To confirm the LSE of this impact, a full suite of high quality marine geophysical and geotechnical surveys must be undertaken and archaeologically assessed to understand the known resource on the seabed (nature, extent and archaeological value). The impact to setting will be confirmed once the location and size of project infrastructure is known and its proximity to known archaeological receptors.
I-C-122	All offshore	Operations and maintenance	Physical disturbance activities causing direct damage and/or loss to known and/or potential prehistoric landscapes, deposits, features or finds on or under the seabed.	C-OFF-10 C-OFF-34 C-OFF-65 C-OFF-63 C-OFF-19 C-OFF-22 C-OFF-67 C-OFF-60 C-OFF-61	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Any of the pre-installation clearance activities, installation of proposed infrastructure, decommissioning activities and cables or vessel usage that impact the seabed, sub-seabed or intertidal zone in any manner have the potential to result in the damage/loss of submerged prehistoric landscape deposits, features or finds, if present. Effects could be temporary or permanent. To confirm the LSE of this impact, a full suite of high quality marine geophysical and geotechnical surveys must be undertaken and archaeologically assessed to understand the known resource on the seabed (nature, extent and archaeological value). This must be followed with appropriate mitigation measures in place including those stipulated in a WSI as agreed with the Archaeological Curator, including a Protocol for Archaeological Discoveries.
I-C-123	All offshore	Operations and maintenance	Physical disturbance activities causing direct damage and/or loss to known and recorded marine (including maritime and aviation receptors) and intertidal heritage receptors and/or anomalies of likely/possible anthropogenic origin on or under the seabed.	C-OFF-10 C-OFF-34 C-OFF-67 C-OFF-63 C-OFF-19 C-OFF-22 C-OFF-67 C-OFF-60 C-OFF-61	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Any of the pre-installation clearance activities, installation of proposed infrastructure, decommissioning activities, and cables or vessel usage that impact the seabed, sub-seabed or intertidal zone in any manner have the potential to result in the damage/loss of known or potential marine and intertidal sites, features or finds, if present. Effects are considered to be permanent. To confirm the LSE of this impact, a full suite of high quality marine geophysical and geotechnical surveys must be undertaken and archaeologically assessed to understand the known resource on the seabed (nature, extent and archaeological value). This must be followed with appropriate mitigation measures in place including those stipulated in a WSI as agreed with the Archaeological Curator, including Archaeological Exclusion Zones and micro-siting.
I-C-124	All offshore	Operations and maintenance	Physical disturbance activities causing direct damage and/or loss to potential, currently unrecorded marine (including maritime and aviation receptors) and intertidal heritage receptors on or under the seabed.	C-OFF-10 C-OFF-34 C-OFF-67 C-OFF-63 C-OFF-19 C-OFF-22 C-OFF-65 C-OFF-60 C-OFF-61	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Any of the pre-installation clearance activities, installation of proposed infrastructure, decommissioning activities, and cables or vessel usage that impact the seabed, sub-seabed or intertidal zone in any manner have the potential to result in the damage/loss of known or potential marine and intertidal sites, features or finds, if present. Effects are considered to be permanent. To confirm the LSE of this impact, a full suite of high quality marine geophysical and geotechnical surveys must be undertaken and archaeologically assessed to understand the known resource on the seabed (nature, extent and archaeological value). This must be followed with appropriate mitigation measures in place including those stipulated in a WSI as agreed with the Archaeological Curator, including a Protocol for Archaeological Discoveries.

I-C-125	All offshore	Operations and maintenance	Physical disturbance activities causing indirect changes to hydrodynamic and sedimentary regimes leading to sediment reduction on the seabed.	C-OFF-34 C-OFF-65 C-OFF-19	**Likely significant effect without secondary mitigation - Scoped In**	Any of the O&M activities or vessel usage may cause indirect changes to hydrodynamic and sedimentary regimes leading to sediment reduction on the seabed and scour, potentially exposing receptors leading to increased rates of deterioration through biological, chemical and physical processes. The LSE of this impact is to be confirmed following review of the Physical Processes assessment.
I-C-126	All offshore	Operations and maintenance	Physical disturbance activities causing indirect changes to hydrodynamic and sedimentary regimes leading to sediment accretion on the seabed.	C-OFF-34 C-OFF-65 C-OFF-19	**Likely significant effect without secondary mitigation - Scoped In**	Any of the O&M activities or vessel usage may cause indirect changes to hydrodynamic and sedimentary regimes may cause sediment to cover receptors inhibiting a range of biological, chemical and physical degradation processes (beneficial effect). The LSE of this impact is to be confirmed following review of the Physical Processes assessment.
I-C-127	All offshore	Operations and maintenance	Temporary or permanent change to the setting of known heritage assets (sites with identified and named vessels or aircraft).	C-OFF-10 C-OFF-34 C-OFF-67 C-OFF-63 C-OFF-19 C-OFF-22 C-OFF-65 C-OFF-61	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	The setting of known and named wreck (and aviation) sites may be impacted by activities associated with the device designs, the offshore export cable and other infrastructure, and in turn this could potentially affect the significance of such seabed features. Effects could be temporary or permanent. To confirm the LSE of this impact, a full suite of high quality marine geophysical and geotechnical surveys must be undertaken and archaeologically assessed to understand the known resource on the seabed (nature, extent and archaeological value). The impact to setting will be confirmed once the location and size of project infrastructure is known and its proximity to known archaeological receptors.
I-C-128	All offshore	Cumulative Effects	Detail to be added post-Scoping	Detail to be added post-Scoping	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Detail to be added post-Scoping
I-C-129	All offshore	Transboundary Effects	Detail to be added post-Scoping	Detail to be added post-Scoping	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Detail to be added post-Scoping

11. Military & Civil Aviation

Impact Background					EIA Scoping	
ID	**Project Element**	**Project Phase**	**Project Activity and Impact**	**Commitments**	**Likely Significant Effect at Scoping (LSE, Possible LSE, No LSE)**	**Approach to Assessment**
I-C-130	All offshore	Construction	Creation of an aviation obstacle environment as a result of offshore structures.	C-OFF-26 C-OFF-37 C-OFF-38 C-OFF-40 C-OFF-44 C-OFF-62	**Likely significant effect without secondary mitigation - Scoped In**	Construction of the wind farm will involve tall crane vessels which could pose a physical obstruction to low flying aircraft, increasing the risk of collision or requiring aircraft to fly extended routes to avoid obstacles. Specifically, tall crane vessels and above sea level infrastructure will have a potential impact on military activities within the Moray Firth Danger Area, helicopters flying to and from offshore oil and gas platforms, and SAR operations, and WTGs may impact the Wick and Kirkwall Airport IFPs. The transportation of pre-assembled WTGs will cause the same impacts along the route taken to the Array Area.
I-C-131	Array Area	Construction	Increased air traffic in the area related to wind farm activities.	C-OFF-26 C-OFF-37 C-OFF-38 C-OFF-40 C-OFF-44 C-OFF-62	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Helicopter traffic associated with the construction phase could impact existing traffic in the area, increasing the risk of aircraft collision. Existing traffic may include military aircraft engaged in activities within the Moray Firth Danger Area, helicopter traffic in support of oil and gas, and aircraft associated with SAR operations. LSE will be ascertained by communication and coordination with the MOD and other aviation operators.
I-C-132	Array Area	Construction	Impact on civil and military PSR systems from WTGs	n/a	**No likely significant effect at Scoping - Scoped Out**	To discriminate aircraft targets from unwanted clutter, PSRs ignore static objects and only display moving targets. PSRs that can see the rotating blades of WTGs can mistake them for aircraft and so present them on the radar display as clutter. Until WTG blades in RLoS are allowed to rotate at operational speeds, they will not generate PSR clutter. Similarly, tall construction vessels and cranes that are in RLoS will not be moving fast enough to generate PSR clutter.
I-C-133	Array Area	Construction	Impact on civil and military SSR systems from WTGs	n/a	**No likely significant effect at Scoping - Scoped Out**	NATS do not consider the impact of WTGs on SSR to be material or relevant for turbines that are beyond approximately 28 km from their SSR facilities. Furthermore, CAP 764 states that WTG effects on SSR "*…are typically only a consideration when the turbines are located very close to the SSR i.e., less than 10 km*". The nearest SSR facility, at Allanshill, is approximately 84.2 km south of the Array Area.
I-C-134	Array Area	Construction	Impact on Hill of Dudwick weather radar from WTGs	n/a	**No likely significant effect at Scoping - Scoped Out**	The closest MET Office radar is at Hill of Dudwick, located 107.3 km to the south of the Array Area. WTGs will be significantly beyond the 20 km safeguarded zone and preliminary RLoS also shows that WTGs within the Array Area will not be visible to the radar.
I-C-135	Offshore ECC	Construction	Impacts from the Offshore ECC	C-OFF-26 C-OFF-37 C-OFF-40 C-OFF-62	**Likely significant effect without secondary mitigation - Scoped In**	Surface vessels will not generate any PSR clutter. The offshore ECCs and surface vessels will be operating within the Moray Firth Danger Area which when active from SFC, includes ordnance, munitions and explosives activities.

I-C-136	All offshore	Operation and maintenance	Creation of an aviation obstacle environment as a result of offshore structures	C-OFF-26 C-OFF-37 C-OFF-38 C-OFF-40 C-OFF-44 C-OFF-62	**Likely significant effect without secondary mitigation - Scoped In**	The presence of completed WTGs could pose a physical obstruction to low flying aircraft, increasing the risk of collision or requiring aircraft to fly extended routes to avoid obstructions. Specifically, WTGs and booster stations will have a potential impact on military activities within the Moray Firth Danger Area, helicopters flying to and from offshore oil and gas platforms, and SAR operations, and WTGs may impact Wick and Kirkwall Airport IFPs.
I-C-137	All offshore	Operation and maintenance	Increased air traffic in the area related to wind farm activities	C-OFF-26 C-OFF-37 C-OFF-38 C-OFF-40 C-OFF-44 C-OFF-62	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Helicopter traffic associated with maintenance activities could impact on existing traffic in the area, increasing the risk of aircraft collision. Existing traffic may include military aircraft engaged in activities within the Moray Firth Danger Area, helicopter traffic in support of oil and gas, and aircraft associated with SAR operations. LSE will be ascertained by communication and coordination with the MOD and other aviation operators.
I-C-138	Array Area	Operation and maintenance	Impact on NERL Allanshill and Buchan AD PSR systems from WTGs	n/a	**Likely significant effect without secondary mitigation - Scoped In**	To discriminate desired aircraft targets from unwanted clutter, PSRs ignore static objects and only display moving targets. PSRs that can see rotating blades of WTGs can mistake them for aircraft and so present them on ATC radar displays as clutter. Controllers may not be able to distinguish aircraft from the clutter. The TOPA produced by NATS for Stromar has stated the Proposed Offshore Development is likely to cause false primary plots to be generated and reduce the radar's probability of detection. This effect on Allanshill radar will impact military ATC, Prestwick Centre ATC, and Aberdeen En-route (Offshore) ATC.
I-C-139	Array Area	Operation and maintenance	Impact on Lossiemouth ATC from WTGs	n/a	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	To discriminate desired aircraft targets from unwanted clutter, PSRs ignore static objects and only display moving targets. PSRs that can see rotating blades of WTGs can mistake them for aircraft and so present them on ATC radar displays as clutter. Controllers may not be able to distinguish aircraft from the clutter. The TOPA produced by NATS for Stromar has stated the Proposed Offshore Development is likely to cause false primary plots to be generated and reduce the radar's probability of detection. LSE will be ascertained by consultation with the MOD to determine the extent WTGs will impact on aviation operations. Further RLoS analysis will be necessary as the project develops and designs are finalised.
I-C-140	Array Area	Operation and maintenance	Impact on Hill of Dudwick weather radar from WTGs	n/a	**No likely significant effect at Scoping - Scoped Out**	The closest MET Office radar is at Hill of Dudwick, located 107.3 km to the south of the Array Area. WTGs will be significantly beyond the 20 km safeguarded zone and preliminary RLoS also shows that WTGs within the Array Area will not be visible to the radar.
I-C-141	Offshore ECC	Operation and maintenance	Impacts from the Offshore ECC	C-OFF-26 C-OFF-37 C-OFF-40 C-OFF-62	**Likely significant effect without secondary mitigation - Scoped In**	Surface vessels will not generate any PSR clutter. The offshore ECCs and surface vessels will be operating within the Moray Firth Danger Area which when active from SFC, includes ordnance, munitions and explosives activities.
I-C-142	Array Area	Operation and maintenance	Impacts on civil and military SSR systems from WTGs	n/a	**No likely significant effect at Scoping - Scoped Out**	NATS do not consider the impact of WTGs on SSR to be material or relevant for turbines that are beyond approximately 28 km from their SSR facilities. Furthermore, CAP 764 states that WTG effects on SSR "*…are typically only a consideration when the turbines are located very close to the SSR i.e., less than 10 km*". The nearest SSR facility at Allanshill is approximately 84.2 km south of the Array Area.
I-C-143	Array Area	Operation and maintenance	Impact on Inverness Airport PSR from WTGs	n/a	**No likely significant effect at Scoping - Scoped Out**	RLoS modelling indicates that the WTGs will not be visible to Inverness PSR.
I-C-144	Array Area	Operation and maintenance	Impact on NERL Perwinnes PSR from WTGs	n/a	**No likely significant effect at Scoping - Scoped Out**	RLoS modelling indicates that the WTGs will not be visible to Perwinnes PSR.

I-C-145	Array Area	Decommissioning	Increased air traffic in the area related to wind farm activities	C-OFF-26 C-OFF-37 C-OFF-38 C-OFF-40 C-OFF-44 C-OFF-62	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Increased helicopter traffic associated with the decommissioning phase could impact on existing traffic in the area, increasing the risk of aircraft collision. Existing traffic may include military aircraft engaged in activities associated with the Moray Firth Danger Area, helicopter traffic in support of oil and gas, and aircraft associated with SAR operations. LSE will be ascertained by communication and coordination with the MOD and other aviation operators.
I-C-146	Offshore ECC	Decommissioning	Impact from the offshore ECC	C-OFF-26 C-OFF-37 C-OFF-40 C-OFF-62	**Likely significant effect without secondary mitigation - Scoped In**	Surface vessels will not generate any PSR clutter. The offshore ECCs and surface vessels will be operating within the Moray Firth Danger Area which when active from SFC, includes ordnance, munitions and explosives activities.
I-C-147	All offshore	Decommissioning	Creation of an aviation obstacle environment as a result of offshore structures	C-OFF-26 C-OFF-37 C-OFF-38 C-OFF-40 C-OFF-44 C-OFF-62	**No likely significant effect at Scoping - Scoped Out**	During the decommissioning phase the existing WTGs will be gradually dismantled and therefore the aviation obstacle environment will be removed. No specific decommissioning impacts are foreseen above those present in the construction and O&M phases.
I-C-148	Array Area	Decommissioning	Impact on NERL Allanshill, MOD Lossiemouth ATC and Buchan AD PSR systems from WTGs	n/a	**No likely significant effect at Scoping - Scoped Out**	During the decommissioning phase the blades of the WTGs will cease rotating, therefore the impact on PSRs will gradually reduce until the last WTG ceases operation. Any mitigations will remain in place until the last WTG ceases rotation. There will be no specific impacts on PSRs during decommissioning.
I-C-149	All offshore	Cumulative Effects	Detail to be added post-Scoping	Detail to be added post-Scoping	**Likely significant effect without secondary mitigation - Scoped In**	Detail to be added post-Scoping
I-C-150	All offshore	Transboundary Effects	Detail to be added post-Scoping	Detail to be added post-Scoping	**No likely significant effect at Scoping - Scoped Out**	Detail to be added post-Scoping

12. Seascape, landscape and Visual Impact

Impact Background					EIA Scoping	
ID	Project Element	Project Phase	Project Activity and Impact	Commitments	Likely Significant Effect at Scoping (LSE, Possible LSE, No LSE)	Approach to Assessment
I-C-151	Array Area	Construction, operations and maintenance, decommissioning	Construction, operational and decommissioning phase seascape, landscape, and visual impacts of the Array Area outside the 60 km radius SLVIA study area.	n/a	**No likely significant effect at Scoping - Scoped Out**	The 60km radius SLVIA study area is defined to an outer limit within which significant effects could occur. Significant effects will not occur beyond 60 km due to the limited changes to views arising from the Array Area at distances of over 60 km. Based on METAR visibility data at the nearest Met Office weather station at Wick Airport, visibility beyond 60 km occurs infrequently and it is predicted that the Array Area will rarely, if ever, be visible and recognisable at distances beyond 60 km. In the Caledonia Offshore Wind Farm Scoping Opinion (Marine Scotland 2023a), Scottish Ministers advised that the study area for the SLVIA should be a radius of 60km, which was in line with the Highland Council representation.
I-C-152	Offshore ECC	Construction, operations and maintenance, and decomissioning	The seascape, landscape, and visual impacts of the HVAC Reactive Compensation Station (RCS)	n/a	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	If HVAC technology is selected, one Reactive Compensation Station (RCS) will be located offshore at a point between the offshore wind farm and the landfall. The closest point to the coast at which it may currently be located is approximately 20 km from the Aberdeenshire coast, but this distance is likely to increase at EIAR. At this distance from the coast, a single RCS of similar but smaller design than the main offshore wind farm substations may give rise to significant effects on seascape, landscape and visual receptors. As design and RPSS development continues, the number of Offshore ECCs, the corridor width and the HVAC search area are likely to reduce. Receptors to be Scoped In and Out of the assessment of the RCS will be identified as part of the preliminary assessment in the SLVIA.
I-C-153	Offshore ECC	Construction, and decommissioning	The seascape, landscape, and visual impacts of the construction and decommissioning of the offshore ECC beyond (outside) the inter-tidal area.	n/a	**No likely significant effect at Scoping - Scoped Out**	Effects on seascape, landscape and visual receptors are unlikely to be significant (outside the inter-tidal area), due to the nature of the offshore ECC; and the distant visibility of related activity offshore within an expansive seascape context. The sporadic nature of related above-sea construction activity means its effects will be short-term and temporary. Related above-sea construction activity is mainly related to the movement of sea vessels, which are an established component of the baseline seascape and views of it. Long-range visibility of this activity further reduces its impact. The number of offshore ECCs is also likely to reduce as design and RPSS development continues.
I-C-154	Offshore ECC, landfall	Construction and decommissioning	The seascape, landscape, and visual impacts of the construction and decommissioning of the offshore ECC within the inter-tidal area.	n/a	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping**	Possible significant effects on seascape, landscape and visual receptors arising from the construction of the offshore ECC within the inter-tidal area, including potential use of cofferdam in the intertidal zone to assist in cable installation activities by excluding water from the working area. Effects anticipated to be localised to the receptors located in close proximity to the construction works taking place in the inter-tidal area. The number of offshore ECCs is also likely to reduce as design and RPSS development continues.
I-C-155	Offshore ECC	Operations and maintenance	The seascape, landscape, and visual effects of the operation of the offshore ECC.	n/a	**No likely significant effect at Scoping - Scoped Out**	No potential for significant effects on SLVR arising from the offshore ECC, due to its location below the sea surface and its lack of visibility.

I-C-156	Landfall	Construction, operations and maintenance, decommissioning	Impacts of the construction, operation and decommissioning of the Proposed Offshore Development on physical aspects of landscape character.	n/a	**No likely significant effect at Scoping - Scoped Out**	No potential for physical effects on landscape receptors. Due to the offshore location of the Array Area, it will only affect the perceived character and qualities of the landscape, which is considered as an indirect effect. No physical attributes that define landscape character or special qualities of designated landscapes will be changed.
I-C-157	Array Area	Construction, operations and maintenance, decommissioning	Impact (daytime) of the construction, operation and decommissioning of the Array Area on seascape (coastal) character.	C-OFF-01 C-OFF-36 C-OFF-37	**No likely significant effect without secondary mitigation - Scoped Out** **Possible likely significant effect without secondary mitigation - Scoped In at Scoping** **Likely significant effect without secondary mitigation - Scoped In**	Those coastal character receptors proposed to be Scoped Out either experience no visibility or limited theoretical visibility of the Array Area, often at very long range, as shown on **Figure 17.5**. There will therefore be no potential for significant effects on these receptors. Coastal character receptors proposed to be Scoped into the assessment may experience views of the Array Area at ranges typically between 40-50km. Typically, those predicted to experience LSE are located in closer proximity to the Array Area, and /or experience relatively high-level theoretical visibility of the Proposed Offshore Development. Those predicted to experience Possible LSE are generally located at greater distances from the Array Area, and /or experience lower levels of theoretical visibility. However, both groups of receptors may or may not experience significant effects as a result of the Proposed Offshore Development. An initial assessment of the potential effects of the Array Area on these RCCAs and CCAs will be undertaken initially using desk-based information and ZTV analysis, with a detailed assessment focusing on those that are identified as requiring further assessment. Detailed assessment to include desk-based seascape character assessment publications and primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies to determine likely significance, and modelling such as ZTV analysis and wireline/photomontage visualisations.
I-C-158	Array Area	Construction, operations and maintenance, decommissioning	Impact (daytime) of the construction, operation and decommissioning of the Array Area on perceived landscape character.	C-OFF-01 C-OFF-36 C-OFF-37	**No likely significant effect without secondary mitigation - Scoped Out** **Possible likely significant effect without secondary mitigation - Scoped In at Scoping** **Likely significant effect without secondary mitigation - Scoped In**	Those landscape receptors proposed to be Scoped Out here either experience no visibility or limited theoretical visibility of the Array Area, often at very long range, as shown in Figure 17.4, or are located inland and do not feature a relationship to the sea as a key characteristic. There will therefore be no potential for significant effects on these receptors. Landscape character receptors proposed to be Scoped In to the assessment may experience views of the Array Area at ranges typically between 40-50km. Typically, those predicted to experience LSE are located in closer proximity to the Array Area, and /or experience relatively high-level theoretical visibility of the Proposed Offshore Development. Those predicted to experience Possible LSE are generally located at greater distances from the Array Area, and /or experience lower levels of theoretical visibility. However, both groups of receptors may or may not experience significant effects as a result of the Proposed Offshore Development. An initial assessment of the potential effects of the Array Area on landscape receptors will be undertaken initially using desk-based information and ZTV analysis, with a detailed assessment focusing on those that are identified as requiring further assessment. Detailed assessment to include desk-based seascape character assessment publications and primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies to determine likely significance, and modelling such as ZTV analysis and wireline/photomontage visualisations.

I-C-159	Array Area	Construction, operations and maintenance, decommissioning	Impact (daytime) of the construction, operation and decommissioning of the Array Area on perceived landscape character/special qualities of designated landscapes.	C-OFF-01 C-OFF-36 C-OFF-37	**No likely significant effect without secondary mitigation - Scoped Out** **Likely significant effect without secondary mitigation - Scoped In**	Those designated landscapes proposed to be Scoped Out experience no theoretical visibility of the Array Area, as shown in **Figure 17.3**. There will therefore be no potential for significant effects on these receptors. An initial assessment of the potential effects of the Array Area on the perceived character and special qualities of the remaining designated landscapes will be undertaken initially using desk-based information and ZTV analysis, with a detailed assessment focusing on those that are identified as requiring further assessment. Detailed assessment to include desk-based assessment to define special qualities that may be affected by the Array Area, using published documents and primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies to determine likely significance, and modelling such as ZTV analysis and wireline/photomontage visualisations. Relevant special qualities for detailed assessment will be agreed with stakeholders as part of the evidence plan process.
I-C-160	Array Area	Construction, operations and maintenance, decommissioning	Impact (daytime) of the construction, operation and decommissioning of the Array Area on visual receptors/views.	C-OFF-01 C-OFF-36 C-OFF-37	**No likely significant effect without secondary mitigation - Scoped Out** **Possible likely significant effect without secondary mitigation - Scoped In at Scoping** **Likely significant effect without secondary mitigation - Scoped In**	Those visual receptors proposed to be Scoped Out here either experience no visibility or limited theoretical visibility of the Array Area, often at very long range, as shown in Figure 17.4, or are considered to be of lower sensitivity to changes in the surrounding seascape environment. There will therefore be no potential for significant effects on these receptors. Visual receptors proposed to be Scoped In to the assessment may experience views of the Array Area at ranges typically between 40-50km. Typically, those predicted to experience LSE are located in closer proximity to the Array Area, and /or represent views experienced by receptors of higher sensitivity to changes associated with the Proposed Offshore Development. Those predicted to experience Possible LSE are generally located at greater distances from the Array Area, and /or represent views experienced by receptors of lower sensitivity to changes associated with the Proposed Offshore Development. However, both groups of receptors may or may not experience significant effects as a result of the Proposed Offshore Development. An initial assessment of the potential effects of the Stromar Array Area on views and visual receptors will be undertaken initially using desk-based information and ZTV analysis, with a detailed assessment focusing on those that are identified as requiring further assessment. Detailed assessment to include desk-based publications and primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies to determine likely significance, and modelling such as ZTV analysis and wireline/photomontage visualisations.
I-C-161	Array Area	Operation and maintenance	Impact (night-time) of the operation and maintenance of the Stromar Array Area lighting on visual receptors/views and the visual aspects of coastal character.	C-OFF-01 C-OFF-36 C-OFF-37	**Possible likely significant effect without secondary mitigation - Scoped In at Scoping** **No likely significant effect at Scoping - Scoped Out**	A ZTV showing the geographic extent of visible aviation and marine navigation lighting will be used to inform the assessment of effects resulting from WTG lighting. Night-time photographs and visualisations will be prepared from proposed night-time viewpoints (**Table 17.2**) to illustrate the effects of the lighting from key viewpoints, to be agreed with stakeholders. In the Caledonia Offshore Wind Farm Scoping Opinion (Marine Scotland, 2023a), Scottish Ministers advised that the Developer should consider the night-time component of the character and visual amenity, in line with the NatureScot representation
I-C-162	All offshore	Cumulative Effects	Detail to be added post-Scoping	Detail to be added post-Scoping	**Likely significant effect without secondary mitigation - Scoped In**	Detail to be added post-Scoping
I-C-163	All offshore	Transboundary Effects	Detail to be added post-Scoping	Detail to be added post-Scoping	**No likely significant effect at Scoping - Scoped Out**	Detail to be added post-Scoping

13. Socioeconomics & Tourism

Impact Background					EIA Scoping	
ID	Project Element	Project Phase	Project Activity and Impact	Commitments	Likely Significant Effect at Scoping (LSE, Possible LSE, No LSE)	Approach to Assessment
I-C-164	All offshore, landfall	Construction	Increase in employment and GVA.	C-OFF-07	Likely significant effect without secondary mitigation - Scoped In	The construction of Project will require expenditure with companies in each of the study areas. This will support employment and generate GVA, including impacts associated with spending in the wider supply chain (indirect effects) and spending by staff (induced effects).
I-C-165	Landfall	Construction	Economic activity associated with onshore elements in Aberdeenshire.	C-OFF-07	Likely significant effect without secondary mitigation - Scoped In	The construction of the onshore elements of the Project will require spending in Aberdeenshire. This will support employment and generate GVA, including impacts associated with spending in the wider supply chain (indirect effects) and spending by staff (induced effects).
I-C-166	Landfall	Construction	Demographic changes.	n/a	Likely significant effect without secondary mitigation - Scoped In	The impacts of demographic changes will be assessed as far as possible, including the scale of any impact and its potential to be significant. If ports have been determined by the time of the assessment, it will be possible to be more definitive on the likely significance of these impacts.
I-C-167	Landfall	Construction	Changes to housing demand.	n/a	Likely significant effect without secondary mitigation - Scoped In	The impacts of demographic changes and the implications for housing demand will be assessed as far as possible, including the scale of any impact and its potential to be significant. This will include the potential demand for temporary accommodation from transient workers. If ports have been determined by the time of the assessment, it will be possible to be more definitive on the likely significance of these impacts.
I-C-168	Landfall	Construction	Changes to other local public and private services.	n/a	Likely significant effect without secondary mitigation - Scoped In	The impacts of demographic changes and the implications for demand on local public and private services will be assessed as far as possible, including the scale of any impact and its potential to be significant. If ports have been determined by the time of the assessment, it will be possible to be more definitive on the likely significance of these impacts.
I-C-169	Landfall	Construction	Socio-cultural impacts.	n/a	No likely significant effect at Scoping - Scoped Out	The potential socio-cultural impacts, including changes to community character or image and quality of life, will require primary stakeholder engagement in the communities around the key epicentres of impact. To avoid survey fatigue and ensure meaningful interactions, this engagement will occur post consent as decisions are made regarding the location of key activities, such as ports. These impacts have therefore been Scoped Out of the assessment.
I-C-170	Landfall	Construction	Changes to visitor behaviour.	n/a	Likely significant effect without secondary mitigation - Scoped In	Potential changes to visitor behaviour may arise from changes to onshore activity associated with the construction of the Proposed Offshore Development, including onshore grid connection and increased activity at ports and harbours.
I-C-171	Landfall	Construction	Changes to onshore recreation.	C-ONS-036 C-ONS-027	Likely significant effect without secondary mitigation - Scoped In	Potential disruption to onshore recreational assets, such as walking and cycling trails, golf courses, beaches and surfing, may reduce recreational opportunities.
I-C-172	All offshore	Construction	Changes to commercial fisheries.	C-OFF-18 C-OFF-31	Likely significant effect without secondary mitigation - Scoped In	Potential disruption to the commercial fishing sector leading to changes in economic activity in the sector.

I-C-173	All offshore	Construction	Changes to shipping and marine recreation.	C-OFF-44	**Likely significant effect without secondary mitigation - Scoped In**	Changes to economic activity as a result of the construction of the Proposed Offshore Development may impact activity in the shipping and marine recreation sectors.
I-C-174	All offshore, landfall	Operation and maintenance	Increase in employment and GVA.	C-OFF-07	**Likely significant effect without secondary mitigation - Scoped In**	O&M will require expenditure with companies and organisations in each of the study areas, supporting employment and generating GVA.
I-C-175	Landfall	Operation and maintenance	Economic activity associated with onshore elements in Aberdeenshire	C-OFF-07	**Likely significant effect without secondary mitigation - Scoped In**	The O&M of the onshore elements of the Project will require spending in Aberdeenshire supporting employment and generating GVA.
I-C-176	Landfall	Operation and maintenance	Demographic changes.	n/a	**Likely significant effect without secondary mitigation - Scoped In**	The impacts of demographic changes will be assessed as far as possible, including the scale of any impact and its potential to be significant. If ports have been determined by the time of the assessment, it will be possible to be more definitive on the likely significance of these impacts.
I-C-177	Landfall	Operation and maintenance	Changes to housing demand.	n/a	**Likely significant effect without secondary mitigation - Scoped In**	The impacts of demographic changes and the implications for housing demand will be assessed as far as possible, including the scale of any impact and its potential to be significant. If ports have been determined by the time of the assessment, it will be possible to be more definitive on the likely significance of these impacts.
1-C-178	Landfall	Operation and maintenance	Changes to other local public and private services.	n/a	**Likely significant effect without secondary mitigation - Scoped In**	The impacts of demographic changes and the implications for demand on local public and private services will be assessed as far as possible, including the scale of any impact and its potential to be significant. If ports have been determined by the time of the assessment, it will be possible to be more definitive on the likely significance of these impacts.
1-C-179	Landfall	Operation and maintenance	Socio-cultural impacts	n/a	**Likely significant effect without secondary mitigation - Scoped In**	The potential socio-cultural impacts, including changes to community character or image and quality of life, will require primary stakeholder engagement in the communities around the key epicentres of impact. To avoid survey fatigue and ensure meaningful interactions, this engagement will occur post consent as decisions are made regarding the location of key activities, such as ports. These impacts have therefore been Scoped Out of the assessment.
1-C-180	Landfall	Operation and maintenance	Changes to visitor behaviour.	n/a	**Likely significant effect without secondary mitigation - Scoped In**	Potential changes to visitor behaviour may arise from changes to onshore activity associated with the O&M of the Project, such as increased activity at ports and harbours, or changes to seascape and visual impact.
I-C-181	Landfall	Operation and maintenance	Changes to onshore recreation.	n/a	**Likely significant effect without secondary mitigation - Scoped In**	Potential disruption to onshore recreational activities, such as walking and cycling trails, golf courses, beaches and surfing, may reduce recreational opportunities.
I-C-182	All offshore	Operation and maintenance	Changes to commercial fisheries.	C-OFF-18 C-OFF-29 C-OFF-31	**Likely significant effect without secondary mitigation - Scoped In**	Potential disruption to the commercial fishing sector leading to changes in economic activity in the sector.
I-C-183	All offshore	Operation and maintenance	Changes to shipping and marine recreation.	C-OFF-44	**Likely significant effect without secondary mitigation - Scoped In**	Changes to economic activity as a result of the operation of the Project may impact activity in the shipping and marine recreation sectors.
I-C-184	All offshore, landfall	Decommissioning	Increase in employment and GVA.	n/a	**Likely significant effect without secondary mitigation - Scoped In**	Decommissioning will require expenditure with companies and organisations in each of the study areas, supporting employment and generating GVA.

I-C-185	Landfall	Decommissioning	Economic activity associated with onshore elements in Aberdeenshire	n/a	**Likely significant effect without secondary mitigation - Scoped In**	The decommissioning of the onshore elements of the Project will require spending in Aberdeenshire supporting employment and generating GVA.
I-C-186	Landfall	Decommissioning	Changes to visitor behaviour.	n/a	**No likely significant effect at Scoping - Scoped Out**	Potential changes to visitor behaviour may arise from changes to onshore activity associated with decommissioning of the Project, such as increased activity at ports, harbours and the onshore infrastructure, or changes to seascape and visual impact. However, the locations, methods and approach to decommissioning is unlikely to be known at this stage and the tourism sector baseline has the potential to change significantly between now and the time of decommissioning. The significance of any effect will also be determined by the location of ports used in the decommissioning. This has been Scoped Out as a meaningful assessment will not be possible until the port location(s) are known.
I-C-187	Landfall	Decommissioning	Demographic changes.	n/a	**Likely significant effect without secondary mitigation - Scoped In**	The impacts of demographic changes will be assessed as far as possible, including the scale of any impact and its potential to be significant. If ports have been determined by the time of the assessment, it will be possible to be more definitive on the likely significance of these impacts.
I-C-188	Landfall	Decommissioning	Changes to housing demand.	n/a	**Likely significant effect without secondary mitigation - Scoped In**	The impacts of demographic changes and the implications for housing demand will be assessed as far as possible, including the scale of any impact and its potential to be significant. If ports have been determined by the time of the assessment, it will be possible to be more definitive on the likely significance of these impacts.
I-C-189	Landfall	Decommissioning	Changes to other local public and private services.	n/a	**Likely significant effect without secondary mitigation - Scoped In**	The impacts of demographic changes and the implications for demand on local public and private services will be assessed as far as possible, including the scale of any impact and its potential to be significant. If ports have been determined by the time of the assessment, it will be possible to be more definitive on the likely significance of these impacts.
I-C-190	Landfall	Decommissioning	Changes to onshore recreation.	n/a	**Likely significant effect without secondary mitigation - Scoped In**	Potential disruption to onshore recreational assets, such as walking and cycling trails, golf courses, beaches and surfing, and sea cliff climbing, may reduce recreational opportunities.
I-C-191	Landfall	Decommissioning	Socio-cultural impacts	n/a	**No likely significant effect at Scoping - Scoped Out**	The potential socio-cultural impacts, including changes to community character or image and quality of life, will require primary stakeholder engagement in the communities around the key epicentres of impact. To avoid survey fatigue and ensure meaningful interactions, this engagement will occur post consent as decisions are made regarding the location of key activities, such as ports. These impacts have therefore been Scoped Out of the assessment.
I-C-192	All offshore	Decommissioning	Changes to commercial fisheries.	n/a	**Likely significant effect without secondary mitigation - Scoped In**	Potential disruption to the commercial fishing sector leading to changes in economic activity in the sector.
I-C-193	All offshore	Decommissioning	Changes to shipping and marine recreation.	n/a	**Likely significant effect without secondary mitigation - Scoped In**	Changes to economic activity as a result of decommissioning the Project may impact activity in the shipping and marine recreation sectors.
I-C-194	All offshore	Cumulative Effects	Detail to be added post-Scoping	Detail to be added post-Scoping	**Likely significant effect without secondary mitigation - Scoped In**	Detail to be added post-Scoping
I-C-195	All offshore	Transboundary Effects	Detail to be added post-Scoping	Detail to be added post-Scoping	**Likely significant effect without secondary mitigation - Scoped In**	Detail to be added post-Scoping

14. Greenhouse Gas & Climate

Impact Background					EIA Scoping	
ID	Project Element	Project Phase	Project Activity and Impact	Commitments	Likely Significant Effect at Scoping (LSE, Possible LSE, No LSE)	Approach to Assessment
I-C-196	All offshore, landfall	Construction and decommissioning	GHG emissions associated with construction materials (raw material supply, transportation, and manufacture)	C-OFF-09 C-OFF-13 C-OFF-14	Likely significant effect without secondary mitigation - Scoped In	The Proposed Offshore Development will result in generation of GHG emissions during construction due to the construction materials.
I-C-197	All offshore, landfall	Construction and decommissioning	GHG emissions associated with construction processes (including transportation to site and installation processes).	C-OFF-09 C-OFF-13 C-OFF-14	Likely significant effect without secondary mitigation - Scoped In	The construction and installations activities associated with the Proposed Offshore Development will lead to generation of GHG emissions.
I-C-198	All offshore, landfall	Construction and decommissioning	CCR of construction and decommissioning period.	C-OFF-09 C-OFF-13 C-OFF-14	Likely significant effect without secondary mitigation - Scoped In	The Proposed Offshore Development has potential to be adversely impacted by changes in climate during construction and decommissioning.
I-C-199	All offshore, landfall	Construction and decommissioning	ICCI of construction and decommissioning period.	C-OFF-09 C-OFF-13 C-OFF-14 C-OFF-67	Likely significant effect without secondary mitigation - Scoped In	The Proposed Offshore Development has the potential to be adversely impacted by significant effects on environmental receptors within the scope of the EIA, which are not present under the current climate conditions.
I-C-200	All offshore, landfall	Construction and decommissioning	GHG emissions associated with decommissioning processes and waste materials.	C-OFF-13 C-OFF-14 C-OFF-67	Likely significant effect without secondary mitigation - Scoped In	The decommissioning of the Proposed Offshore Development will result in the generation of GHG emissions.
I-C-201	All offshore, landfall	Operations and maintenance	GHG emissions associated with operation (including energy use).	C-OFF-13 C-OFF-14	Likely significant effect without secondary mitigation - Scoped In	The Proposed Offshore Development will support the generation of low carbon energy during the O&M phase, although the net benefits against the future baseline will be assessed.
I-C-202	All offshore, landfall	Operations and maintenance	GHG emissions that are associated with maintenance (including materials used for repair and replacement activities).	C-OFF-13 C-OFF-14	Likely significant effect without secondary mitigation - Scoped In	The will be GHG emissions generated during the maintenance cycles associated with material replacement and repair activities for the Proposed Offshore Development.
I-C-203	All offshore, landfall	Operations and maintenance	CCR of operational period.	C-OFF-13 C-OFF-14	Likely significant effect without secondary mitigation - Scoped In	The anticipated changes in climate during the O&M phase may negatively impact the Proposed Offshore Development.
I-C-204	All offshore, landfall	Operations and maintenance	ICCI of operational period.	C-OFF-13 C-OFF-14	Likely significant effect without secondary mitigation - Scoped In	The Proposed Offshore Development may be adversely impacted by significant effects on environmental receptors within the scope of the EIA, which are not present under the current climate conditions.
I-C-205	All offshore	Cumulative Effects	Detail to be added post-Scoping	Detail to be added post-Scoping	Likely significant effect without secondary mitigation - Scoped In	Detail to be added post-Scoping
I-C-206	All offshore	Transboundary Effects	Detail to be added post-Scoping	Detail to be added post-Scoping	No likely significant effect at Scoping - Scoped Out	Detail to be added post-Scoping

15. Other Human Activities

Impact Background					EIA Scoping	
ID	Project Element	Project Phase	Project Activity and Impact	Commitments	Likely Significant Effect at Scoping (LSE, Possible LSE, No LSE)	Approach to Assessment
I-C-207	Offshore ECC	Construction and decommissioning	Temporary obstruction to other OWFs.	C-OFF-02 C-OFF-10 C-OFF-18 C-OFF-35 C-OFF-39 C-OFF-46 C-OFF-58	**Likely significant effect without secondary mitigation - Scoped In**	The study area overlaps with the Array Area or the ECC of the Broadshore and Ayre OWF. Thus, there is potential during construction to obstruct activities necessary to their development. The Project aspect Scoped In for further assessment is the Offshore ECC.
I-C-208	All offshore	Construction and decommissioning	Temporary obstruction to wave and tidal renewable energy activities and developments	C-OFF-10 C-OFF-35	**No likely significant effect at Scoping - Scoped Out**	There are no wave or tidal renewable projects in the study area.
I-C-209	Offshore ECC	Construction and decommissioning	Temporary obstruction to O&G activities and developments.	C-OFF-02 C-OFF-10 C-OFF-18 C-OFF-35 C-OFF-38 C-OFF-39 C-OFF-46 C-OFF-55 C-OFF-58	**Likely significant effect without secondary mitigation - Scoped In**	Due to the proximity of the Captain Oil Field development of enhanced oil recovery this will be included in the future assessment as part of the EIA. The Project aspect Scoped In for further assessment is the Offshore ECC.
I-C-210	All offshore	Construction and decommissioning	Temporary obstruction to CCS activities and developments.	C-OFF-02 C-OFF-10 C-OFF-35 C-OFF-39 C-OFF-46 C-OFF-58	**No likely significant effect at Scoping - Scoped Out**	There are no CCS activities within the study area.
I-C-211	Offshore ECC	Construction and decommissioning	Temporary obstructions to INTOG activities.	C-OFF-02 C-OFF-10 C-OFF-18 C-OFF-35 C-OFF-39	**Likely significant effect without secondary mitigation - Scoped In**	There is one proposed INTOG activity within the study area. The Project aspect Scoped In for further assessment is the Offshore ECC.
I-C-212	Array Area	Construction and decommissioning	Temporary obstruction to subsea cables and utilities activities and developments.	C-OFF-02 C-OFF-10 C-OFF-18 C-OFF-38 C-OFF-39 C-OFF-46	**Likely significant effect without secondary mitigation - Scoped In**	The study area overlaps the Shetland HVDC Link and due to the proximity with the cables this will be included in the future assessment as part of the EIA. The Project aspect Scoped In for further assessment is the Array Area.
I-C-213	All offshore	Construction and decommissioning	Temporary obstructions to aquaculture activities.	n/a	**No likely significant effect at Scoping - Scoped Out**	There are no aquaculture sites or proposed projects in the study area.

I-C-214	Offshore ECC and landfall	Construction and decommissioning	Temporary obstruction to marine dredging and disposal activities.	C-OFF-02 C-OFF-10 C-OFF-18 C-OFF-35 C-OFF-38 C-OFF-39 C-OFF-55 C-OFF-58	**Likely significant effect without secondary mitigation - Scoped In**	There is one open disposal site within the study area. The effect on this site will be considered further within the EIA assessment. The Project aspects Scoped In for further assessment are the Offshore ECC and landfall.
I-C-215	All offshore	Construction and decommissioning	Temporary obstruction to marine aggregate activities.	C-OFF-10 C-OFF-18 C-OFF-35	**No likely significant effect at Scoping - Scoped Out**	There are no marine aggregate dredging activities in the vicinity of the study area.
I-C-216	All offshore	Construction and decommissioning	Temporary obstruction to nuclear activities.	C-OFF-10 C-OFF-18 C-OFF-35	**No likely significant effect at Scoping - Scoped Out**	There are no nuclear energy sites in the vicinity of the study area.
I-C-217	Array Area and Offshore ECC	Operation and maintenance	Temporary obstruction to other OWFs	C-OFF-11 C-OFF-22 C-OFF-42	**Likely significant effect without secondary mitigation - Scoped In**	The study area overlaps with the Array Area or the ECC of the Broadshore and Cluaran Ear-Thuath/Ayre OWF. Thus, there is potential during O&M to obstruct activities necessary to their development. The Project aspects Scoped In for further assessment are the Array Area and Offshore ECC.
I-C-218	All offshore	Operation and maintenance	Temporary obstruction to wave and tidal renewable energy activities and developments	C-OFF-22 C-OFF-42	**No likely significant effect at Scoping - Scoped Out**	There are no wave or tidal renewable projects in the study area.
I-C-219	Offshore export cables	Operation and maintenance	Temporary obstruction to O&G activities and developments	C-OFF-11 C-OFF-22 C-OFF-42	**Likely significant effect without secondary mitigation - Scoped In**	Due to the Proximity of the Captain Oil Field development of enhanced oil recovery this will be included in the future assessment as part of the EIA. The Project aspect Scoped In for further assessment is the offshore export cables.
I-C-220	All offshore	Operation and maintenance	Temporary obstruction to CCS activities and developments	C-OFF-22 C-OFF-42	**No likely significant effect at Scoping - Scoped Out**	There are no plans to develop CCS projects within the study area.
I-C-221	Offshore ECC	Operation and maintenance	Temporary obstructions to INTOG activities	C-OFF-11 C-OFF-22 C-OFF-42	**Likely significant effect without secondary mitigation - Scoped In**	There is one proposed INTOG activity within the study area. The Project aspect Scoped In for further assessment is the Offshore ECC.
I-C-222	Array Area	Operation and maintenance	Temporary obstruction to subsea cables and utilities activities and developments	C-OFF-11 C-OFF-22 C-OFF-42	**Likely significant effect without secondary mitigation - Scoped In**	The study area overlaps the Shetland HVDC Link and due to the proximity with the cables this will be included in the future assessment as part of the EIA. The Project aspect Scoped In for further assessment is the Array Area.
I-C-223	All offshore	Operation and maintenance	Temporary obstructions to aquaculture activities	n/a	**No likely significant effect at Scoping - Scoped Out**	There are no aquaculture sites or proposed projects in the study area.
I-C-224	Offshore ECC and landfall	Operation and maintenance	Temporary obstruction to marine dredging and disposal activities	C-OFF-22 C-OFF-42	**Likely significant effect without secondary mitigation - Scoped In**	There is one open disposal site within the study area. The effect on this site will be considered further within the EIA assessment. The Project aspects Scoped In for further assessment are the Offshore ECC and landfall.
I-C-225	All offshore	Operation and maintenance	Temporary obstruction to marine aggregate activities	C-OFF-22 C-OFF-42	**No likely significant effect at Scoping - Scoped Out**	There are no marine aggregate dredging activities in the vicinity of the study area.
I-C-226	All offshore	Operation and maintenance	Temporary obstruction to nuclear activities	C-OFF-22 C-OFF-42	**No likely significant effect at Scoping - Scoped Out**	There are no nuclear energy sites in the vicinity of the study area.
I-C-227	All offshore	Cumulative Effects	Detail to be added post-Scoping	Detail to be added post-Scoping	**Likely significant effect without secondary mitigation - Scoped In**	Detail to be added post-Scoping
I-C-228	All offshore	Transboundary Effects	Detail to be added post-Scoping	Detail to be added post-Scoping	**Likely significant effect without secondary mitigation - Scoped In**	Detail to be added post-Scoping

STROMAR

Stromar Offshore Wind Farm

Environmental Impact Assessment:

Offshore Scoping Report

Appendix C: Proportionate EIA Position Paper

Proposed Offshore Development

Date: 03 January 2024

Document Number: 08550858

Revision: A

Classification: Public

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Revision History

Rev.	Prepared By	Checked by	Approved by	Description	Date
A	Shepherd & Wedderburn LLP	Stromar Offshore Wind Farm Ltd	Stromar Offshore Wind Farm Ltd	Final draft for submission to MD-LOT	January 2024

Contents

1 Purpose of this Position Paper

1.1 Background

1.1.1 This Position Paper has been prepared by the Stromar Offshore Wind Farm Project (the "Project") to inform the Scottish Government Marine Directorate, Aberdeenshire Council and NatureScot of the Project's approach in relation to the environmental impact assessments (EIA) for the Stromar Offshore Wind Farm consent applications.

1.1.2 This paper considers opportunities to deliver a "proportionate EIA" in support of the Project's applications for consent for the offshore infrastructure under Section 36 of the Electricity Act 1989; applications for marine licences; and applications for planning permission for the onshore infrastructure under the Town and Country Planning (Scotland) Act 1997.

1.2 Institute of Environmental Management and Assessment Strategy

1.2.1 As noted by the Institute of Environmental Management and Assessment (IEMA)[1] delivering proportionate EIA is a key opportunity for the UK planning and consenting system and developers seeking to take projects forward:

> *"…the drive for improved quality in EIA, combined with the UK's evidence-based and precautionary approach, has led to substantial challenges for the future of practice. The increased complexity of multi-faceted decisions and the wider range of stakeholders who seek transparency and clear audit trails, has further compounded the problems. The combined impact of the above good intentions has often led to individual EIAs being too broadly scoped and their related Environmental Statement (ES) to be overly long and cumbersome."*

1.2.2 IEMA goes on to note that one result of these disproportionate approaches is that matters that may be most important to design, decision-making and consent conditions can be lost amidst excessive detail on less material matters.

