Toyness Baseline Survey Design

This survey has been designed to support an application for the relocation and expansion of an existing marine pen fish farm at Toyness, Scapa Flow, Orkney (CAR/L/1015855). The existing and proposed site configurations are shown in Figure 1, and site infrastructure details are summarised in Table 1. Co-ordinates and a location plan for the proposed site are included as Appendix A.

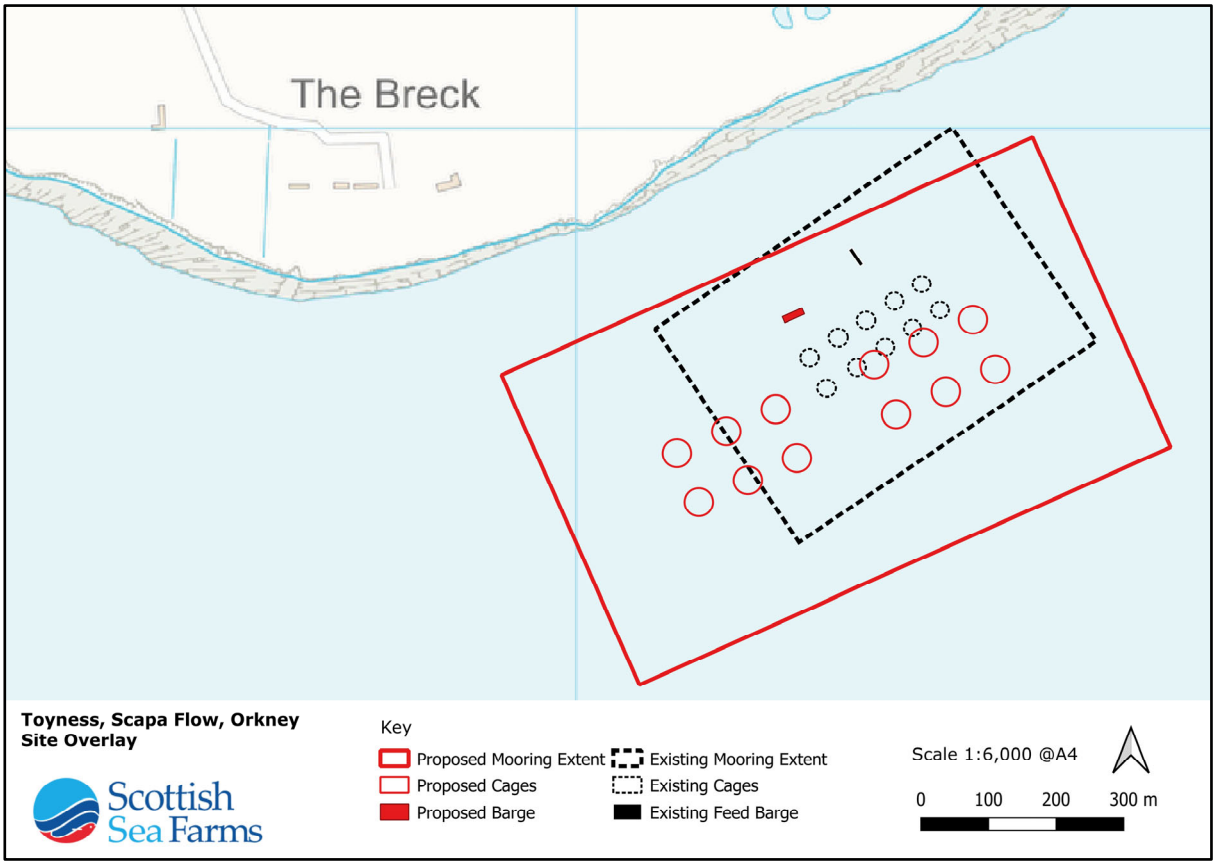


Figure 1: Existing and proposed site configuration at Toyness.

Table 1: Existing and proposed site details

	Existing	Proposed
Number of pens	10	12
Pen circumference (m)	80	120
Net depth (m)	15	12
Number of pen groups	1 x 10	2 x 6
Grid spacing (m)	50	80
Feed barge capacity (T)	200	420
Maximum biomass (T)	1342.9	2500