1.2.3 IEMA identifies four themes that are relevant in achieving proportionate EIA.

- Enhancing People: so that those involved in EIA have the skills, knowledge and confidence to avoid an overly precautionary approach.
- Improving Scoping: to generate a more consistently focussed approach to this critical activity throughout the EIA process.
- Sharing Responsibility: recognising that disproportionate EIA is driven by many factors and that enabling proportionate assessment will require collaborative actions that work towards a shared goal.
- Embracing Innovation and Digital: modernising EIA to deliver effective and efficient assessment and reporting that adds value to projects and their interaction with the environment.

1 IEMA - Delivering Proportionate EIA

1.2.4 In addition, in separate guidance ('Guide to Shaping Quality Development' (2015)[2]), IEMA suggests that "*environmentally informed design and inclusion of mitigation (primary and tertiary) as part of the design process*" can help to provide a more proportionate EIAR.

2 IEMA Guidance Documents EIA Guide to Shaping Quality Development V6.pdf (iaia.org)

2 Legislative Requirements

2.1.1 It is important that the approach to EIA is demonstrably compliant with legal and consenting requirements under the relevant legislation and guidance. The purpose of the EIA Regulations and the European EIA Directive[3] they transpose is to ensure an assessment of the likely significant effects ('LSE') of a proposed development on the environment is carried out in order to inform decision-making around that particular development.

2.1.2 The UK courts have confirmed on numerous occasions in cases concerning the adequacy of an ES/EIAR that it does not need to contain every scrap of environmental information[4]; instead it need only cover the 'likely significant effects'[5].

2.1.3 This focus has been sharpened by amendments made to the EIA Directive in 2014. For example, the word 'significant' has been inserted into Article 3 so it now reads:

> "*The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case…the direct and indirect significant effects of a project on the following factors…*".

2.1.4 This focus is also reflected in the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017, and the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017, in particular the definition of Environmental Impact Assessment Report in those regulations[6], which, read together with Schedule 4 of each of those sets of regulations set the minimum required content of the EIA Report, clearly frame the required (minimum) content by reference to LSE[7]. It is further evident in relation to information the Scottish Ministers/the planning authority are entitled to request from applicants to ensure an adequate EIA Report. That extends to:

3 Directive 2011/92/EU as amended by Directive 2014/52/EU

4 R v Cornwall County Council, ex parte Hardy [2001] Env LR 473

5 Humber Sea Terminal Limited v Secretary of State for Transport [2005] EWHC 1289

6 Regulation 5 of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, Regulation 6 of the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017, and Regulation 5 of the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017

7 Previously the EIA Directive and EIA Regulations also referred to the "main effects" or the "environmental effects". Similar changes have been made in the Town and Country Planning (Environmental Impact Assessment (Scotland) Regulations 2017 and the Marine Works (Environmental Impact Assessment (Scotland) Regulations 2017.

> *" supplementary information about any matter mentioned in schedule 4 which in the opinion of the Scottish Ministers is directly relevant to reaching a reasoned conclusion on the significant effects of the development on the environment …* [8]"

2.1.5 To reach a 'reasoned conclusion', the Scottish Ministers/planning authority will need to be satisfied that the effects identified as significant in the EIA Report are all of the LSE and that there are no material omissions.

2.1.6 In conclusion, there is no obligation to report negligible or minor effects on the environment under the EIA Regulations. An EIA Report which focusses exclusively or mainly on the LSE on the environment meets the requirements of the EIA Regulations.

8 Regulation 19, Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017. Equivalent provisions are found in Regulation 26 of the Town and Country Planning (Environmental Impact Assessment (Scotland) Regulations 2017 and Regulation 21 of the Marine Works (Environmental Impact Assessment (Scotland) Regulations 2017.

3 Scottish Government Guidance and Advice

3.1.1 The table below provides a summary of guidance and advice in Scotland that includes references to the level of detail for documents required for an EIA Report.

Guidance and Advice	Detail
Scottish Specific Guidance	
Scottish Planning Circular 1/2017	This Circular is relevant to EIA in the context of the Scottish town and country planning regime. As noted from the below excerpt, it is supportive of an approach to EIA that is accessible to the reader; provides the information reasonably required for identifying "significant effects"; and is based on the scoping opinion (if any). It does also acknowledge that impacts of little or no significance may be included but need only brief treatment to confirm they have been considered. "*It is the applicant's responsibility to prepare the EIA report. There is no statutory provision as to the form of an EIA report but it must constitute a '**single and accessible compilation**'. (Berkeley v SSETR (2000) WLR 21/7/2000 p420). It must contain at least the information specified in Regulation 5 and any additional information specified in Schedule 4 of the 2017 Regulations (reproduced in Annex B to this Circular) which is relevant to the specific characteristics of a particular development and to the environmental features likely to be affected. **It is emphasised that the requirement is to include the information that may reasonably be required for reaching a reasoned conclusion on the significant effects of the project** on the environment, taking into account current knowledge and methods of assessment. **Other impacts may be of little or no significance for the particular development in question and, if included in the EIA report, will need only very brief treatment to indicate that their possible relevance has been considered**. Where a scoping opinion has been adopted or a scoping direction issued, (see paragraph 98) the EIA report must **be based on that opinion or direction**.*" (**emphasis added**)
Scottish Planning Advice Note 1/2013	Although now slightly dated, the Planning Advice Note on EIA also encourages a concise EIA Report highlighting key issues relevant to decision making. "*5.4 The EIA Report is the applicant's statement on the project, its likely significant environmental effects, and the measures proposed to mitigate adverse effects. The EIA Report is the main output of the EIA procedure and it follows that an EIA Report which is poorly written, and excessively long, can reduce the overall value of EIA to decision-makers [4] . In addition to ensuring compliance with schedule 4 of the EIA Regulations - and to improve transparency - developers and their agents have a responsibility to produce EIA Reports which are;* • ***Clear & concise** - the EIA Report should contain **a clear analysis of the significant areas of impact**. It should highlight **key issues relevant to the decision** and present them in a non-promotional way which can be understood by all. Technical appendices should be cross-referenced where relevant and proposed mitigation measures should be clearly sign-posted.* • ***Consistent** - the EIA Report should be internally consistent and technical terms (e.g. degrees of significance) should be clearly defined.* • ***Proportionate** - the EIA Report should **not be overly long** and should make use of annexes for technical data and information where appropriate.* *5.5 The Non-Technical Summary (see paragraph 4.22 above) should also reflect - in an accurate and balanced way - the key information contained in the EIA Report. It should be written in language which is understandable to the general public.*" (**emphasis added**)

Guidance for applicants on using the design envelope for applications under section 36 of the Electricity Act 1989, June 2022	This guidance is dated June 2022 and is joint Energy Consents Unit and Marine Scotland (now Marine Directorate) guidance relevant to section 36 applications. It establishes the acceptance of the design envelope approach to EIA in Scotland and sets principles for its use. Paragraph 2.2 "*Applicants must demonstrate that the likely significant environmental effects of the proposal have been properly assessed, and proposals require to be clearly defined and sufficiently detailed to enable determination of an application.*" Paragraph 3.6: "*The parameters established for the proposed development must be sufficiently defined to enable a proper assessment of the likely significant environmental effects and to allow for the identification of mitigation, if necessary, within a range of possibilities*;" "*The assessments in the EIA report should be consistent with the clearly defined parameters and ensure a robust assessment of the likely significant effects*;" Paragraph 5.3 states that where flexibility is sought through a design envelope approach, the EIAR should "*ensure that the approach taken in the assessment is not overly complex, as this may impede the understanding of the assessment and the finding of likely significant effects - fewer options and variations make the EIA report easier to understand.*" Paragraph 5.4 states that where the applicant chooses the design envelope approach using a parameters-led assessment to establish the worst case scenario, the applicant should: "*ensure that the assessment of the worst case scenario(s) addresses impacts which may not be significant on their own but could become significant when they inter-relate with other impacts alone or cumulatively with impacts from other developments (including those identified in other assessments of the relevant descriptions of the environment (identified in accordance with the EIA Regulations))*;" and "*ensure that the potential cumulative impacts with other developments are carefully identified such that the likely significant effects can be shown to have been identified and assessed against the appropriate baseline*."
Proposed Revisions to Consenting and Licensing Guidance for Offshore Renewable Energy Applicants, February 2023	In this paper, the Scottish Government Marine Directorate (at the time Marine Scotland) sought views from stakeholders on proposed revisions to the existing guidance. "*18.1 In order to align with EIA legislation, advice will be provided on the aspects that should be covered in an EIA and which aspects fall outwith the scope of the EIA Regulations. Aspects that do not fall under the scope of the EIA Regulations will still require the same level of detail in the assessment of likely significant effects to enable determination of the application. It is envisaged that the EIA and non-EIA information would be provided at the same time e.g., at scoping and application.*" At section 2, the paper confirms that the Scottish Government intends to produce a webpage covering guidance on EIA "*grouped into key stages, e.g. screening, scoping and reporting etc*".

3.1.2 The guidance is therefore consistent and supportive of a proportionate EIA approach in which only the LSE are subject to a detailed assessment and reporting in the EIA Report.

4 Approach to Proportionate EIA

4.1 Proposed Approach

4.1.1 The Project has considered the ways by which the EIA could be streamlined and developed in a proportionate manner, in line with the IEMA themes, and applicable legislation and guidance.

4.1.2 Along the IEMA theme of "Improving Scoping", the Project proposes that the scoping and pre-application stages could be used to achieve greater proportionality through the following approach:

4.1.2.1 Providing a comprehensive scoping report to allow the Scottish Ministers/planning authority and consultees to fully consider matters and to allow a scoping opinion to be produced on the scope and level of detail of information to be provided in the EIA report.

4.1.2.2 In the period up to the application being submitted, more evidence will become available in relation to the Project and its likely impacts, including survey results, and the project description and parameters will be refined. Emerging evidence and refinements to the project may allow for refinement of the treatment of certain matters, beyond those already scoped out at scoping stage. It is proposed that in the scoping report, the Project categorises likely significance of effects as follows:

I. LSE without secondary mitigation – the impact will be subject to detailed assessment and scoped in to the EIAR;
II. Possible LSE without secondary mitigation, however it may become clear post-scoping stage that the impact does not require detailed assessment in the EIAR – the impact will be scoped in at the scoping stage, with a clear process proposed within the scoping report to determine the treatment of the specific topic within the EIAR; and
III. No LSE identified at scoping stage – the impact will be scoped out.

4.1.2.3 The Scottish Ministers/planning authority will then review the scoping report and consult on it.

4.1.2.4 In addition to the binary scoping in and out of particular impacts (and the detail of assessment methodologies), it is proposed that the scoping report proposes appropriate mechanisms to refine assessment requirements post issue, which, if agreed, could then be set out in the scoping opinion. This would relate to particular impacts identified in the scoping report as having "possible LSE" at the point of scoping and could be based on clear processes proposed in the scoping report including relevant criteria and required consultation.

4.1.2.5 Post-scoping opinion and pre-application, the Project would propose to continue to engage with the Scottish Ministers/planning authority and consultees as relevant in order to confirm areas where a refined assessment in the EIAR may be suitable. In the case of the section 36 application for the offshore infrastructure this may include pre-EIAR validation workshops with relevant consultees, where outcomes, including areas where no further assessment in the EIAR is required, would be minuted. In the case of the planning application for the onshore infrastructure, this could include discussion of these matters at the gate check meeting which forms part of Aberdeenshire Council's priority determination service – at this meeting, any

refinements to EIAR assessment could be agreed with Aberdeenshire Council and documented in writing.

4.1.2.6 The EIAR should be based on the best and most recent evidence. The EIAR will be submitted at application stage, reflecting the scoping opinion and further agreements/decisions with stakeholders and consultees through post-scoping consultation and workshops. An explanation of how the scoping opinion mechanisms have been applied, including the relevant post scoping evidence which has been gathered, and the level of assessment therefore undertaken (if any), will be set out in the impacts register, which will be an appendix to the EIA Report (see 4.3.3 below in relation to the impacts register).

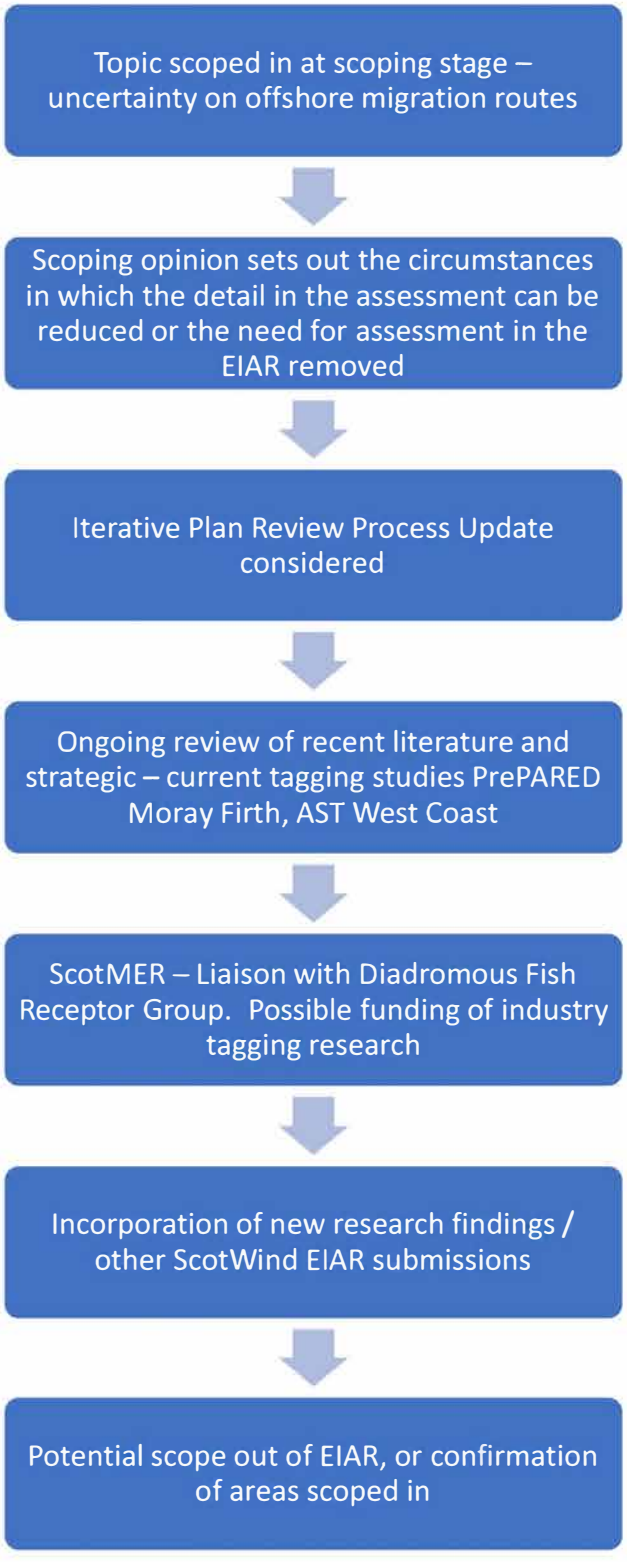
4.1.3 **In order to achieve this proportionate approach to EIA, it is proposed that the scoping opinion expressly states that it will be possible to undertake refinement of certain areas for assessment as further evidence becomes available and the Project parameters are finalised through further consultation.**

4.1.4 It will also be important to establish a detailed process for post scoping discussions/agreements and for these to be documented formally. We would be happy to discuss details of this process with the Marine Directorate, Aberdeenshire Council and NatureScot, and any other key consultees considered relevant.

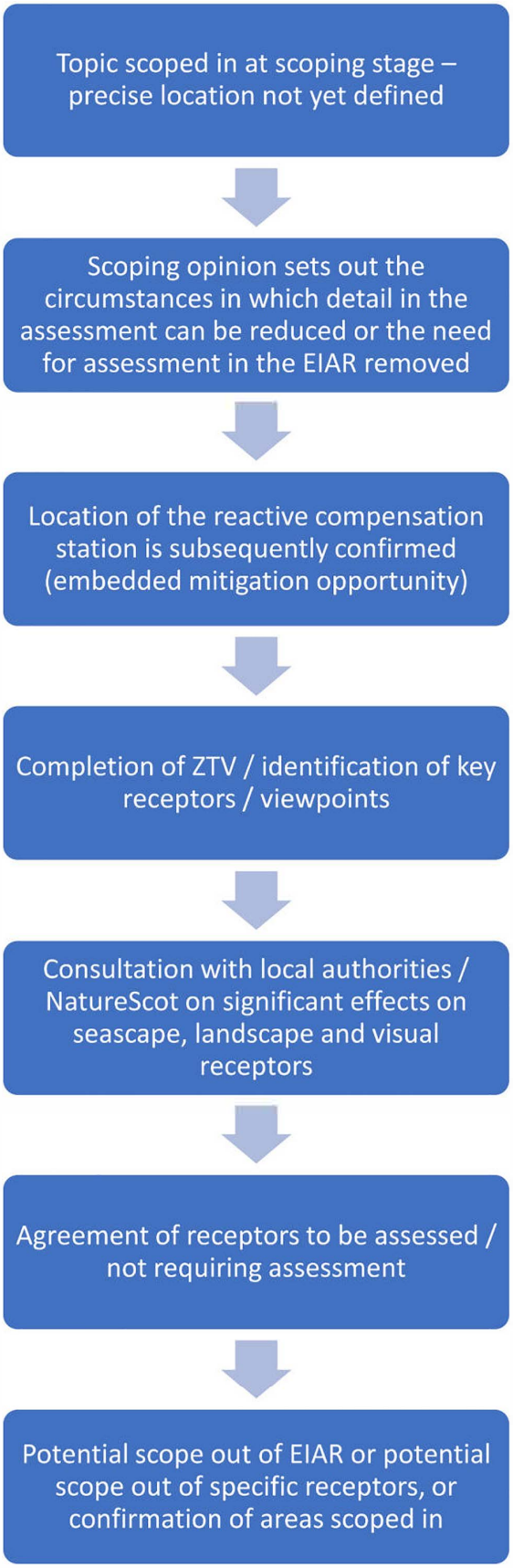
4.2 Indicative Examples

4.2.1 The Project has set out two indicative examples below of areas where there may be opportunities for proportionate EIA through the above approach:

Migratory Fish/Electromagnetic Fields/Noise



Seascape Visual Impact Assessment for Reactive Compensation Station



4.3 Documents to deliver Proportionate EIA

4.3.1 It is proposed that a proportionate EIA can be assisted through the use of three key documents:

- An impacts register;
- A commitments register; and
- An application document register.

4.3.2 The function of each of these documents is set out below.

4.3.3 **Impacts Register**: the impacts register lists all potential impacts identified as part of the Project development, construction, operations and decommissioning. This document is updated throughout the scoping and pre-application phase of the project. It will then be annexed to the EIA Report. This register would identify impacts in the following categories:

4.3.3.1 Impacts which have an LSE without secondary mitigation, and will therefore be subject to detailed assessment and scoped in to the EIAR (see 4.1.2.2 (I.) above);

4.3.3.2 Impacts which at scoping stage had a possible LSE without secondary mitigation, and which as a result of the process at 4.1.2.2 above, were then subsequently agreed not to require detailed assessment in the EIAR (see 4.1.2.2 (II.) above); and

4.3.3.3 Impacts where no LSE is identified at scoping stage and will therefore be scoped out (see 4.1.2.2 (III.) above).

4.3.4 The Impacts Register would explain any further refinement to assessment approach utilising further information and mechanisms built into the scoping opinion. Additionally, this register captures a summary of mitigation and commitments considered and presented, relative to each impact. This register provides for stakeholders to view all project impacts in one place, along with their scoping status, mitigation and decision on final assessment.

4.3.5 An example Impacts Register is available at: Impacts Register Example

4.3.6 **Commitments Register**: throughout project development the Project will make commitments to mitigate, where possible, against the impacts identified in the Impacts Register. These commitments will be logged and detailed within the Commitments Register, which will serve as the repository for all project commitments and will be annexed to the EIA Report. The Commitments Register will also include enhancement measures. This register will outline each commitment, the activity and project phase it relates to, the relevant environmental receptor, and details how the commitment will be secured within the relevant application documents. Commitments are classified mitigation measures in accordance with the IEMA 'Guide to Shaping Quality Development' (IEMA, 2016) definitions, as follows:

- Primary (inherent) mitigation are measures that form an intrinsic part of the design that are described in the design evolution narrative and included within the project description e.g. reducing infrastructure heights to reduce visual impact;

- Secondary (foreseeable) mitigation: those measures that require further activity in order to achieve the anticipated outcome, e.g. development of the optimal reinstatement measures for restoring a disturbed sensitive natural habitat; and
- Tertiary (inexorable): are measures which will be required regardless of the EIA process as they are imposed e.g. as a result of legislative requirements and/or standard industry practices e.g. via a Code of Construction Practice or similar.

4.3.7 An example Commitments Register is available at: Commitment Register Example

4.3.8 **Application Document Register**: the document register will list all of the documents comprising the application for consent. The register should be used in conjunction with the Commitments Register to easily identify those documents that secure each commitment made by the project. It will be annexed to the EIA Report. By employing the use of the Impacts Register to present all potential project impacts, the EIAR chapters can be used to focus on those impacts expected to result in a LSE. This supports decision makers and stakeholders review of the project impacts and ensures that matters that may be most important to design, decision-making and consent conditions are not lost amidst excessive detail on less material matters.

4.3.9 An example Application Document Register is available at: Application Document Register Example

4.3.10 Finally, it is suggested that the form, function and inter-relationships between the registers will be presented to consultees and stakeholders via the pre-EIAR submission workshops and meetings referred to in paragraph 4.1.2 above.

STROMAR

Stromar Offshore Wind Farm

Environmental Impact Assessment: Offshore Scoping Report
Appendix D: Year 1 DAS Report

Proposed Offshore Development

Date: 03 January 2024

Document Number: 08550861

Revision: A

Classification: Public

Ørsted BlueFloat ENERGY Renantis

Digital video aerial surveys of seabirds and marine megafauna at Ørsted Stromar: Annual Report March 2022 to February 2023

Revision History

Rev.	Prepared By	Checked by	Approved by	Description	Date
A	HiDef	HiDef	Stromar Offshore Wind Farm Ltd	Final draft submission to MD-LOT	January 2024

Contents

Figures

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Executive summary

In March 2022, Ørsted commissioned HiDef Aerial Surveying Limited ('HiDef') to undertake a programme of high-resolution digital video aerial surveys for marine megafauna, ornithological and human activity over the proposed Stromar Wind Farm Project. The proposed Stromar Wind Farm Project is located approximately 50km off the coast of north-east Scotland.

A total of 12 monthly surveys were flown between March 2022 and February 2023. HiDef designed a survey that placed 2km-spaced transects across the development area plus a 4km surrounding buffer ('the survey area'). The total survey area was approximately 593km^2.

Surveys were undertaken using an aircraft equipped with four bespoke HiDef cameras with sensors set to a resolution of 2cm Ground Sample Distance (GSD). Each camera sampled a strip of 125m width, separated from the next camera by ~25m, to provide a combined sampled width of 500m within a 575m overall strip. Two of the four cameras were analysed, achieving approximately 12.5% coverage of the survey area in each flight. The remaining footage is available for analysis at a later stage if required.

Data analysis followed a two-stage process in which video footage was reviewed (with a 20% random sample used for audit) and detected objects were identified to species or species group level (again with 20% selected at random for audit). The audit of both stages requires 90% agreement to be achieved.

Density and abundance estimates were calculated using strip transect analysis and kernel density estimation (KDE) was used to create density surface maps. In addition, known diving rates of four species were used to estimate the proportion of diving animals that would be underwater at the time of survey to provide absolute estimates of density and abundance.

The surveys recorded a total of 10,913 birds of 18 species and 96 non-avian animals of five species. In addition, a total of 20 birds identified to species level were recorded as dead. Furthermore, 390 birds were partially identified to 10 species groups and 11 non-avian animals were partially identified to two species groups. In addition, a total of seven birds identified to a species group level were recorded as dead. An identification rate to species level of 96.58% was achieved throughout the 12-month survey period.

The primary observations from the surveys were:

- Black-legged kittiwakes (*Rissa tridactyla*) were present in relatively low densities with the exception of July 2022 (peak density of 5.44 birds/km^2 (95% CI 2.93 – 9.40)). Sitting and flying birds were recorded suggesting use of the area for passage and foraging;
- Great black-backed gulls (*Larus fuscus*) were recorded in relatively low abundance during the non-breeding season, with peak densities estimated at 0.58 birds/km^2 (95% CI 0.29 – 0.86) in January 2023;
- Common guillemots (*Uria aalge*) were the most abundant species, peaking in August 2022 during post-breeding dispersal (absolute peak density 49.40 birds/km^2 (95% CI 41.34 – 58.55));
- Razorbills (*Alca torda)* were recorded in relatively low abundance during the breeding season, with an absolute peak density of 6.64 birds/km^2 (95% CI 4.39 – 9.02) in July 2022;
- Atlantic puffins (*Fratercula arctica*) were the third most abundant species observed, peaking in August and September 2022, during the end of the breeding season and start of the post-

breeding migration period (peak absolute density 6.72 birds/km^2 (95% CI 4.54 – 9.37) in August 2022);

- Northern fulmars (*Fulmarus glacialis*) were the second most abundant species, peaking in July 2022 (5.40 birds/km^2 (95% CI 2.99 – 9.28)) during the breeding season. A second peak was observed in January 2023 coinciding with the return migration period;
- Northern gannets (*Morus bassanus*) were recorded in relatively low numbers with density peaking in July 2022 (0.70 birds/km^2 (95% CI 0.23 – 1.50)), coinciding with the usual breeding season. A total of 7 dead gannets were recorded;
- Harbour porpoise (*Phocoena phocoena*) were the most abundant non-avian species peaking in January 2023 with an absolute density of 0.90 animals/km^2 (95% CI 0.23 – 1.61).

The density of birds varied, with birds distributed across the whole survey area especially between July and September 2022. The distribution of non-avian animals was also widespread.

The work undertaken by HiDef collected 12 months of continuous data. The data collected works towards satisfying the survey requirements for the contract.

1 Introduction

1 The Stromar Wind Farm Project (hereafter 'Stromar') is a proposed offshore wind farm, located approximately 50km off the coast of Wick, north-east Scotland. The development area covers an area of approximately 256km^2.

2 In March 2022, Ørsted commissioned HiDef Aerial Surveying Limited (hereafter 'HiDef') to undertake a programme of high-resolution digital video aerial surveys of marine megafauna (defined within this report as cetaceans, pinnipeds or other large, non-avian marine fauna), ornithological and human activity in support of the development proposal. The survey design consisted of 2km-spaced transects within the Stromar development area plus a 4km surrounding buffer, together referred to as the 'survey area', with a total area of approximately 593km^2.

3 HiDef designed the survey methodology to provide information suitable to support Ørsted's proposed development at Stromar for which baseline surveys and an accurate assessment of abundance and distribution of seabirds and marine mammals is required to inform the Environmental Impact Assessment (EIA).

4 Multiple important bird sites classified as Special Protection Areas (SPA) are located in the vicinity of the survey area. The legislation transposing the EU Habitats Directive and the Wild Birds Directive has been amended so that the strict protections afforded to sites, habitats and species continues following EU Exit. The suite of legislative instruments is collectively termed the 'Habitat Regulations'. The Habitat Regulations were amended in 2019 as a result of the UK leaving the EU within the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019.

5 The Copinsay, North Caithness Cliffs and East Caithness Cliffs SPAs, located approximately 53km north-west, 72km west and 74km west of the development area respectively, are designated to protect multiple species of breeding seabirds, including razorbill (*Alca torda*), northern fulmar (*Fulmarus glacialis*, hereafter 'fulmar'), herring gull (*Larus argentatus*), great black-backed gull (*L.. marinus*), black-legged kittiwake (*Rissa tridactyla*, hereafter 'kittiwake'), common guillemot (*Uria aalge*, hereafter 'guillemot') and Atlantic puffin (*Fratercula arctica*, hereafter 'puffin') (JNCC, 2018a; 2018b; 2022a).

6 Approximately 92km south and 118km south-east of the development The Troup, Pennan and Lion's Heads and the Buchan Ness to Collieston Coast SPAs are designated to protect similar species, including fulmar; great black-backed gull; herring gull; kittiwake; guillemot; razorbill and Atlantic puffin (JNCC, 2015a; 2019).

7 The foraging ranges of birds located at colonies within SPAs at Orkney may also overlap with the survey area, such as those at the Fair Isle SPA (approximately 115km north), Calf of Eday SPA (approximately 87km north-west), Hoy SPA (approximately 78km north-west) and West Westray SPA (approximately 90km north-west) designated to support nationally important seabird breeding populations, including fulmar; northern gannet (*Morus bassanus*, hereafter 'gannet'); kittiwake; great skua (*Stercorarius skua*) and guillemot (JNCC, 2015b; 2015c; 2022b; 2022c). For example, the mean maximum foraging ranges plus one standard deviation of gannet and fulmar are 509.4km and 1,200.2km respectively (Woodward *et al.* 2019) which will comfortably encompass Stromar when measured from those SPAs. Other migratory and transient bird species are also known to occur in the area, requiring year-round surveys to be carried out to characterise their abundance.

8 Marine mammals are also likely to occur year-round within the survey area, with harbour porpoise (*Phocoena phocoena*) likely to be the most numerous. The Moray Firth Special Area of Conservation

(SAC), situated approximately 120km south-west of Stromar, is designated to protect bottlenose dolphins (*Tursiops truncatus*) (JNCC, 2015d). The Southern Trench Marine Protected Area (MPA), located approximately 52km south of the development area, is designated to protect minke whales (*Balaenoptera acutorostrata*) (NatureScot, 2020a). Grey seal (*Halichoerus grypus*) and harbour seal (*Phoca vitulina*) are commonly observed along the northeast coast of Scotland and, the former in particular, is likely to be present within the survey area for example, Sanday SAC which is approximately 85km north of the area which is designated for harbour seal (JNCC, 2015e) and Faray and Holm of Faray SAC, approximately 89km north-west of the area which is designated for grey seals (JNCC, 2015f).

9 This report ('the annual report') provides the results from 12 surveys undertaken between March 2022 and February 2023. Observations and survey effort are summarised, and results presented as density surface distribution maps, density estimates with 95% confidence intervals (CIs) and summarised data on behaviour and age. A discussion is provided as to the representativeness of the results in relation to the wider region.

2 Methods

2.1 Survey flights

10 A series of strip transects were flown on a monthly basis between March 2022 and February 2023, following the protocol agreed in March 2022 (HP00182-001).

11 The survey design consisted of 2km-spaced transects across the Stromar development area (256km^2) and a surrounding 4km buffer (Figure 1). This created an overall survey area of 593km^2.

12 Fourteen strip transects were flown extending roughly north-west to south-east, perpendicular to the depth contours along the coast. Such a design ensures that each transect samples a similar range of habitats (primarily relating to water depth) and will reduce the variation in bird and mammal abundance estimates between transects.

13 Surveys were undertaken using an aircraft equipped with four bespoke HiDef cameras with sensors set to a resolution of 2cm Ground Sample Distance (GSD). Each camera sampled a strip of 125m width, separated from the next camera by ~25m, thus providing a combined sampled width of 500m within a 575m overall strip.

14 A minimum target of 12.5% site coverage was agreed, with data from two out of the four cameras being processed. This ensured a survey with sufficient coverage and number of transects for precise abundance estimation, with the remaining unprocessed data archived.

15 The surveys were flown along the transect pattern shown in Figure 1 at a height of approximately 550m (~1800') above sea level (ASL). Flying at this height ensures that there is no risk of flushing species that are easily disturbed by aircraft noise. Thaxter *et al.* (2016) recommends a minimum flight altitude of 460 – 500m ASL. Hammond *et al.* (2013) also highlight that an aerial survey flown at an altitude of 183m is unlikely to result in a responsive reaction from any marine mammal.

16 Position data for the aircraft was captured from a Garmin GPSMap 296 receiver with differential GPS enabled to give 1m accuracy for the positions and recording updates in location at one second intervals for later matching to bird and marine mammal observations.

Figure 1 Stromar survey design with 4km buffer and 2km-spaced transects flown between March 2022 and February 2023

2.2 Data review and object detection

17 Data were viewed by trained reviewers who marked any objects in the footage as requiring further analysis, as well as determining which were birds, marine megafauna or anthropogenic objects such as ships or buoys.

18 As part of HiDef's quality assurance (QA) process, an additional 'blind' review of 20% of the raw data was performed and the results compared with those of the original review. If 90% agreement was not attained during the QA process, then corrective action was initiated: the remaining data set was reviewed and where appropriate, the failed reviewer's data discarded and all data re-reviewed. If required, additional training was given to improve performance.

19 Objects were only recorded where they reached a reference line (known as 'the red line') which defined the true transect width of 125m for each camera. By excluding objects that do not cross the red line, biases to abundance estimates caused by flux (movement of objects in the video footage relative to the aircraft, such as where the survey craft is buffeted by airflow) were eliminated.

2.3 Object identification

20 Images marked as requiring further analysis were reviewed by the ID Team; ornithologists[1] and marine mammal specialists[2] for identification to the lowest taxonomic level possible and for assessment of the approximate age and the sex of each animal, as well as any behaviour traits visible from the imagery.

21 At least 20% of all objects were selected at random and subjected to a separate 'blind' QA process. If less than 90% agreement was attained for any individual camera then corrective action was initiated: if appropriate, the failed identifier's data were discarded, and the data re-identified. Any disputed identifications were passed to a third-party expert ornithologist/marine mammal specialist for a final decision. The level of agreement within the QA process was calculated as the final number of agreements as a percentage of all identifications subjected for QA for the entire survey.

22 All objects were assigned to a species group and where possible, each of these then further identified to species level. The species identifications were given a confidence rating of 'possible', 'probable' or 'definite'[3].

23 It is important to note that confidence ratings are not standardised. The likelihood of achieving a definite or probable identification is not consistent for all component members of a species group. For example, someone undertaking identification of a large auk will find it easier to be confident of guillemot identification than razorbill. Confidence scores should not be used to filter or weight the probability of 'large auk' being one species or another in any analysis, as this will lead to biased results, particularly if the identification rate is low.

24 Any animals that could not be identified to species level were assigned to a category 'No ID' and only identified to group level. If, on occasion, the unidentified bird is suspected of belonging to two possible genera, then a broader group category may be used. For example, a bird would usually be assigned to

1 HiDef employs three current and former members of the British Birds Rarities Committee ('BBRC') as expert ornithologists

2 HiDef staff have long-standing experience in marine mammal identification, regularly undertaking boat surveys as part of ESAS (European Seabirds At Sea Partnership), SCANS and other programmes. They process thousands of cetacean images, hold regular internal training sessions and have access to marine specialists within our wider company BioConsult SH.

3 Definite: as certain as reasonably possible. Probable: very likely to be this species or species group. Possible: more likely to be this species or species group than anything else.

the group category 'Shearwater species' if identified as a Manx shearwater (*Puffinus puffinus)*, or to 'Large Auk species' if identified as a guillemot. However, if the bird has the potential to be either, then it would be assigned to a wider group category 'Shearwater / Auk species' and the species level recorded as 'No ID'.

25 In the case of birds, additional information was recorded on basic behaviour (i.e. whether the bird was sitting; loafing on land or other objects; flying; diving or taking off). Detail was recorded where possible on foraging behaviour, approximate age, sex and any other details of interest. Aging of birds was based on moults and was conducted where possible on species which show seasonal variation in plumage.

26 In the case of marine mammals, surfacing behaviour was also recorded as either 'surfacing', 'surfacing at red line', 'submerged' or 'unknown'. 'Surfacing at red line' (or snapshot surfacing) was defined as the animal's dorsal fin being above the water in the frame nearest to the 'red line' on the operator's screen and is required for calculation of availability bias (Section 2.5.3). 'Surfacing' was defined as any other surfacing behaviour that was not snapshot surfacing and included any part of the animal's body breaking the surface of the water in any frame. Sexing and aging of marine mammals was carried out where possible, and are presented in the relevant sections where data are available.

27 Anthropogenic activity was recorded as either 'man-made object', 'fishing boat' or 'other boat'. Further details were noted in the comments of the observations Excel files, including further specifying the type of object (e.g., 'fishing buoy', 'marker buoy', 'wind turbine').

2.4 Final processing

28 All data were geo-referenced, taking into account the offset from the transect line of the cameras, and compiled into a single output; Geographical Information System (GIS) files for the Observation and Track data are issued in ArcGIS shapefile format, using UTM30N projection, ETRS89 datum.

2.5 Data analysis

2.5.1 Data treatment

29 Raw count data were trimmed to the survey area prior to presentation in this report. Dead birds in this report are not included in the raw observation lists. After basic monthly presentation, data were processed to estimate density, abundance and distribution of key species and species groups. Dead birds were only removed for density estimation when they represented 10% or more of at least 10 birds in each month for a species. Smaller percentages of dead birds do not make a material difference to point estimates of density given the stochasticity of the bootstrapping process (see 2.5.3 paragraph 37) and relatively wide confidence intervals around estimates. For this report, this was only done for August and September 2022.

30 Records identified to species level were separated out from records of individuals identified to group level, and the following analyses undertaken on both datasets. All confidence levels of species identifications were used in the analysis.

2.5.2 Population estimates

31 Population estimates were calculated for the Stromar survey area (development area plus 4km buffer).

32 Each strip transect was treated as a statistically independent random sample from the site. The length and breadth (i.e., the width of the field of view of the camera) of each transect were multiplied to give the transect area; dividing the number of observations for each species on each transect by the transect

area gives a point estimate of the density of that species for the transect. The density of animals at the site (and hence the population size by multiplying by the area of the site), the standard deviation, the 95% CIs and coefficient of variance (CV) were then estimated using a non-parametric block bootstrap method with replacement (Buckland *et al.,* 2001), to ensure equal transect effort was sampled across each bootstrap iteration. This was done by using transect ID as the sampling unit with replacement. A group of transects were randomly sampled until their total length equalled approximately the same length as the total survey length.

33 One thousand bootstrap iterations were performed from which the mean and standard deviation of the sampled means were calculated, as well as the relative standard deviation (or CV) as defined by the standard deviation divided by the mean multiplied by 100. Data were processed in the R programming language (version 4.3.0) and code can be provided on request.

34 The density estimate is expressed as the average number of animals per square km in the whole survey area. The population estimate is expressed as the estimated number of animals within the whole survey area. The upper and lower confidence limits (CLs) define the range that the population estimate falls within with 95% certainty. The CV is a measure of the precision of the population and density estimates.

35 For most species these abundance estimates relate to absolute abundance, but for diving species such as auks, the abundance relates to relative abundance due to a proportion of animals being submerged at the time of survey. In Section 2.5.3 we describe our method for taking account of species availability to generate estimates of absolute abundance for auks and harbour porpoise.

2.5.3 Availability bias

36 In wildlife surveys, a proportion of seabirds or marine mammals that spend any time underwater, especially while feeding, will not be detectable at the surface. This 'availability bias' leads to an under-estimate of their abundance during surveys. For species that make long dives underwater, this bias might be significant (for example, guillemot).

37 There are two main approaches to account for availability bias: by using double platform surveys (for example Borchers *et al.,* 2002) which can be logistically difficult to achieve and relatively expensive; and by using known data on time spent underwater to apply correction factors to abundance estimates (for example Barlow *et al.,* 1988).

38 Following Barlow *et al.* (1988) the probability that an animal is available at the surface is calculated as:

$$\Pr(being\ visible) = \frac{(s+t)}{(s+d)}$$

Where s is the average time spent at the surface, *t* is the window of time that the animal is within view and *d* is the average time below the surface. In the case of digital video surveys, the value of *t* is negligibly small and is treated as 0.

39 Due to a lack of diving rate data for many species, availability bias corrections were only conducted on four species: guillemots, razorbills, puffins and harbour porpoise. When considering population estimates calculated for other diving species, it should be noted that population estimates for the survey area are likely to be underestimated.

2.5.3.1 Seabirds

40 Using Barlow's method, the proportion of time that an animal was available at the surface was calculated (Pr (visible)) for guillemots and razorbills. Absolute density, corrected for availability, was then obtained by dividing the density of birds observed by Pr(visible).

41 For guillemots and razorbills, data obtained during the breeding season using data loggers were used to estimate availability bias. Thaxter *et al.* (2010) give mean times for these species engaged in flying, feeding and underwater per trip during the chick-rearing period.

42 Thus, the proportion of time that guillemots and razorbills are available at the surface (Pr(visible)) was estimated at 0.7595 and 0.8182, respectively.

43 For puffins, the results from a study using data loggers reported in Spencer (2012) were used. The results show that puffins spend 14.16% of daylight time underwater. This infers that the proportion of time that puffins were available at the surface (Pr(visible)) was 0.8584.

44 The estimates of Pr(visible) for guillemots, razorbills and puffins were used to correct relative abundance estimates of birds sitting on the sea. These corrected abundance estimates for sitting birds were then added to the abundance estimate of flying birds to give an overall absolute abundance for the species.

2.5.3.2 Marine mammals

45 Harbour porpoise abundance is also affected by availability bias, and further complicated because detections of animals are possible while they are submerged. The approach to correct for availability bias for this species applies a correction factor to the density of animals that were recorded surfacing only using data on the surfacing rates from tagged animals.

46 Teilmann *et al.* (2013) provides detailed information which accommodates variation in time of year, geographical location and time of day in the proportion of time spent breaking the surface. All of these metrics relate to model outputs in Teilmann *et al.* (2013) and are used to refine the predicted amount of time that harbour porpoise spend surfacing in the outputs.

47 The tagging study of Teilmann *et al.* (2013) did not extend to the area of North Sea surrounding this project, but no other data are available on surfacing behaviour for this species in the relevant area. For our analysis, we therefore assumed that diving behaviour in the survey area was comparable to that of the North Sea data collection area of Teilmann *et al.* (2013).

48 To estimate the density of surfacing harbour porpoise, we first calculated the proportion of animals snapshot surfacing. Snapshot surfacing indicates where the dorsal fin is clear of the water surface in the middle frame of the sequence in which the animal is present. By using the snapshot surfacing detections, we subsample the data to mimic the surfacing behaviour category in Teilmann *et al.* (2013) which corresponds to periods when the transmitter on the dorsal fin of tagged animals is completely clear of the water. This was done using data from all months combined because sample sizes were too small to be accurate when calculating the surfacing proportions in individual months. We then multiplied the calculated density of all harbour porpoise by the proportion of snapshot surfacing encounters in our surveys to estimate the density of surfacing harbour porpoises. Finally, this was then divided by the proportion surfacing from Teilmann *et al.* (2013) in Table 1 to derive the estimates of absolute density and abundance.

Table 1 **Correction factors used to account for availability bias for harbour porpoise at different times of the year and at different times of the day (after Teilmann *et al.*, 2013)**

Month	Surface behaviour	
	09:00 – 15:00	15:00 – 21:00
January	0.0490	0.0476
February	0.0398	0.0384
March	0.0543	0.0529
April	0.0646	0.0632
May	0.0563	0.0549
June	0.0518	0.0503
July	0.0493	0.0479
August	0.0530	0.0516
September	0.0420	0.0406
October	0.0413	0.0399
November	0.0406	0.0392
December	0.0429	0.0415

2.5.4 Distribution mapping

49 Maps of the distribution of key species only, selected on the basis of their relatively high abundance or their significance at nearby protected sites were generated using a Watson-Nadaraya type kernel density estimation (KDE) technique (Simonoff, 1996). For diving species (guillemot, razorbill, puffin and harbour porpoise), the KDE mapping represents a relative estimate of density only and does not take account of availability bias.

50 In KDE, a small 'window' function (the kernel) was used to calculate a local density at each point in the survey area. To evaluate the density at a given point, the kernel was centred on that point and all the observations within the window were summed to obtain a local count. The total area of the transect(s) intersecting the window was then summed to obtain a local measure of effort. By dividing the local count by the local effort, a local density estimate was obtained. To build a density map, the study area was covered with a fine mesh of study points and the density was calculated at each point in the mesh in turn.

51 Kernel techniques are robust and not as complex as other density estimation techniques because they have few parameters; as a result, they are arguably the easiest density surface technique to reproduce independently. The only variables are the size and shape of the kernel or window function. For these analyses, we have used a Gaussian window function, which has the advantages of being smooth,

rotationally symmetric and easy to compute. The shape of the Gaussian is determined by a single width parameter; the selection of this parameter is the only variable in the computation of the density maps.

52 Rather than set the width parameter arbitrarily, we have used a leave-one-out cross validation method. Cross validation estimates the predictive power of a model by removing some of the data from the data set and using the remainder of the data and the model to predict the values for the data that was removed. The closer the predicted values represent the removed data, the better the model performance and the width parameter used in the model.

53 To apply cross validation to the survey area, each transect was subdivided into 500m segments. To evaluate a particular choice of kernel width, each segment was removed in turn, using the kernel and the remaining data to predict the density of the missing segment and subtract the known value from the prediction to obtain an error score. This process was repeated for every segment and the error scores for all segments were squared and summed to give a total performance score for that particular choice of kernel width. The kernel width was then varied, and the process repeated; if the new score was lower than the old, the new kernel width was a better choice than the previous value. An exhaustive search over all kernel widths was then used to identify the best global choice. The result of the process was a smooth density estimate which has been derived without any manual parameter selection. The whole process was repeated from scratch for each map, as different kernel sizes are appropriate for different species.

54 It should be noted that several of the KDE maps are effectively 'flat' (i.e., they appear uniform in colour). These correspond to distributions where the density surface as obtained from a small local kernel was not effective at predicting missing data; this can happen with evenly distributed birds but can also happen for very sparse distributions. In the case of sparse distributions, the 'flat' map does not necessarily mean that the true underlying distribution is 'flat'; it could mean that the data don't contain enough evidence to determine what the underlying distribution is. It is, therefore useful to refer back to the population estimates for the corresponding map when looking at these 'flat' densities; we have also overlaid the relevant observations as dots to help with interpretation of the maps. In extreme cases, density surfaces were not included in maps, with the raw observations presented instead.

55 For less abundant bird and non-avian species, as well as those identified to group level, distribution is illustrated by dot maps only.

2.5.5 Flight direction of seabirds

56 Wind rose diagrams were created per survey to present the flying direction of seabirds, where each cardinal point (N, E, S, W) and intercardinal point (NE, SE, SW, NW) indicates the total number of flying birds recorded.

3 Results

3.1 Survey effort

58 The date, number of transects and survey effort (i.e., length of transects) undertaken between March 2022 and February 2023 are shown in Table 2. The number of transects and the total length of transects are those used in subsequent analysis (see Figure 2 for the aircraft flight pattern). Variation in presentation of track data is due to differing GPS records in the equipment, frequency of the GPS records can occasionally vary for the flight pattern. This does not affect location data for the observations recorded.

59 The same transect lines were used for each survey, although effort may have differed slightly between surveys. This can be caused by minor differences in the start and stop times for transects and minor deviations of the aircraft from the transect line.

Table 2 Survey effort across the Stromar survey area between March 2022 and February 2023 inclusive

Survey date	Survey number	Number of transects analysed	Total length of transects analysed (km)	Area covered (km²)	Area covered (%)
20 March 2022	1	14	296.13	74.03	12.47
02 April 2022	2	14	295.78	73.95	12.45
07 May 2022	3	14	295.90	73.98	12.46
20 June 2022	4	14	296.15	74.04	12.47
23 July 2022	5	14	294.83	73.71	12.41
22 August 2022	6	14	296.00	74.00	12.46
03 September 2022	7	14	297.61	74.40	12.53
13 October 2022	8	14	295.81	73.95	12.45
02 November 2022	9	14	296.39	74.10	12.48
03 December 2022	10	14	295.56	73.89	12.44
20 January 2023	11	14	295.80	73.95	12.45
25 February 2023	12	14	291.77	72.94	12.28

Figure 2 Flight pattern for surveys flown between March and August 2022 over the Stromar survey area

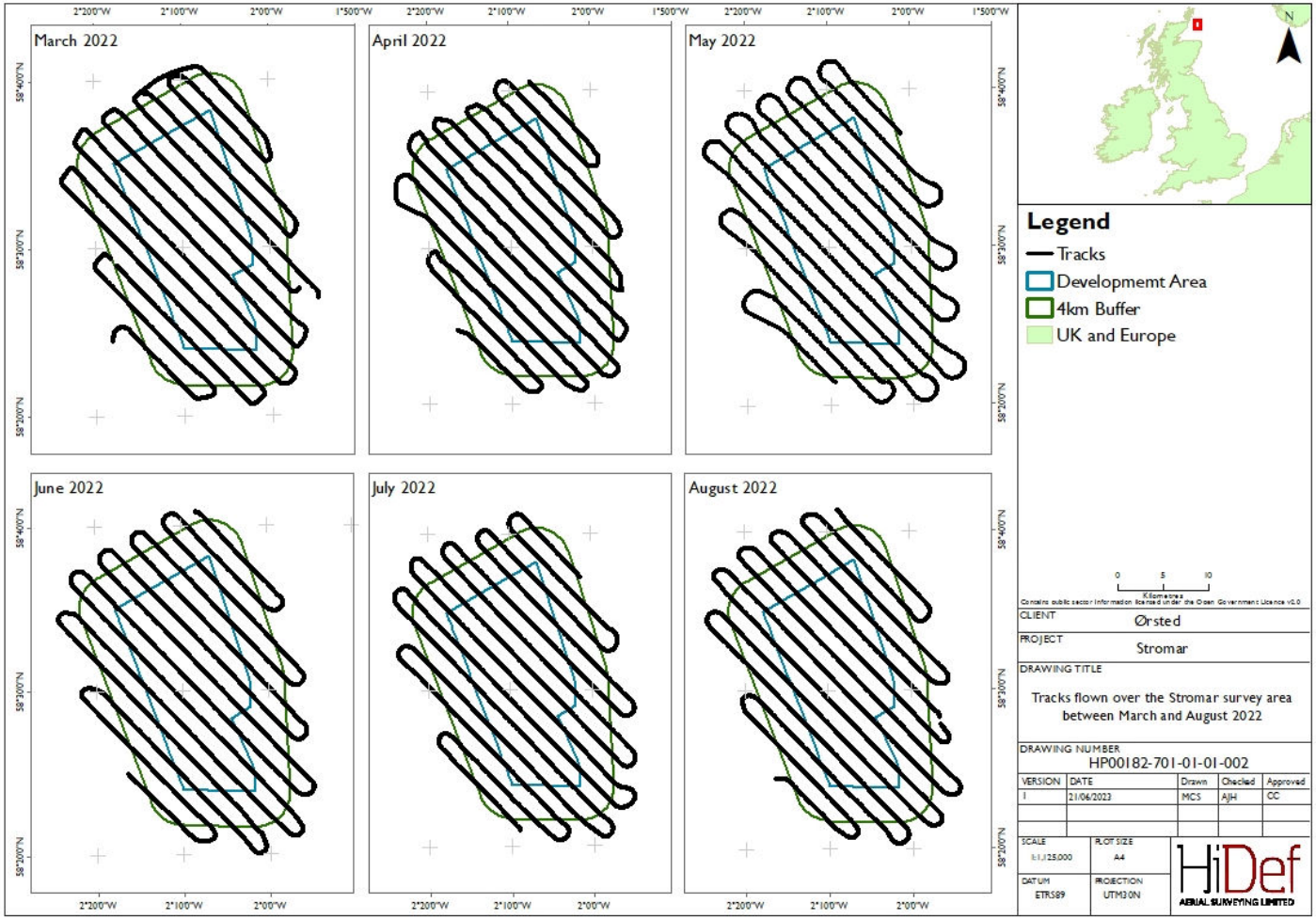
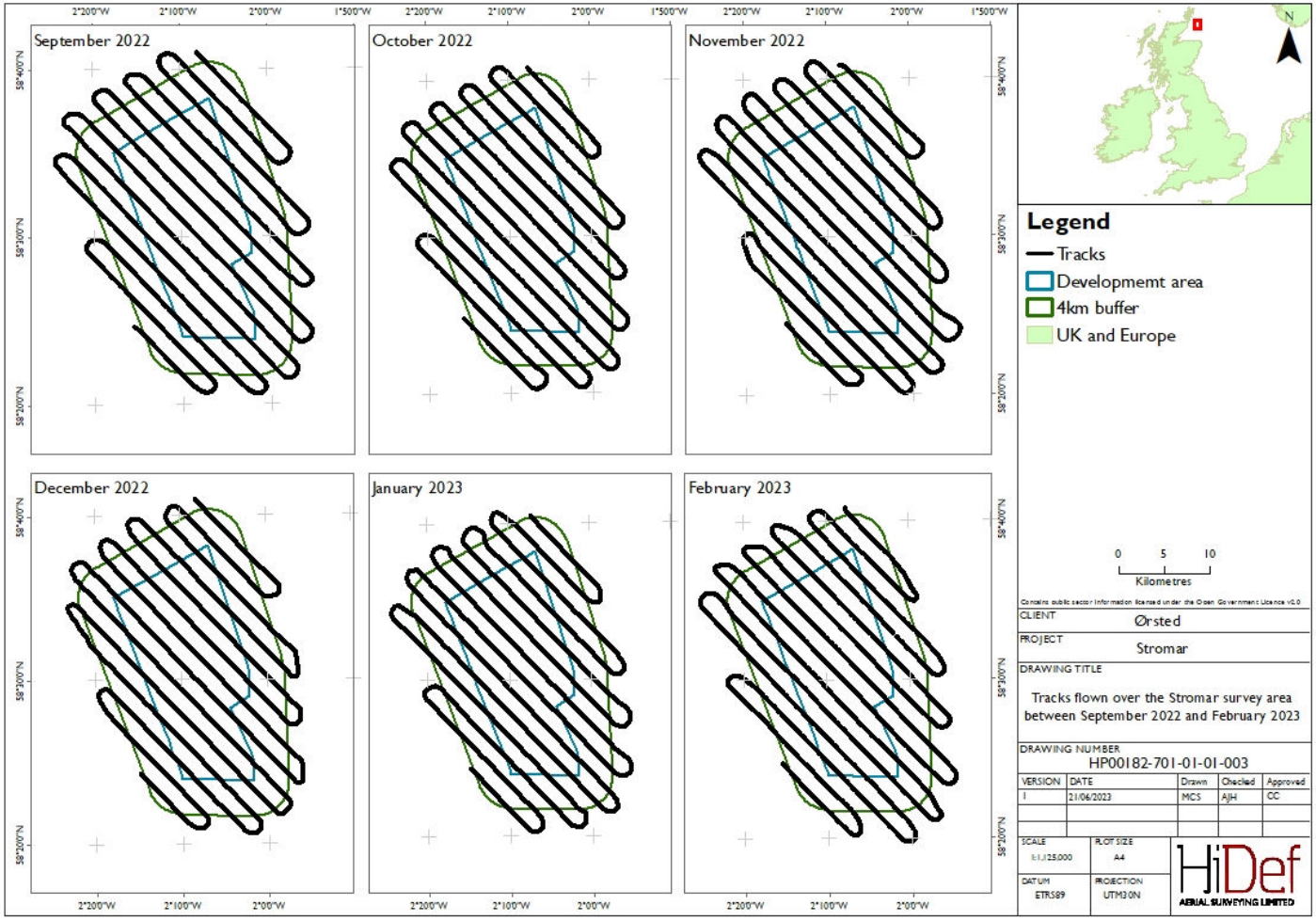


Figure 3 Flight pattern for surveys flown between September 2022 and February 2023 over the Stromar survey area



3.2 Survey results

60 Each animal was assigned to a species group, and where possible these were also assigned a species identification with confidence levels of 'Possible', 'Probable' or 'Definite'. Any animals that could not be identified to species level were assigned to a category 'No ID'. The analysis of data to species level uses all levels of identification confidence. The overall identification rate of birds and non-avian animals to species level (not including 'No ID's) for the 12 surveys are given in Table 3.

61 The total number of objects detected in each survey flight, as well as numbers of species and species groups are presented in Table 4 and Table 5.

Table 3 Stromar survey identification rates between March 2022 and February 2023 inclusive

Survey date	ID rate (%)
20 March 2022	93.27
02 April 2022	96.47
07 May 2022	97.71
20 June 2022	95.24
23 July 2022	95.57
22 August 2022	96.59
03 September 2022	96.50
13 October 2022	99.04
02 November 2022	97.70
03 December 2022	92.75
20 January 2023	98.58
25 February 2023	99.59
Average	**96.58**

Table 4 **Number of objects detected during each survey assigned to species level (including dead animals) in the Stromar survey area between March 2022 and February 2023. Survey dates presented in Table 3.**

Species	Scientific name	Month												Total
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	
Wigeon	*Mareca penelope*	0	0	0	0	0	0	0	4	0	0	0	0	**4**
Kittiwake	*Rissa tridactyla*	48	47	1	15	398	68	9	14	8	16	21	7	**652**
Great black-backed gull	*Larus marinus*	1	8	0	1	0	0	0	40	16	25	43	26	**160**
Herring gull	*Larus argentatus*	0	3	0	0	0	0	0	0	4	5	35	1	**48**
Lesser black-backed gull	*Larus fuscus*	0	1	0	0	0	0	0	0	0	0	0	0	**1**
Common tern	*Sterna hirundo*	0	0	0	0	0	1	0	0	0	0	0	0	**1**
Arctic tern	*Sterna paradisaea*	0	0	0	0	17	0	0	0	0	0	0	0	**17**
Great skua	*Stercorarius skua*	0	0	2	0	2	1	0	0	0	0	0	0	**5**
Arctic skua	*Stercorarius parasiticus*	0	0	0	0	0	0	1	0	0	0	0	0	**1**
Guillemot	*Uria aalge*	82	295	169	205	1137	2776	1235	47	109	7	415	35	**6512**
Razorbill	*Alca torda*	3	18	8	22	403	82	21	1	0	3	5	5	**571**
Puffin	*Fratercula arctica*	3	21	132	59	137	429	394	15	0	0	0	0	**1190**
Red-throated diver	*Gavia stellata*	0	1	0	0	0	0	0	0	0	0	0	0	**1**
European storm petrel	*Hydrobates pelagicus*	0	0	0	14	0	0	0	0	0	0	0	0	**14**
Fulmar	*Fulmarus glacialis*	45	109	21	78	390	114	57	163	117	72	213	160	**1539**

Species	Scientific name	Month												Total
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	
Sooty shearwater	*Ardenna grisea*	0	0	0	0	0	0	1	0	0	0	0	0	**1**
Manx shearwater	*Puffinus puffinus*	0	0	2	0	11	0	0	0	0	0	0	0	**13**
Gannet	*Morus bassanus*	26	16	6	6	52	15	20	24	1	0	29	6	**201**
Grey seal	*Halichoerus grypus*	0	1	0	0	0	0	0	0	0	0	0	0	**1**
Common dolphin	*Delphinus delphis*	0	0	1	0	0	0	0	0	0	0	0	0	**1**
Risso's dolphin	*Grampus griseus*	0	0	0	2	0	0	0	0	0	0	0	0	**2**
White-beaked dolphin	*Lagenorhynchus albirostris*	0	0	0	0	0	0	0	4	3	0	10	2	**19**
Harbour porpoise	*Phocoena phocoena*	1	10	7	17	3	15	0	0	0	0	20	0	**73**
Total		**209**	**530**	**349**	**419**	**2550**	**3501**	**1738**	**312**	**258**	**128**	**791**	**242**	**11027**

Table 5 **Number of objects with no species ID (including dead animals) detected during each survey assigned to species group in the Stromar survey area between March 2022 and February 2023. Survey dates presented in Table 3.**

Species group (No ID)	Month												Total
	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	
Wader species	0	0	0	0	1	0	0	0	0	0	0	0	**1**
Large gull species	0	1	0	0	1	0	0	0	0	1	0	0	**3**
Gull species	0	0	1	0	0	0	0	0	0	0	0	0	**1**
Arctic / common tern	0	0	0	0	12	11	1	0	0	0	0	0	**24**
Tern / small gull	0	0	0	0	0	0	2	0	0	0	0	0	**2**
Large auk	7	10	1	9	76	39	7	0	1	3	4	1	**158**
Auk species	6	7	6	11	24	69	50	2	1	1	2	0	**179**
Auk / small gull	1	0	0	0	0	0	0	0	1	0	0	0	**2**
Large auk / diver species	0	1	0	0	0	0	0	0	0	0	0	0	**1**
Auk / shearwater species	0	0	0	0	1	0	2	0	0	0	0	0	**3**
Fulmar / gull species	1	0	0	0	3	4	1	1	3	5	5	0	**23**
Seal species	1	3	0	2	1	2	0	0	0	0	0	0	**9**
Seal / small cetacean species	0	1	0	0	0	1	0	0	0	0	0	0	**2**
Total	**16**	**23**	**8**	**22**	**119**	**126**	**63**	**3**	**6**	**10**	**11**	**1**	**408**

3.3 Distribution patterns and seasonal abundances

62 The density, total estimated population and upper and lower 95% CLs are presented for key species only in this section. Estimates, including standard deviation and CV, for all species and species groups are presented in Appendix I. An explanation of these parameters is presented in Table 6.

63 For certain diving species (guillemot, razorbill, puffin and harbour porpoise), estimates were adjusted to account for availability bias (Section 2.5.3) and estimate absolute abundance. The adjusted (absolute) density and abundances provide the best estimates at the time of survey. No calculation of availability bias was carried out for any other diving species (e.g., gannet and shag (*Gulosus aristotelis*)) due to a lack of information on dive times, and so estimates for such species should be considered low. Absolute density and abundance estimates for the relevant key species are presented within this result section, alongside corresponding relative estimates.

64 Distribution patterns of the most abundant species are presented as density maps, in which a density surface depicts the estimated number of animals per km². Any months within these maps which recorded five or less birds have been indicated by an induvial dot on the map, other than in all birds and non-avian animal sections.

65 Distributions of less abundant species, unidentified species and anthropogenic activity are presented as dot maps only.

66 References to species-specific seasonality may be made throughout the report and are based on the biologically defined minimum population scale (BDMPS) report of Furness (2015) and the breeding seasons provided by NatureScot (2020b) (Table 7).

Table 6 Terms used in population analysis

Term	Definition
Density estimate (animals/km^2)	The average number of animals per square km surveyed over the whole area.
Population estimate (number)	The mean number of animals estimated within the survey area.
95% confidence interval (CI)	A measure of uncertainty in the mean value. If the analysis was repeated, 95% of the time the mean population estimate would fall within this range. The smaller the CI range the more confident we can be that the mean estimate is an accurate reflection of the true population size.
Confidence limit *(CL)*	The upper and lower values that define the range of the 95% confidence interval.
Standard deviation *(SD)* of population estimate	The amount of variation or dispersion of a set of values. A low SD indicates that the bootstrap values tend to be close to the mean of the set.
CV (%)	The coefficient of variation is a standard measure that describes the dispersion of data points around the mean. The lower the CV the more precise the estimate. It is calculated as the SD / mean.
Relative abundance	In the case of diving birds and mammals, this is the estimated population size based on animals recorded on or above the sea surface and does not account for any that may be diving and thus submerged at the time of survey.
Absolute abundance	The most accurate estimate of population size. In the case of diving birds and mammals, this includes an estimate for the number that are believed to be submerged at the time of survey.

Table 7 Seasonality for the presented key seabird species (based on Furness (2015) and NatureScot (2020b))

Species	Breeding season (NatureScot, 2020b)	Non-breeding season (Furness, 2015)		
		Post-breeding migration	Non-breeding	Return migration
Kittiwake	mid Apr – Aug	Aug – Dec	Sep – Feb	Jan – Apr
Great black-backed gull	Apr - Aug	Aug - Nov	Sep - Mar	Jan - Apr
Guillemot	Apr – mid Aug	Jul – Oct	Aug – Feb	Dec – Feb
Razorbill	Apr – mid Aug	Aug – Oct	Aug – Mar	Jan – Mar
Puffin	Apr – mid Aug	late Jul – Aug	mid Aug – Mar	Mar – Apr
Fulmar	Apr – mid Sep	Sep – Oct	Sep – Dec	Dec – Mar
Gannet	mid Mar – Sep	Sep – Nov	Oct – Feb	Dec – Mar

3.3.1 All bird species

67 The total number of alive birds recorded across the Stromar survey area is presented in Figure 4, whilst the distributions and densities of birds throughout the survey period are presented in Figure 5 and Figure 6. In addition, a total of 27 birds were recorded as dead during the survey period (Table 8). Only dead birds that met the removal criteria as described at Section 2.5.1 (August and September 2022) have been removed from density and abundance maps (Figure 5 and Figure 6).

68 The total number of birds varied between surveys, with the highest numbers recorded in August 2022, and the lowest observed in December 2022. Relatively low numbers of birds were also recorded in February 2023.

69 Birds were found in relatively high densities across the survey area, such as between July and September 2022 (Figure 5 and Figure 6).

Figure 4 Total number of alive birds recorded between March 2022 and February 2023 in the Stromar survey area

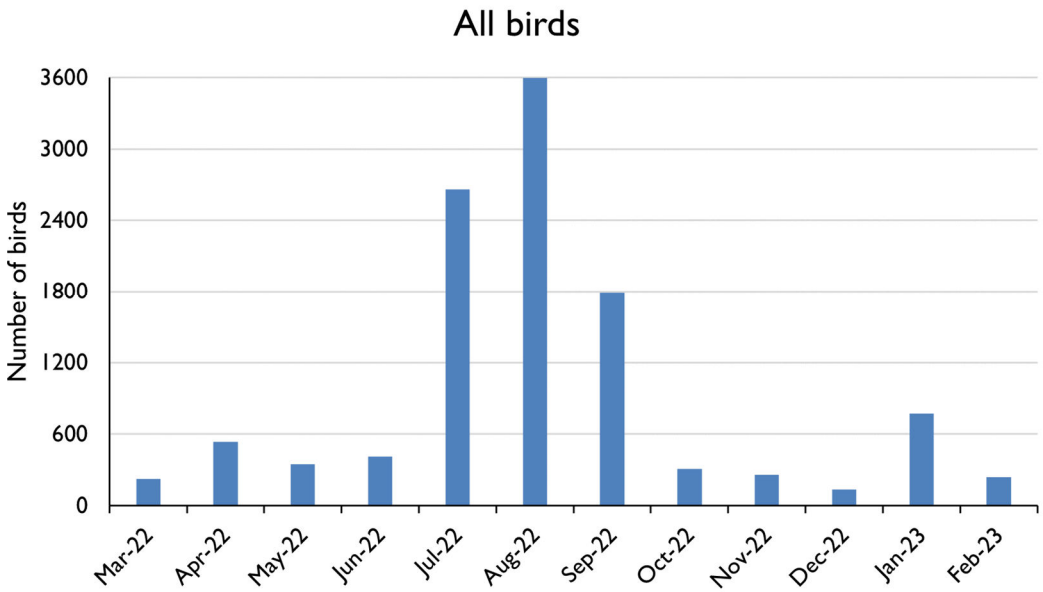


Table 8 Number of dead birds observed in the Stromar survey area between March 2022 and February 2023

Species	May - 22	Jun - 22	Jul - 22	Aug - 22	Sep - 22	Total recorded as dead
Gannet	0	4	1	6	6	**17**
Great black-backed gull	0	1	0	0	0	**1**
Great skua	1	0	0	0	0	**1**
Kittiwake	0	1	0	0	0	**1**
No ID	1	0	2	4	0	**7**
Grand total	**2**	**6**	**3**	**10**	**6**	**27**

Figure 5 Density of all birds (number/km²) and number of detections per segment in the Stromar survey area between March and August 2022

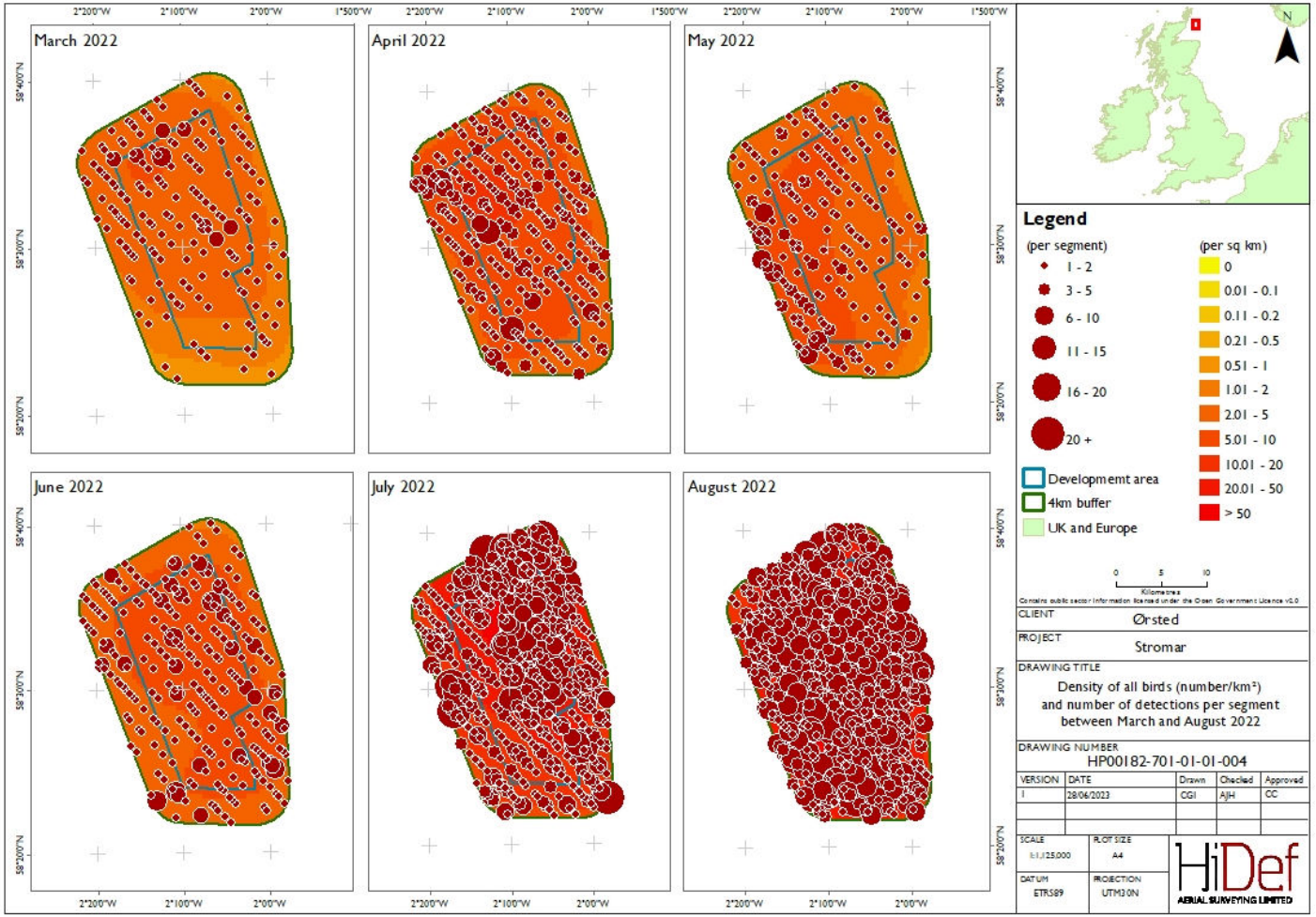
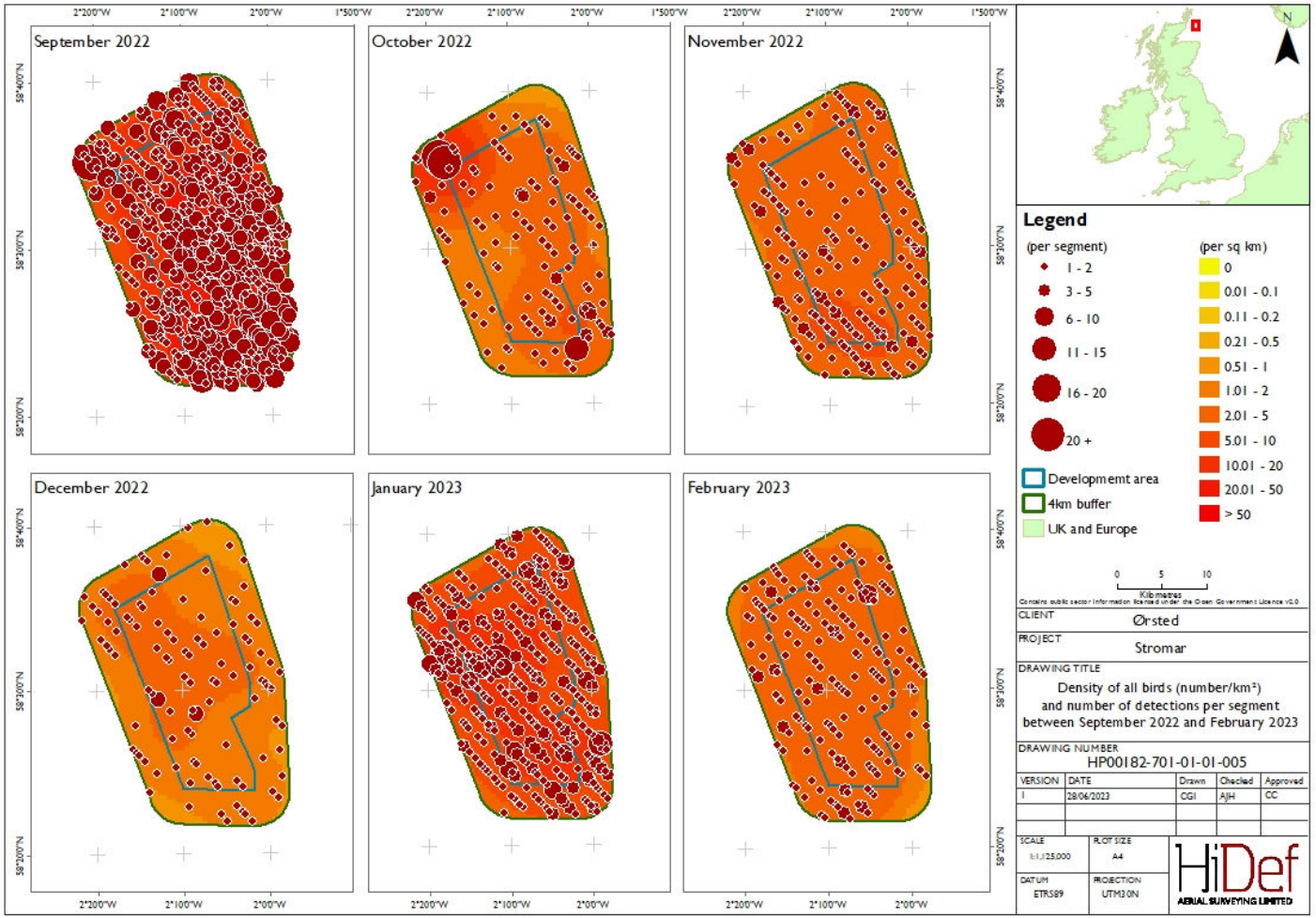


Figure 6 **Density of all birds (number/km²) and number of detections per segment in the Stromar survey area between September 2022 and February 2023**



3.3.2 Kittiwake

70 Kittiwakes were recorded in relatively low numbers during the survey period, with the exception of July 2022, when numbers peaked at 398 birds (Figure 7). A total of one dead bird was recorded during the survey period (June 2022) – this did not meet the threshold removal criteria.

71 Density estimates for the species ranged between 0.01 birds/km^2 (95% CI 0.00 – 0.04) in May 2022 and 5.44 birds/km^2 (95% CI 2.93 – 9.40) in July 2022 (Figure 8 and Table 9), equating to 8 birds (95% CI 0 – 24) and 3,226 birds (95% CI 1,739 – 5,579) respectively.

72 Kittiwakes were distributed throughout the survey area. In July 2022 when records peaked, the highest density of birds was found in the north of the buffer and the east of the development area (Figure 9). In other months, the distribution of birds varied, with kittiwakes distributed in both the development area and buffer. In October 2022, kittiwakes were mainly recorded in the development area (Figure 10) and in January 2023, distributed towards the north, west and south-east of the survey area.

73 Of the birds that could be aged, 94% were recorded as adults, with the largest number of juvenile birds recorded in August 2022 (Table 10).

74 Over the survey period, 58% of birds were recorded flying, with a large number of birds recorded as sitting on the water in July 2022 (Table 11). In June 2022, one kittiwake was recorded as dead.

75 Kittiwakes were recorded flying in every month (Figure 11). In July 2022, when abundance peaked, birds were mainly heading in northerly to north-westerly directions.

Figure 7 Number of alive kittiwakes recorded between March 2022 and February 2023 in the Stromar survey area

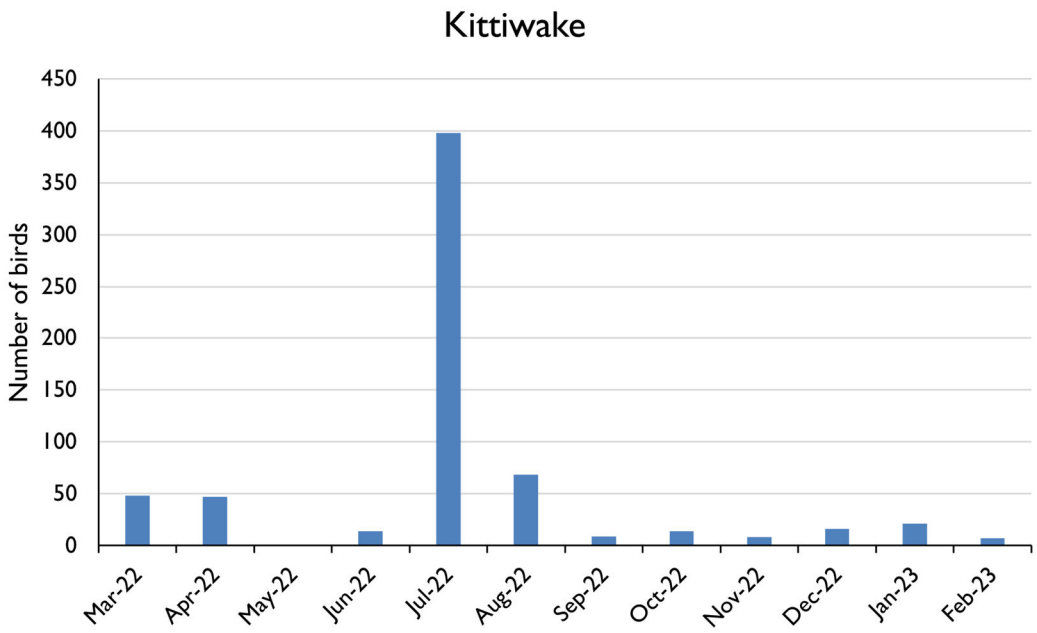


Figure 8 Kittiwake density estimates, with 95% lower and upper confidence limits, in the Stromar survey area, between March 2022 and February 2023

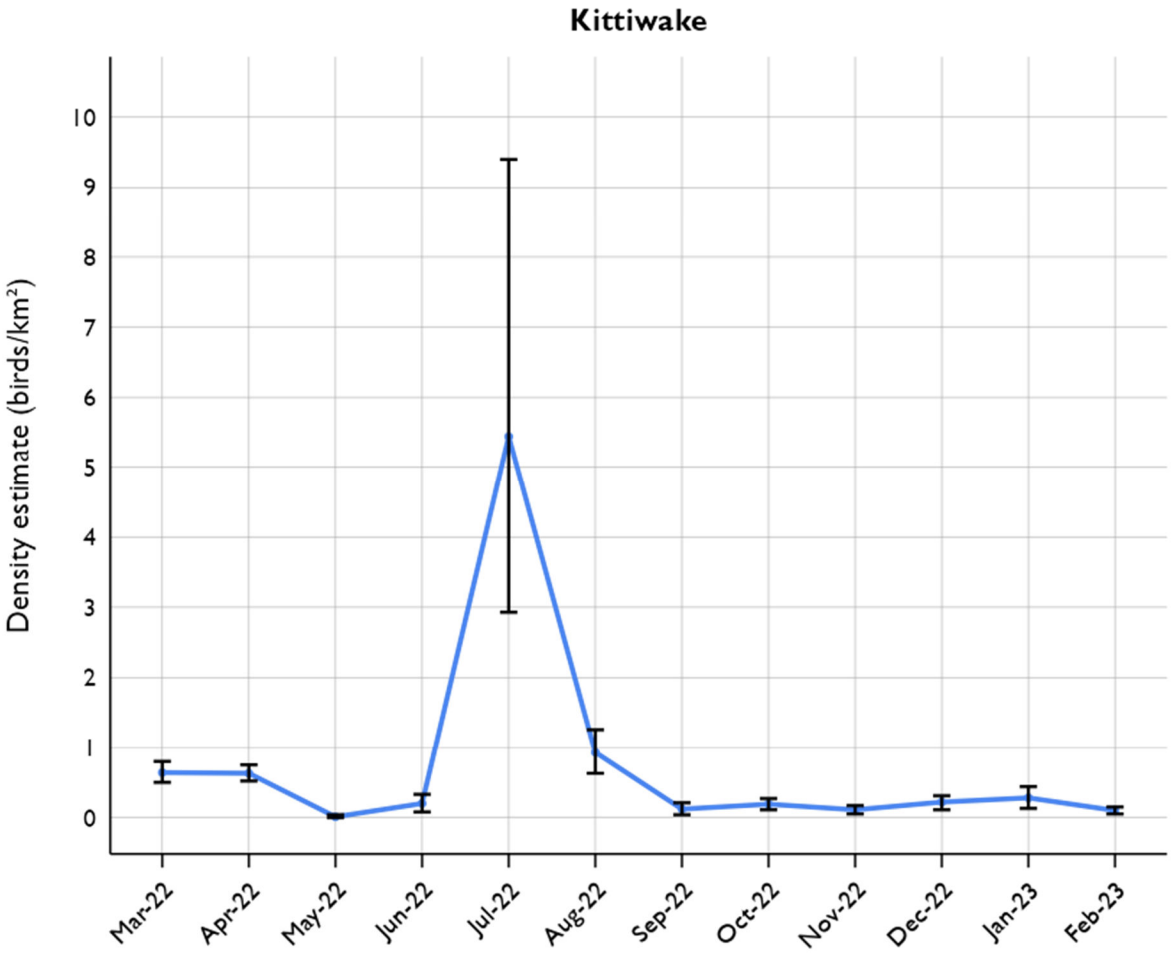


Table 9 Density and population estimates of kittiwake in the Stromar survey area between March 2022 and February 2023

Survey date	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
20 March 2022	0.64	383	298	475	47	12.11
02 April 2022	0.63	376	308	446	36	9.57
07 May 2022	0.01	8	0	24	8	97.07
20 June 2022	0.2	118	46	199	41	34.2
23 July 2022	5.44	3226	1739	5579	1040	32.23
22 August 2022	0.92	542	382	723	90	16.47
03 September 2022	0.12	72	23	123	27	36.59
13 October 2022	0.19	112	67	161	25	22.36
02 November 2022	0.11	65	31	103	19	29.04
03 December 2022	0.22	128	66	184	31	23.98
20 January 2023	0.28	170	80	261	48	27.84
25 February 2023	0.10	58	30	92	17	29.44

Table 10 Summary of kittiwake ages in the Stromar survey area between March 2022 and February 2023

Survey date	Number recorded as adult	Number recorded as immature	Number recorded as juvenile	Number recorded as unknown	% Adult (from aged birds)	Total
20 March 2022	38	1	0	9	97	**48**
02 April 2022	40	0	0	7	100	**47**
07 May 2022	1	0	0	0	100	**1**
20 June 2022	12	2	0	0	86	**14**
23 July 2022	320	1	0	77	100	**398**
22 August 2022	35	0	16	17	69	**68**
03 September 2022	4	0	4	1	50	**9**
13 October 2022	9	0	4	1	69	**14**
02 November 2022	5	0	1	2	83	**8**
03 December 2022	14	0	0	2	100	**16**
20 January 2023	15	2	0	4	88	**21**
25 February 2023	7	0	0	0	100	**7**
Total	**500**	**6**	**25**	**120**	**94**	**651**

Table 11 Summary of kittiwake behaviours in the Stromar survey area between March 2022 and February 2023

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	Number recorded landing	% Flying	Total	Total recorded as dead
20 March 2022	0	42	6	0	0	88	**48**	0
02 April 2022	0	38	9	0	0	81	**47**	0
07 May 2022	0	1	0	0	0	100	**1**	0
20 June 2022	0	14	0	0	0	100	**14**	1
23 July 2022	0	148	248	1	1	37	**398**	0
22 August 2022	0	66	2	0	0	97	**68**	0
03 September 2022	0	7	2	0	0	78	**9**	0
13 October 2022	0	14	0	0	0	100	**14**	0
02 November 2022	0	6	2	0	0	75	**8**	0
03 December 2022	0	15	1	0	0	94	**16**	0
20 January 2023	0	17	4	0	0	81	**21**	0
25 February 2023	0	7	0	0	0	100	**7**	0
Total	**0**	**375**	**274**	**1**	**1**	**58**	**651**	**1**

Figure 9 **Detections, density of kittiwakes (number/km²) and number of detections per segment in the Stromar survey area between March and August 2022**

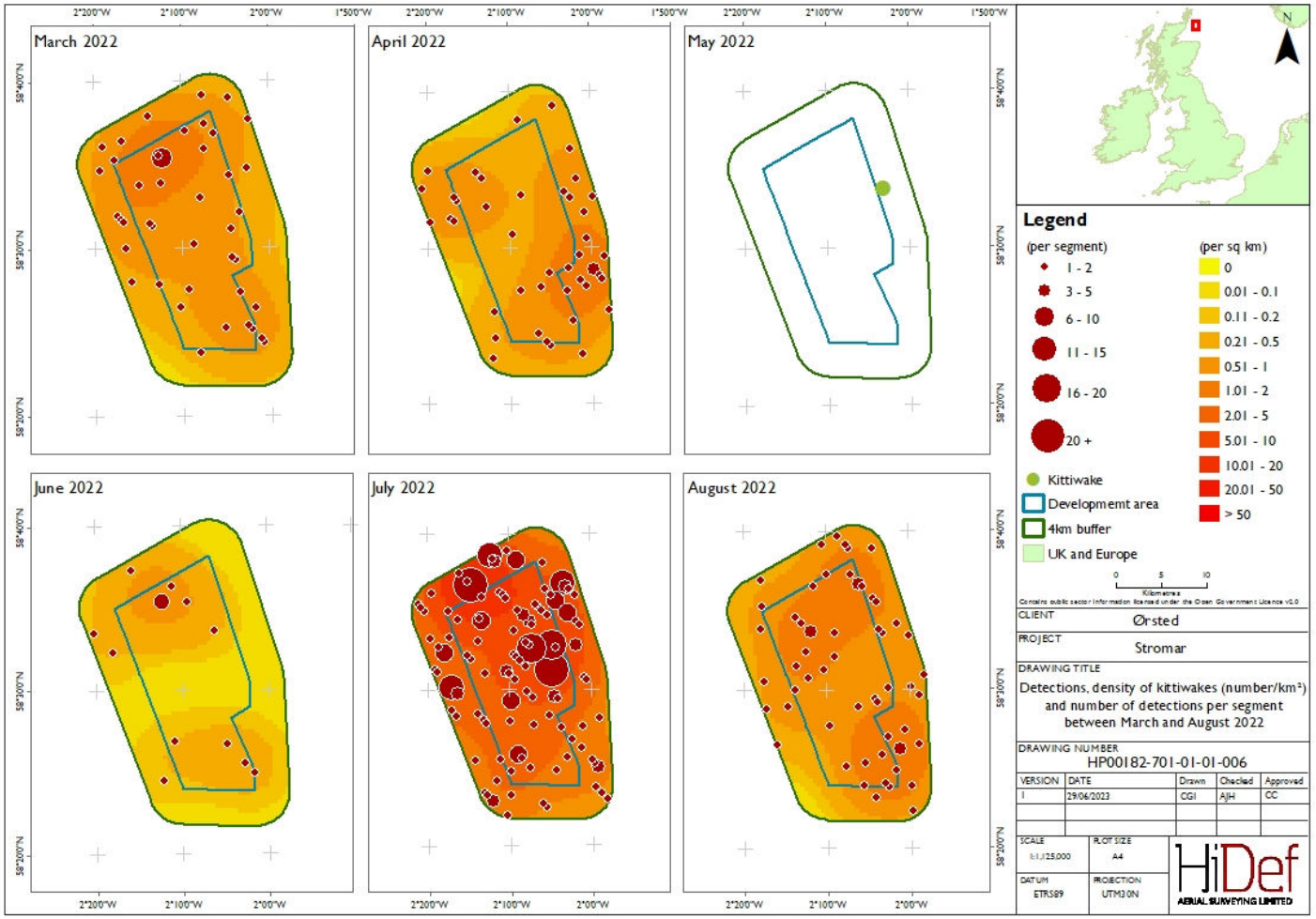


Figure 10 **Density of kittiwakes (number/km²) and number of detections per segment in the Stromar survey area between September 2022 and February 2023**

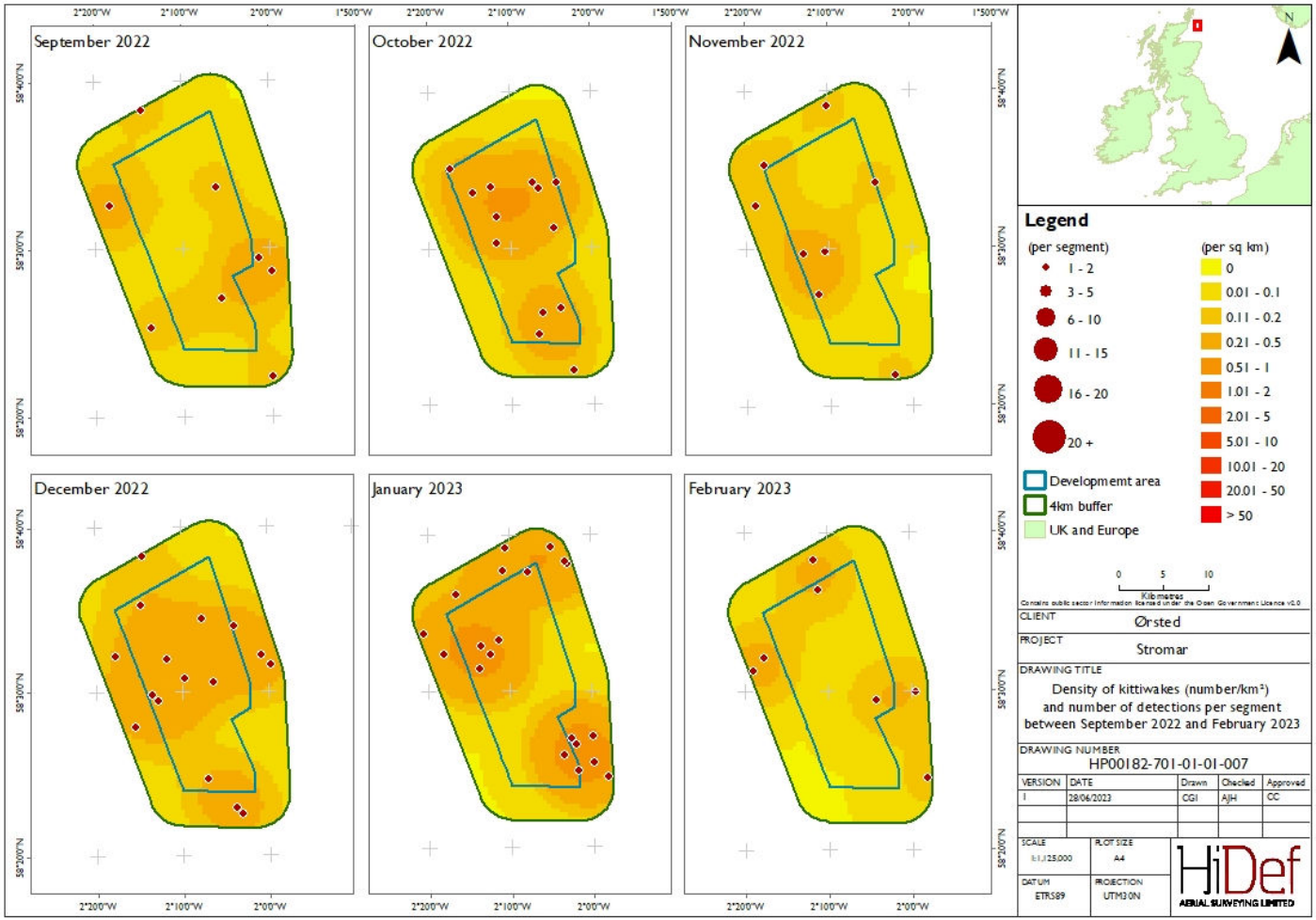
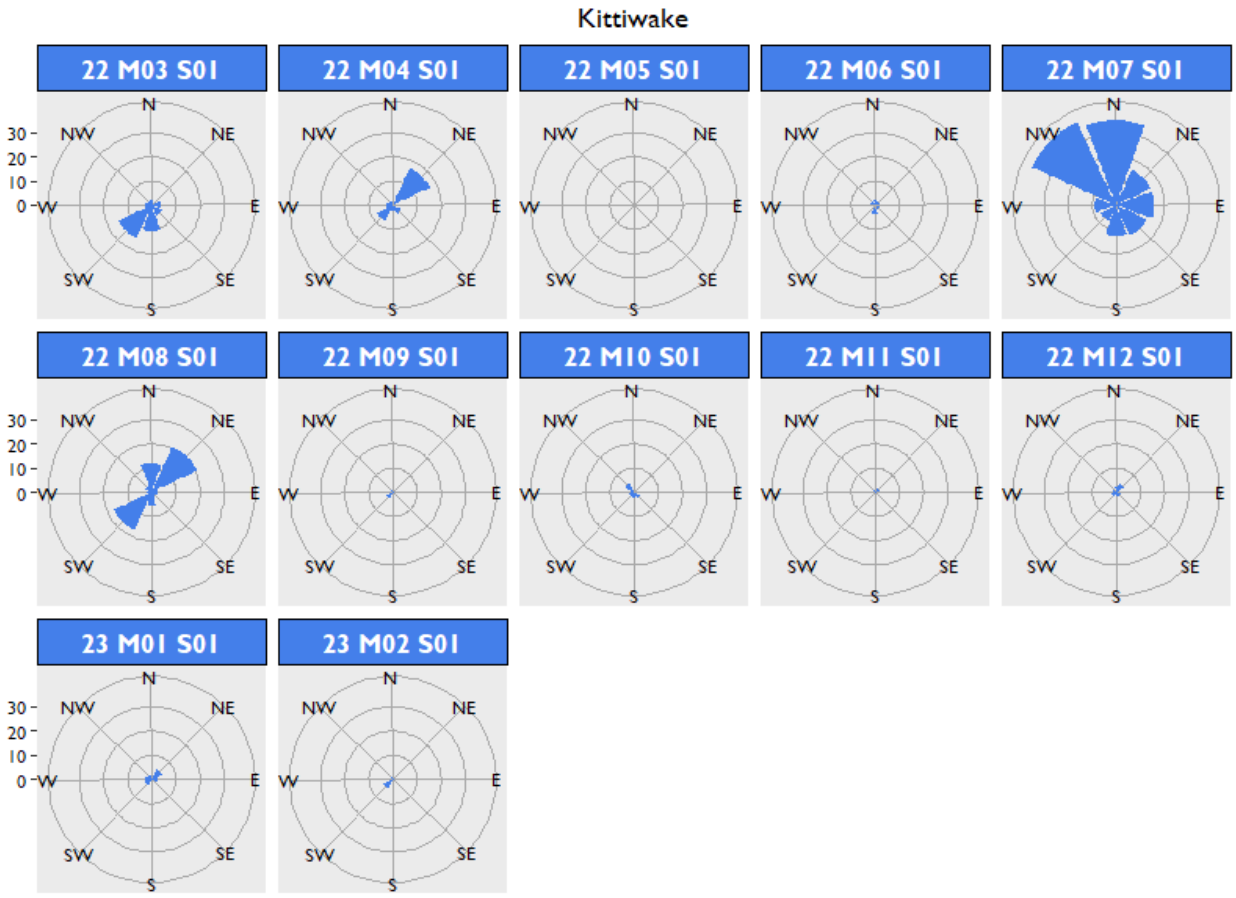


Figure 11 Summarised direction of movement of flying kittiwakes in the Stromar survey area between March 2022 and February 2023



3.3.3 Great black-backed gull

76 Great black-backed gulls were recorded in relatively low numbers during the non-breeding season, with little to no observations recorded in the breeding season between March and September 2022 (Figure 12). In addition, a total of one bird was observed as dead in June 2023 (Table 14) – this did not meet the threshold removal criteria.

77 When recorded, density estimates for the species ranged between 0.01 birds/km^2 (95% CI 0.00 – 0.04) in June 2022 and 0.58 birds/km^2 (95% CI 0.29 – 0.86) in January 2023 (Figure 13 and Table 12), equating to 8 birds (95% CI 0 – 24) and 346 birds (95% CI 170 – 513) respectively.

78 Relatively high densities of great black-backed gulls were observed in the north-west and west of the buffer and development area in October and November 2022 (Figure 15) with birds being more widespread in December 2022, January and February 2023. In April 2022, great black-backed gulls were distributed within the northern half of the survey area (Figure 14).

79 Of the birds that could be aged, 77% were recorded as adults, with the immature birds primarily recorded between October 2022 and January 2023 (Table 13).

80 Over the survey period, 36% of birds were recorded flying, with a total of 101 birds reported as sitting on the water across the 12-month period (Table 14).

81 There were survey months in which no data regarding flight direction were available, therefore, only surveys which contained flight direction data are displayed (Figure 16). In January 2023, when numbers of flying birds peaked, birds were mainly heading in westerly and north-easterly directions, while in December 2022, birds were flying in multiple directions.

Figure 12 Number of alive great black-backed gulls recorded between March 2022 and February 2023 in the Stromar survey area

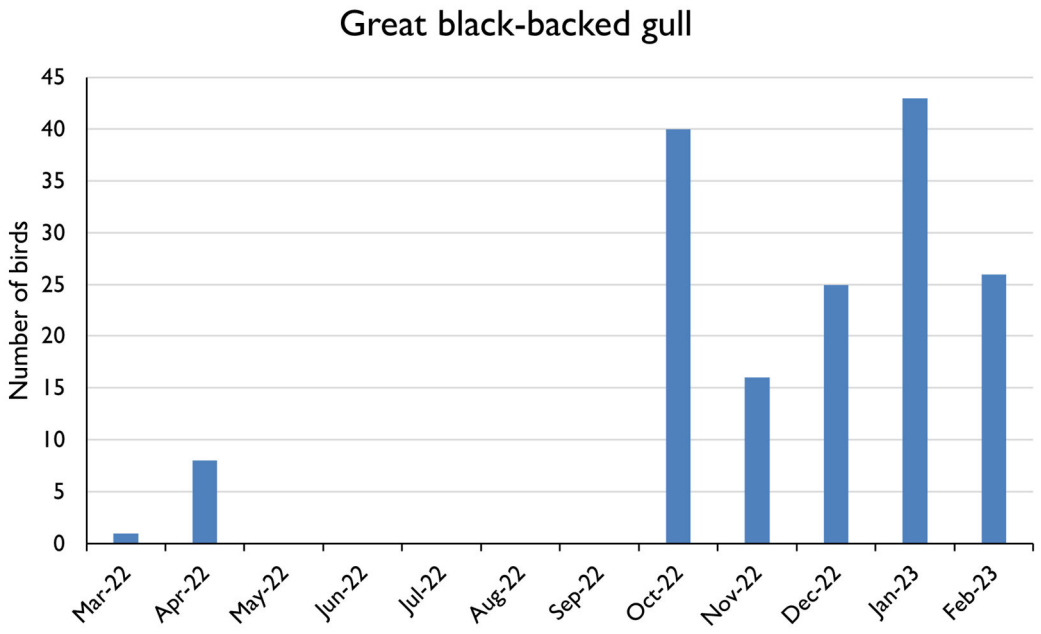


Figure 13 **Great black-backed gull density estimates, with 95% lower and upper confidence limits, in the Stromar survey area, between March 2022 and February 2023**

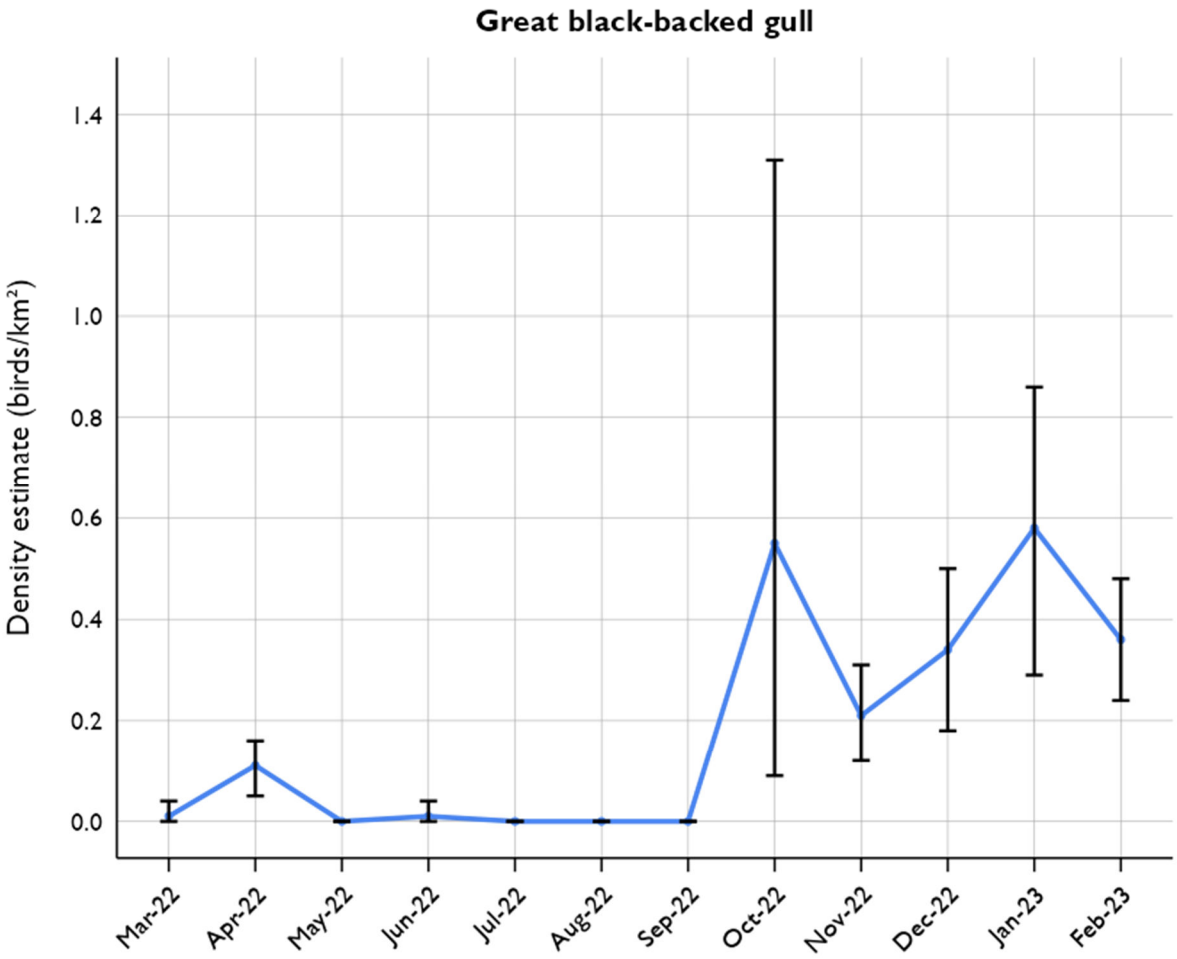


Table 12 Density and population estimates of great black-backed gull in the Stromar survey area between March 2022 and February 2023

Survey date	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
20 March 2022	0.01	9	0	24	8	90.52
02 April 2022	0.11	64	32	95	16	24.33
07 May 2022	0.00	0	0	0	0	0.00
20 June 2022	0.01	8	0	24	8	92.12
23 July 2022	0.00	0	0	0	0	0.00
22 August 2022	0.00	0	0	0	0	0.00
03 September 2022	0.00	0	0	0	0	0.00
13 October 2022	0.55	325	54	779	220	67.55
02 November 2022	0.21	127	74	183	28	21.89
03 December 2022	0.34	200	105	295	48	23.71
20 January 2023	0.58	346	170	513	89	25.64
25 February 2023	0.36	213	146	286	36	16.78

Table 13 Summary of great black-backed gull ages in the Stromar survey area between March 2022 and February 2023

Survey date	Number recorded as adult	Number recorded as immature	Number recorded as juvenile	Number recorded as unknown	% Adult (from aged birds)	Total
20 March 2022	1	0	0	0	100	**1**
02 April 2022	4	4	0	0	50	**8**
07 May 2022	0	0	0	0	-	**0**
20 June 2022	0	0	0	0	-	**0**
23 July 2022	0	0	0	0	-	**0**
22 August 2022	0	0	0	0	-	**0**
03 September 2022	0	0	0	0	-	**0**
13 October 2022	34	5	0	1	87	**40**
02 November 2022	11	2	1	2	79	**16**
03 December 2022	15	3	0	7	83	**25**
20 January 2023	32	4	0	7	89	**43**
25 February 2023	13	13	0	0	100	**26**
Total	**110**	**31**	**1**	**17**	**77**	**159**

Table 14 Summary of great black-backed gull behaviours in the Stromar survey area between March 2022 and February 2023

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	% Flying	Total	Number recorded as dead
20 March 2022	0	1	0	0	100	**1**	0
02 April 2022	0	3	5	0	38	**8**	0
07 May 2022	0	0	0	0	-	**0**	0
20 June 2022	0	0	0	0	-	**0**	1
23 July 2022	0	0	0	0	-	**0**	0
22 August 2022	0	0	0	0	-	**0**	0
03 September 2022	0	0	0	0	-	**0**	0
13 October 2022	0	4	36	0	10	**40**	0
02 November 2022	0	3	13	0	19	**16**	0
03 December 2022	0	15	10	0	60	**25**	0
20 January 2023	0	21	22	0	49	**43**	0
25 February 2023	0	11	15	0	42	**26**	0
Total	**0**	**58**	**101**	**0**	**36**	**159**	**1**

Figure 14 **Detections, density of great black-backed gulls (number/km²) and number of detections per segment in the Stromar survey area between March and August 2022**

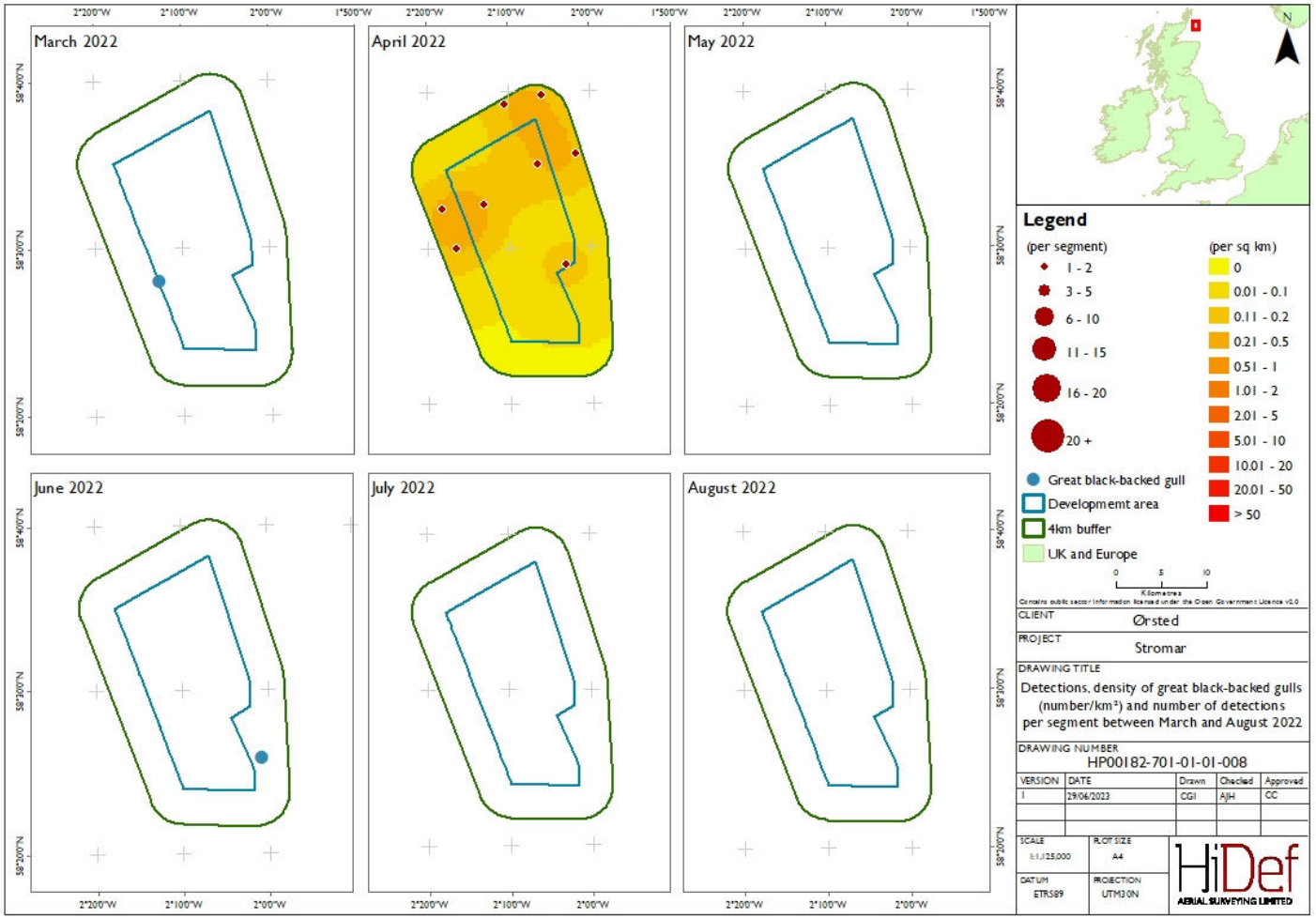


Figure 15 Density of great black-backed gulls (number/km²) and number of detections per segment in the Stromar survey area between September 2022 and February 2023

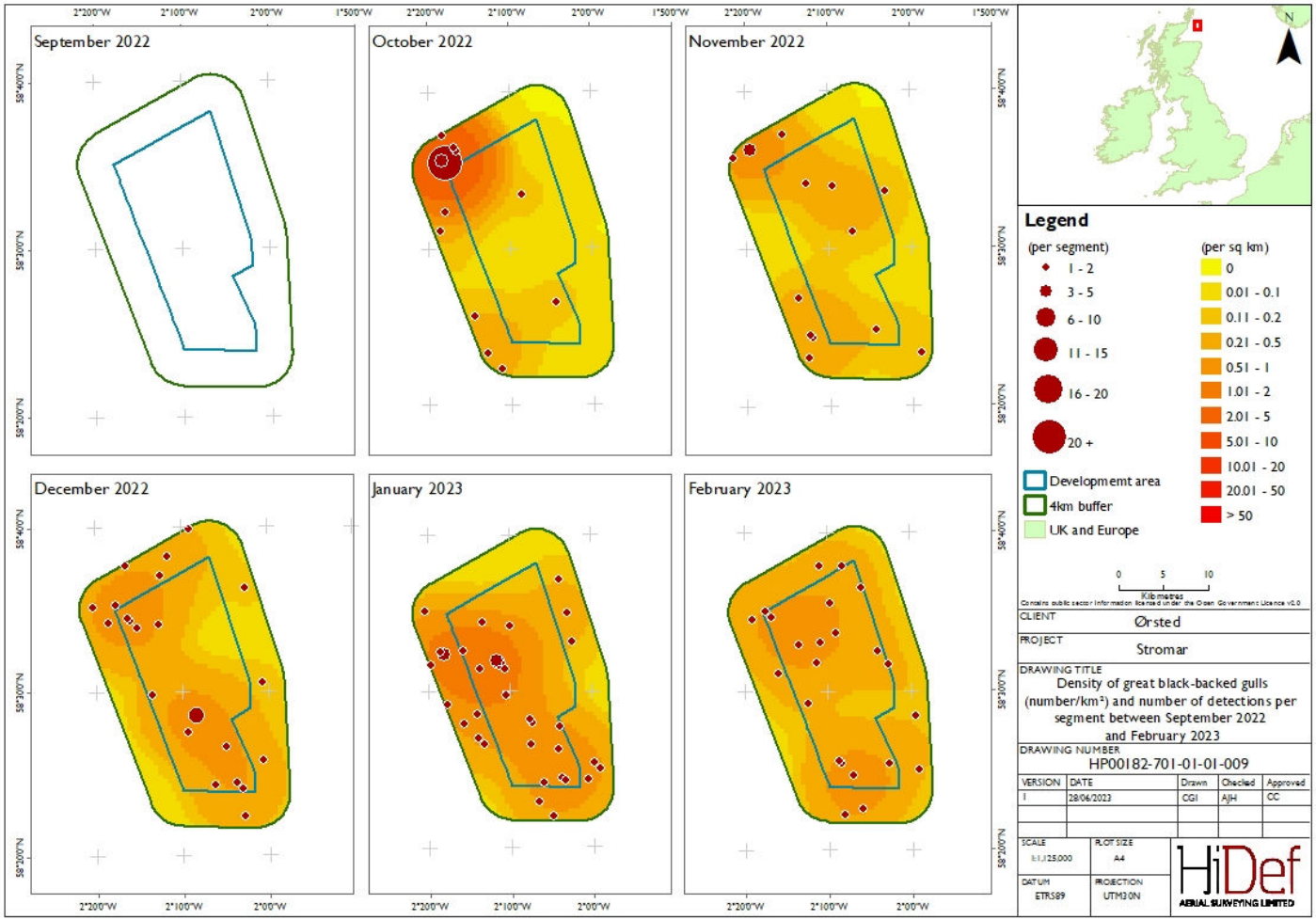


Figure 16 Summarised direction of movement of flying great black-backed gulls in the Stromar survey area between March 2022 and February 2023

3.3.4 Guillemot

82 Guillemots were the most abundant species recorded, with observations peaking in August 2022 during the post-migration period, with 2,776 records (Figure 17). A total of 6,512 birds were recorded throughout the 12-month survey period.

83 Absolute density estimates for the species ranged between 0.13 birds/km^2 (95% CI 0.01 – 0.26) in December 2022 and 49.40 birds/km^2 (95% CI 41.34 – 58.55) in August 2022 (Figure 18 and Table 15), equating to 75 birds (95% CI 11 – 158) and 29,130 birds (95% CI 24,382 – 34,524) respectively.

84 Guillemots were found throughout the survey area. In August and September 2022, when records peaked, density of the birds were spread across the whole survey area (Figure 19 and Figure 20).

85 Age data for guillemots are not presented since adults can only be aged when in the presence of a juvenile for size comparison, and they occur almost always as single adult-chick pairs. In July and August 2022 at least 40 and one adult-juvenile pairs were recorded, respectively.

86 As expected for the species, the majority of the birds were recorded sitting on the water with less than 1% of all birds recorded flying (Table 16).

87 There were survey months in which no data regarding flight direction were available, therefore, only surveys which contained flight direction data are displayed (Figure 21). In April 2022 birds were mainly heading north, while in June 2022 birds were mainly flying in north-west and south-east. In January 2023 birds primarily flew south-east.

Figure 17 Number of guillemots recorded between March 2022 and February 2023 in the Stromar survey area

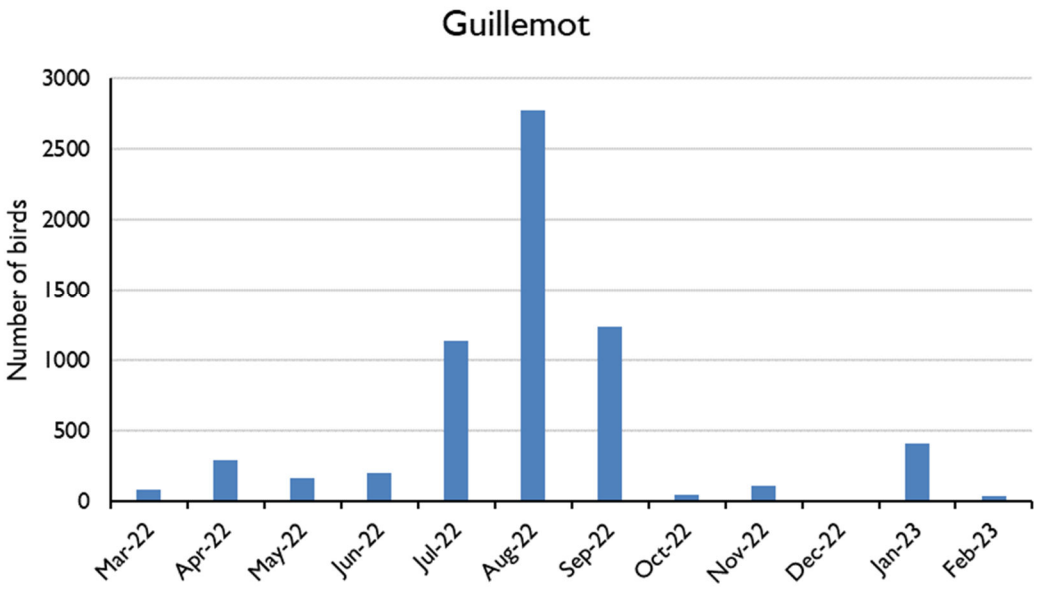


Figure 18 Guillemot absolute density estimates, with 95% lower and upper confidence limits, in the Stromar survey area, between March 2022 and February 2023

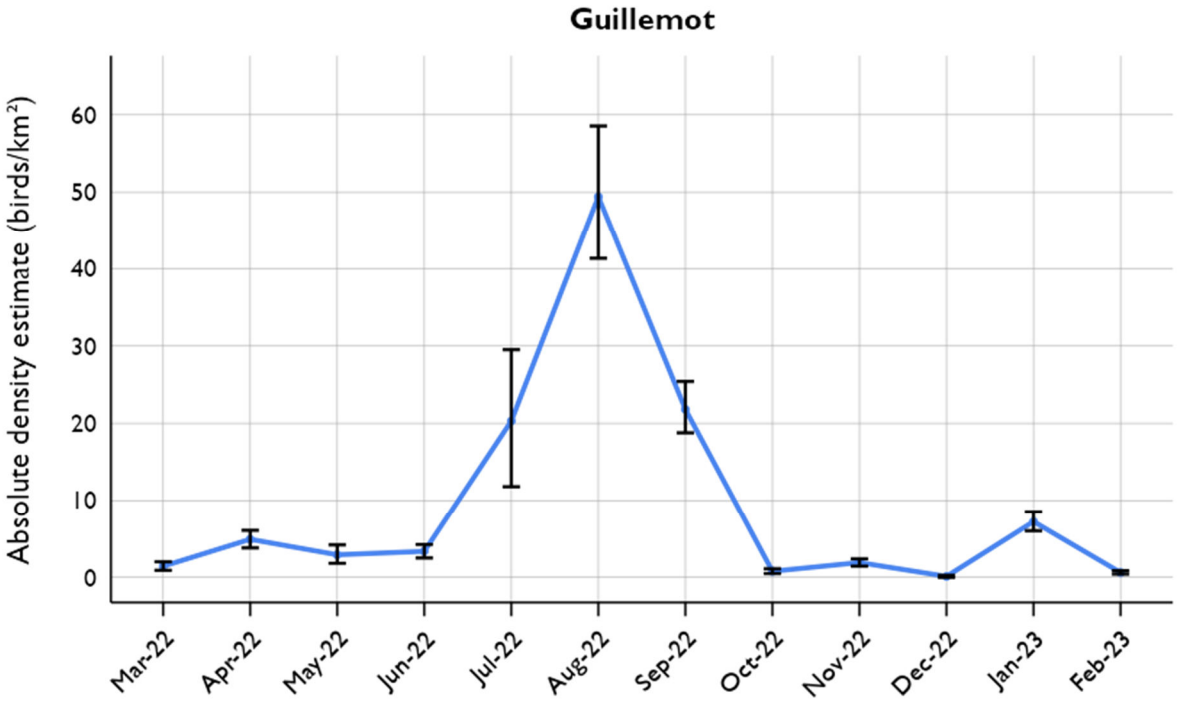


Table 15 Relative and absolute monthly density and population estimates for guillemot in the Stromar survey area between March 2022 and February 2023, accounting for birds estimated as unavailable for detection

Survey date	Relative estimates						Absolute estimates					
	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
20 March 2022	1.11	659	443	901	117	17.67	1.44	852	545	1198	161	18.90
02 April 2022	4.01	2381	1956	2801	216	9.05	4.92	2921	2261	3598	254	8.70
07 May 2022	2.29	1360	939	1889	250	18.36	2.92	1732	1088	2492	340	19.63
20 June 2022	2.76	1638	1377	1903	138	8.40	3.36	1998	1496	2514	180	9.01
23 July 2022	15.56	9236	5499	13354	1964	21.27	20.30	12044	7013	17522	2805	23.29
22 August 2022	37.54	22141	18628	26227	1993	9.00	49.40	29130	24382	34524	2825	9.70
03 September 2022	16.63	9808	8432	11611	819	8.35	21.81	12859	11074	14987	1127	8.76
13 October 2022	0.64	378	268	479	53	14.00	0.79	473	294	669	74	15.64
02 November 2022	1.47	872	664	1088	107	12.24	1.92	1143	860	1429	144	12.60
03 December 2022	0.10	58	8	127	31	52.27	0.13	75	11	158	43	57.33
20 January 2023	5.61	3330	2930	3779	223	6.67	7.21	4276	3570	5061	324	7.58
25 February 2023	0.48	285	190	391	50	17.4	0.63	375	257	516	71	18.93

Table 16 Summary of guillemot behaviours in the Stromar survey area between March 2022 and February 2023

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	% Flying	Total
20 March 2022	0	5	77	0	6	**82**
02 April 2022	0	78	217	0	26	**295**
07 May 2022	0	32	137	0	19	**169**
20 June 2022	0	60	145	0	29	**205**
23 July 2022	8	13	1116	0	1	**1137**
22 August 2022	0	2	2774	0	0	**2776**
03 September 2022	0	2	1233	0	0	**1235**
13 October 2022	1	6	40	0	13	**47**
02 November 2022	0	3	106	0	3	**109**
03 December 2022	0	0	7	0	0	**7**
20 January 2023	0	36	379	0	9	**415**
25 February 2023	0	0	35	0	0	**35**
Total	**9**	**237**	**6266**	**0**	**0**	**6512**

Figure 19 Density of guillemots (number/km²) and number of detections per segment in the Stromar survey area between March and August 2022

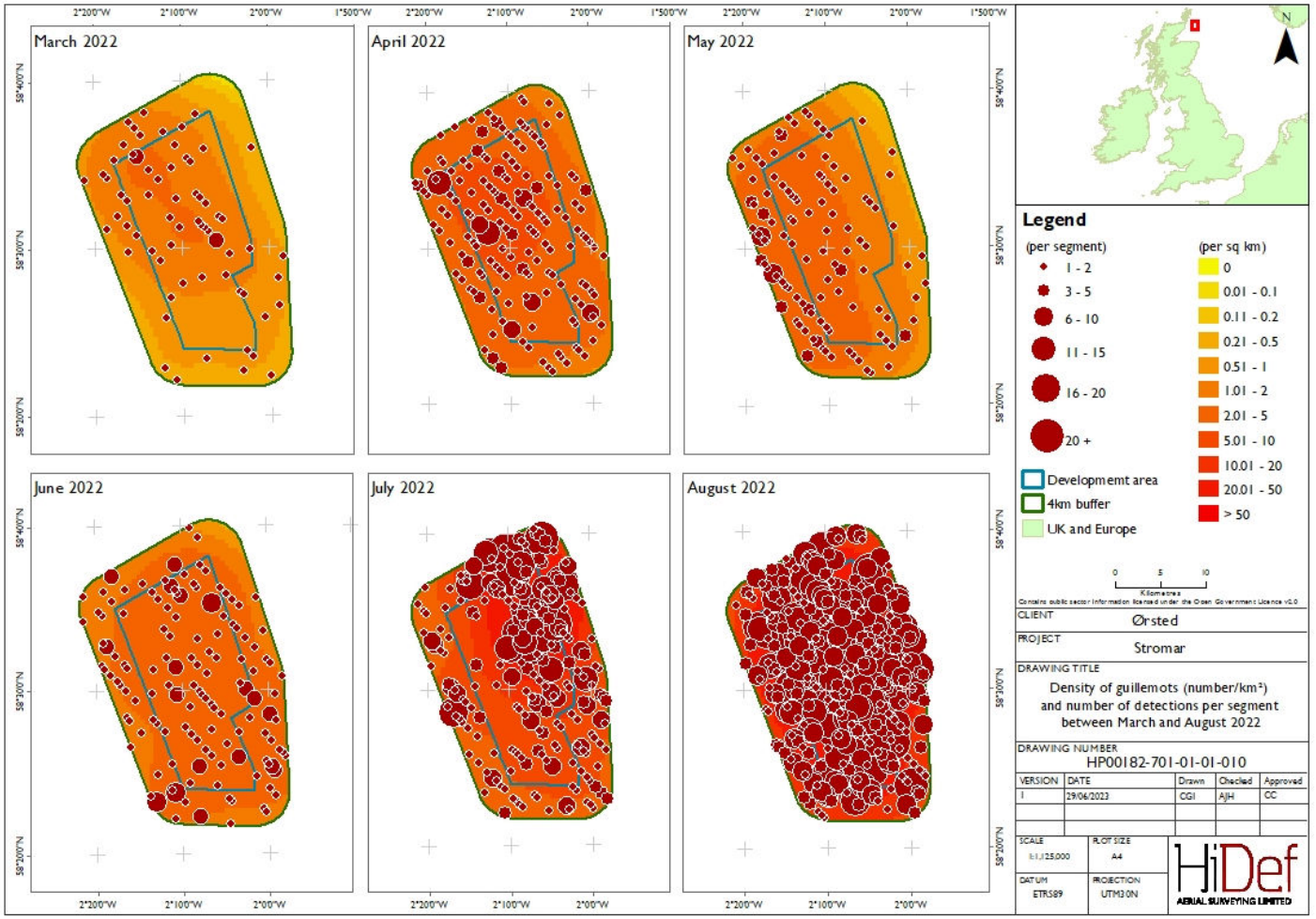


Figure 20 Density of guillemots (number/km²) and number of detections per segment in the Stromar survey area between September 2022 and February 2023

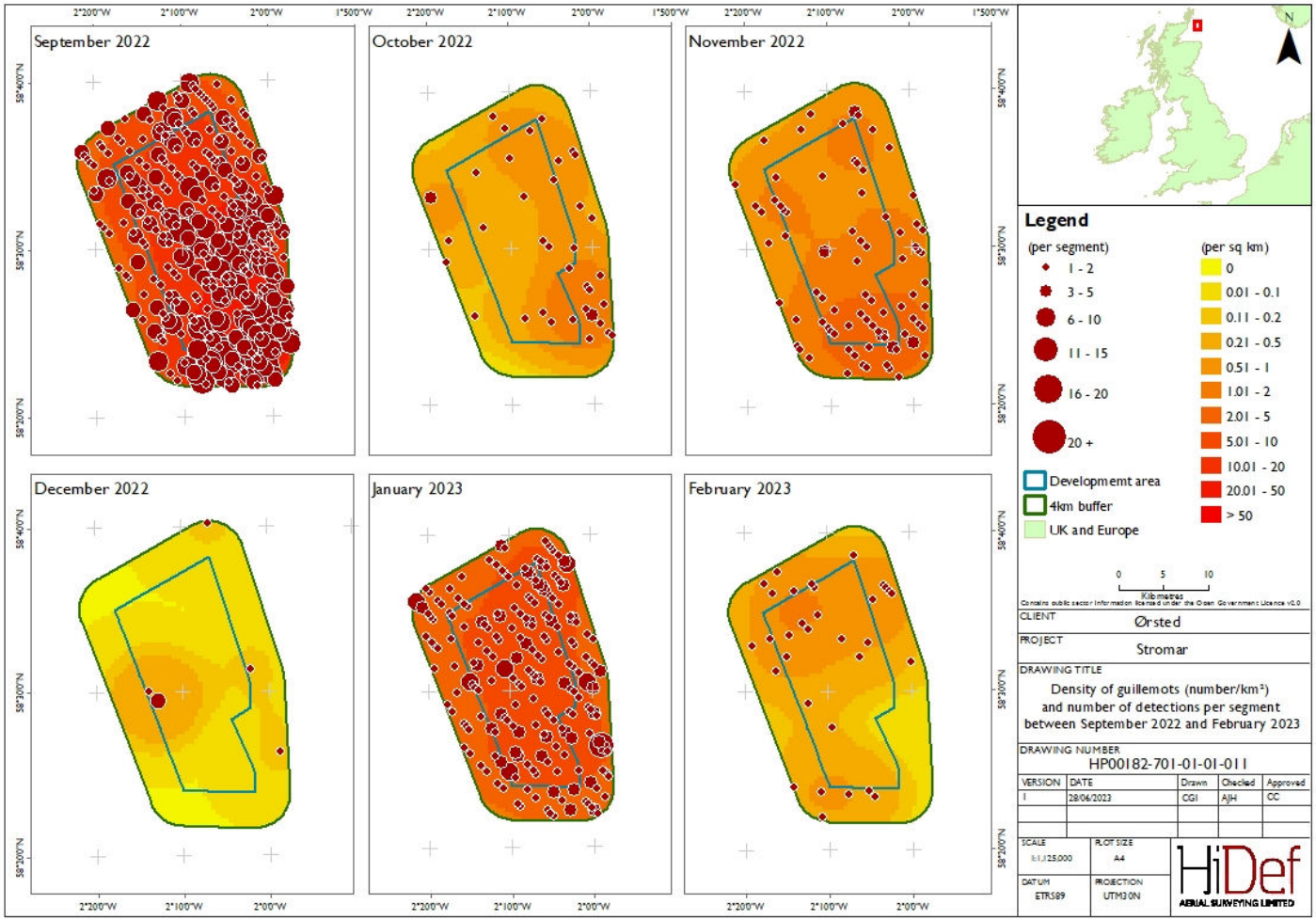
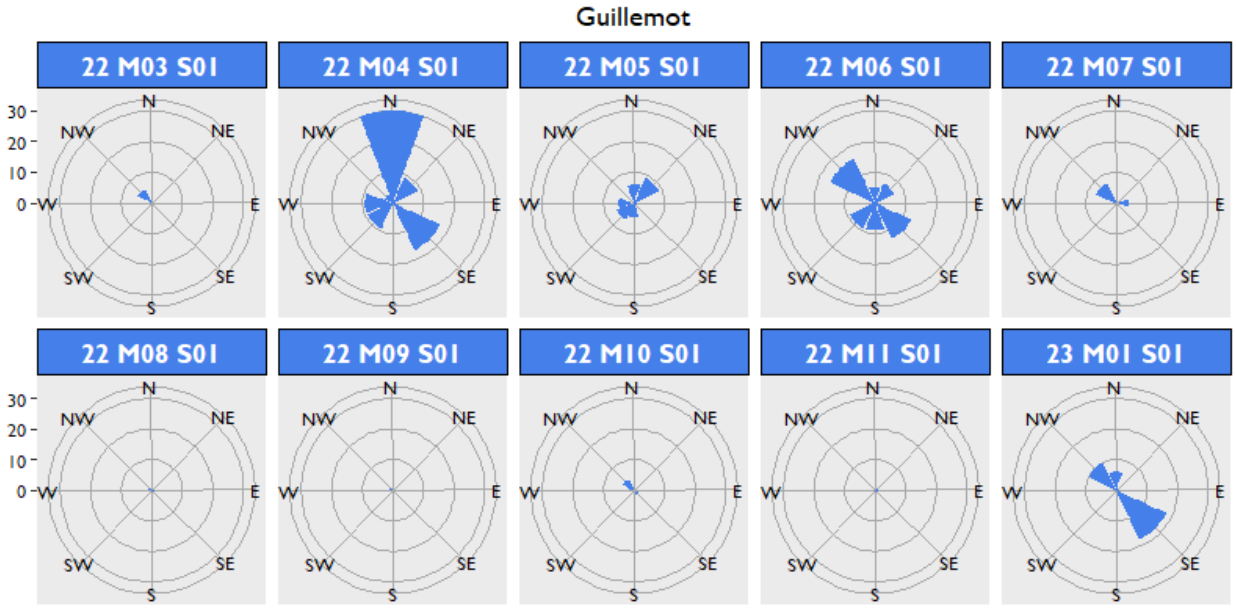


Figure 21 Summarised direction of movement of flying guillemots in the Stromar survey area between March 2022 and February 2023



3.3.5 Razorbill

88 Razorbills were recorded in relatively low numbers during the breeding season, except in July 2022 when numbers peaked (Figure 22). Few birds were recorded during the non-breeding season.

89 When recorded, absolute density estimates for the species ranged between 0.01 birds/km^2 (95% CI 0.00 – 0.05) in October 2022 and 6.64 birds/km^2 (95% CI 4.39 – 9.02) in July 2022 (Figure 23 and Table 17), equating to 11 birds (95% CI 0 – 29) and 3,938 birds (95% CI 2,606 – 5,354) respectively.

90 Razorbills were found throughout the survey area, with higher densities generally observed the south and west of the survey area in April 2022 and May 2022 respectively (Figure 24). In June 2022, higher densities were observed in the south-east of the buffer whereas in June and August 2022 higher densities were recorded in the centre of the development area. In September 2022, higher densities of razorbills were recorded in the south-west of the survey area (Figure 25).

91 Age data for razorbills, like for guillemots, are not presented since adults can only be aged when in the presence of a juvenile for size comparison, and they occur almost always as single adult-chick pairs. Seventeen adult-juvenile pairs were recorded in July 2022.

92 Over the survey period, 4% of birds were recorded flying, with most birds recorded as sitting on the water, especially in July 2022 when over 400 sitting birds were recorded (Table 18).

93 There were survey months in which no data regarding flight direction were available, therefore, only surveys which contained flight direction data are displayed (Figure 26). In April 2022 birds were mainly heading in northerly and southerly directions.

Figure 22 Number of razorbills recorded between March 2022 and February 2023 in the Stromar survey area

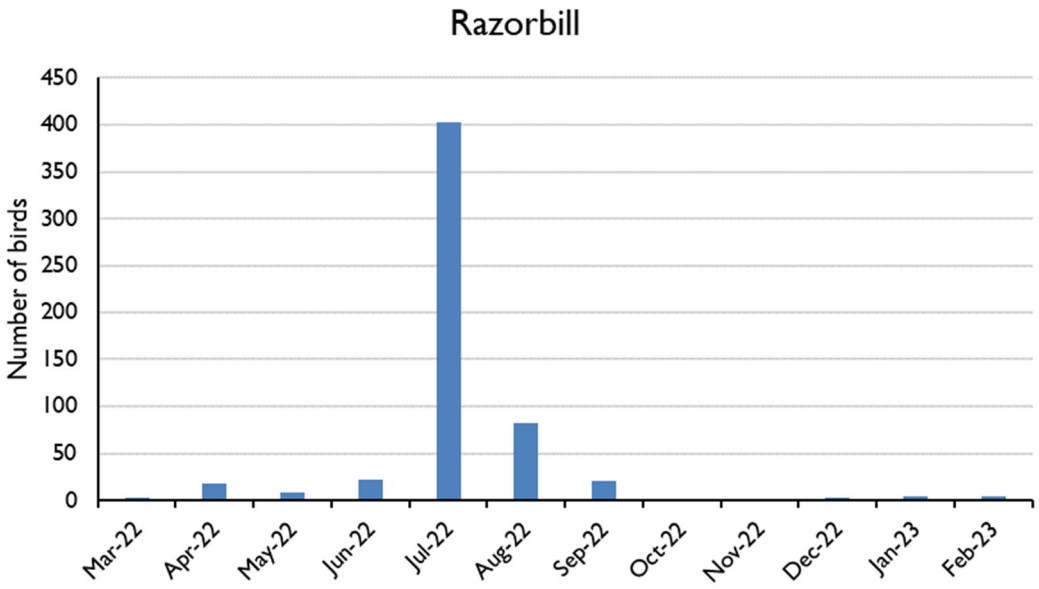


Figure 23 Razorbill absolute density estimates, with 95% lower and upper confidence limits, in the Stromar survey area, between March 2022 and February 2023

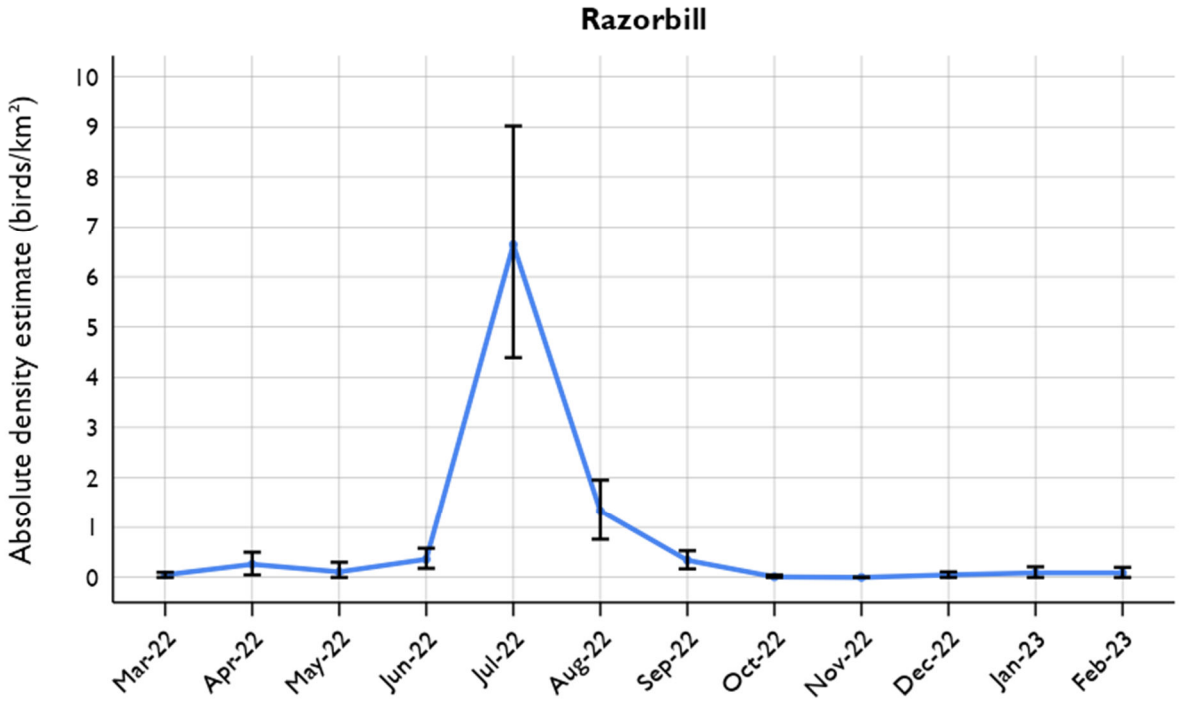


Table 17 Relative and absolute monthly density and population estimates for razorbill in the Stromar survey area between March 2022 and February 2023, accounting for birds estimated as unavailable for detection

Survey date	Relative estimates						Absolute estimates					
	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
20 March 2022	0.04	24	0	53	13	51.58	0.05	31	0	60	18	58.06
02 April 2022	0.24	145	48	248	52	35.53	0.26	157	29	300	59	37.58
07 May 2022	0.11	64	0	129	33	50.31	0.11	71	0	183	40	56.34
20 June 2022	0.30	177	103	263	41	22.82	0.36	215	106	342	59	27.44
23 July 2022	5.45	3234	2170	4411	585	18.07	6.64	3938	2606	5354	820	20.82
22 August 2022	1.08	638	356	979	159	24.77	1.33	784	446	1159	212	27.04
03 September 2022	0.29	169	89	259	45	26.45	0.34	205	101	313	64	31.22
13 October 2022	0.01	9	0	24	8	93.92	0.01	11	0	29	11	100.00
02 November 2022	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
03 December 2022	0.04	24	0	56	16	65.42	0.05	29	0	68	22	75.86
20 January 2023	0.07	41	0	104	30	73.84	0.09	49	0	127	42	85.71
25 February 2023	0.07	40	0	96	25	61.40	0.09	51	0	117	35	68.63

Table 18 Summary of razorbill behaviours in the Stromar survey area between March 2022 and February 2023

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	% Flying	Total
20 March 2022	0	0	3	0	0	**3**
02 April 2022	0	12	6	0	67	**18**
07 May 2022	0	4	4	0	50	**8**
20 June 2022	0	2	20	0	9	**22**
23 July 2022	0	0	403	0	0	**403**
22 August 2022	0	2	80	0	2	**82**
03 September 2022	0	0	21	0	0	**21**
13 October 2022	0	0	1	0	0	**1**
02 November 2022	0	0	0	0	-	**0**
03 December 2022	0	0	3	0	0	**3**
20 January 2023	0	0	5	0	0	**5**
25 February 2023	0	0	5	0	0	**5**
Total	**0**	**20**	**551**	**0**	**4**	**571**

Figure 24 Detections, density of razorbills (number/km²) and number of detections per segment in the Stromar survey area between March and August 2022

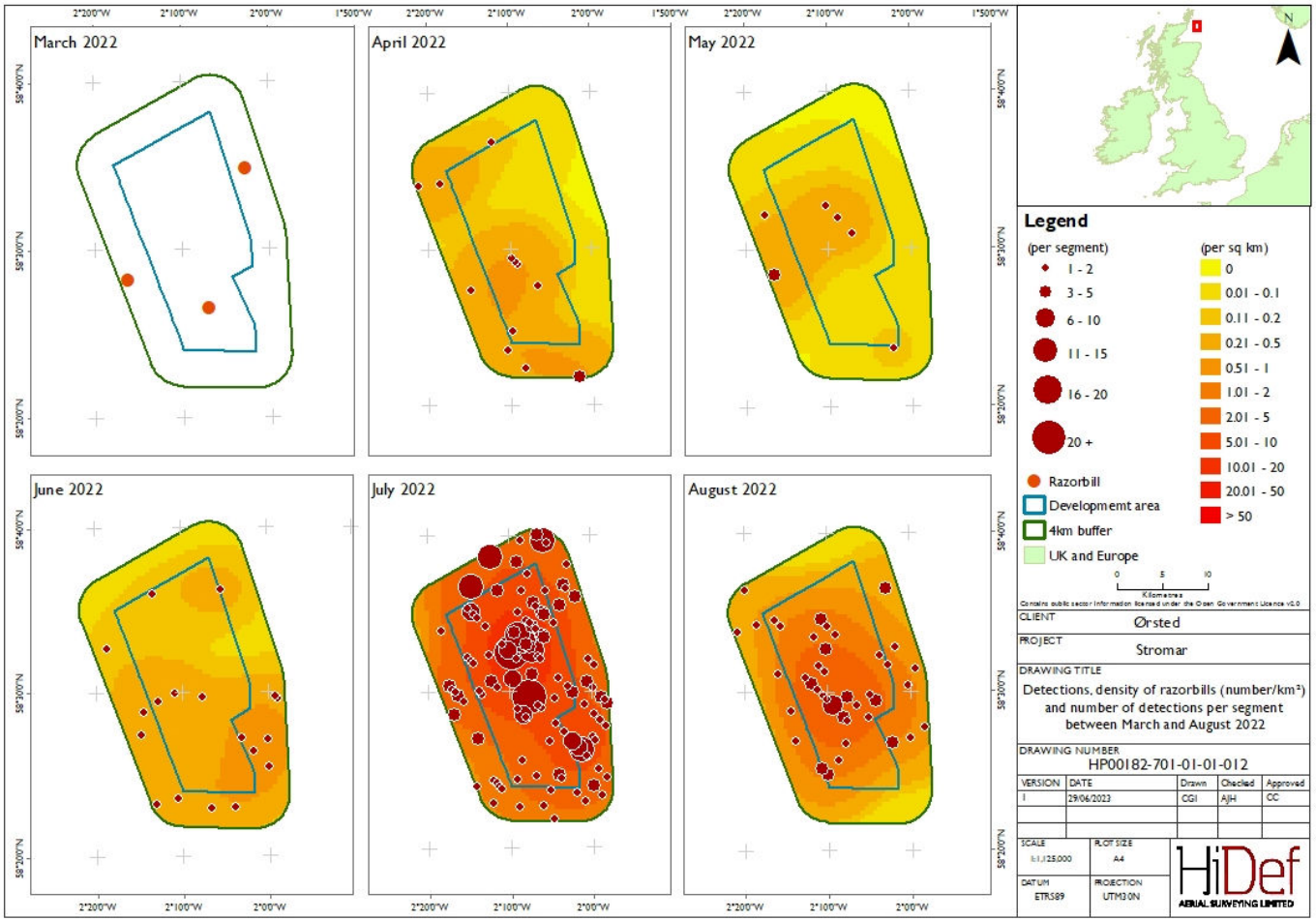


Figure 25 Detections, density of razorbills (number/km²) and number of detections per segment in the Stromar survey area between September 2022 and February 2023

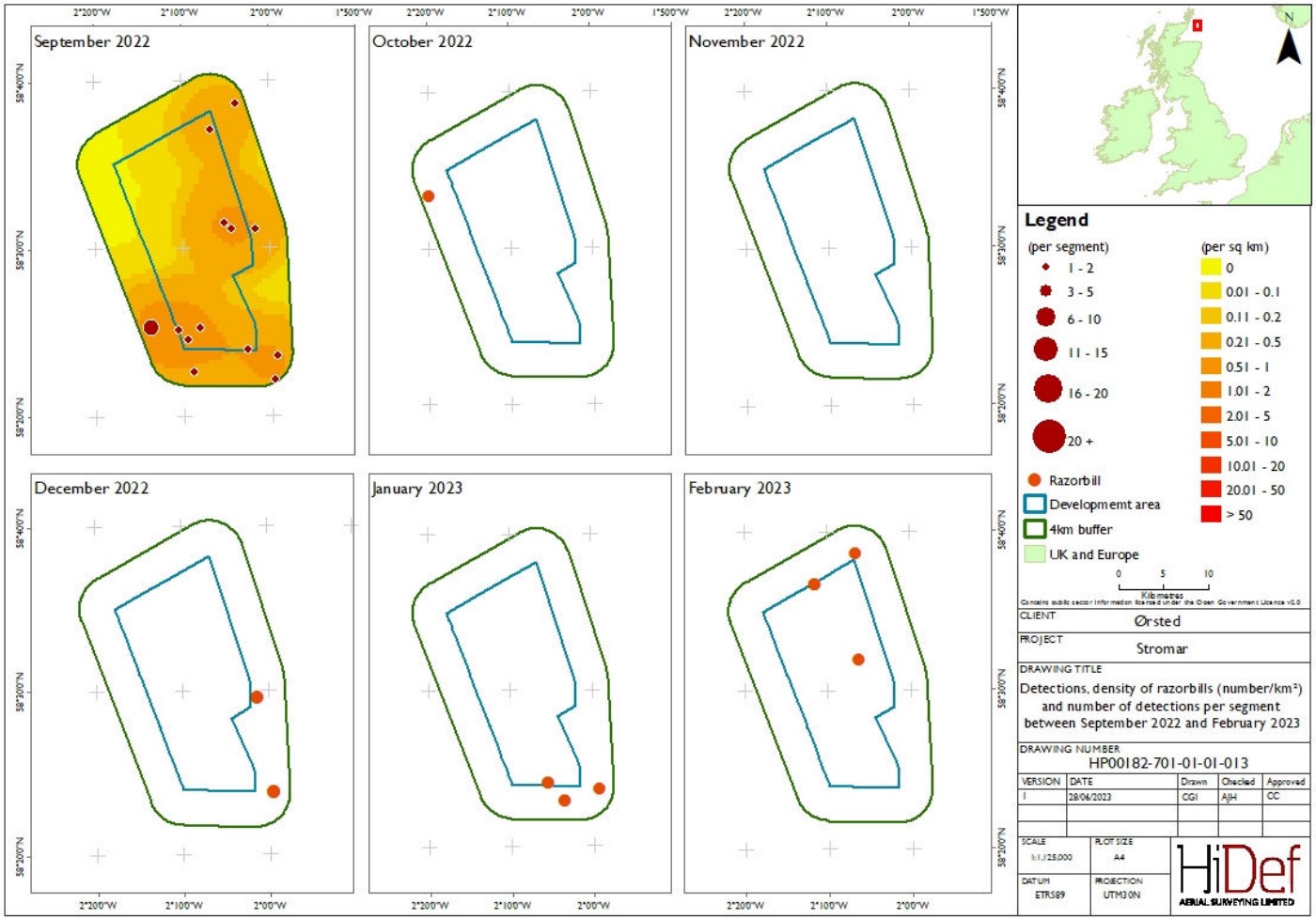
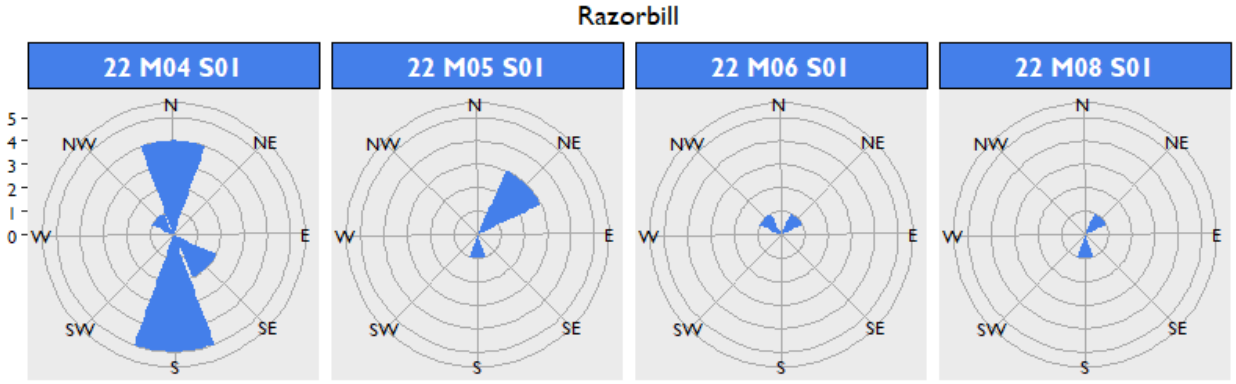


Figure 26 Summarised direction of movement of flying razorbills in the Stromar survey area between March 2022 and February 2023



3.3.6 Puffin

94 Puffins were the third most abundant species and were generally recorded during the breeding season between April and September 2022, peaking in August 2022 (Figure 27). No puffins were recorded between November 2022 and February 2023.

95 When recorded, absolute density estimates for the species ranged between 0.05 birds/km^2 (95% CI 0.00 – 0.13) in March 2022 and 6.72 birds/km^2 (95% CI 4.54 – 9.37) in August 2022 (Figure 28 and Table 19), equating to 30 birds (95% CI 0 – 77) and 3,962 birds (95% CI 2,678 – 5,524) respectively.

96 Puffins were found throughout the survey area, with no clear pattern in distribution (Figure 29 and Figure 30).

97 Many of the birds were recorded sitting on the water with only 1% of birds recorded flying (Table 20).

98 There were survey months in which no data regarding flight direction were available, therefore, only surveys which contained flight direction data are displayed (Figure 31). In May 2022, when numbers of flying birds peaked, birds were mainly heading north-east and east.

Figure 27 Number of puffins recorded between March 2022 and February 2023 in the Stromar survey area

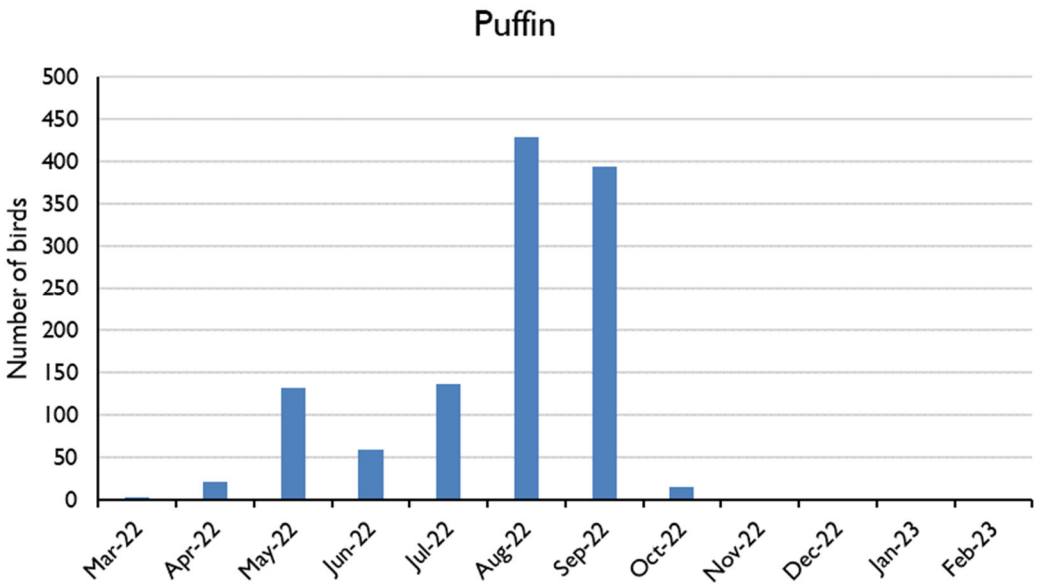


Figure 28 Puffin absolute density estimates, with 95% lower and upper confidence limits, in the Stromar survey area, between March 2022 and February 2023

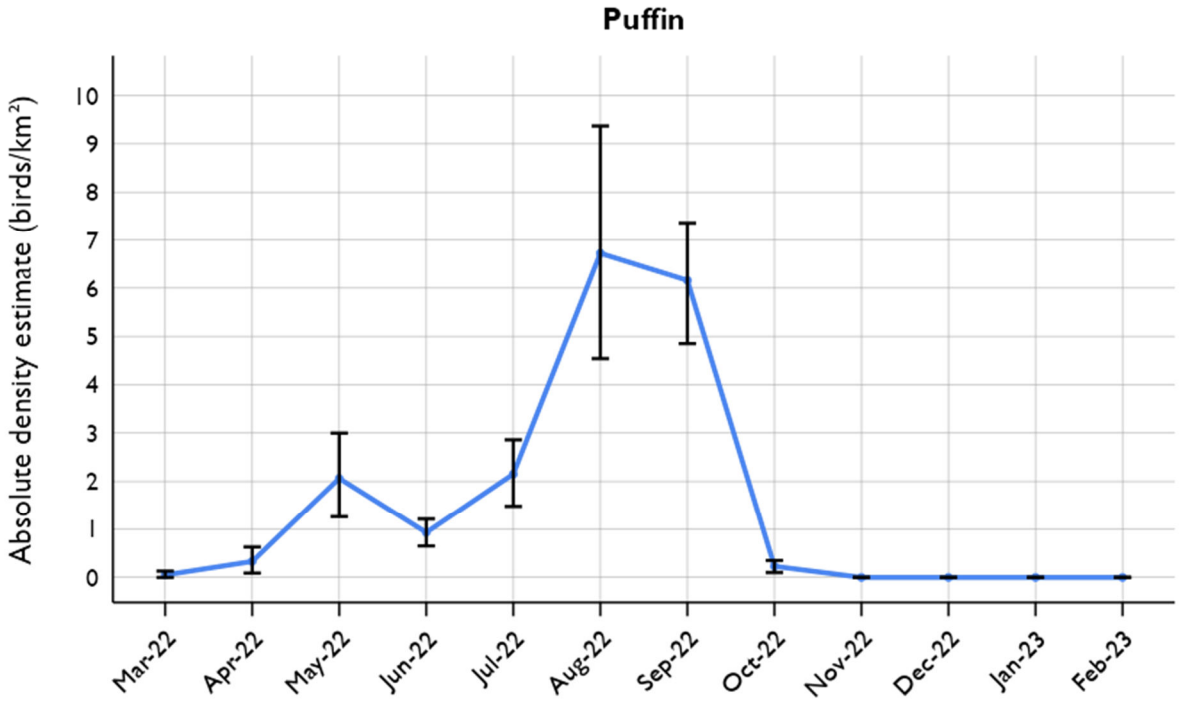


Table 19 Relative and absolute monthly density and population estimates for puffin in the Stromar survey area between March 2022 and February 2023, accounting for birds estimated as unavailable for detection

Survey date	Relative estimates						Absolute estimates					
	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
20 March 2022	0.04	25	0	62	18	69.91	0.05	30	0	77	25	83.33
02 April 2022	0.28	169	40	324	74	43.35	0.33	195	54	372	103	52.82
07 May 2022	1.79	1061	665	1520	217	20.39	2.06	1223	749	1781	301	24.61
20 June 2022	0.80	474	342	619	73	15.37	0.93	548	387	723	95	17.34
23 July 2022	1.85	1097	784	1451	172	15.61	2.15	1282	882	1696	243	18.95
22 August 2022	5.75	3393	2289	4650	604	17.79	6.72	3962	2678	5524	868	21.91
03 September 2022	5.30	3126	2401	3745	344	10.99	6.16	3636	2861	4338	475	13.06
13 October 2022	0.20	120	55	187	34	27.97	0.23	141	64	209	47	33.33
02 November 2022	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
03 December 2022	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
20 January 2023	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
25 February 2023	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00

Table 20 Summary of puffin behaviours in the Stromar survey area between March 2022 and February 2023

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	% Flying	Total
20 March 2022	0	0	3	0	0	**3**
02 April 2022	0	0	21	0	0	**21**
07 May 2022	0	8	124	0	6	**132**
20 June 2022	0	3	56	0	5	**59**
23 July 2022	0	1	136	0	1	**137**
22 August 2022	0	2	427	0	0	**429**
03 September 2022	0	1	393	0	0	**394**
13 October 2022	0	0	15	0	0	**15**
02 November 2022	0	0	0	0	0	**0**
03 December 2022	0	0	0	0	0	**0**
20 January 2023	0	0	0	0	0	**0**
25 February 2023	0	0	0	0	0	**0**
Total	**0**	**15**	**1175**	**0**	**1**	**1190**

Figure 29 **Detections, density of puffins (number/km²) and number of detections per segment in the Stromar survey area between March and August 2022**

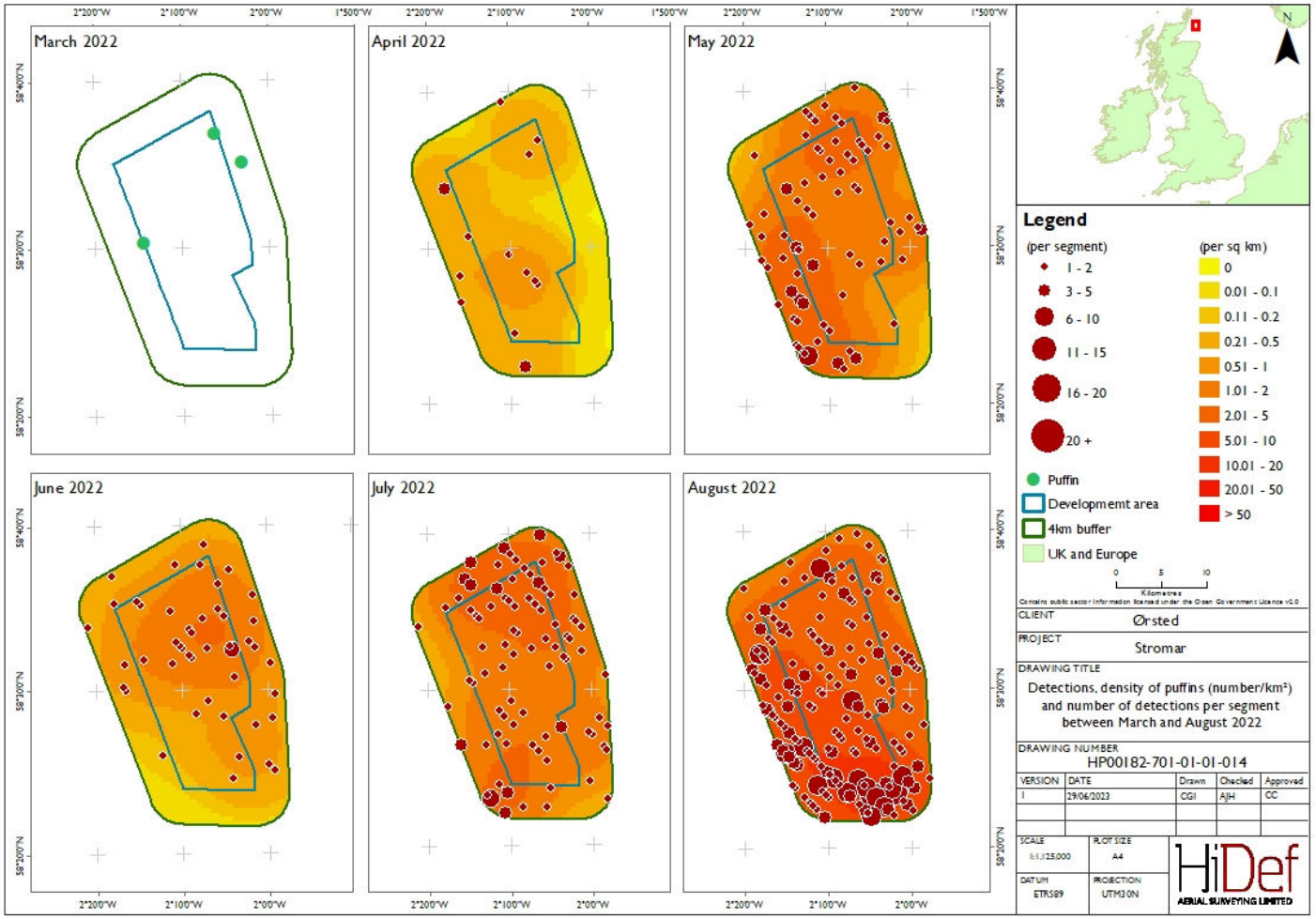


Figure 30 Density of puffins (number/km²) and number of detections per segment in the Stromar survey area between September 2022 and February 2023

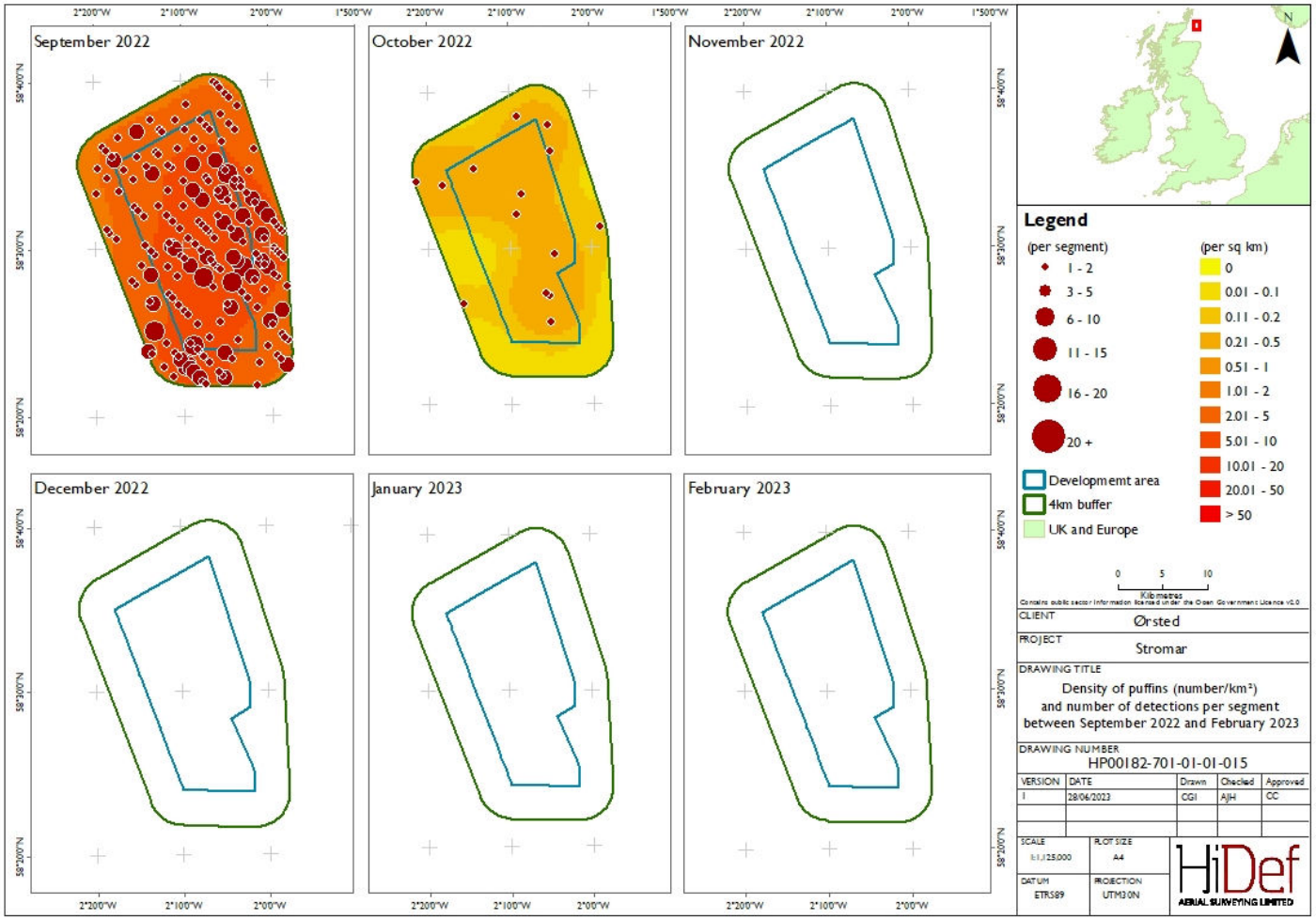
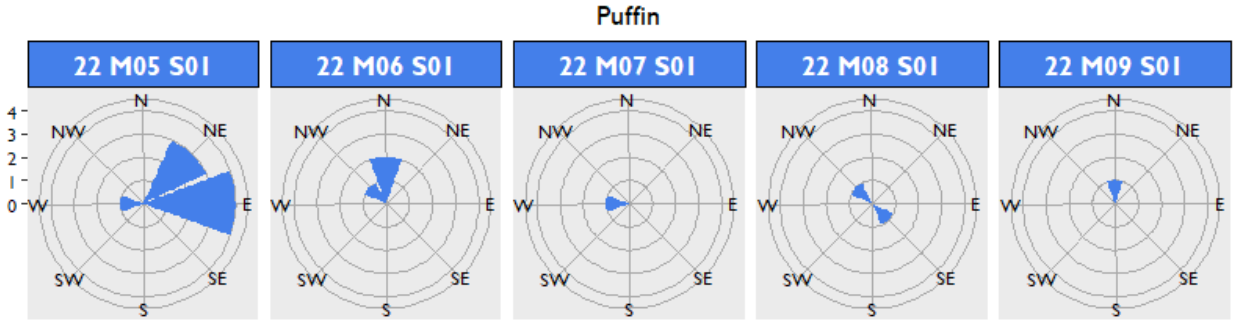


Figure 31 Summarised direction of movement of flying puffins in the Stromar survey area between March 2022 and February 2023



3.3.7 Fulmar

99 Fulmars were the second most abundant species and were recorded throughout the year, except in May 2022 when only 21 observations were recorded (Figure 32).

100 Density estimates for the species ranged between 0.29 birds/km^2 (95% CI 0.16 – 0.41) in May 2022 and 5.40 birds/km^2 (95% CI 2.99 – 9.28) in July 2022 (Figure 33 and Table 21), equating to 171 birds (95% CI 96 – 244) and 3,205 birds (95% CI 1,773 – 5,505) respectively.

101 Fulmars were found throughout the survey area, with higher densities generally observed within the buffer area, particularly in the north and north-west in July 2022 and September and October 2022 respectively (Figure 34 and Figure 35). In other months, birds were more widespread.

102 Over the survey period, 58% of birds were recorded flying, with varying number of birds recorded as sitting on the water across the survey period (Table 22).

103 Fulmars were recorded flying in all months and flight direction data are displayed in Figure 36. In January and February 2023, when flying numbers peaked, birds were mainly heading a variety of directions, with more birds flying in north-westerly and south-eastly directions in January 2023 and southerly and south-westerly directions in February 2023. In July 2022, when abundance peaked, the flight direction was variable.

Figure 32 Number of fulmars recorded between March 2022 and February 2023 in the Stromar survey area

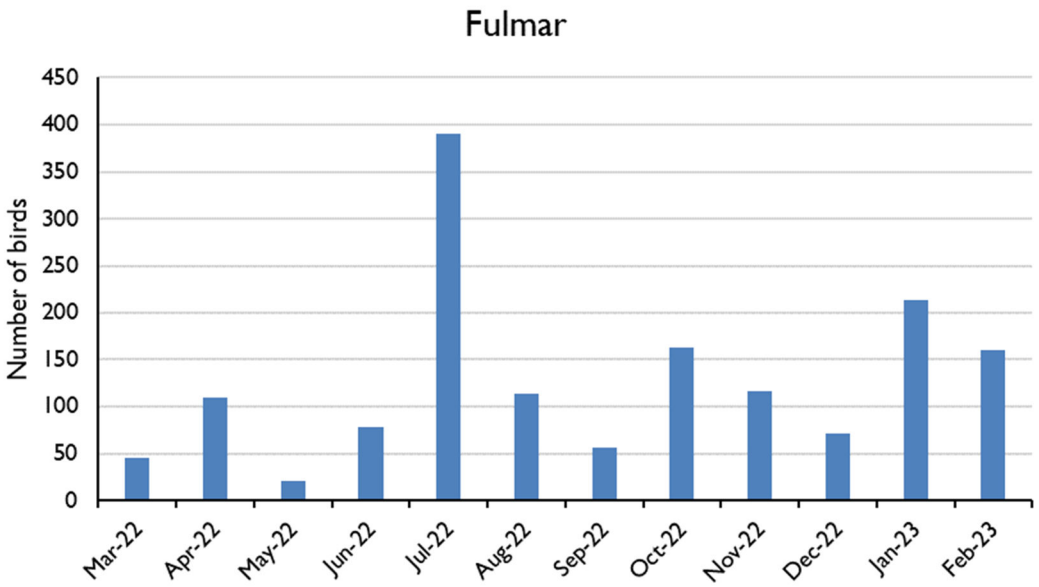


Figure 33 Fulmar density estimates, with 95% lower and upper confidence limits, in the Stromar survey area, between March 2022 and February 2023

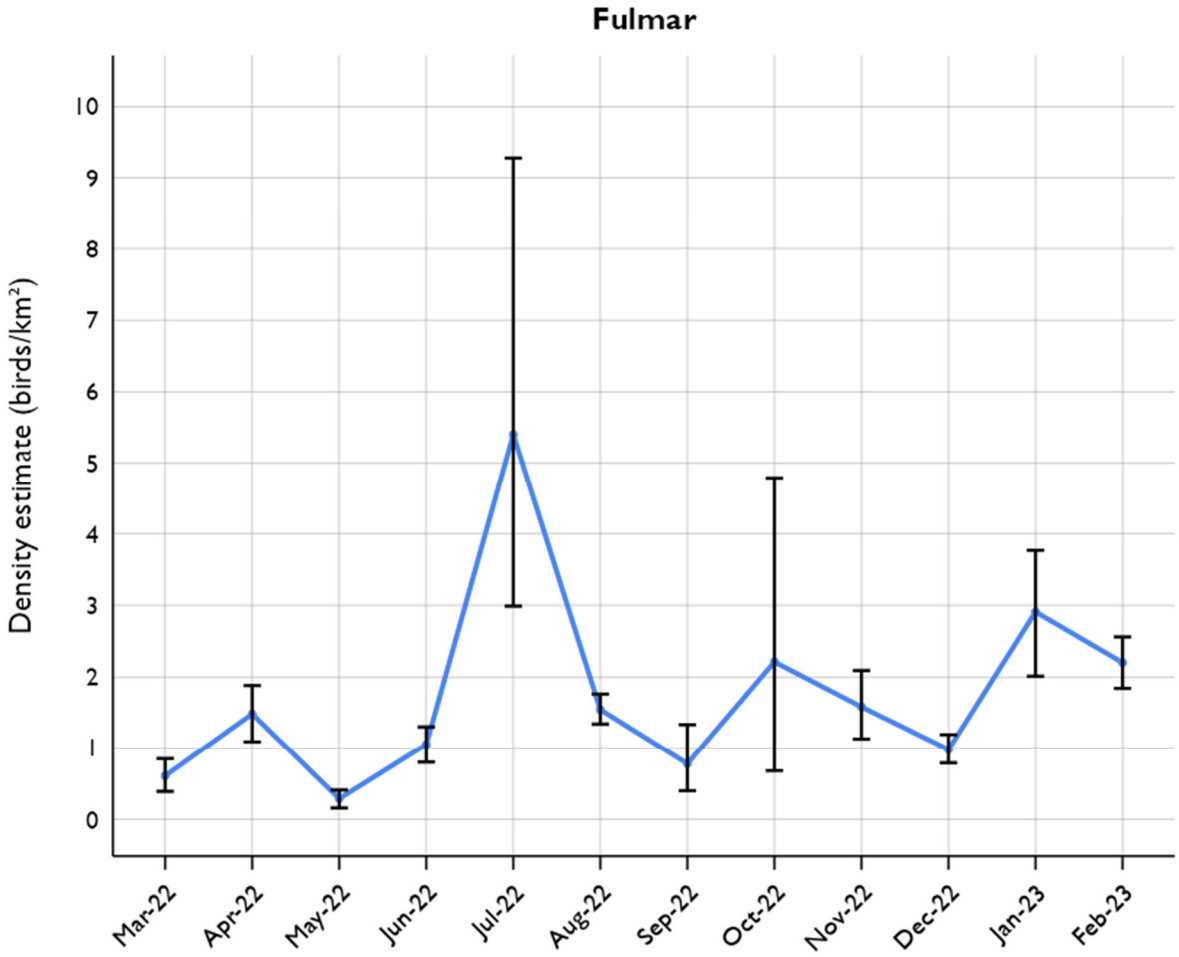


Table 21 Density and population estimates of fulmar in the Stromar survey area between March 2022 and February 2023

Survey date	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
20 March 2022	0.61	361	234	502	68	18.86
02 April 2022	1.48	880	648	1113	120	13.63
07 May 2022	0.29	171	96	244	39	22.6
20 June 2022	1.05	626	478	773	77	12.19
23 July 2022	5.40	3205	1773	5505	997	31.09
22 August 2022	1.54	912	792	1040	63	6.89
03 September 2022	0.78	460	236	782	153	33.05
13 October 2022	2.21	1309	407	2841	726	55.42
02 November 2022	1.58	938	670	1239	147	15.57
03 December 2022	0.98	580	469	708	63	10.78
20 January 2023	2.91	1726	1190	2238	278	16.11
25 February 2023	2.20	1305	1090	1521	111	8.48

Table 22 Summary of fulmar behaviours in the Stromar survey area between March 2022 and February 2023

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	% Flying	Total
20 March 2022	0	36	9	0	80	**45**
02 April 2022	0	31	78	0	28	**109**
07 May 2022	0	15	6	0	71	**21**
20 June 2022	0	70	8	0	90	**78**
23 July 2022	0	134	255	1	34	**390**
22 August 2022	0	70	44	0	61	**114**
03 September 2022	0	17	40	0	30	**57**
13 October 2022	0	106	52	5	65	**163**
02 November 2022	0	77	40	0	66	**117**
03 December 2022	0	64	8	0	89	**72**
20 January 2023	0	139	74	0	65	**213**
25 February 2023	0	141	19	0	88	**160**
Total	**0**	**900**	**633**	**6**	**58**	**1539**

Figure 34 Density of fulmars (number/km²) and number of detections per segment in the Stromar survey area between March and August 2022

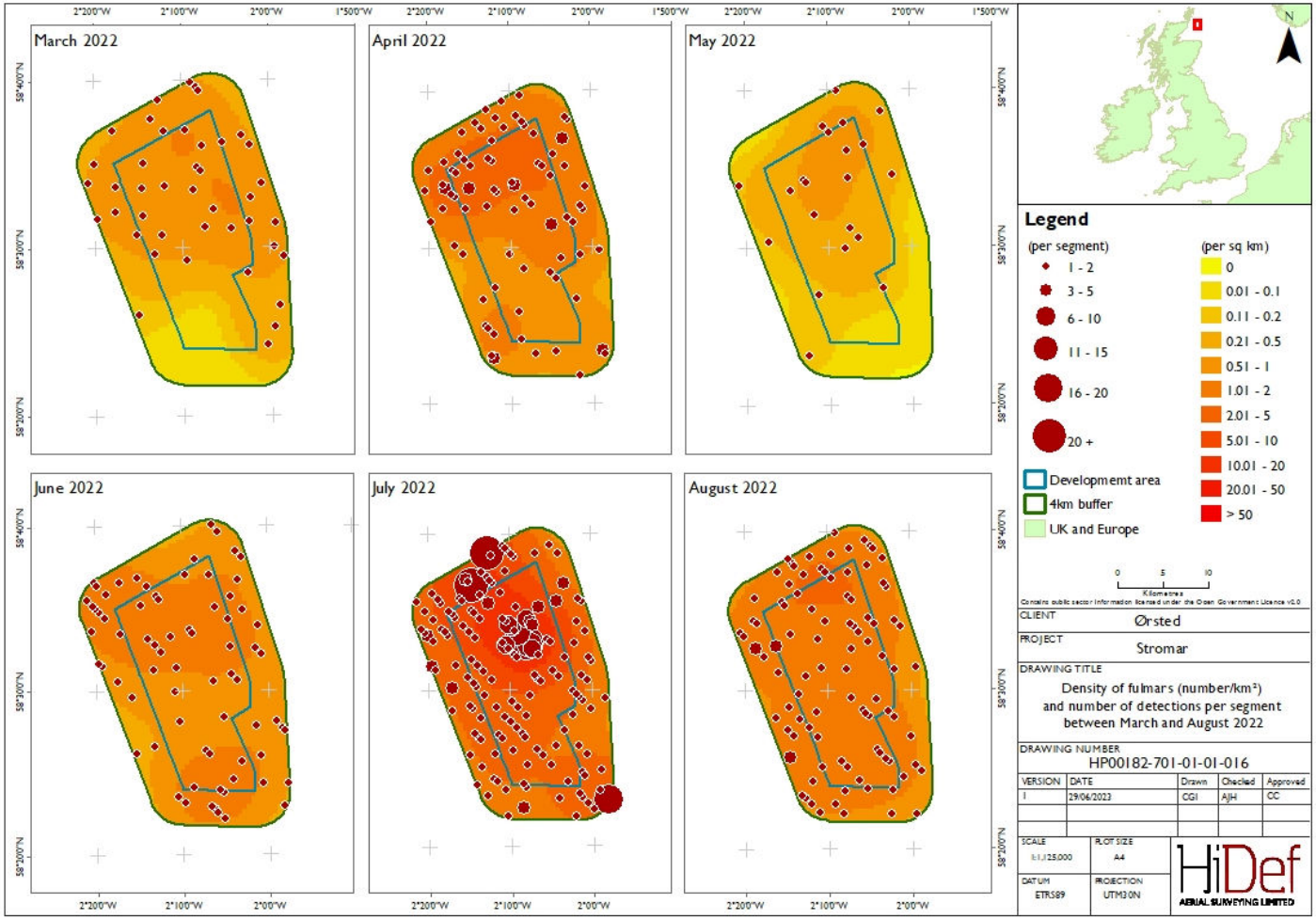


Figure 35 Density of fulmars (number/km²) and number of detections per segment in the Stromar survey area between September 2022 and February 2023

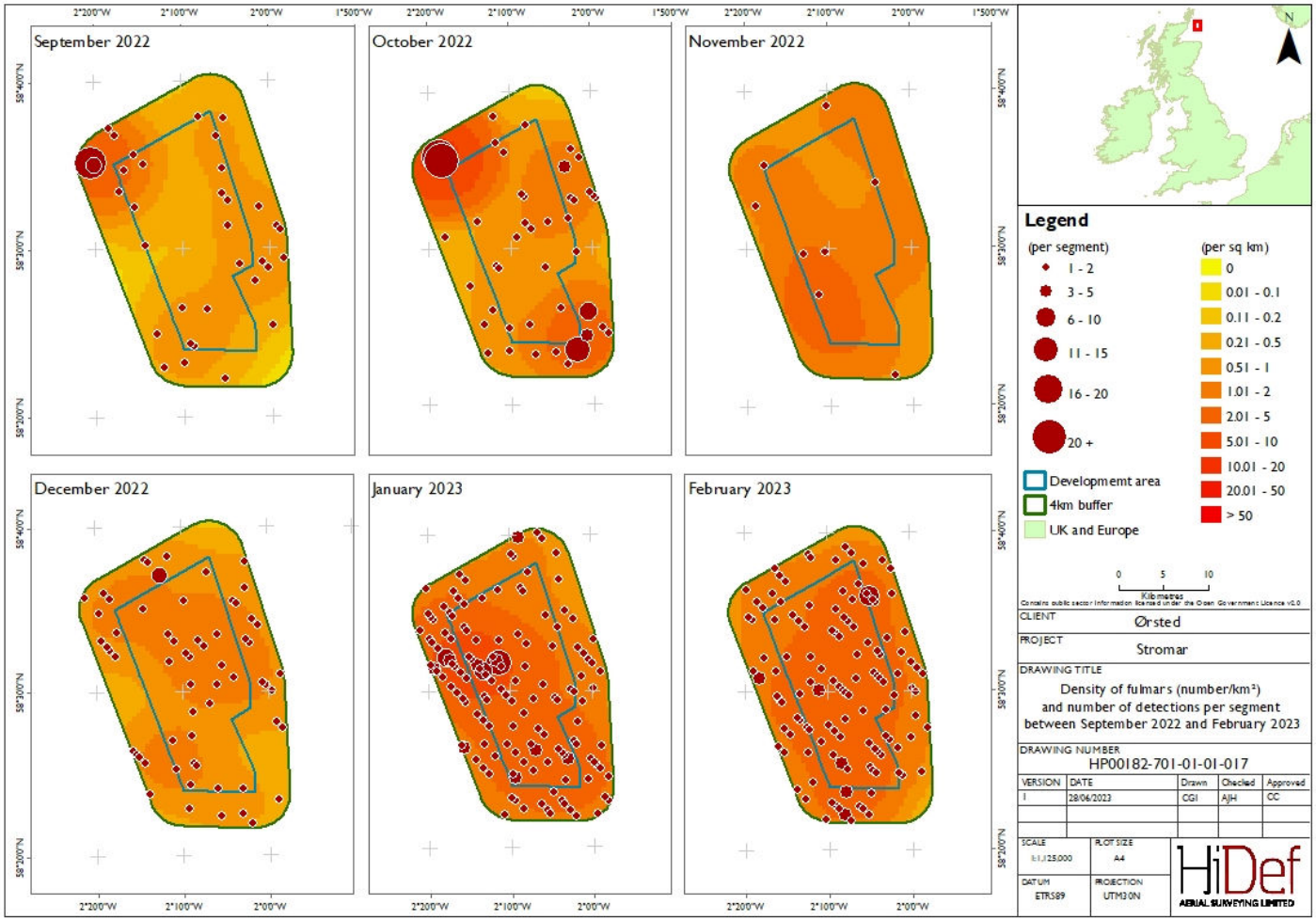
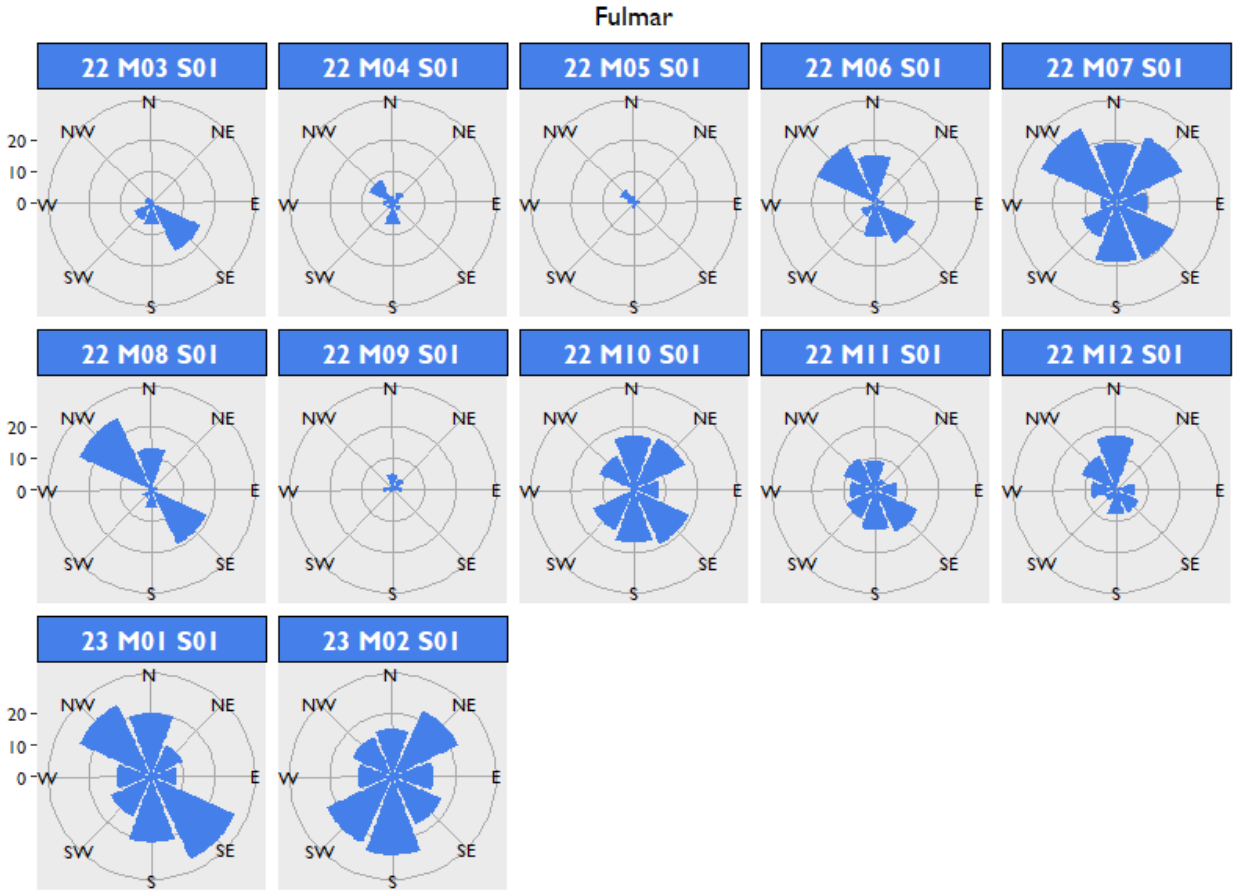


Figure 36 Summarised direction of movement of flying fulmars in the Stromar survey area between March 2022 and February 2023



3.3.8 Gannet

104 Gannets were recorded in relatively low numbers across the survey period, with records peaking in July 2022 with 51 observations (Figure 37). Apart from the breeding season peak (July 2022), relatively high numbers of birds were recorded during the post-breeding and return migration periods (e.g., March and October 2022). In addition, a total of 17 birds were recorded as dead (Table 25) – 12 of which (six individuals in August 2022, and six individuals in September 2022) did meet the threshold removal criteria.

105 Density estimates ranged between 0.01 birds/km^2 (95% CI 0.00 – 0.04) in November 2022 and 0.70 birds/km^2 (95% CI 0.23 – 1.50) in July 2022 (Figure 38 and Table 23), equating to 9 birds (95% CI 0 – 24) and 417 birds (95% CI 135 – 890) respectively.

106 Gannets were found throughout the survey area, with higher densities generally observed towards the centre of the development area in July 2022 when abundance peaked (Figure 39). In October 2022, higher densities were observed in the north-west of the buffer and to the west and south-east of the survey area in January 2023 (Figure 40).

107 Of the birds that could be aged, 84% were recorded as adults, with the largest number of immature birds recorded in July 2022 (Table 24).

108 Over the survey period, 47% of birds were recorded flying, although a relatively large number of birds were recorded as sitting on the water during the July 2022 survey (Table 25). Of the birds recorded, 17 observations were dead birds.

109 There were surveys in which no data regarding flight direction were available, therefore, only surveys which contained flight direction data are displayed (Figure 41). In March 2022 and January 2023, when flying numbers peaked, birds were mainly heading in southerly and south-westerly directions, while in October 2022 birds were flying in north-westerly directions.

Figure 37 Number of alive gannets recorded between March 2022 and February 2023 in the Stromar survey area

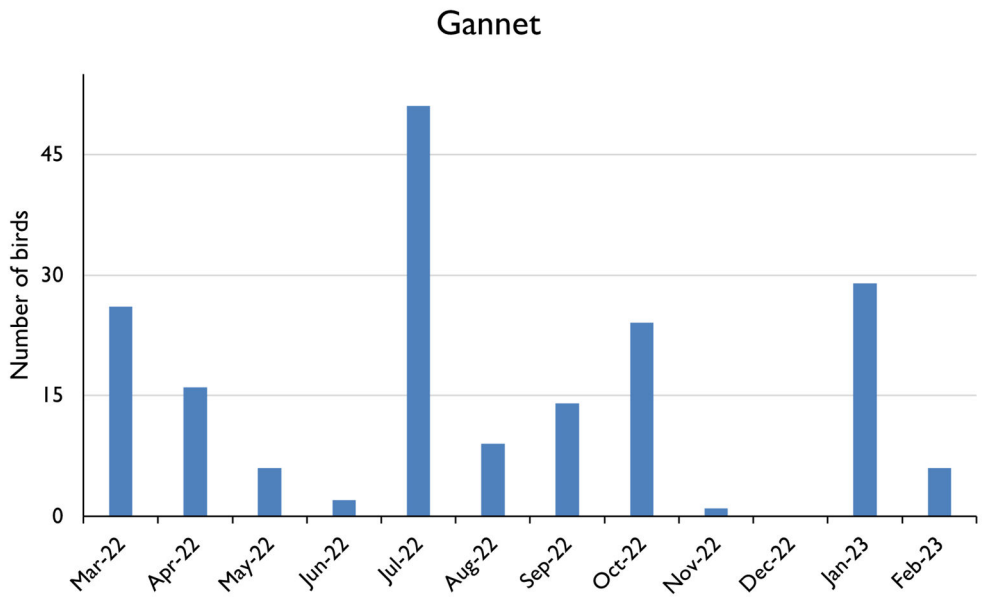


Figure 38 Gannet density estimates, with 95% lower and upper confidence limits, in the Stromar survey area, between March 2022 and February 2023

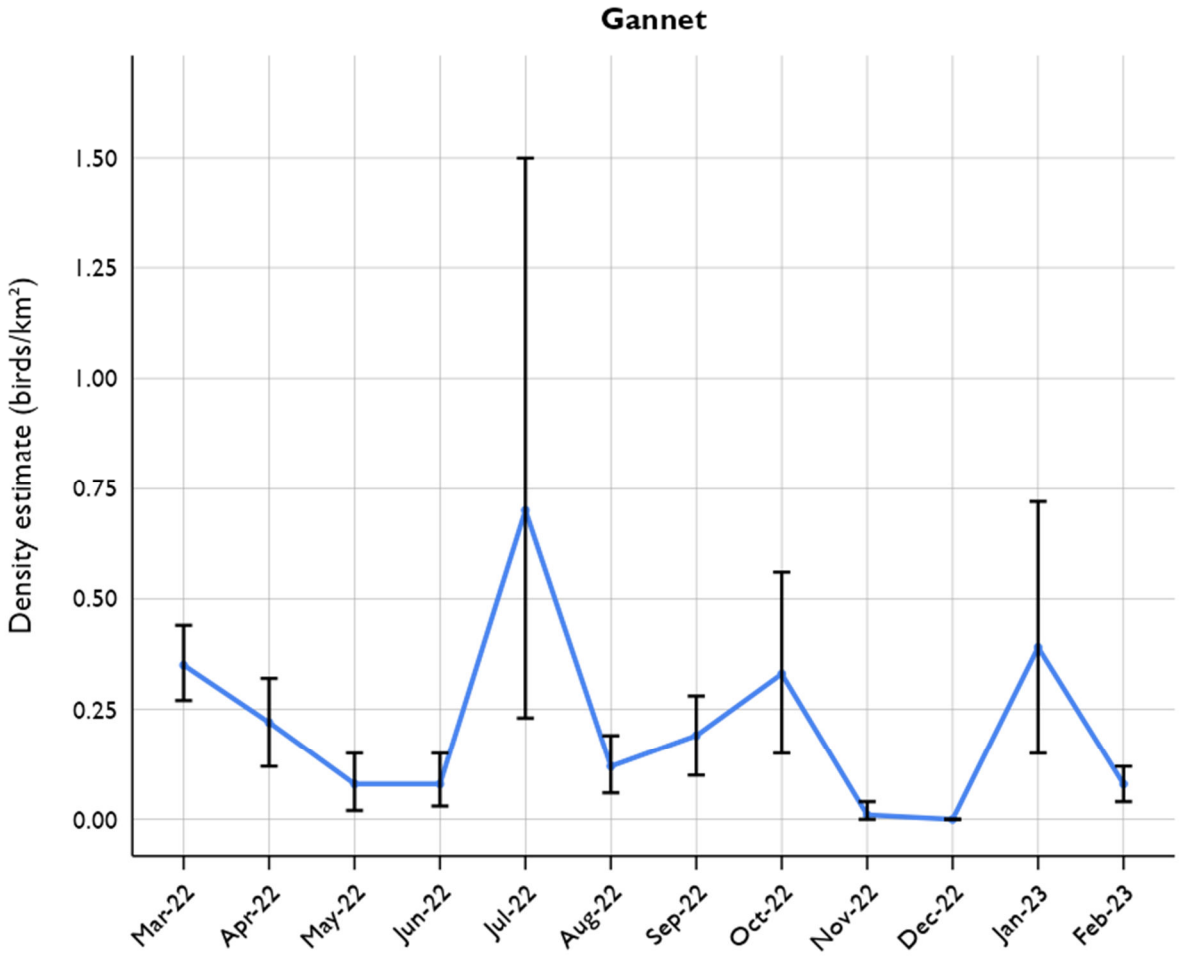


Table 23 Density and population estimates of gannet in the Stromar survey area between March 2022 and February 2023

Survey date	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
20 March 2022	0.35	208	158	260	26	12.35
02 April 2022	0.22	128	72	192	32	24.72
07 May 2022	0.08	48	15	89	21	42.35
20 June 2022	0.08	49	15	88	20	39.41
23 July 2022	0.70	417	135	890	221	53.01
22 August 2022	0.12	73	37	112	21	27.73
03 September 2022	0.19	111	62	164	27	23.73
13 October 2022	0.33	194	92	331	66	33.81
02 November 2022	0.01	9	0	24	8	92.38
03 December 2022	0.00	0	0	0	0	0.00
20 January 2023	0.39	232	87	429	90	38.58
25 February 2023	0.08	50	24	73	13	25.44

Table 24 Summary of gannet ages in the Stromar survey area between March 2022 and February 2023

Survey date	Number recorded as adult	Number recorded as immature	Number recorded as juvenile	Number recorded as unknown	% Adult (from aged birds)	Total
20 March 2022	17	0	0	9	100	**26**
02 April 2022	15	0	0	1	100	**16**
07 May 2022	6	0	0	0	100	**6**
20 June 2022	1	1	0	0	50	**2**
23 July 2022	29	21	0	1	58	**51**
22 August 2022	8	0	0	1	100	**9**
03 September 2022	12	2	0	0	86	**14**
13 October 2022	20	2	1	1	87	**24**
02 November 2022	1	0	0	0	100	**1**
03 December 2022	0	0	0	0	-	**0**
20 January 2023	26	0	0	3	100	**29**
25 February 2023	6	0	0	0	100	**6**
Total	**141**	**26**	**1**	**16**	**84**	**184**

Table 25 Summary of gannet behaviours in the Stromar survey area between March 2022 and February 2023

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	% Flying	Total	Number recorded as dead
20 March 2022	0	17	9	0	65	**26**	0
02 April 2022	0	8	8	0	50	**16**	0
07 May 2022	0	2	4	0	33	**6**	0
20 June 2022	0	1	1	0	50	**2**	4
23 July 2022	0	10	41	0	20	**51**	1
22 August 2022	0	3	6	0	33	**9**	6
03 September 2022	0	8	6	0	57	**14**	6
13 October 2022	0	15	8	1	63	**24**	0
02 November 2022	0	1	0	0	100	**1**	0
03 December 2022	0	0	0	0	-	**0**	0
20 January 2023	0	17	12	0	59	**29**	0
25 February 2023	0	5	1	0	83	**6**	0
Total	**0**	**87**	**96**	**1**	**47**	**184**	**17**

Figure 39 Density of gannets (number/km²) and number of detections per segment in the Stromar survey area between March and August 2022 (dead birds excluded from August 2022)

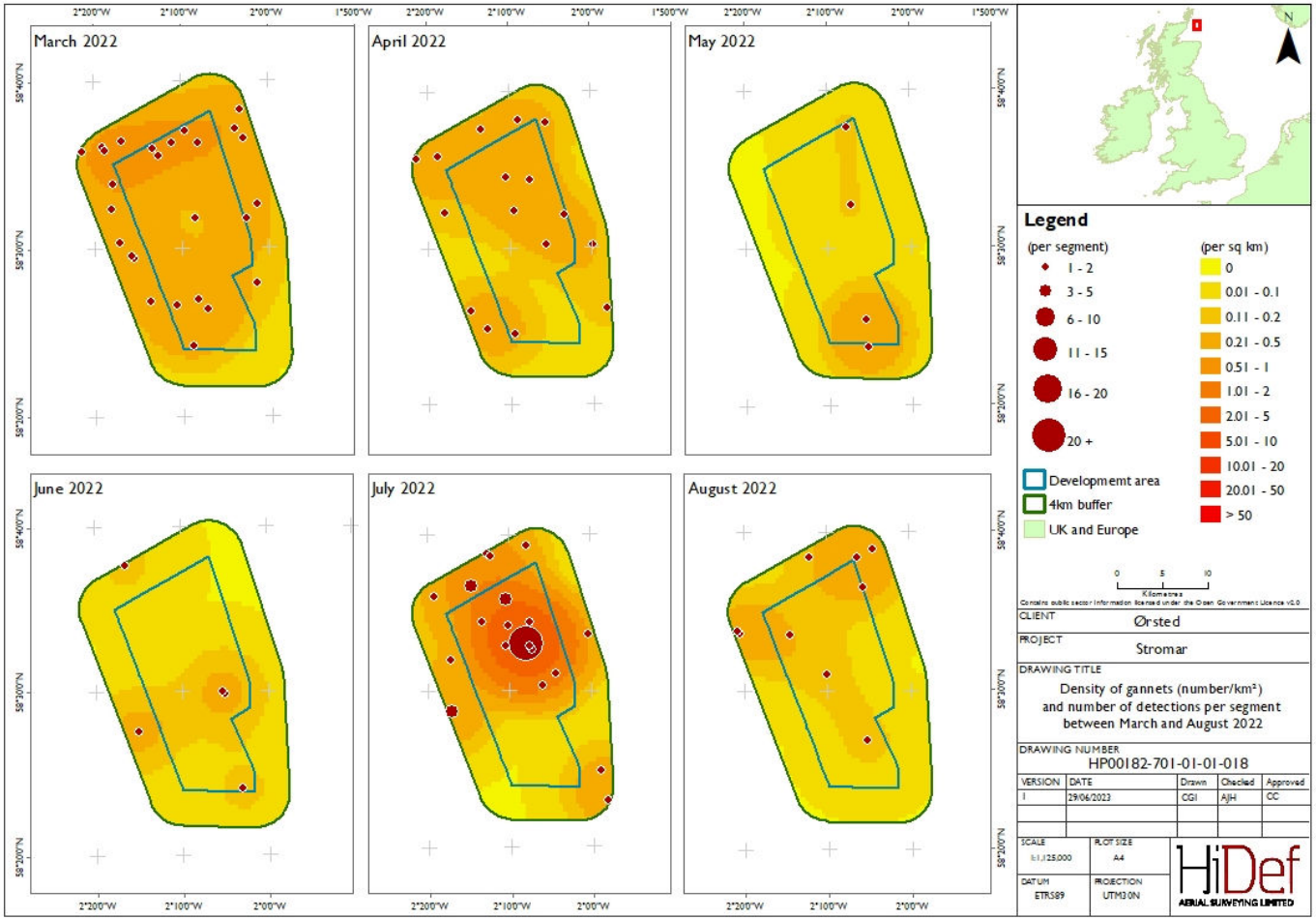


Figure 40 Detections, density of gannets (number/km²) and number of detections per segment in the Stromar survey area between September 2022 and February 2023 (dead birds excluded from September 2022)

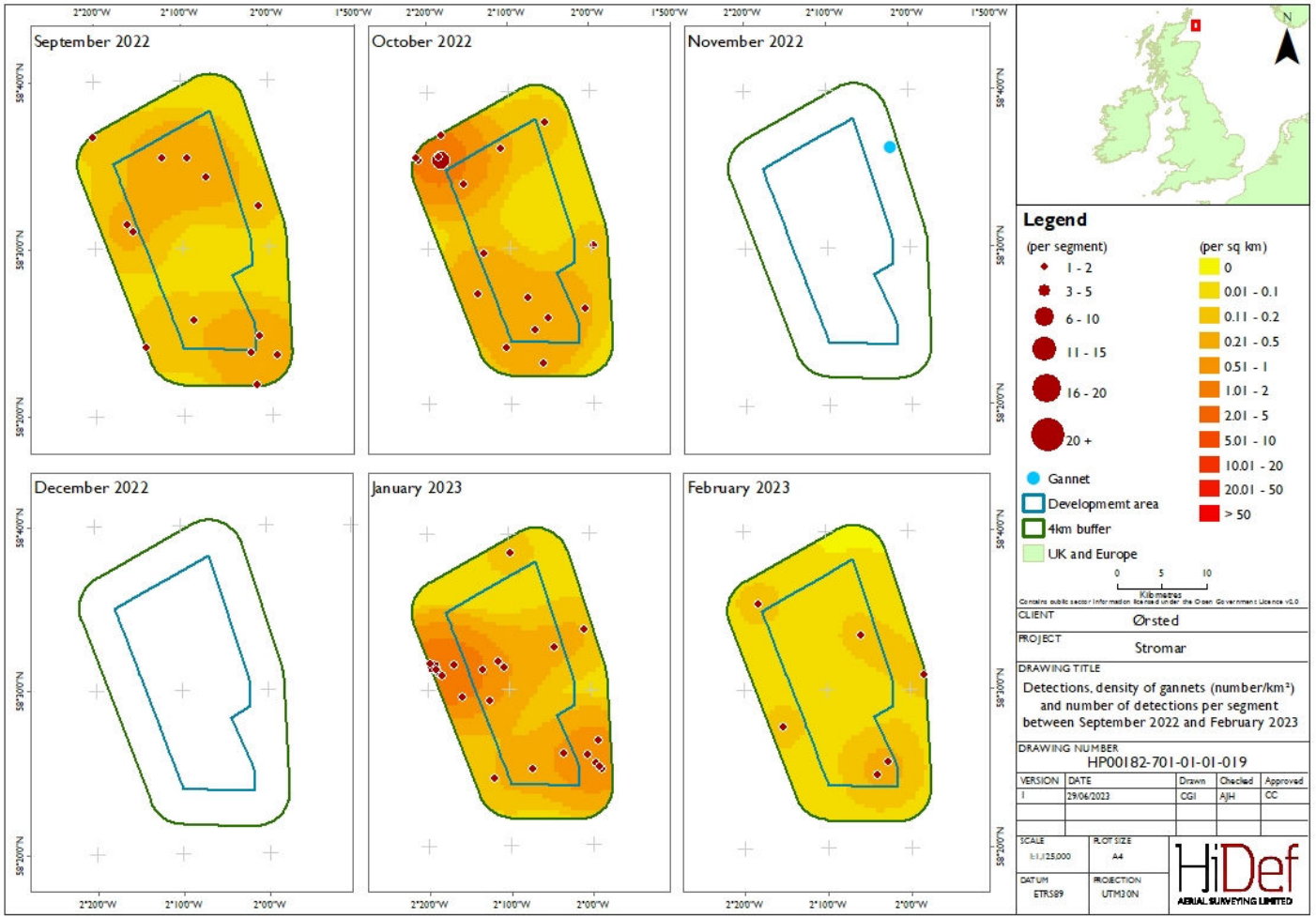
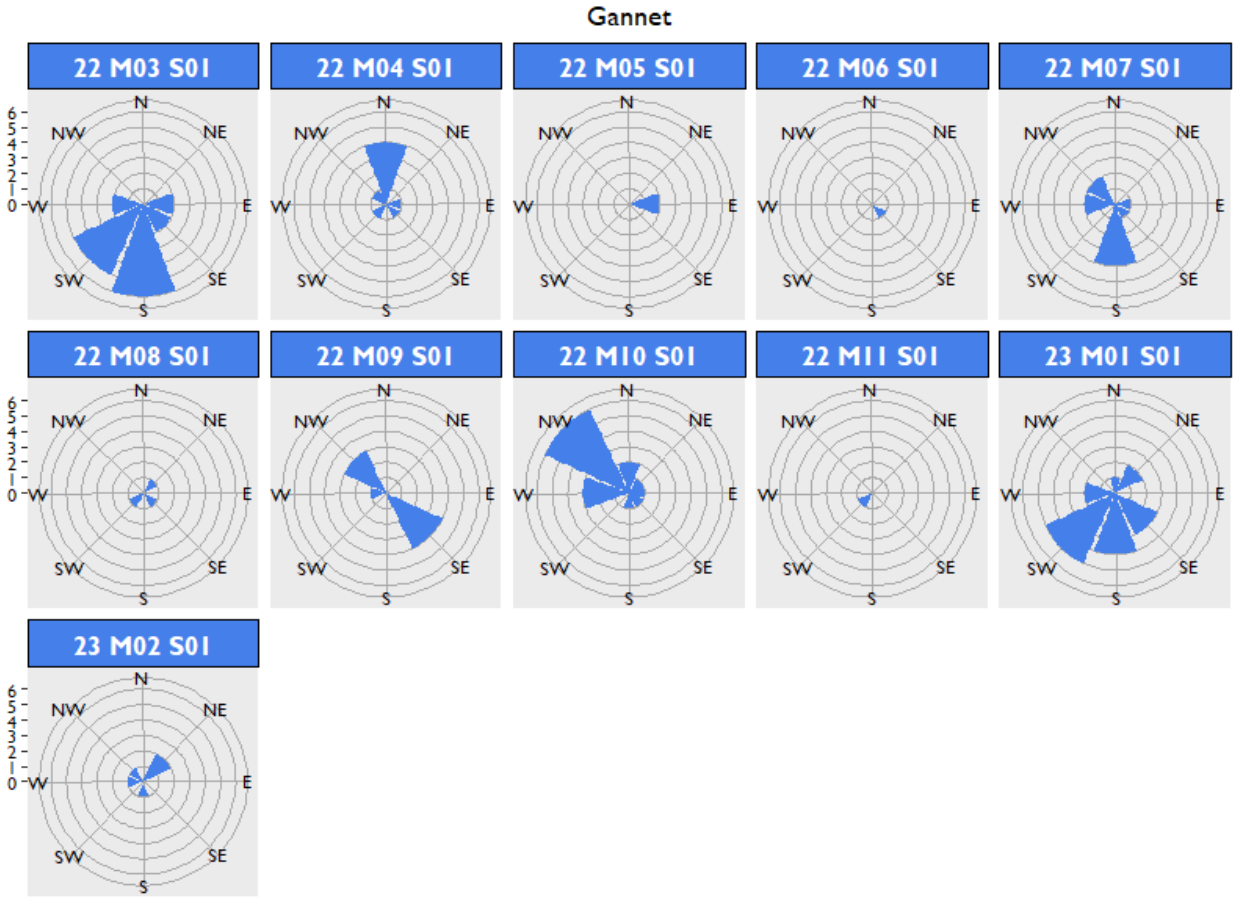


Figure 41 Summarised direction of movement of flying gannets in the Stromar survey area between March 2022 and February 2023



3.3.9 Less abundant bird species

110 Across the survey period, 106 less abundant birds were recorded across 11 different species. Distributions are presented in Figure 43 and Figure 44, while population and density estimates for these species can be found in Appendix I.

111 Herring gulls were the most numerous recorded within the less abundant birds with 48 records over the five of the 12 surveys (Figure 42). Abundance peaked in January 2023 with most birds distributed in the west of the buffer (Figure 44). One lesser black-backed gull (*Larus fuscus*) was found in the south-east of the buffer in April 2022.

112 Arctic terns (*Sterna paradisaea*) were recorded in relatively moderate abundance during one survey of the breeding season (July 2022), distributed in north-west of the development area (Figure 43). One common tern (*Sterna hirundo*) was recorded in August 2022.

113 In June 2022, 14 European storm petrels (*Hydrobates pelagicus*) were recorded and in May and July 2022, two and 11 Manx shearwater were recorded respectively. Both species were distributed across the survey area, with observations recorded in both the development area and buffer. One sooty shearwater (*Ardenna grisea*) was recorded in September 2022 (Figure 44).

114 Low numbers of great skua were present, with only four individuals recorded in total in May, July and August 2022 within the buffer. One dead great skua was recorded in May 2022 which did not meet the threshold removal criteria. One Arctic skua (*Stercorarius parasiticus*) was observed within the south-east of the development area in September 2022.

115 Other species, such as red-throated diver (*Gavia stellata*) and wigeon (*Mareca penelope*) were recorded infrequently with only one and four observations respectively recorded in the April and October 2022 surveys respectively. Both species were distributed in the development area.

Figure 42 Numbers of less abundant bird species recorded within the Stromar survey area between March 2022 and February 2023

*Herring gull – 35 observations in January 2023

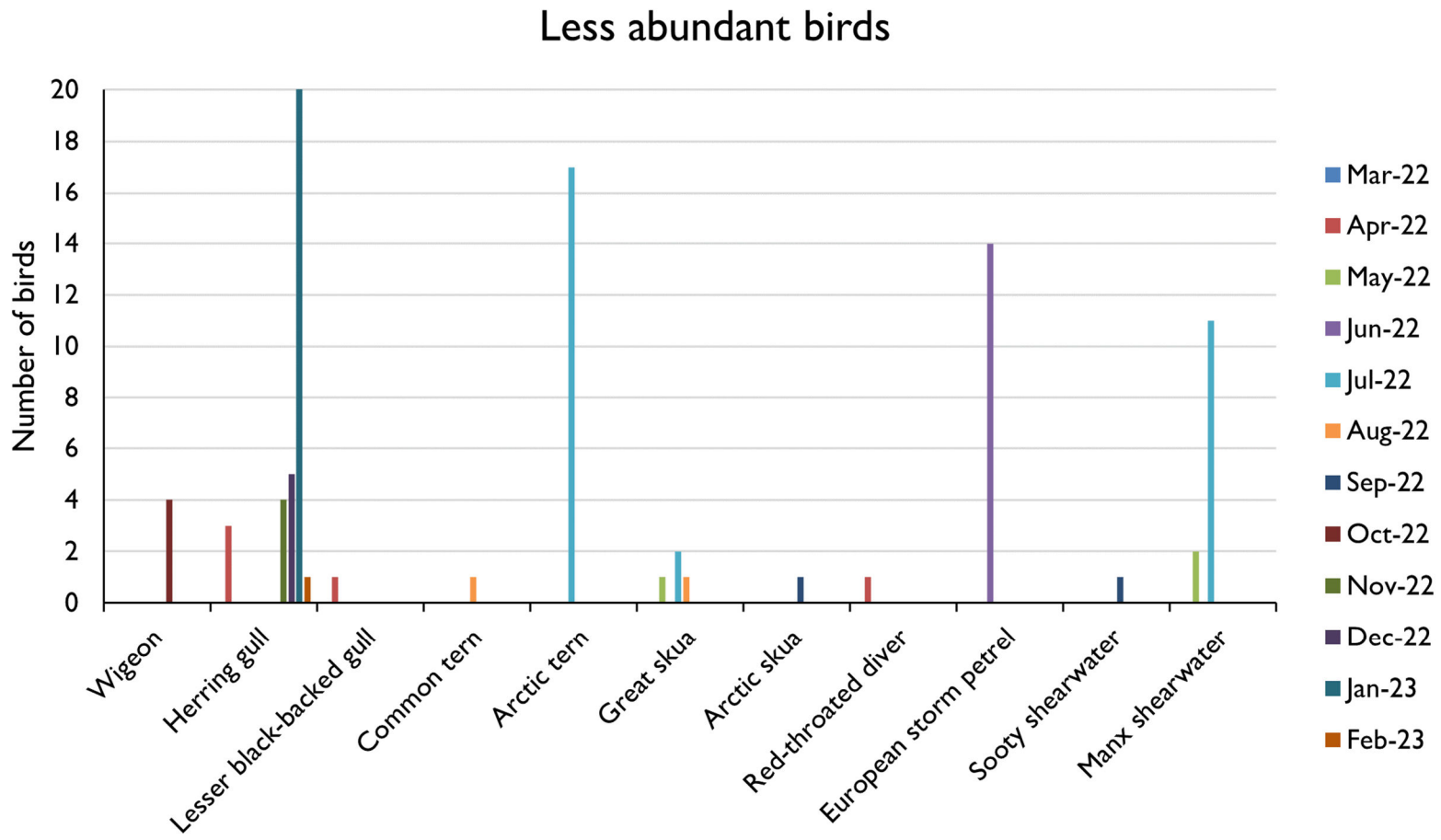


Figure 43 Detections of less abundant bird species in the Stromar survey area between March and August 2022

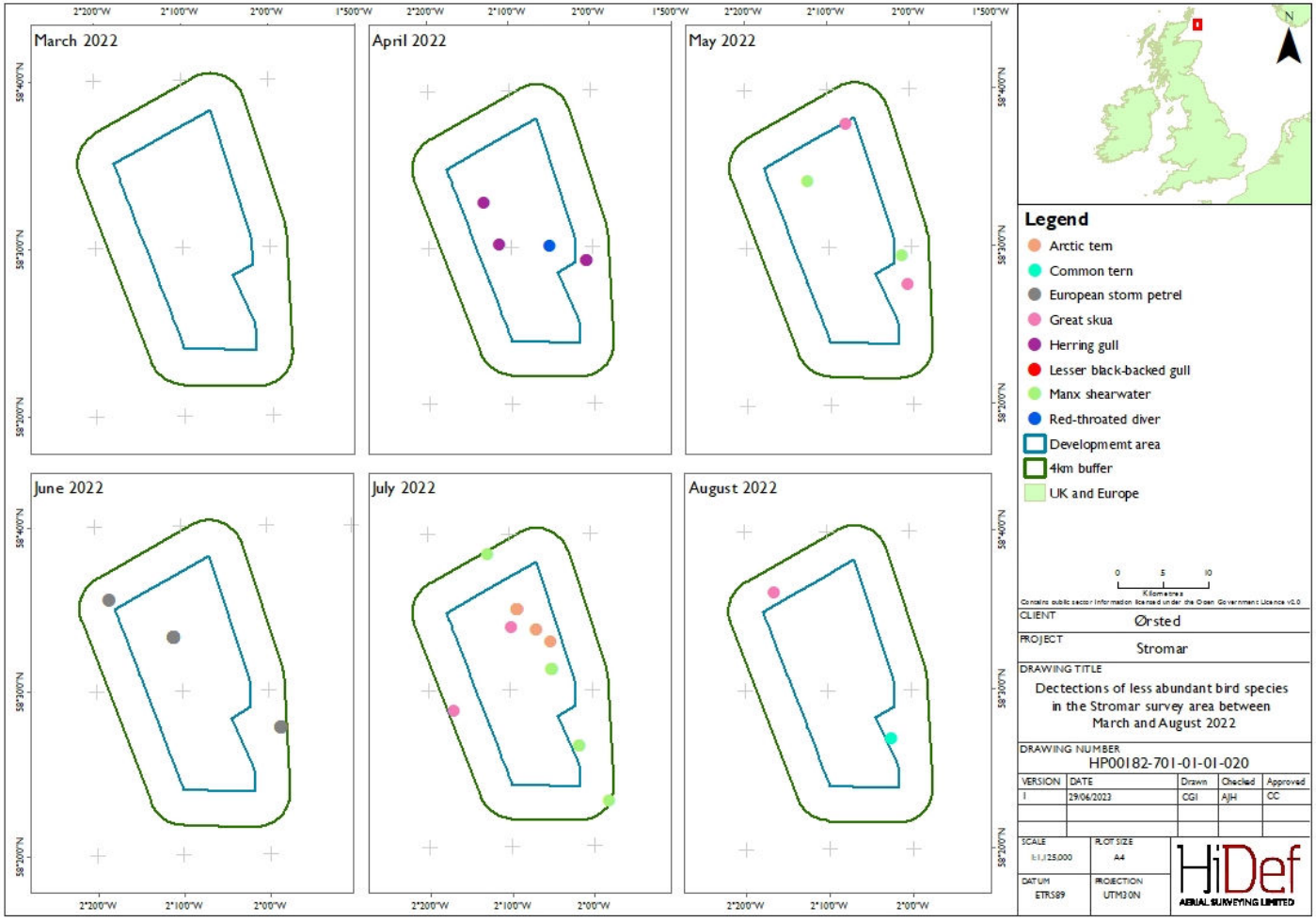
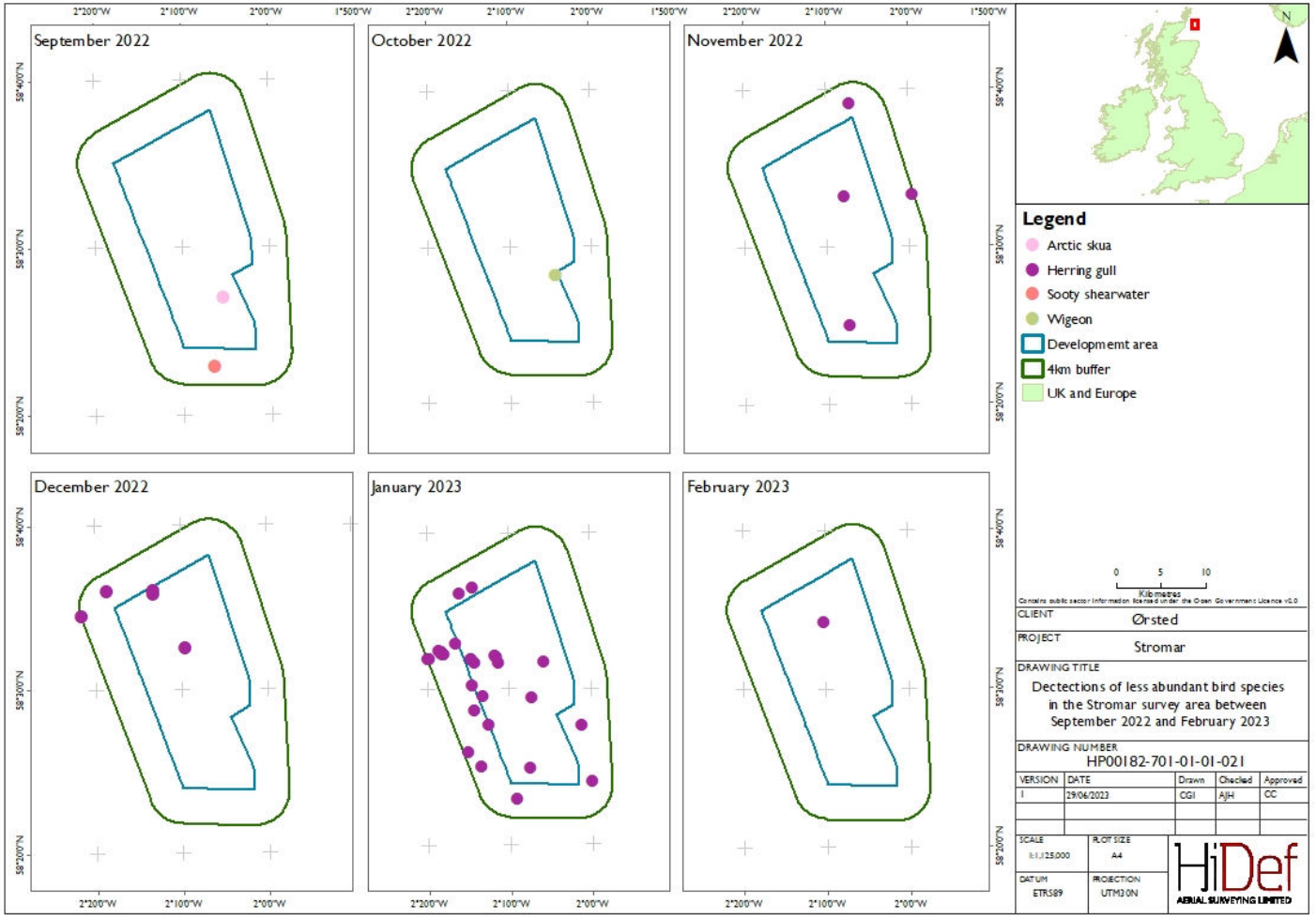


Figure 44 Detections of less abundant bird species in the Stromar survey area between September 2022 and February 2023



3.3.10 Unidentified bird species

116 Unidentified birds were recorded throughout the survey period with greater numbers recorded between July and September 2022 (Figure 45). The summer peaks of non-identification relate primarily to difficulties separating large auk species (notably razorbill and guillemot) and reflect the large number of birds present at that time. These are especially hard to distinguish when birds are in moult and accompanied by juveniles.

117 Distributions of unidentified birds are displayed in Figure 46 and Figure 47.

118 A total of seven birds were recorded as dead throughout the survey period (Table 26).

Table 26 Number of dead unidentified birds observed in the Stromar survey area between March 2022 and February 2023

Species group	May - 22	Jun - 22	Jul - 22	Aug - 22	Sep - 22	Total recorded as dead
Fulmar / gull species	0	0	1	0	0	**1**
Gull species	1	0	0	0	0	**1**
Large auk species	0	0	0	4	0	**4**
Large gull species	0	0	1	0	0	**1**
Grand total	**1**	**0**	**2**	**4**	**0**	**7**

Figure 45 Number of unidentified birds, assigned to species group, recorded within the Stromar survey area between March 2022 and February 2023

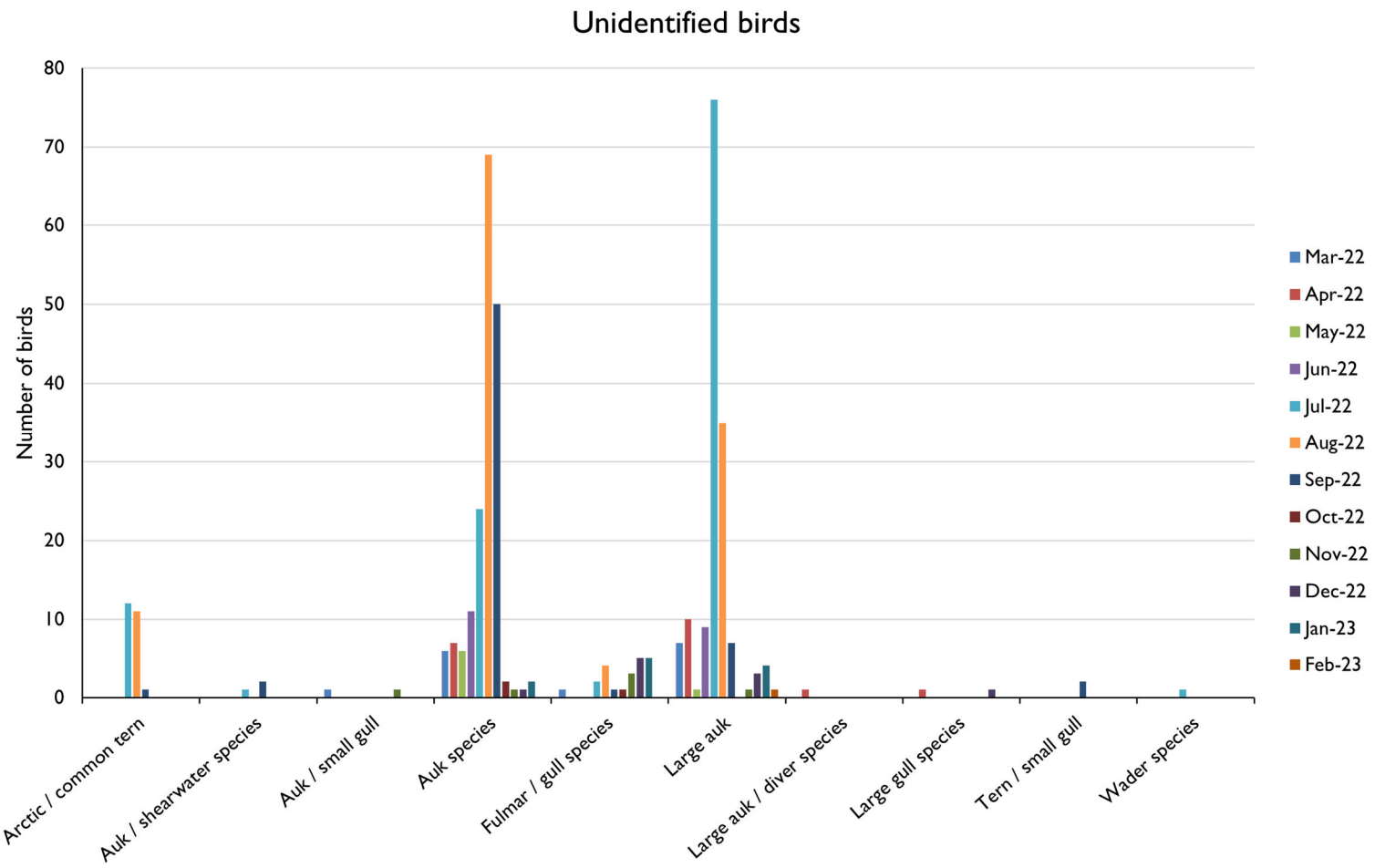
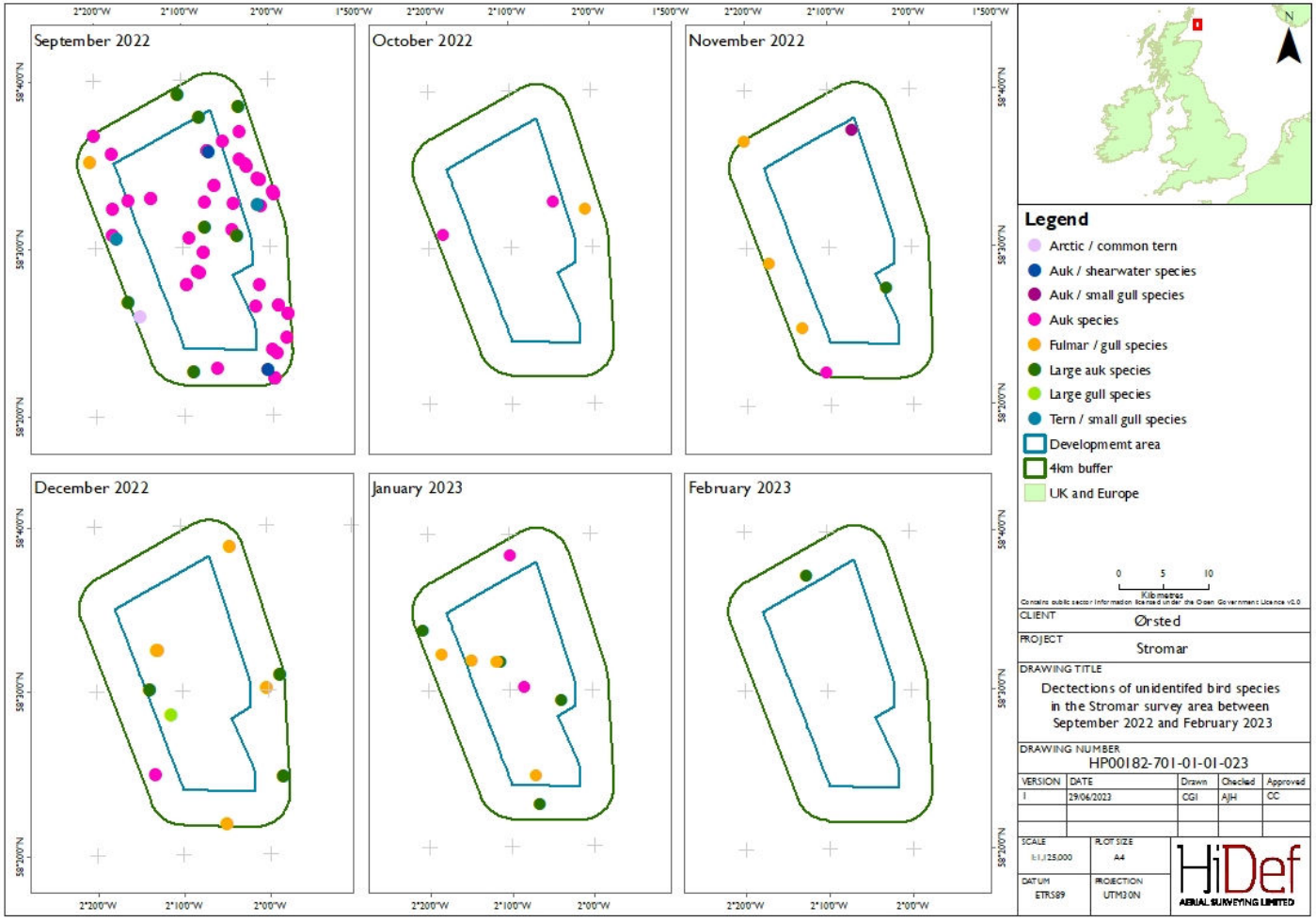


Figure 46 Detections of unidentified birds, assigned to species group in the Stromar survey area between March and August 2022

Figure 47 Detections of unidentified birds, assigned to species group in the Stromar survey area between September 2022 and February 2023



3.3.11 All non-avian animals

119 Non-avian animals were recorded in ten surveys, with the highest numbers recorded in January 2023 (Figure 48). No non-avian animals were recorded in September and December 2022.

120 Surfacing rates of non-avian animals can be found in Table 27.

121 The densities of all non-avian animals are presented in Figure 49 and Figure 50.

Figure 48 Total number of non-avian animals recorded in the Stromar survey area, between March 2022 and February 2023

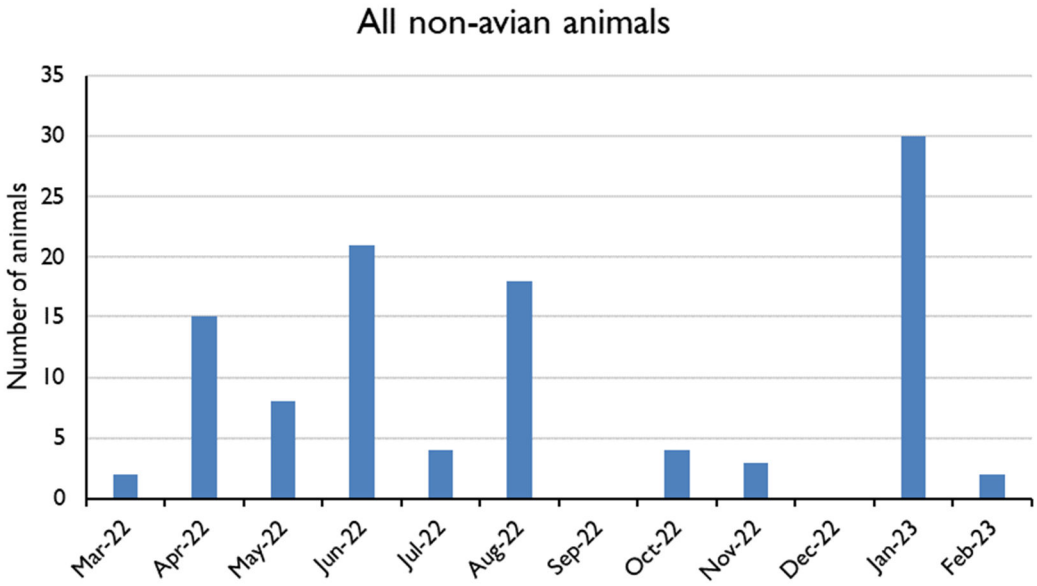


Table 27 Summary of surfacing behaviour for all non-avian animals in the Stromar survey area between March 2022 and February 2023

Species	Submerged	Surfacing	Surfacing at red line	% Surfacing at red line	Total
Grey seal	0	0	1	100	**1**
Common dolphin	1	0	0	0	**1**
Risso's dolphin	1	0	1	50	**2**
White-beaked dolphin	9	1	9	47	**19**
Harbour porpoise	49	12	12	16	**73**
No ID					
Seal / small cetacean species	2	0	0	0	**2**
Seal species	5	0	4	44	**9**
Total	**67**	**13**	**27**	**25**	**107**

Figure 49 Density of all non-avian animals (number/km²) and number of detections per segment in the Stromar survey area between March and August 2022

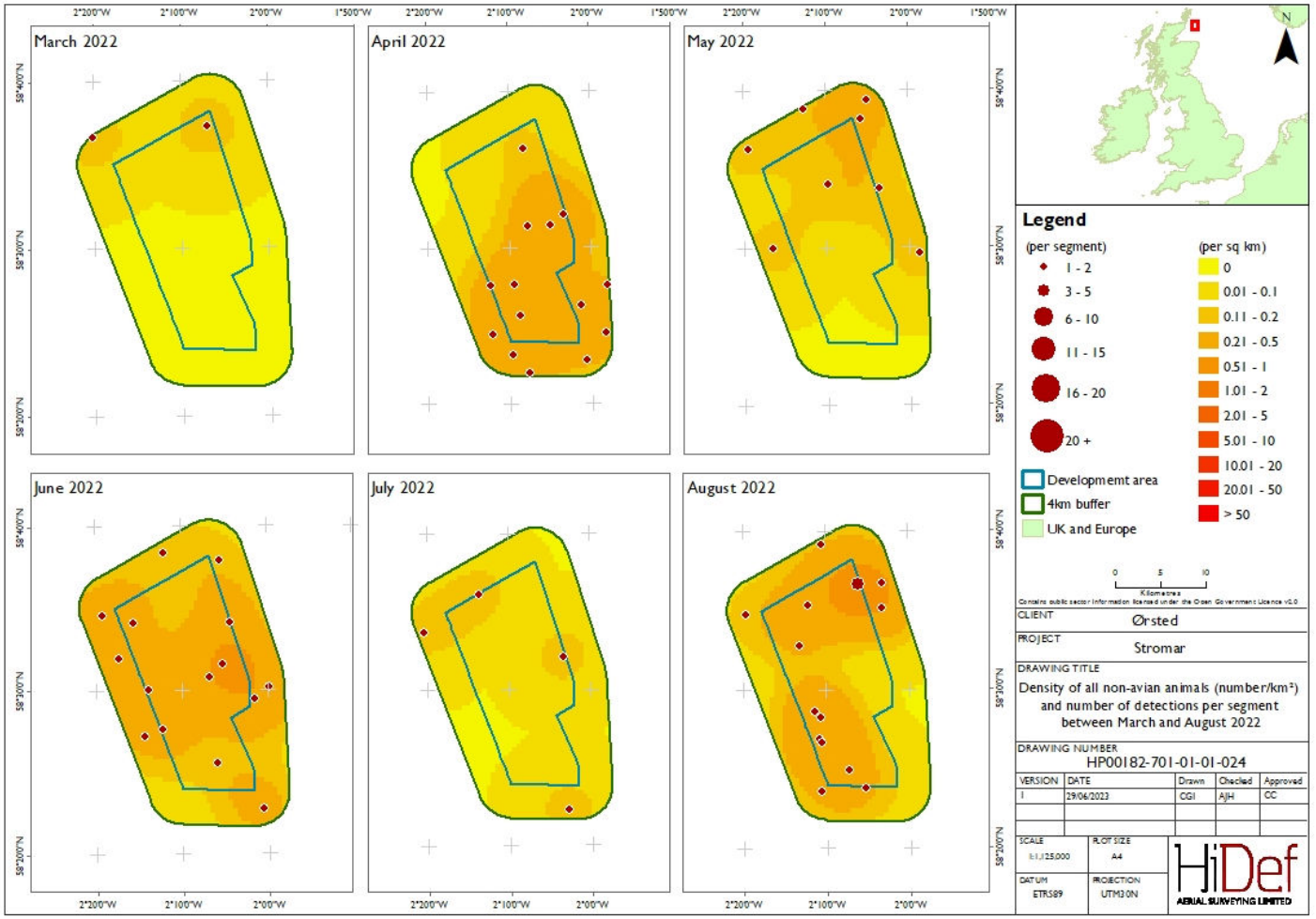
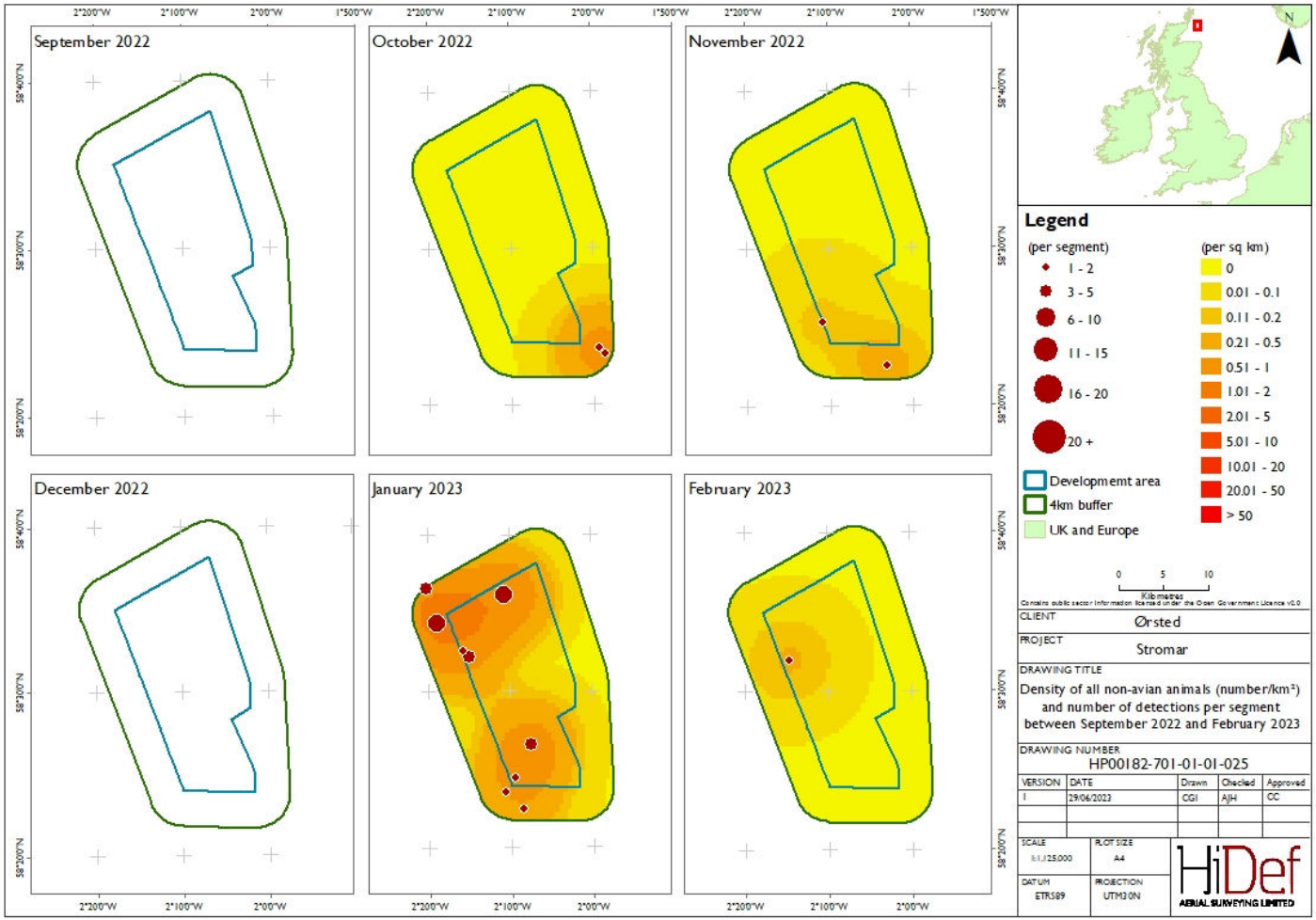


Figure 50 Density of all non-avian animals (number/km²) and number of detections per segment in the Stromar survey area between September 2022 and February 2023



3.3.12 Harbour porpoise

122 Harbour porpoise were the most abundant marine mammal recorded throughout the survey period, with numbers peaking in January 2023 (Figure 51). No observations were recorded between September and December 2022 and in February 2023.

123 When observed absolute density estimates for the species ranged between 0.03 animals/km^2 (95% CI 0.00 – 0.12) in March 2022 and 0.90 animals/km^2 (95% CI 0.23 – 1.61) in January 2023 (Figure 52 and Table 28), equating to 24 animals (95% CI 0 – 72) and 532 animals (95% CI 134 – 961) respectively.

124 Harbour porpoise were widespread across the survey area, with high densities found in both the development area and buffer (Figure 53 and Figure 54).

125 Proportions of surfacing animals can be found in Table 27; 67% of individuals were recorded as submerged.

126 Since juveniles are almost always accompanied by adults, and this is the easiest way of aging adult cetaceans, the proportion of adults and juveniles in aged animals appears to be similar. Five adult/juvenile pairs were recorded in June 2022.

Figure 51 Number of harbour porpoises recorded between March 2022 and February 2023 in the Stromar survey area

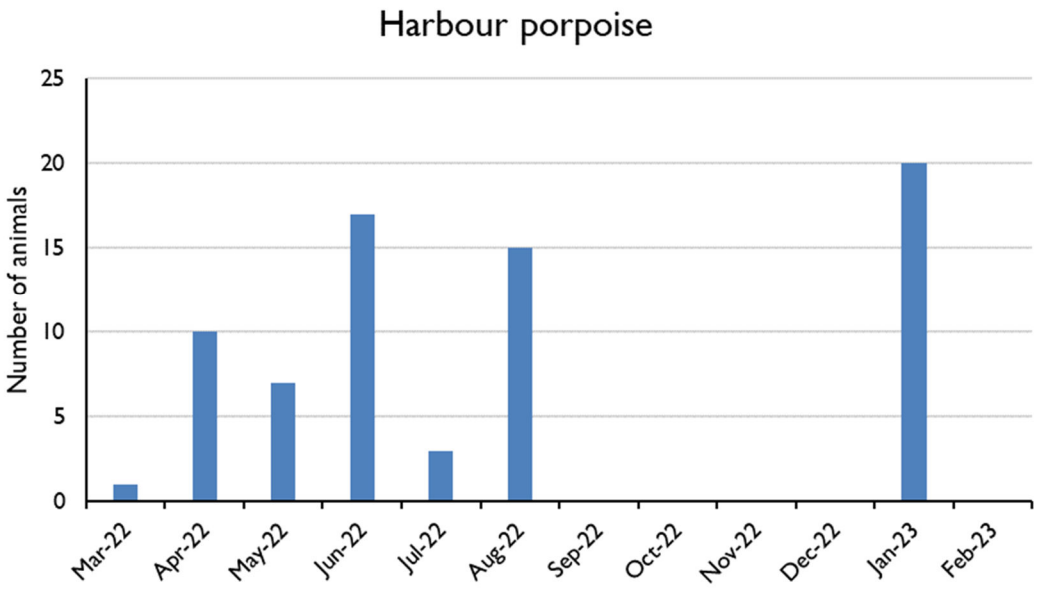


Figure 52 Harbour porpoise density estimates, with 95% lower and upper confidence limits, in the Stromar survey area, between March 2022 and February 2023

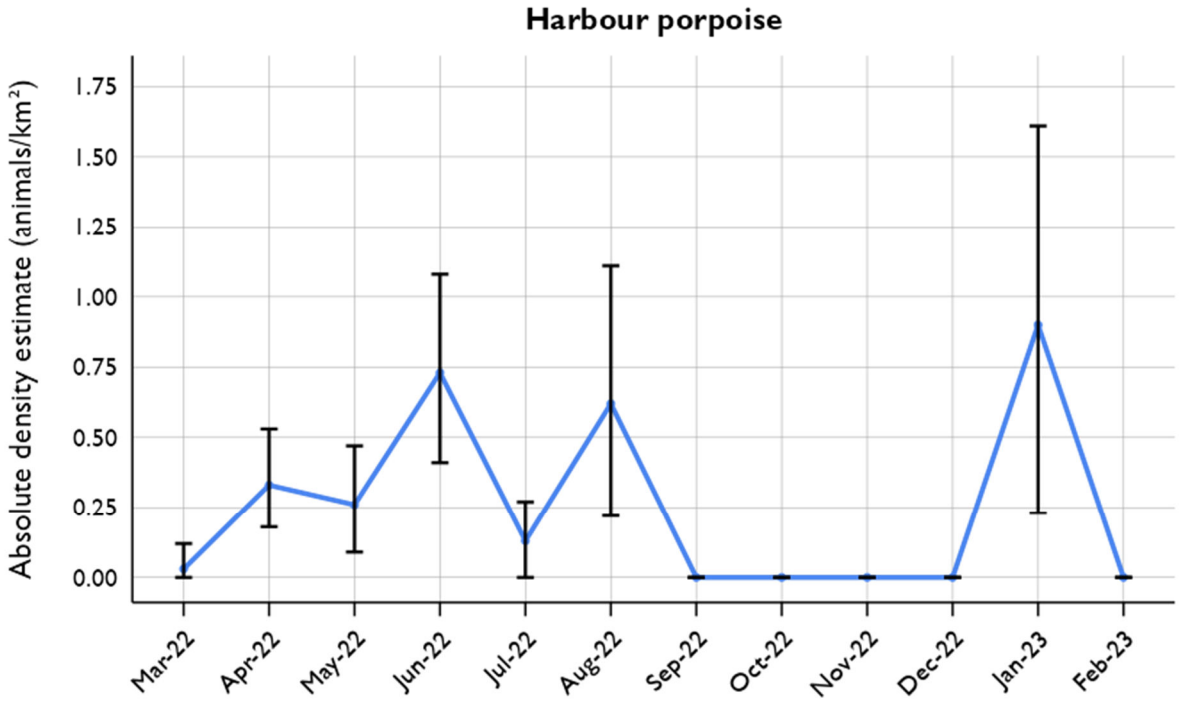


Table 28 Relative and absolute monthly density and population estimates for harbour porpoise in the Stromar survey area between March 2022 and February 2023, accounting for animals estimated as unavailable for detection

Survey date	Relative population estimates						Absolute population estimates			
	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)
20 March 2022	0.01	8	0	24	8	98.47	0.03	24	0	72
02 April 2022	0.13	80	39	124	22	27.63	0.33	203	99	315
07 May 2022	0.09	57	16	96	20	34.74	0.26	166	47	280
20 June 2022	0.23	137	78	200	33	23.66	0.73	434	247	633
23 July 2022	0.04	25	0	48	12	47.01	0.13	83	0	160
22 August 2022	0.20	121	39	215	46	37.52	0.62	374	121	665
03 September 2022	0.00	0	0	0	0	0	0.00	0	0	0
13 October 2022	0.00	0	0	0	0	0	0.00	0	0	0
02 November 2022	0.00	0	0	0	0	0	0.00	0	0	0
03 December 2022	0.00	0	0	0	0	0	0.00	0	0	0
20 January 2023	0.27	159	40	287	64	40.24	0.90	532	134	961
25 February 2023	0.00	0	0	0	0	0	0.00	0	0	0

Figure 53 Detections, density of harbour porpoises (number/km²) and number of detections per segment in the Stromar survey area between March and August 2022

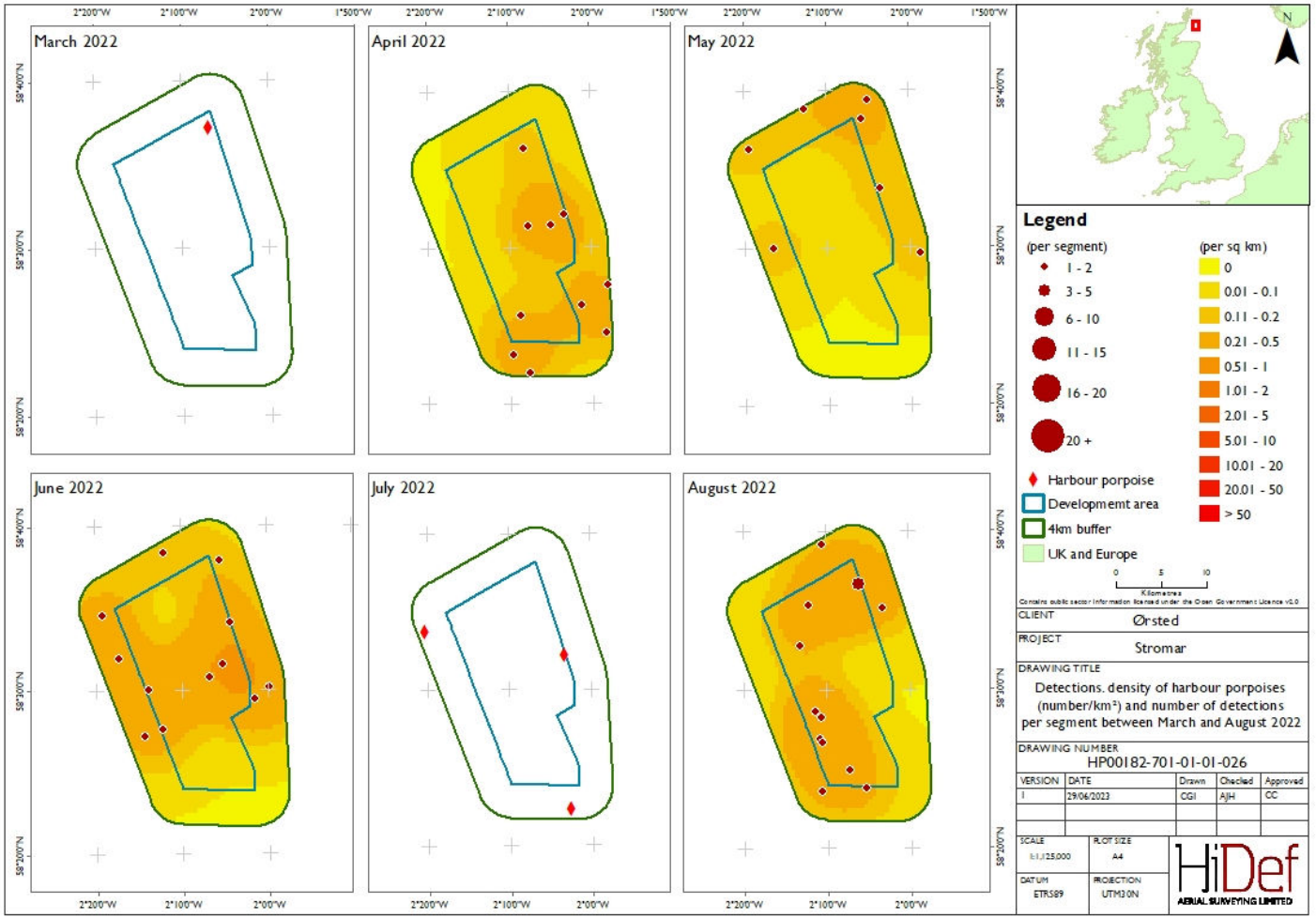
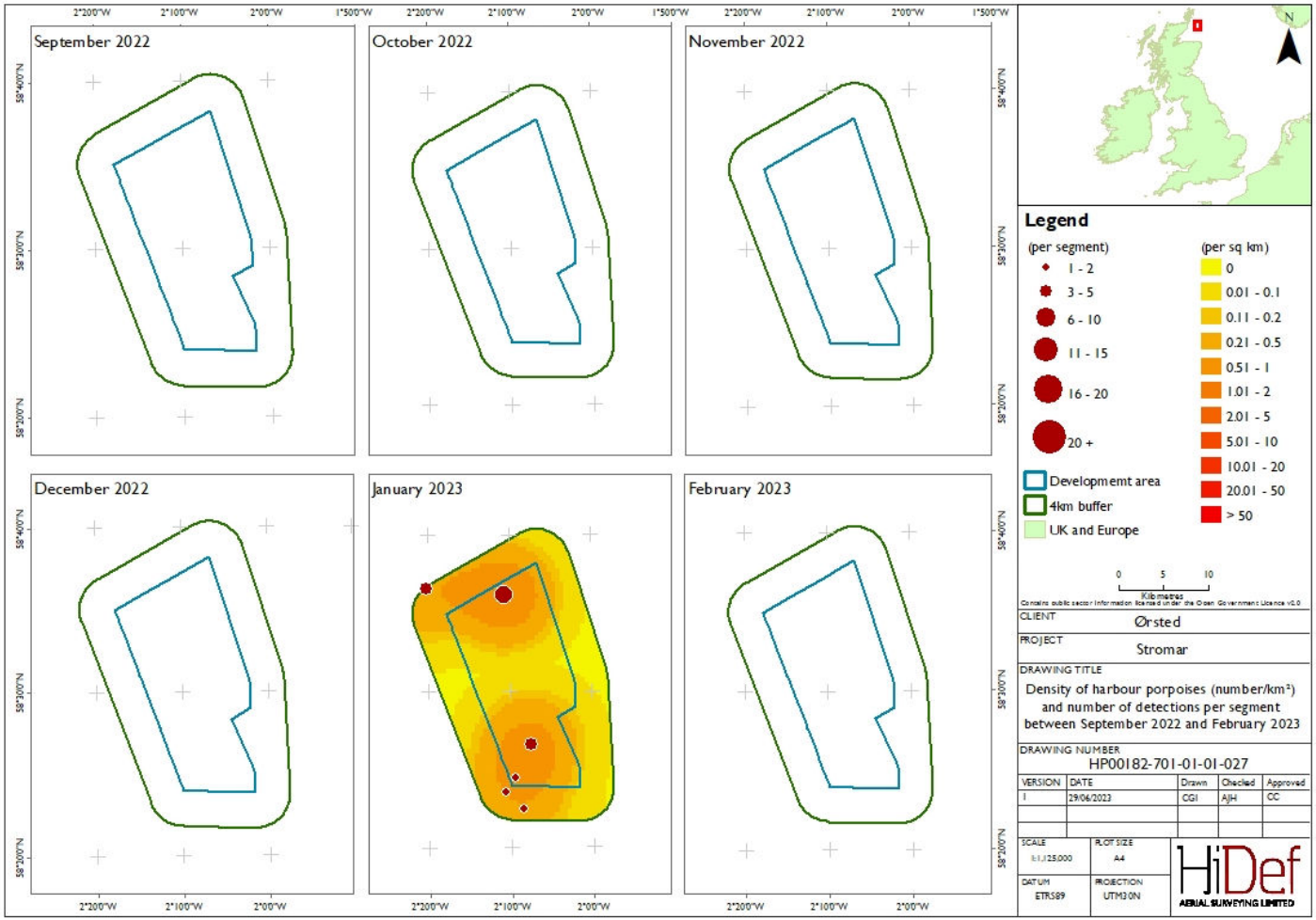


Figure 54 Density of harbour porpoises (number/km²) and number of detections per segment in the Stromar survey area between September 2022 and February 2023



3.3.13 Less abundant non-avian animal species

127 Multiple other non-avian animal species were recorded throughout the survey period. A total of one grey seal, one common dolphin (*Delphinus delphis*) and two Risso's dolphin (*Grampus griseus*) were recorded in April, May and June 2022 respectively (Figure 55).

128 White-beaked dolphin (*Lagenorhynchus albirostris*) were the second most numerous non-avian animal species with a total of 19 individuals recorded across the survey period, when observations peaked in January 2023, ten individuals were recorded.

129 Distribution of less abundant non-avian animal species are presented in Figure 56 and Figure 57.

Figure 55 Number of less abundant non-avian animals recorded within the Stromar survey area between March 2022 and February 2023

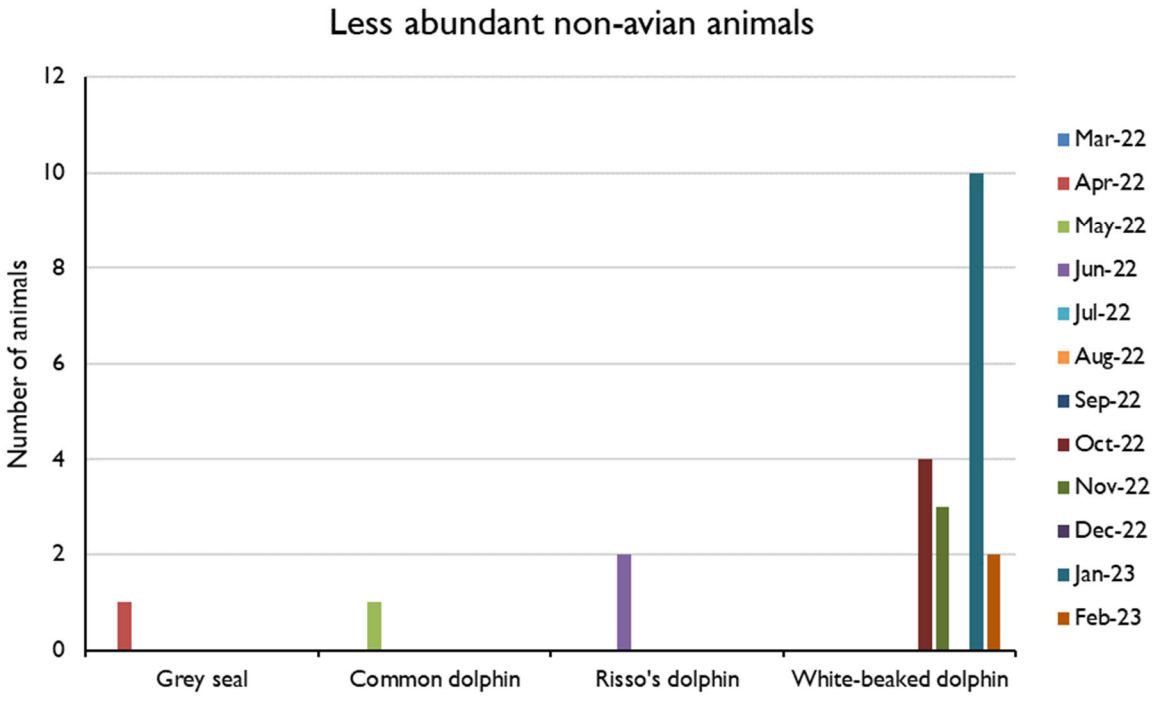


Figure 56 Detections of less abundant non-avian animal species in the Stromar survey area between March and August 2022

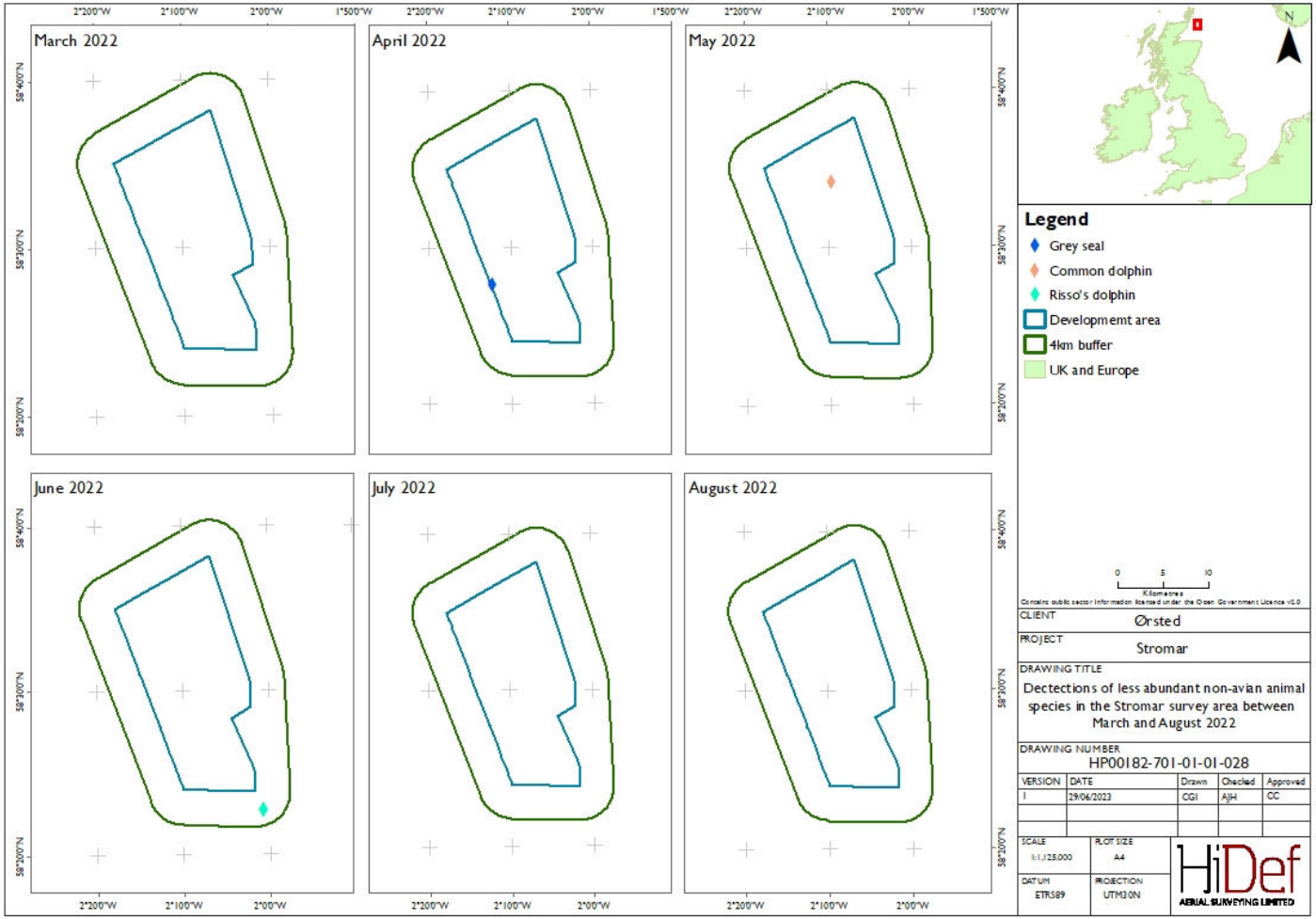
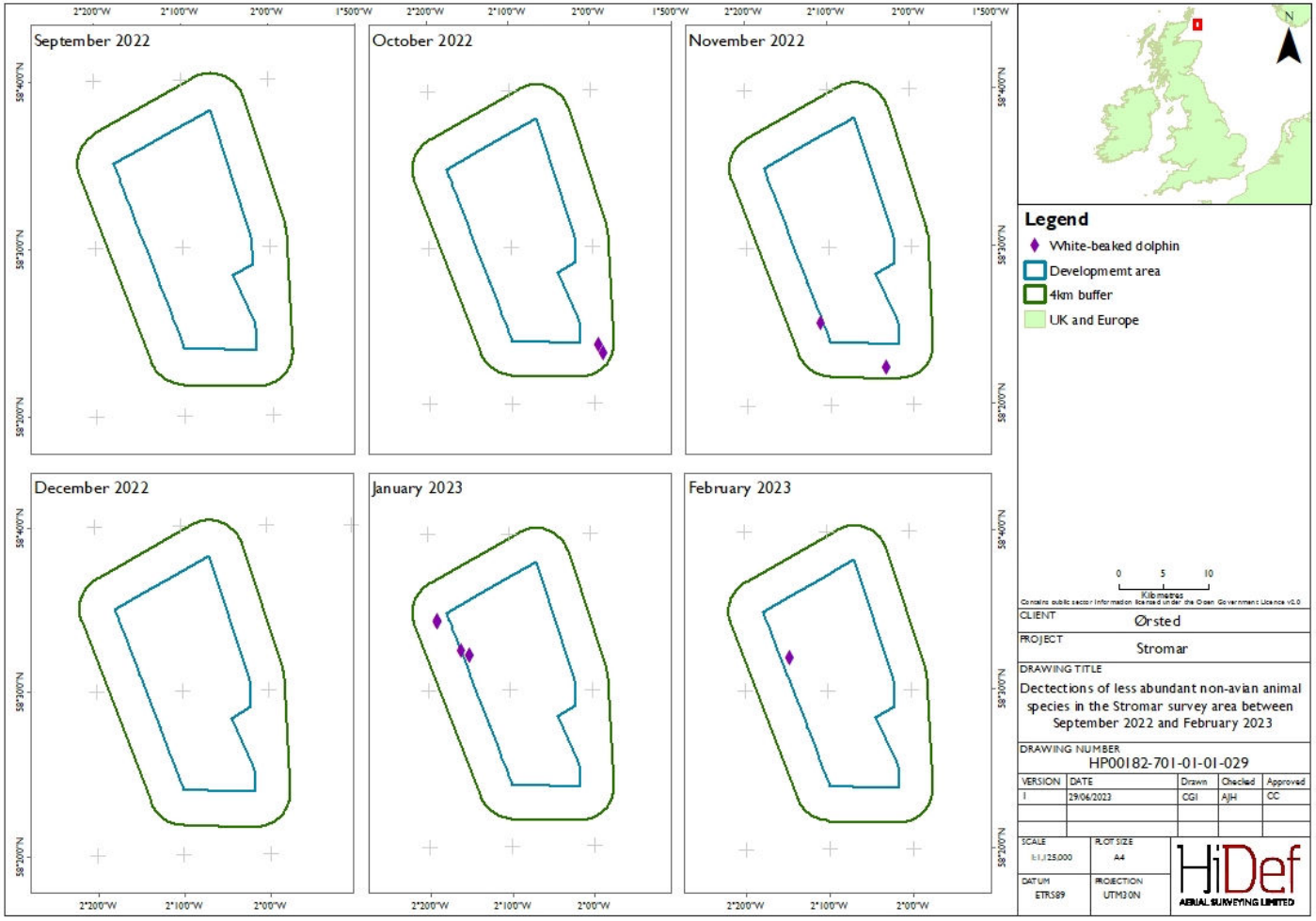


Figure 57 Detections of less abundant non-avian animal species in the Stromar survey area between September 2022 and February 2023



3.3.14 Unidentified non-avian animals

130 Unidentified non-avian animals were recorded in the first half of the survey period, with peaks in non-identification related to seal species (Figure 58). This is primarily related to difficulties differentiating between harbour and grey seals, which can be problematic as females and juveniles of each species overlap in size. There were no unidentified non-avian animals between September 2022 and February 2023.

131 Although animals were dispersed throughout the survey area, observations were found in the northern buffer for most months (Figure 59) with observations also recorded in the south in April and June 2022.

Figure 58 Number of unidentified non-avian animals recorded within the Stromar survey area between March 2022 and February 2023

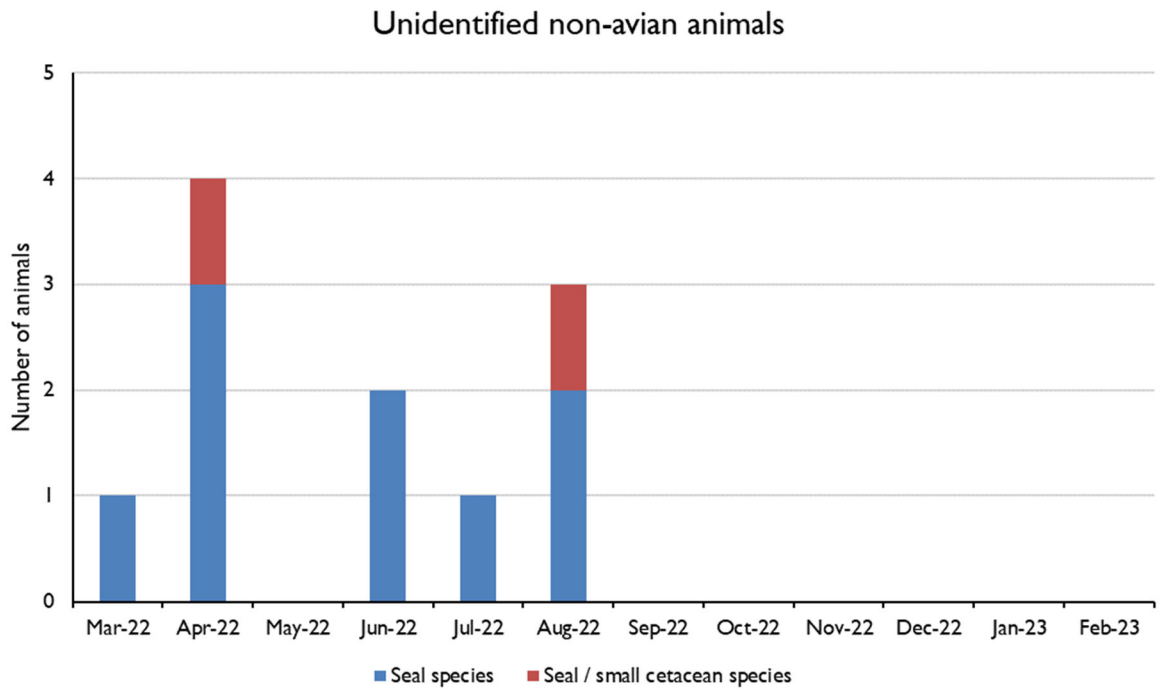
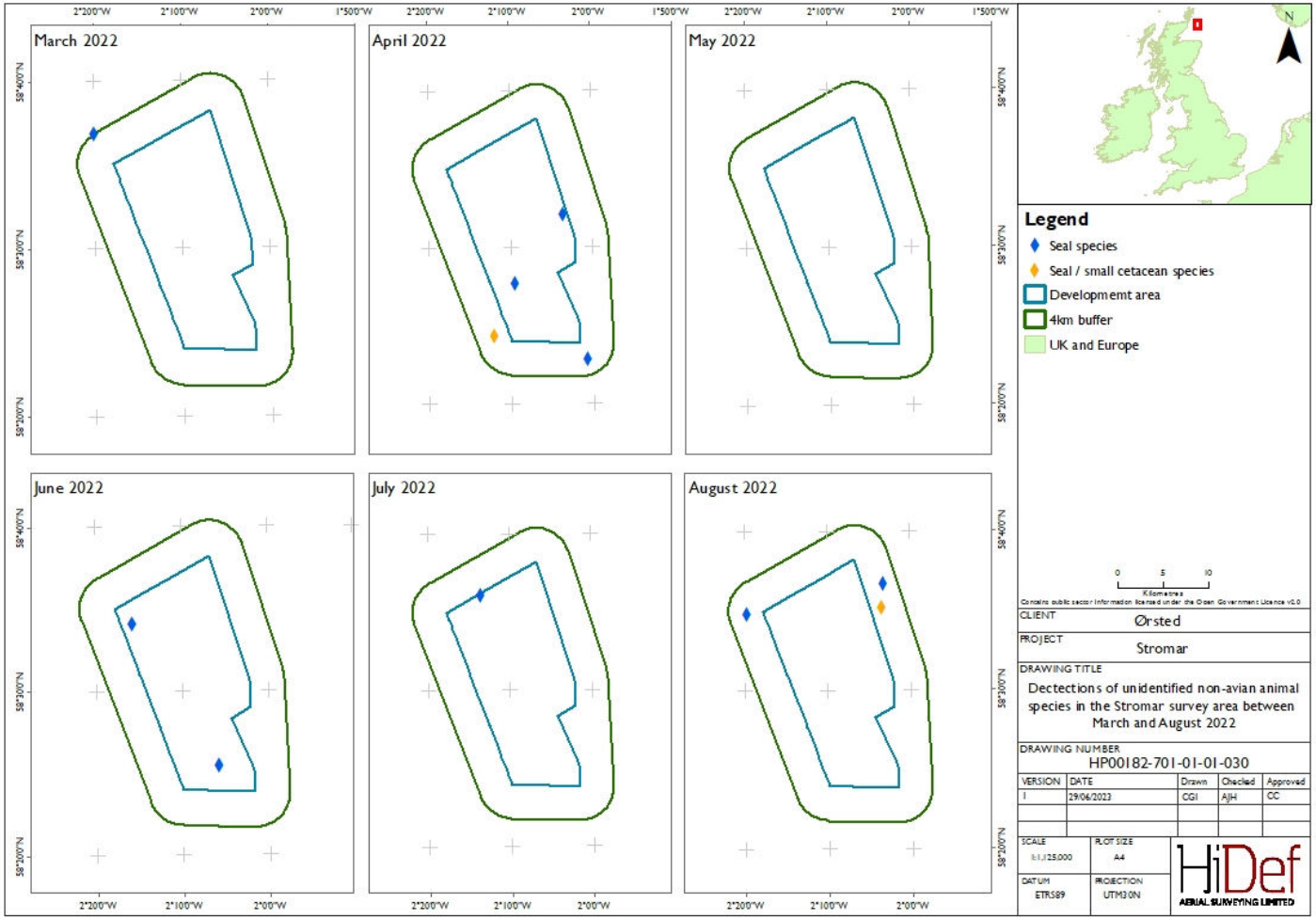


Figure 59 Detections of unidentified non-avian animal species in the Stromar survey area between March and August 2022



3.3.15 Anthropogenic activity

132 Minimal anthropogenic activity was recorded (Figure 60). Fishing buoys were the most numerous anthropogenic objects recorded (7 records) in addition to one unidentified man-made object. In seven surveys, no anthropogenic activity was recorded. Anthropogenic activity was generally present in the north of the survey area (Figure 61 and Figure 62).

Figure 60 Number of vessels and anthropogenic objects recorded within the Stromar survey area between March 2022 and February 2023

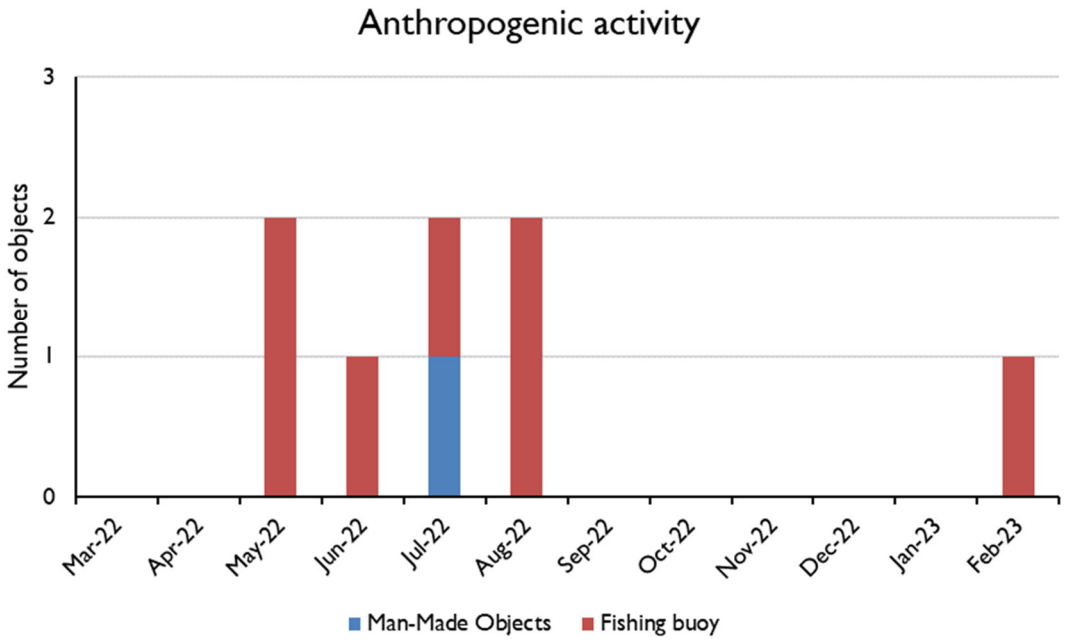


Figure 61 Detections of anthropogenic activity within the Stromar survey area between March and August 2022

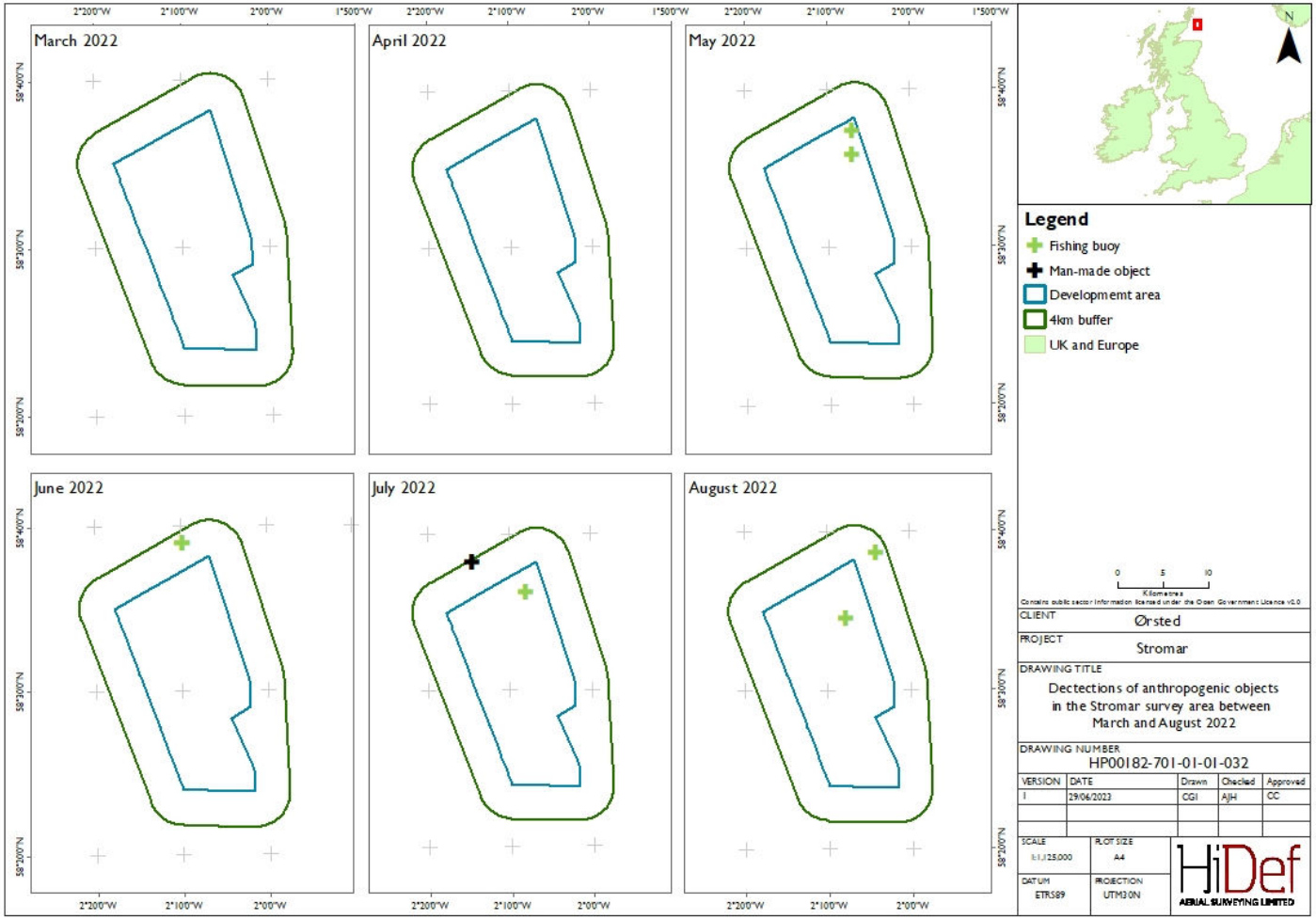
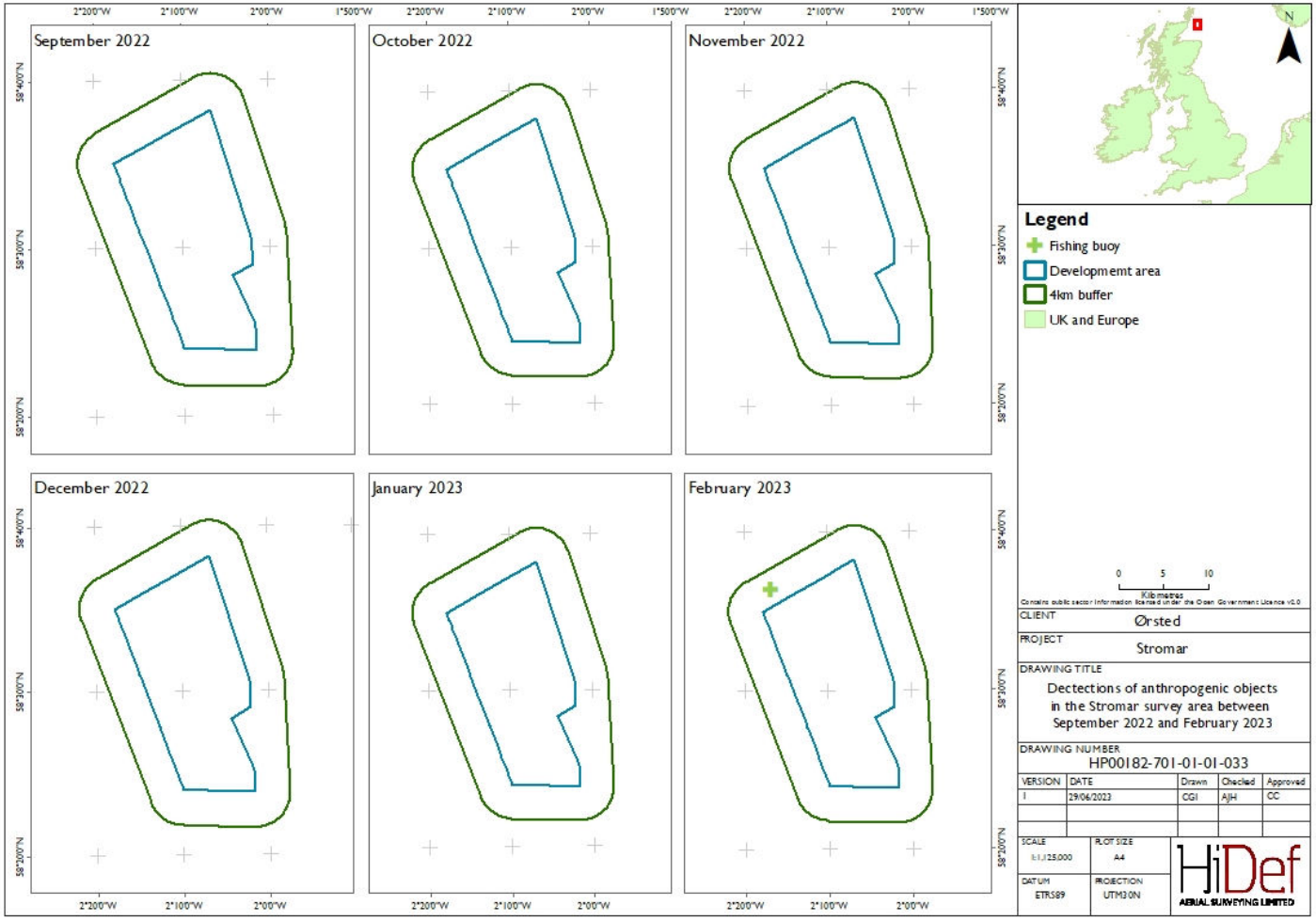


Figure 62 Detections of anthropogenic activity within the Stromar survey area between September 2022 and February 2023



4 Discussion

The surveys recorded a total of 10,913 birds of 18 species and 96 non-avian animals of five species. In addition, a total of 20 birds identified to species level were recorded as dead. Furthermore, 390 birds were partially identified to 10 species groups and 11 non-avian animals were partially identified to two species groups. In addition, a total of seven birds identified to a species group level were recorded as dead. An identification rate to species level of 96.58% was achieved throughout the 12-month survey period.

133 Kittiwakes were present in relatively low abundance throughout the year, although there was a marked increase in July 2022 during the breeding season. Typically, chicks will fledge around the end of July (Gilbert *et al.*, 2011), at which time adults will be required to forage to provision chicks. In the July 2022 survey many birds were recorded sitting on the water suggesting the area is utilised during foraging, perhaps by birds from nearby breeding colonies such as the North Caithness Cliffs SPA. Approximately 15 breeding colonies close to the survey area are within kittiwake foraging range (mean max 156.1km ±144.5 SD; Woodward *et al.*, 2019), spread across Orkney and Shetland, the closest being Copinsay, North Caithness Cliffs and East Caithness Cliffs SPAs, which were recorded to host 1,776 Apparently Occupied Nests (AONs) in 2010, 5,568 AONs in 2016 and 2,520 AONs in 2013 respectively (NatureScot, 2010; Swann, 2018; and Swann, 2016).

134 Great black-backed gulls were observed in relatively low numbers across the survey period, with the highest abundances generally recorded during the non-breeding season. The species is known to breed at the nearby North Caithness Cliffs SPA, supporting 68 Apparently Occupied Territories (AOT) in 2016 (Swann, 2018) The higher proportion of sitting compared to flying great-black backed gulls in the non-breeding season indicates the survey area may support suitable foraging habitat during this period.

135 Guillemots were the most abundant species recorded, peaking in August 2022 during the post-migration period. Birds lay a single egg between mid-April / May, with incubation lasting 33 – 34 days and the young leaving the colony 20 days after hatching (Gilbert *et al.*, 2011). They remain in the care of the adult male at sea from the end of June to August. Low numbers prior to the post-breeding migration period suggest the site is used less when birds are incubating eggs and rearing chicks at cliff colonies, but more in August as a possible moult site during post-breeding dispersal when birds are flightless; although few adult-chick pairs were recorded (40 pairs) compared to the total number of individuals observed. The nearest colony is likely to be that associated with the North Caithness Cliffs SPA, which is estimated to host approximately 38,863 individuals (Swann, 2018), equating to around 4% of the Great British (GB) population (NatureScot, 2018). Low abundance over the winter season is to be expected, since the species generally disperses offshore after chick-rearing (Forrester *et al.*, 2007).

136 Razorbills were recorded in relatively low abundance compared with other large auk species and almost exclusively during the breeding season, peaking in July 2022. Low abundance in May and June 2022 coincides with egg-laying when birds may be more constrained to colonies (Forrester *et al.*, 2012). In July 2022, 17 adult-chick pairs were recorded and with the large number of birds sitting on the water in this month corresponds to the post-breeding flightless moult period where birds are no longer associated with the colonies. It also suggests the survey area is used to raft and forage. As with guillemots, the North Caithness Cliffs SPA, the Buchan Ness to Collieston Coast SPA and the Troup, Pennan and Lion's Heads SPA are designated for the protection of breeding razorbills, hosting approximately 3,503, 5,800 and 3,000 individuals in 2016, 2019 and 2021, respectively (Swann, 2018;

BTO, 2023). The North Caithness Cliffs SPA hold almost 3% of the GB population (NatureScot, 2018), indicating the presence of suitable habitat in or near the survey area.

137 Puffins were third most abundant species recorded and were mostly observed during the breeding season. Peaks in abundance occurred at the end of the migration-free breeding season and post-breeding period as birds disperse form their colonies. Low abundance and absence during the non-breeding season suggests the area is not used for wintering, but only further surveys in the non-breeding season will clarify this. Puffins relatively large foraging range (mean max 137.1km ±128.3 SD; Woodward *et al.*, 2019) means the birds observed are potentially coming from a range of breeding colonies in the North Sea, such as those at the North Caithness Cliffs, Hoy and Sule Stack and Sule Skerry SPAs. Birds are also potentially coming from those colonies at the East Caithness Cliffs and Copinsay SPAs, hosting approximately 200 individuals in 2015 and more that 490 Apparently Occupied Burrows (AOBs) and 600 individuals in 2016 respectively (Lawson *et al.*, 2015; BTO, 2023).

138 Fulmars were the second more abundant species, peaking in July 2022 during the breeding season. A secondary peak was observed in January 2023 coinciding with the return migration from offshore waters. Generally, fulmars move further offshore to spend the winter at sea when there is less requirement to return to coastal breeding colonies as frequently, with many birds travelling back to coastal areas for the breeding season at the start of April (Edwards *et al.,* 2013). Due to fulmars very large foraging range (mean max of 542.3km ±657.9 SD; Woodward *et al.*, 2019), observed birds may be associated with the East Caithness Cliffs SPA and as far as Shetland and Orkney Island SPAs (Furness, 2015). Hoy SPA supports 6% of the GB population, in addition to the North Caithness Cliffs SPA which supports around 3% (SNH, 2009; NatureScot 2018).

139 Gannets were recorded in relatively low numbers over the 12-month period, peaking in July 2022, during the breeding season. Birds are most closely associated with colonies from May to August: with egg-laying occurring in late March -April until early-mid-July and hatching occurring 43 days later. Chicks fledge on average after 91 days from hatching, with an average fledging peak in mid-late September. Colonies are typically fully abandoned during the mid-winter (Forrester *et al.,* 2012). These timings are reflected by the increasing number of birds present in the survey area throughout this time and absence during winter months, although a secondary peak occurred in January 2023 which may indicate return-migration birds ahead of the breeding season. The presence of sitting and flying birds suggests the area is utilised both during foraging as well as during passage to other potential feeding grounds. Gannets are wide-ranging (mean max 315.2km ±194.2 SD; Woodward *et al.,* 2019), and although Stromar is not close in vicinity to gannet colonies, it is situated approximately within the foraging range of the Fair Isle SPA, West Westray SPA and Troup, Pennan and Lion's Head SPA, which were recorded to hold 4,971 (AONs) in 2021, 1,384 AONs in 2021 and 4,825 AONs in 2019, respectively (BTO, 2023). A total of 17 dead gannets were recorded over the breeding season which were most likely mortalities from the avian influenza (HPAI) H5N1 outbreak.

140 Harbour porpoises were the most commonly observed marine mammal species. Abundance peaked in January 2023 with an estimated absolute density of 0.90 porpoise/km² (40.24% CV). As the most common cetacean species present in the North Sea and wider UK waters (Hammond *et al.,* 2021), it is unsurprising that this species was the most abundant non-avian animal recorded during the survey period.

5 Conclusions

141 The provision of high-resolution digital aerial video surveys provided spatial distributions of birds, marine mammals and other megafauna in the Stromar project area, located off the coast of Wick, Scotland. The survey design allowed repeatable estimates of species abundance, and the digital aerial platform provides a unique, auditable record of species identification.

142 The surveys recorded a total of 10,913 birds of 18 species and 96 non-avian animals of five species. In addition, a total of 20 birds identified to species level were recorded as dead. Furthermore, 390 birds were partially identified to 10 species groups and 11 non-avian animals were partially identified to two species groups. In addition, a total of seven birds identified to a species group level were recorded as dead. An identification rate to species level of 96.58% was achieved throughout the 12-month survey period.

143 The seasonal changes in the numbers of seabirds recorded is consistent with the project's proximity to seabird breeding colonies on the islands and coastline of north Scotland, such as those at North Caithness Cliffs SPA, East Caithness Cliffs SPA and Copinsay SPA as well as Troup, Pennan and Lion's Head SPA and Buchan Ness to Collieston Coast SPA. Several seabird species appear to sue the area during the breeding season including kittiwake, puffin, fulmar and gannet with others such as great-black backed gull primarily recorded during the non-breeding season. Non-avian animals were recorded intermittently.

144 The study provided robust distribution and density data for multiple seabird and non-avian animal species off the coast of Wick and north-east Scotland. Regular data collection is essential when assessing trends in distribution and abundance of marine species.

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Appendix I: Density and population estimates

145 The density, total estimated population, upper and lower 95% CLs, standard deviation and CV for each species and species group have been calculated using strip transect analysis and are presented here for each of the surveys undertaken.

Table 29 Density and population estimates of species groups in the Stromar survey area during Survey 1 on 20 March 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	3.01	1785	1510	2064	139	7.75
All non-avian animals	0.03	17	0	39	11	61.96
Species group						
Small gull species	0.59	353	261	460	50	14.14
Large gull species	0.01	8	0	24	8	97.1
Large auk	1.23	728	525	936	107	14.58
Auk species	0.12	72	24	125	26	35.23
Auk / small gull	0.04	25	0	64	18	73.56
Fulmar / gull species	0.65	387	262	511	66	16.99
Gannet species	0.35	209	159	264	27	12.88
Seal species	0.01	9	0	24	8	88.57
Cetacean species	0.01	8	0	24	8	97.96

Table 30 Density and unapportioned population estimates of species in the Stromar survey area during Survey 1 on 20 March 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Kittiwake	0.64	383	298	475	47	12.11
Great black-backed gull	0.01	9	0	24	8	90.52
Guillemot	1.11	659	443	901	117	17.67
Razorbill	0.04	24	0	53	13	51.58
Puffin	0.04	25	0	62	18	69.91
Fulmar	0.61	361	234	502	68	18.86
Gannet	0.35	208	158	260	26	12.35
Harbour porpoise	0.01	8	0	24	8	98.47

Table 31 Density and population estimates of species groups in the Stromar survey area during Survey 2 on 02 April 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	7.27	4316	3738	5075	351	8.12
All non-avian animals	0.21	123	71	180	29	23.03
Species group						
Small gull species	0.60	354	289	420	34	9.60
Black-backed gull species	0.07	41	15	72	16	38.91
Large gull species	0.11	65	32	99	18	27.14
Large auk	4.35	2579	2136	3054	229	8.86
Auk species	0.39	234	104	416	80	33.96
Auk / small gull	0.05	33	8	70	18	52.27
Large auk / diver species	0.01	8	0	24	8	91.89
Diver species	0.01	8	0	24	8	90.34
Fulmar / gull species	1.47	871	644	1102	123	14.05
Gannet species	0.22	131	75	195	32	24.14
Seal species	0.05	32	8	64	16	50.79
Cetacean species	0.13	80	33	124	24	29.43
Seal / small cetacean species	0.01	9	0	31	9	100.05

Table 32 Density and unapportioned population estimates of species in the Stromar survey area during Survey 2 on 02 April 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Kittiwake	0.63	376	308	446	36	9.57
Great black-backed gull	0.11	64	32	95	16	24.33
Herring gull	0.04	25	8	48	11	44.96
Lesser black-backed gull	0.01	9	0	24	8	93.13
Guillemot	4.01	2381	1956	2801	216	9.05
Razorbill	0.24	145	48	248	52	35.53
Puffin	0.28	169	40	324	74	43.35
Red-throated diver	0.01	8	0	24	8	100.19
Fulmar	1.48	880	648	1113	120	13.63
Gannet	0.22	128	72	192	32	24.72
Grey seal	0.01	8	0	24	8	94.95
Harbour porpoise	0.13	80	39	124	22	27.63

Table 33 Density and population estimates of species groups in the Stromar survey area during Survey 3 on 07 May 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	4.72	2799	2109	3711	424	15.14
All non-avian animals	0.11	64	30	105	20	30.54
Species group						
Small gull species	0.01	9	0	24	8	93.05
Gull species	0.01	9	0	24	8	93.41
Skua species	0.03	16	0	39	11	63.5
Large auk	2.42	1434	1005	2040	272	18.92
Auk species	1.88	1114	720	1524	208	18.67
Fulmar / gull species	0.28	167	89	245	41	24.03
Shearwater species	0.03	18	0	40	11	59.77
Gannet species	0.08	49	15	92	21	41.59
Dolphin species	0.01	8	0	24	8	92.18
Cetacean species	0.10	57	22	102	21	36.88

Table 34 Density and unapportioned population estimates of species in the Stromar survey area during Survey 3 on 07 May 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Kittiwake	0.01	8	0	24	8	97.07
Great skua	0.03	17	0	39	11	62.88
Guillemot	2.29	1360	939	1889	250	18.36
Razorbill	0.11	64	0	129	33	50.31
Puffin	1.79	1061	665	1520	217	20.39
Fulmar	0.29	171	96	244	39	22.6
Manx shearwater	0.03	17	0	39	11	62.79
Gannet	0.08	48	15	89	21	42.35
Common dolphin	0.01	8	0	24	8	96.44
Harbour porpoise	0.09	57	16	96	20	34.74

Table 35 Density and population estimates of species groups in the Stromar survey area during Survey 4 on 20 June 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	5.70	3380	2909	3845	240	7.09
All non-avian animals	0.29	170	93	256	43	25.16
Species group						
Small gull species	0.21	122	48	209	41	33.62
Black-backed gull species	0.01	8	0	24	8	97.57
Large auk	3.16	1877	1584	2148	142	7.55
Auk species	0.95	566	403	742	87	15.31
Auk / shearwater species	0.01	8	0	24	8	93.3
Storm petrel species	0.18	109	0	251	68	61.89
Fulmar / gull species	1.05	626	464	777	80	12.69
Gannet species	0.08	49	8	93	21	41.58
Seal species	0.03	16	0	38	10	59.88
Dolphin species	0.03	17	0	48	16	90.81
Cetacean species	0.23	137	77	202	33	23.72

Table 36 Density and unapportioned population estimates of species in the Stromar survey area during Survey 4 on 20 June 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Kittiwake	0.20	118	46	199	41	34.20
Great black-backed gull	0.01	8	0	24	8	92.12
Guillemot	2.76	1638	1377	1903	138	8.40
Razorbill	0.3	177	103	263	41	22.82
Puffin	0.8	474	342	619	73	15.37
European storm petrel	0.2	116	8	265	67	57.77
Fulmar	1.05	626	478	773	77	12.19
Gannet	0.08	49	15	88	20	39.41
Risso's dolphin	0.03	17	0	48	16	90.68
Harbour porpoise	0.23	137	78	200	33	23.66

Table 37 Density and population estimates of species groups in the Stromar survey area during Survey 5 on 23 July 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	35.96	21340	13795	31511	4506	21.11
All non-avian animals	0.05	33	8	56	12	37.16
Species group						
Wader species	0.01	9	0	25	9	98.57
Small gull species	5.46	3239	1684	5564	1079	33.31
Large gull species	0.01	9	0	24	8	88.76
Arctic / common tern	0.38	226	0	652	180	79.64
Skua species	0.03	17	0	40	11	63.67
Large auk	21.86	12972	8646	17541	2265	17.46
Auk species	2.39	1418	1025	1816	209	14.7
Auk / shearwater species	0.03	17	0	40	11	63.48
Fulmar / gull species	5.25	3117	1779	5249	971	31.13
Shearwater species	0.14	86	9	188	48	55.22
Gannet species	0.71	424	139	895	223	52.57
Seal species	0.01	8	0	24	8	92.32
Cetacean species	0.04	25	0	48	12	47.20

Table 38 Density and unapportioned population estimates of species in the Stromar survey area during Survey 5 on 23 July 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Kittiwake	5.44	3226	1739	5579	1040	32.23
Arctic tern	0.24	142	0	405	125	88.53
Great skua	0.03	16	0	40	11	65.36
Guillemot	15.56	9236	5499	13354	1964	21.27
Razorbill	5.45	3234	2170	4411	585	18.07
Puffin	1.85	1097	784	1451	172	15.61
Fulmar	5.40	3205	1773	5505	997	31.09
Manx shearwater	0.15	87	17	185	44	50.22
Gannet	0.70	417	135	890	221	53.01
Harbour porpoise	0.04	25	0	48	12	47.01

Table 39 Density and population estimates of species groups in the Stromar survey area during Survey 6 on 22 August 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	48.67	28700	25616	32398	1770	6.17
All non-avian animals	0.24	145	62	257	51	34.88
Species group						
Small gull species	0.91	535	368	728	93	17.24
Gull species	0.01	9	0	24	8	93.35
Arctic / common tern	0.16	96	40	151	28	29.15
Skua species	0.01	9	0	24	8	92.27
Large auk	38.85	22913	19174	26590	1967	8.58
Auk species	7.00	4130	2888	5496	679	16.44
Fulmar / gull species	1.60	943	836	1056	59	6.23
Gannet species	0.12	73	38	112	20	26.39
Seal species	0.03	16	0	39	11	66.69
Cetacean species	0.20	118	40	210	45	37.92
Seal / small cetacean species	0.01	8	0	24	8	98.74

Table 40 Density and unapportioned population estimates of species in the Stromar survey area during Survey 6 on 22 August 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Kittiwake	0.93	551	374	741	95	17.20
Common tern	0.01	9	0	24	8	91.50
Great skua	0.01	8	0	24	8	94.49
Guillemot	37.54	22141	18628	26227	1993	9.00
Razorbill	1.08	638	356	979	159	24.77
Puffin	5.75	3393	2289	4650	604	17.79
Fulmar	1.54	912	792	1040	63	6.89
Gannet	0.12	73	37	112	21	27.73
Harbour porpoise	0.20	121	39	215	46	37.52

Table 41 Density and population estimates of species groups in the Stromar survey area during Survey 7 on 03 September 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	24.18	14258	12684	16066	886	6.21
Species group						
Small gull species	0.12	71	24	128	27	37.22
Arctic / common tern	0.01	8	0	24	8	98.16
Tern / small gull species	0.03	16	0	38	11	65.67
Skua species excluding great	0.01	8	0	24	8	92.90
Large auk	16.88	9953	8534	11595	771	7.74
Auk species	6.04	3560	2947	4149	298	8.34
Auk / shearwater species	0.03	16	0	38	10	65.45
Fulmar / gull species	0.77	454	242	789	153	33.59
Shearwater species	0.01	8	0	24	8	97.96
Gannet species	0.19	111	63	161	26	23.23

Table 42 Density and unapportioned population estimates of species in the Stromar survey area during Survey 7 on 03 September 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Kittiwake	0.12	72	23	125	27	37.17
Arctic skua	0.01	8	0	24	8	92.54
Guillemot	16.63	9808	8432	11611	819	8.35
Razorbill	0.29	169	89	259	45	26.45
Puffin	5.30	3126	2401	3745	344	10.99
Fulmar	0.78	460	236	782	153	33.05
Sooty shearwater	0.01	8	0	24	8	98.76
Gannet	0.19	111	62	164	27	23.73

Table 43 Density and population estimates of species groups in the Stromar survey area during Survey 8 on 13 October 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	4.37	2593	1213	4786	1099	42.38
All non-avian animals	0.06	34	0	96	30	86.36
Species group						
Duck species	0.05	32	0	94	29	89.36
Small gull species	0.19	114	67	166	26	22.37
Black-backed gull species	0.50	296	56	695	184	62.18
Large gull species	0.04	24	0	71	23	92.17
Large auk	0.63	376	266	491	58	15.32
Auk species	0.23	137	82	195	30	21.25
Large auk / diver species	0.01	9	0	25	8	96.48
Fulmar / gull species	2.19	1301	424	2880	718	55.17
Gannet species	0.32	191	85	324	63	32.77
Dolphin species	0.05	32	0	95	30	92.12

Table 44 Density and unapportioned population estimates of species in the Stromar survey area during Survey 8 on 13 October 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Wigeon	0.06	34	0	96	30	89.36
Kittiwake	0.19	112	67	161	25	22.36
Great black-backed gull	0.55	325	54	779	220	67.55
Guillemot	0.64	378	268	479	53	14.00
Razorbill	0.01	9	0	24	8	93.92
Puffin	0.20	120	55	187	34	27.97
Fulmar	2.21	1309	407	2841	726	55.42
Gannet	0.33	194	92	331	66	33.81
White-beaked dolphin	0.05	31	0	95	30	96.57

Table 45 Density and population estimates of species groups in the Stromar survey area during Survey 9 on 02 November 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	3.52	2088	1678	2466	205	9.78
All non-avian animals	0.04	24	0	56	16	67.39
Species group						
Small gull species	0.11	65	31	104	20	30.12
Large gull species	0.27	160	111	214	28	16.94
Large auk	1.49	882	695	1072	100	11.24
Auk species	0.01	9	0	24	8	97.01
Auk / small gull	0.01	8	0	24	8	99.62
Fulmar / gull species	1.61	957	699	1241	145	15.08
Gannet species	0.01	9	0	24	8	96.43
Dolphin species	0.04	24	0	61	16	67.58

Table 46 Density and unapportioned population estimates of species in the Stromar survey area during Survey 9 on 02 November 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Kittiwake	0.11	65	31	103	19	29.04
Great black-backed gull	0.21	127	74	183	28	21.89
Herring gull	0.05	33	8	62	14	42.64
Guillemot	1.47	872	664	1088	107	12.24
Fulmar	1.58	938	670	1239	147	15.57
Gannet	0.01	9	0	24	8	92.38
White-beaked dolphin	0.04	24	0	62	16	67.21

Table 47 Density and population estimates of species groups in the Stromar survey area during Survey 10 on 03 December 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	1.87	1111	951	1279	84	7.54
Species group						
Small gull species	0.22	129	69	187	31	23.94
Large gull species	0.42	250	154	345	50	19.84
Large auk	0.18	106	54	176	33	31.33
Auk species	0.01	9	0	31	9	96.96
Fulmar / gull species	1.04	618	505	762	65	10.50

Table 48 Density and unapportioned population estimates of species in the Stromar survey area during Survey 10 on 03 December 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Kittiwake	0.22	128	66	184	31	23.98
Great black-backed gull	0.34	200	105	295	48	23.71
Herring gull	0.07	41	15	77	17	40.65
Guillemot	0.10	58	8	127	31	52.27
Razorbill	0.04	24	0	56	16	65.42
Fulmar	0.98	580	469	708	63	10.78

Table 49 Density and population estimates of species groups in the Stromar survey area during Survey 11 on 20 January 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	10.46	6207	5119	7185	537	8.65
All non-avian animals	0.40	238	90	404	80	33.33
Species group						
Small gull species	0.28	167	76	261	48	28.59
Large gull species	1.04	617	326	917	152	24.60
Large auk	5.74	3404	2987	3882	230	6.75
Auk species	0.03	17	0	40	11	61.68
Fulmar / gull species	2.92	1735	1180	2272	285	16.39
Gannet species	0.39	229	80	427	94	40.70
Dolphin species	0.14	82	0	239	74	90.38
Cetacean species	0.27	160	40	293	65	40.50

Table 50 Density and unapportioned population estimates of species in the Stromar survey area during Survey 11 on 20 January 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Kittiwake	0.28	170	80	261	48	27.84
Great black-backed gull	0.58	346	170	513	89	25.64
Herring gull	0.47	280	131	451	80	28.49
Guillemot	5.61	3330	2930	3779	223	6.67
Razorbill	0.07	41	0	104	30	73.84
Fulmar	2.91	1726	1190	2238	278	16.11
Gannet	0.39	232	87	429	90	38.58
White-beaked dolphin	0.13	79	0	238	75	95.63
Harbour porpoise	0.27	159	40	287	64	40.24

Table 51 Density and population estimates of species groups in the Stromar survey area during Survey 12 on 25 February 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Broad category						
All birds	3.31	1966	1690	2226	141	7.13
All non-avian animals	0.03	16	0	48	15	90.07
Species group						
Small gull species	0.09	57	25	90	17	29.25
Large gull species	0.37	219	154	292	37	16.60
Large auk	0.56	334	211	482	71	21.14
Fulmar / gull species	2.19	1301	1089	1518	112	8.60
Gannet species	0.08	49	24	73	13	25.76
Dolphin species	0.03	16	0	49	15	95.72

Table 52 Density and unapportioned population estimates of species in the Stromar survey area during Survey 12 on 25 February 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Standard deviation of population estimate (number)	CV (%)
Species						
Kittiwake	0.10	58	30	92	17	29.44
Great black-backed gull	0.36	213	146	286	36	16.78
Herring gull	0.01	9	0	25	8	90.50
Guillemot	0.48	285	190	391	50	17.40
Razorbill	0.07	40	0	96	25	61.40
Fulmar	2.20	1305	1090	1521	111	8.48
Gannet	0.08	50	24	73	13	25.44
White-beaked dolphin	0.03	16	0	49	16	94.61

Ørsted BlueFloat ENERGY Renantis

STROMAR

Stromar Offshore Wind Farm

Environmental Impact Assessment: Offshore Scoping Report

Appendix E: SLVIA Visualisations

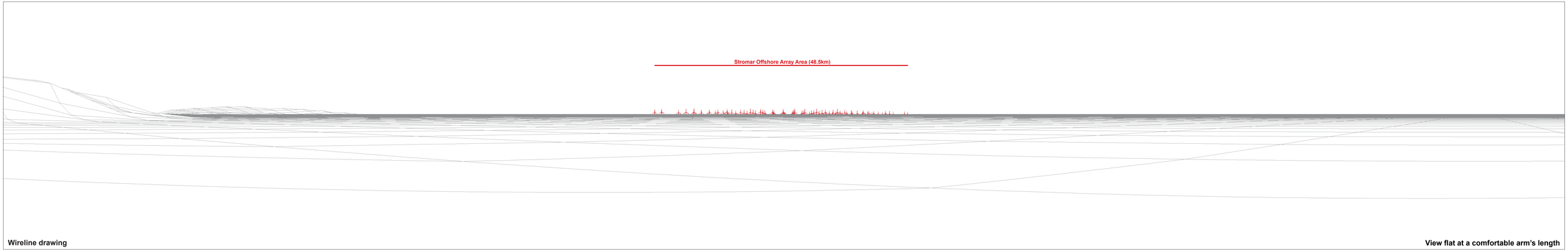
Proposed Offshore Development

Date: 03 January 2024

Document Number: 08550862

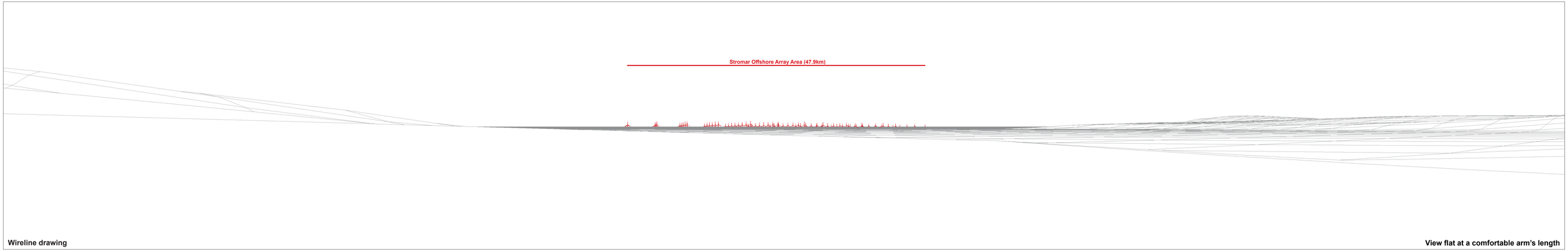
Revision: A

Classification: Public



OS reference:	354970 E 1003399 N	**Horizontal field of view:**	90° (cylindrical projection)
Eye level:	4.8 m AOD	**Principal distance:**	522 mm
Direction of view:	140°	**Paper size:**	841 x 297 mm (half A1)
Nearest turbine:	48.5 km	**Correct printed image size:**	820 x 130 mm

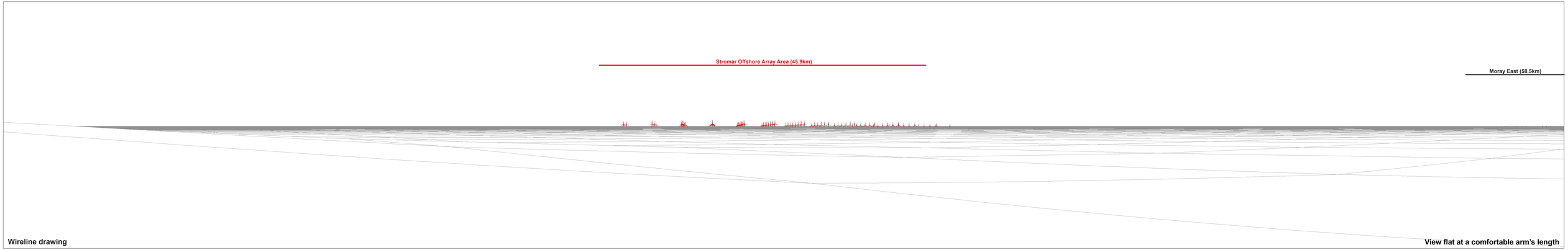
Figure: 17.6
Viewpoint 1: A960 at Taracliff Bay, Orkney Mainland



OS reference: 348022 E 995436 N
Eye level: 3.83 m AOD
Direction of view: 130°
Nearest turbine: 47.9 km

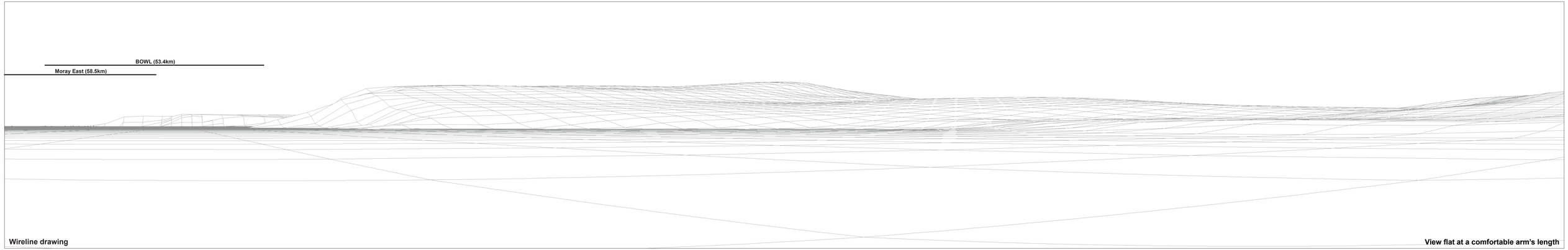
Horizontal field of view: 90° (cylindrical projection)
Principal distance: 522 mm
Paper size: 841 x 297 mm (half A1)
Correct printed image size: 820 x 130 mm

Figure: 17.7
Viewpoint 2: A961 between South Ronaldsay and Burray



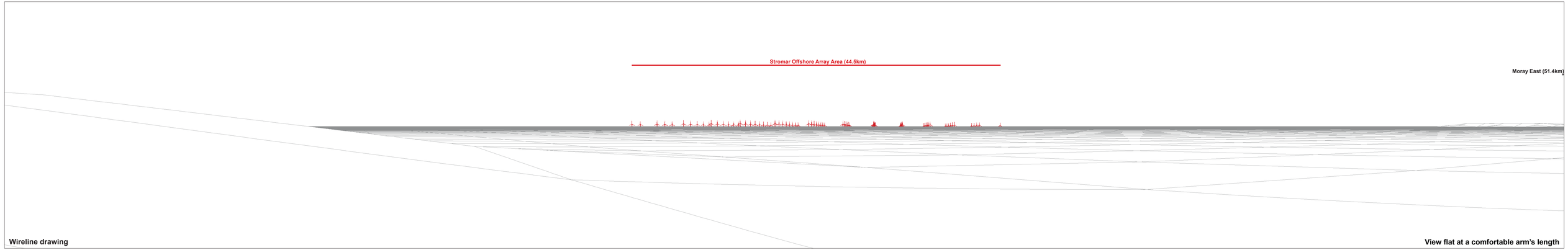
OS reference:	347069 E 990773 N	**Horizontal field of view:**	90° (cylindrical projection)
Eye level:	4.26 m AOD	**Principal distance:**	522 mm
Direction of view:	125°	**Paper size:**	841 x 297 mm (half A1)
Nearest turbine:	45.9 km	**Correct printed image size:**	820 x 130 mm

Figure: 17.8a
Viewpoint 3: Kirkhouse Point, South Ronalsday



OS reference:	347069 E 990773 N	**Horizontal field of view:**	90° (cylindrical projection)
Eye level:	4.26 m AOD	**Principal distance:**	522 mm
Direction of view:	215°	**Paper size:**	841 x 297 mm (half A1)
Nearest turbine:	45.9 km	**Correct printed image size:**	820 x 130 mm

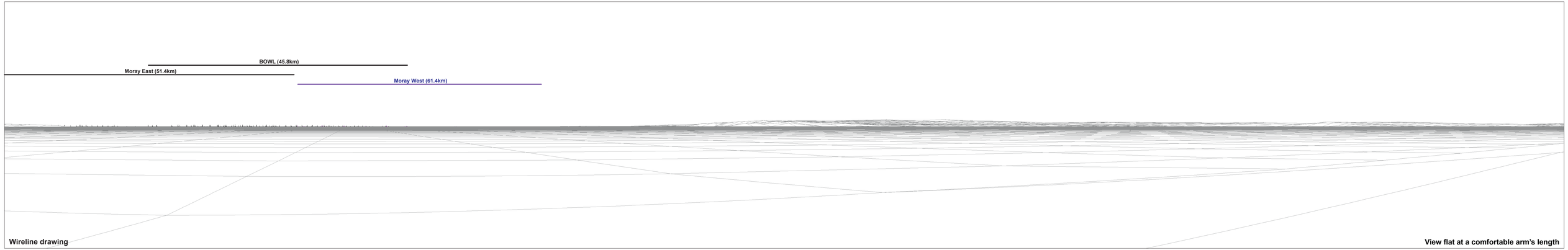
Figure: 17.8b
Viewpoint 3: Kirkhouse Point, South Ronalsday



OS reference: 344638 E 982914 N
Eye level: 5.91 m AOD
Direction of view: 115°
Nearest turbine: 44.5 km

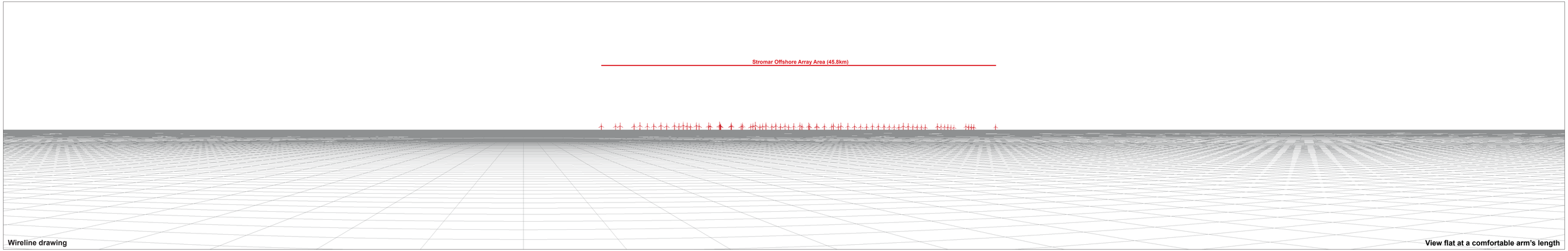
Horizontal field of view: 90° (cylindrical projection)
Principal distance: 522 mm
Paper size: 841 x 297 mm (half A1)
Correct printed image size: 820 x 130 mm

Figure: 17.9a
Viewpoint 4: Brough Ness, South Ronaldsay



OS reference:	344638 E 982914 N	**Horizontal field of view:**	90° (cylindrical projection)
Eye level:	5.91 m AOD	**Principal distance:**	522 mm
Direction of view:	205°	**Paper size:**	841 x 297 mm (half A1)
Nearest turbine:	44.5 km	**Correct printed image size:**	820 x 130 mm

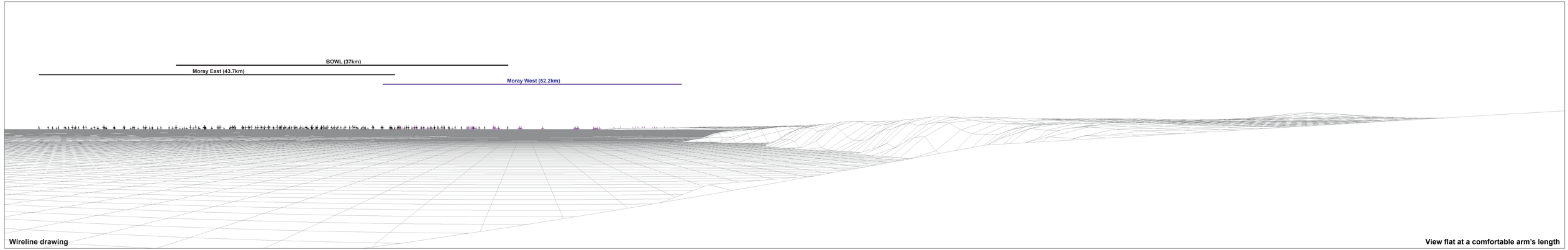
Figure: 17.9b
Viewpoint 4: Brough Ness, South Ronaldsay



OS reference: 340525 E 973250 N
Eye level: 59.95 m AOD
Direction of view: 195°
Nearest turbine: 37 km

Horizontal field of view: 90° (cylindrical projection)
Principal distance: 522 mm
Paper size: 841 x 297 mm (half A1)
Correct printed image size: 820 x 130 mm

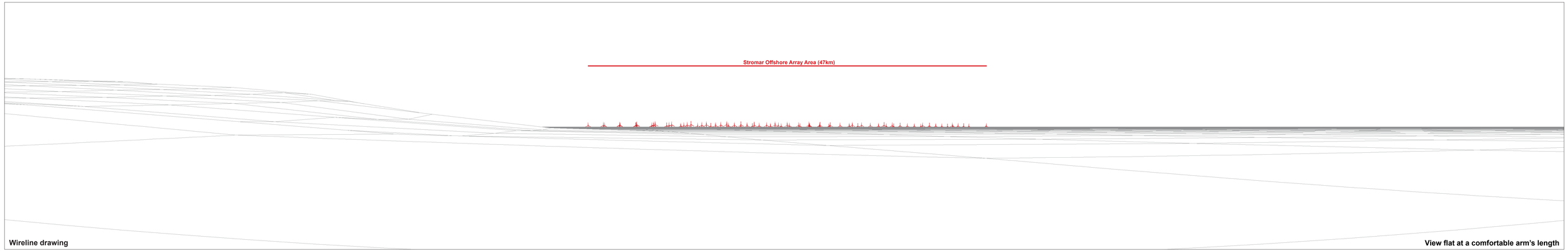
Figure: 17.10a
Viewpoint 5: Duncansby Head



OS reference: 340525 E 973250 N
Eye level: 59.95 m AOD
Direction of view: 195°
Nearest turbine: 37 km

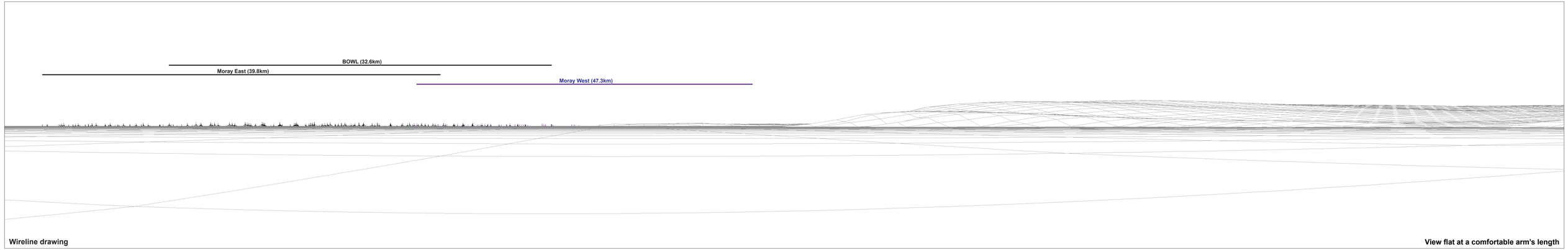
Horizontal field of view: 90° (cylindrical projection)
Principal distance: 522 mm
Paper size: 841 x 297 mm (half A1)
Correct printed image size: 820 x 130 mm

Figure: 17.10b
Viewpoint 5: Duncansby Head



OS reference:	338737 E 968025 N	**Horizontal field of view:**	90° (cylindrical projection)
Eye level:	2.37 m AOD	**Principal distance:**	522 mm
Direction of view:	100°	**Paper size:**	841 x 297 mm (half A1)
Nearest turbine:	32.6 km	**Correct printed image size:**	820 x 130 mm

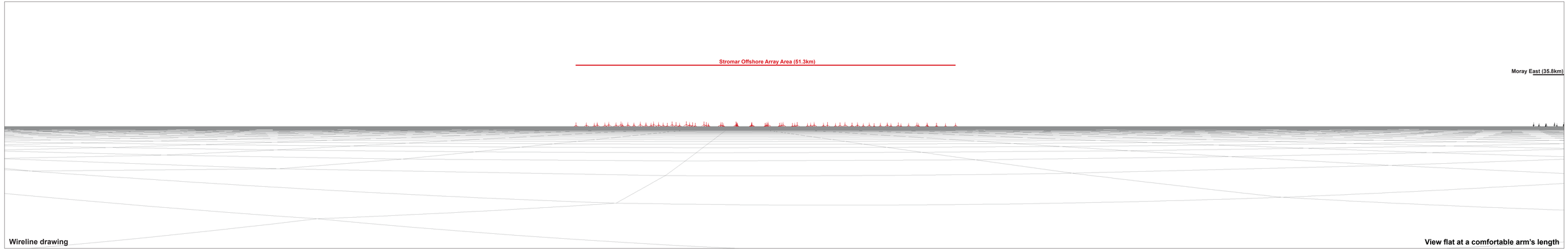
Figure: 17.11a
Viewpoint 6: Skirza



OS reference: 338737 E 968025 N
Eye level: 2.37 m AOD
Direction of view: 190°
Nearest turbine: 32.6 km

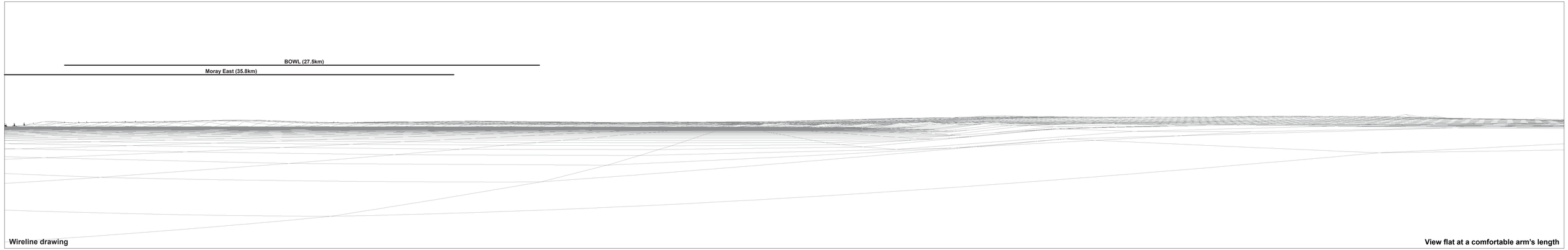
Horizontal field of view: 90° (cylindrical projection)
Principal distance: 522 mm
Paper size: 841 x 297 mm (half A1)
Correct printed image size: 820 x 130 mm

Figure: 17.11b
Viewpoint 6: Skirza



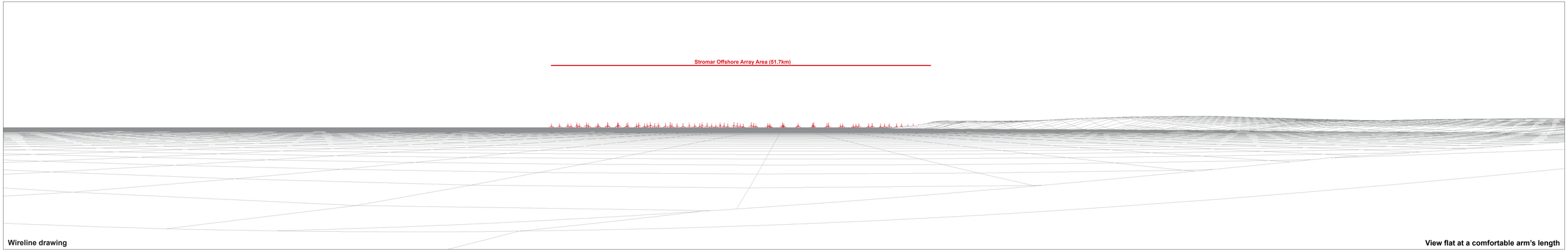
OS reference:	334382 E 960142 N	**Horizontal field of view:**	90° (cylindrical projection)
Eye level:	6.06 m AOD	**Principal distance:**	522 mm
Direction of view:	93°	**Paper size:**	841 x 297 mm (half A1)
Nearest turbine:	27.5 km	**Correct printed image size:**	820 x 130 mm

Figure: 17.12a
Viewpoint 7: Keiss



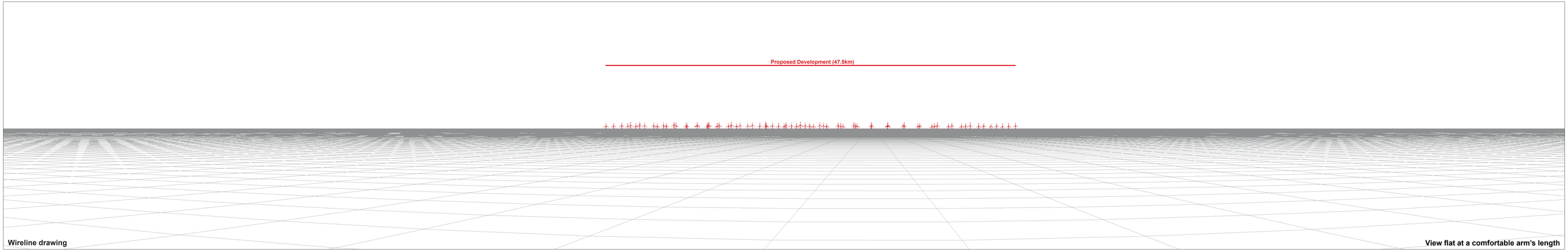
OS reference:	334382 E 960142 N	**Horizontal field of view:**	90° (cylindrical projection)
Eye level:	6.06 m AOD	**Principal distance:**	522 mm
Direction of view:	183°	**Paper size:**	841 x 297 mm (half A1)
Nearest turbine:	27.5 km	**Correct printed image size:**	820 x 130 mm

Figure: 17.12b
Viewpoint 7: Keiss



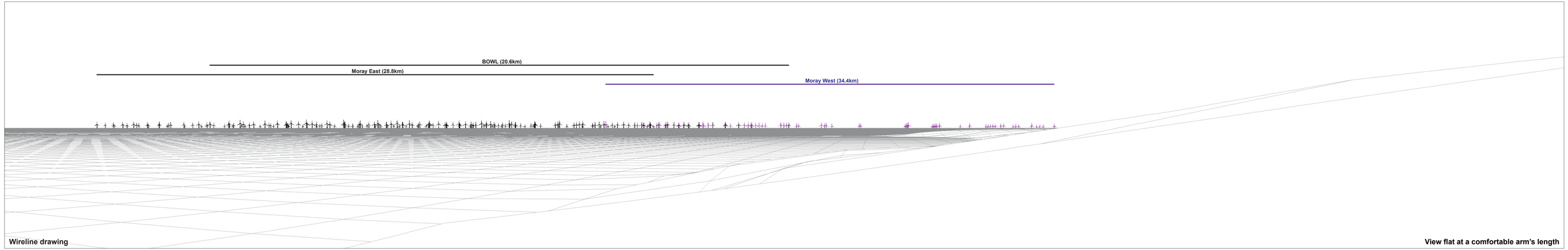
OS reference:	334428 E 955594 N	**Horizontal field of view:**	90° (cylindrical projection)
Eye level:	10.76 m AOD	**Principal distance:**	522 mm
Direction of view:	90°	**Paper size:**	841 x 297 mm (half A1)
Nearest turbine:	51.7 km	**Correct printed image size:**	820 x 130 mm

Figure: 17.13
Viewpoint 8: Ackergill Links



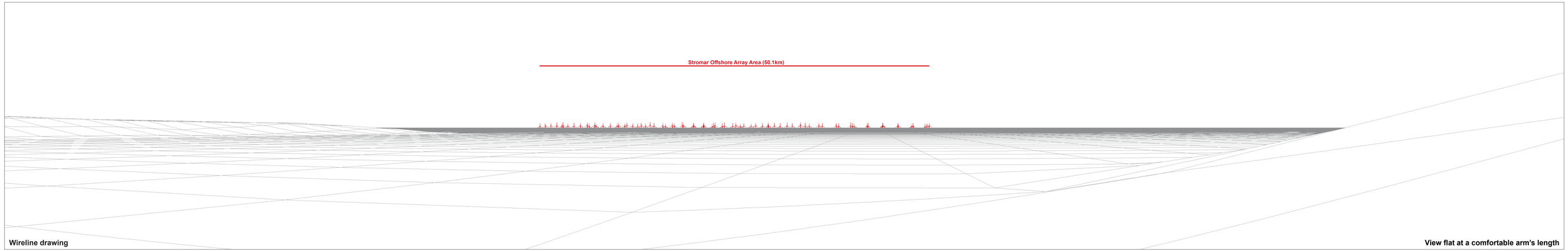
OS reference:	338839 E 954824 N	**Horizontal field of view:**	90° (cylindrical projection)
Eye level:	30.11 m AOD	**Principal distance:**	522 mm
Direction of view:	85°	**Paper size:**	841 x 297 mm (half A1)
Nearest turbine:	20.6 km	**Correct printed image size:**	820 x 130 mm

Figure: 17.14a
Viewpoint 9: Noss Head Lighthouse



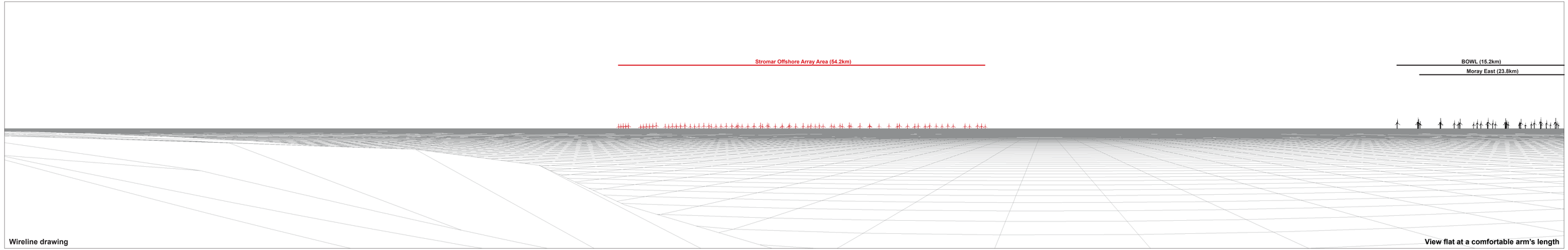
OS reference:	338827 E 955010 N	**Horizontal field of view:**	90° (cylindrical projection)
Eye level:	8.49 m AOD	**Principal distance:**	522 mm
Direction of view:	175°	**Paper size:**	841 x 297 mm (half A1)
Nearest turbine:	20.6 km	**Correct printed image size:**	820 x 130 mm

Figure: 17.14b
Viewpoint 9: Noss Head Lighthouse



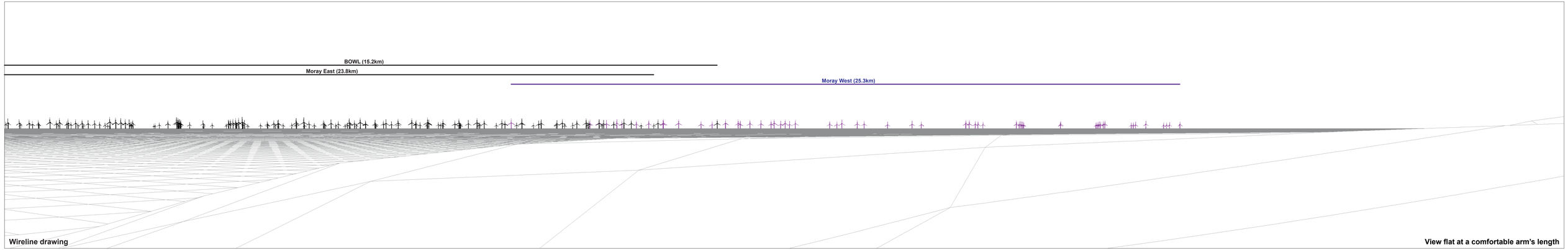
OS reference:	337032 E 950321 N	**Horizontal field of view:**	90° (cylindrical projection)
Eye level:	10.55 m AOD	**Principal distance:**	522 mm
Direction of view:	85°	**Paper size:**	841 x 297 mm (half A1)
Nearest turbine:	50.1 km	**Correct printed image size:**	820 x 130 mm

Figure: 17.15
Viewpoint 10: Wick



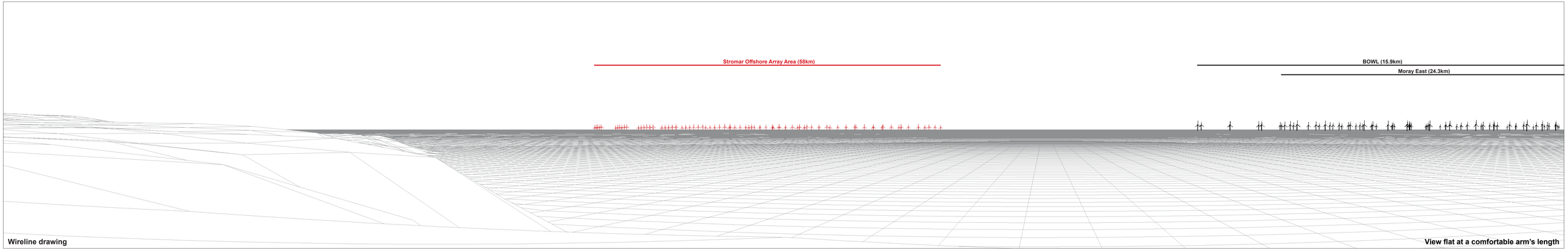
OS reference:	334992 E 943334 N	**Horizontal field of view:**	90° (cylindrical projection)
Eye level:	39.62 m AOD	**Principal distance:**	522 mm
Direction of view:	75°	**Paper size:**	841 x 297 mm (half A1)
Nearest turbine:	15.2 km	**Correct printed image size:**	820 x 130 mm

Figure: 17.16a
Viewpoint 11: Sarclet (Sarclet Haven Info Board)



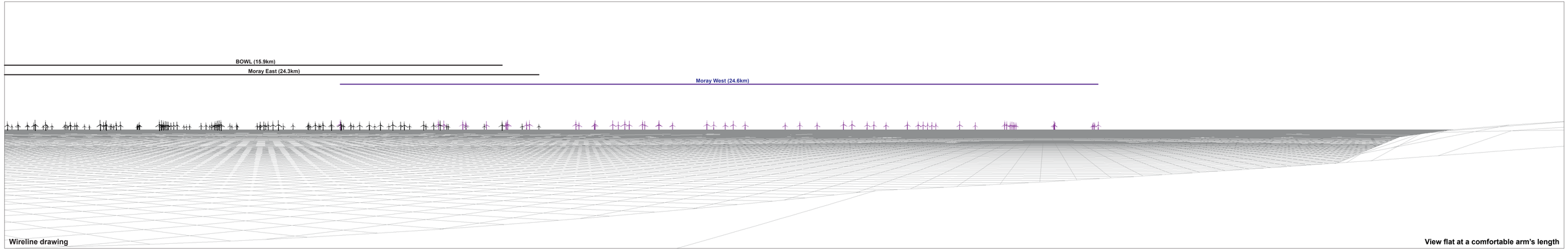
OS reference:	334992 E 943334 N	**Horizontal field of view:**	90° (cylindrical projection)
Eye level:	39.62 m AOD	**Principal distance:**	522 mm
Direction of view:	165°	**Paper size:**	841 x 297 mm (half A1)
Nearest turbine:	15.2 km	**Correct printed image size:**	820 x 130 mm

Figure: 17.16b
Viewpoint 11: Sarclet (Sarclet Haven Info Board)



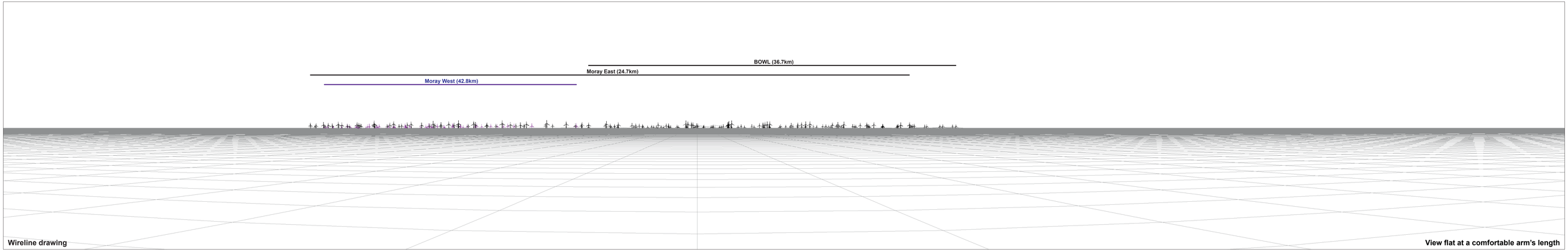
OS reference:	331944 E 940235 N	**Horizontal field of view:**	90° (cylindrical projection)
Eye level:	74.29 m AOD	**Principal distance:**	522 mm
Direction of view:	75°	**Paper size:**	841 x 297 mm (half A1)
Nearest turbine:	15.9 km	**Correct printed image size:**	820 x 130 mm

Figure: 17.17a
Viewpoint 12: Whaligoe Steps



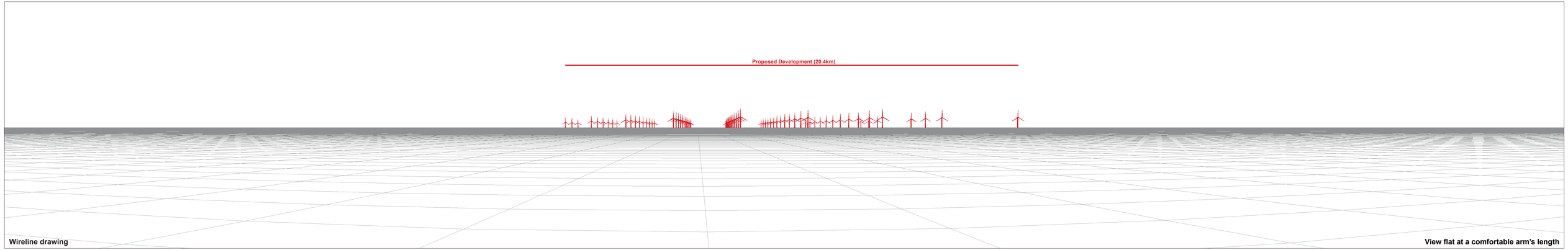
OS reference:	331944 E 940235 N	**Horizontal field of view:**	90° (cylindrical projection)
Eye level:	74.29 m AOD	**Principal distance:**	522 mm
Direction of view:	165°	**Paper size:**	841 x 297 mm (half A1)
Nearest turbine:	15.9 km	**Correct printed image size:**	820 x 130 mm

Figure: 17.17b
Viewpoint 12: Whaligoe Steps



OS reference:	390448 E 926800 N	**Horizontal field of view:**	90° (cylindrical projection)
Eye level:	21.5 m AOD	**Principal distance:**	522 mm
Direction of view:	275°	**Paper size:**	841 x 297 mm (half A1)
Nearest turbine:	20.4 km	**Correct printed image size:**	820 x 130 mm

Figure: 17.18a
Viewpoint 13: Aberdeen - Kirkwall Ferry



OS reference: 390448 E 926800 N
Eye level: 21.5 m AOD
Direction of view: 5°
Nearest turbine: 20.4 km

Horizontal field of view: 90° (cylindrical projection)
Principal distance: 522 mm
Paper size: 841 x 297 mm (half A1)
Correct printed image size: 820 x 130 mm

Figure: 17.18b
Viewpoint 13: Aberdeen - Kirkwall Ferry