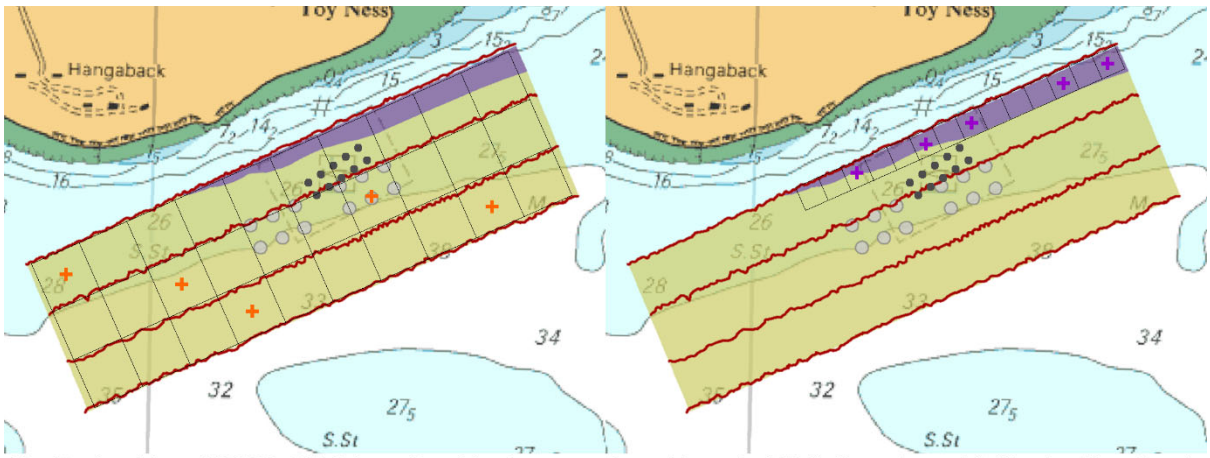
The survey has been designed broadly in accordance with SEPA guidance documents MACS-FFA-01 *Baseline survey & seabed and water quality monitoring plan design* (June 2019) and MACS-FFA-02 *Sampling of soft substrate* (July 2019). The survey work will be carried out by Scottish Sea Farms staff, following approval of the survey protocol by SEPA.

Identification of biotopes

Biotopes were identified by Aquatera Ltd with reference to visual survey data collected by Roving Eye Enterprises Ltd in July and August 2021 and the resulting report (Aquatera Ltd 2021). The survey transects were based on outputs from NewDepomod modelling of the proposed site and surrounding area, and were agreed with SEPA prior to the survey (pers.comm. Cross, Nick email to Alan Harpin, 23/07/2021 14:11). Analysis of the video footage by Aquatera Ltd with reference to the Joint Nature Conservation Committee (JNCC) Marine Habitat Classification for Britain and Ireland (JNCC 2015) indicated that the survey area could be divided into two biotopes; circalittoral muddy sand (SS.SSa.CMuSa); and loose-lying mats of *Phyllophora crispa* on infralittoral muddy sediment (SS.SMp.KSwSS.Pcri) (Figure 2). The boundary for Phyllophora crispa habitat is likely to be mainly influenced by water depth and might occur around the 20-25 m contour. Aquatera Ltd reported that the transition between biotopes is quite gradual, and boundary lines should therefore be treated cautiously. A third biotope, *Capitella capitata* in enriched sublittoral muddy sediments (SS.SMu.ISaMu.Cap), was identified within the footprint of the existing site, but was not sampled as part of the baseline survey because a full four-transect benthic compliance survey was carried out at the same time.

Identification of sampling stations

In accordance with MACS-FFA-01 (June 2019), a grid was drawn over the survey area, dividing it into squares. Each square measured approximately 82m x 82m for the loose-lying mats of *Phyllophora crispa* on infralittoral muddy sediment, and 172m x 172m for the circalittoral muddy sand which accounts for a much larger proportion of the survey area (Figure 2). Stations were then plotted within the selected squares more or less at random, but with some selectivity to ensure samples would be fully representative of the whole area covered by each biotope. Five stations were plotted within each biotope. These stations can be plotted on the vessel charting system prior to starting the survey, allowing each station to be readily located by the skipper.



Circalittoral muddy sand (SS.SSa.CMuSa) sampling grid and sampling stations

Loose-lying mats of *Phyllophora crispa* on infralittoral muddy sediment (SS.SMp.KSwSS.Pcri) sampling grid and sampling stations

Figure 2: Transect lines and biotope distribution overlain with the sampling grids used to define sampling stations for the Toyness survey.

All sampling locations and survey transect lines are shown in Figure 3, and station co-ordinates are summarised in Table 3. From each station, 2 x 0.045m^2 grab samples will be collected for faunal analysis. The two replicates from each station will be combined and passed through a 1mm sieve, to produce a single combined sample per station. Sample residue retained in the sieve will be transferred to a labelled container and preserved with buffered formalin (approximate concentration 10%). Faunal identification, statistical analysis and reporting will be carried out by a suitably qualified contractor.

An additional grab sample will be obtained from each station for geochemistry, from which a single sub-sample will be obtained for each of PSA, TOC and emamectin benzoate residues. Samples will be frozen within 24 hours of collection, prior to despatch to a suitable laboratory for analysis.

All survey results will be reported to SEPA within 16 weeks of the survey date.

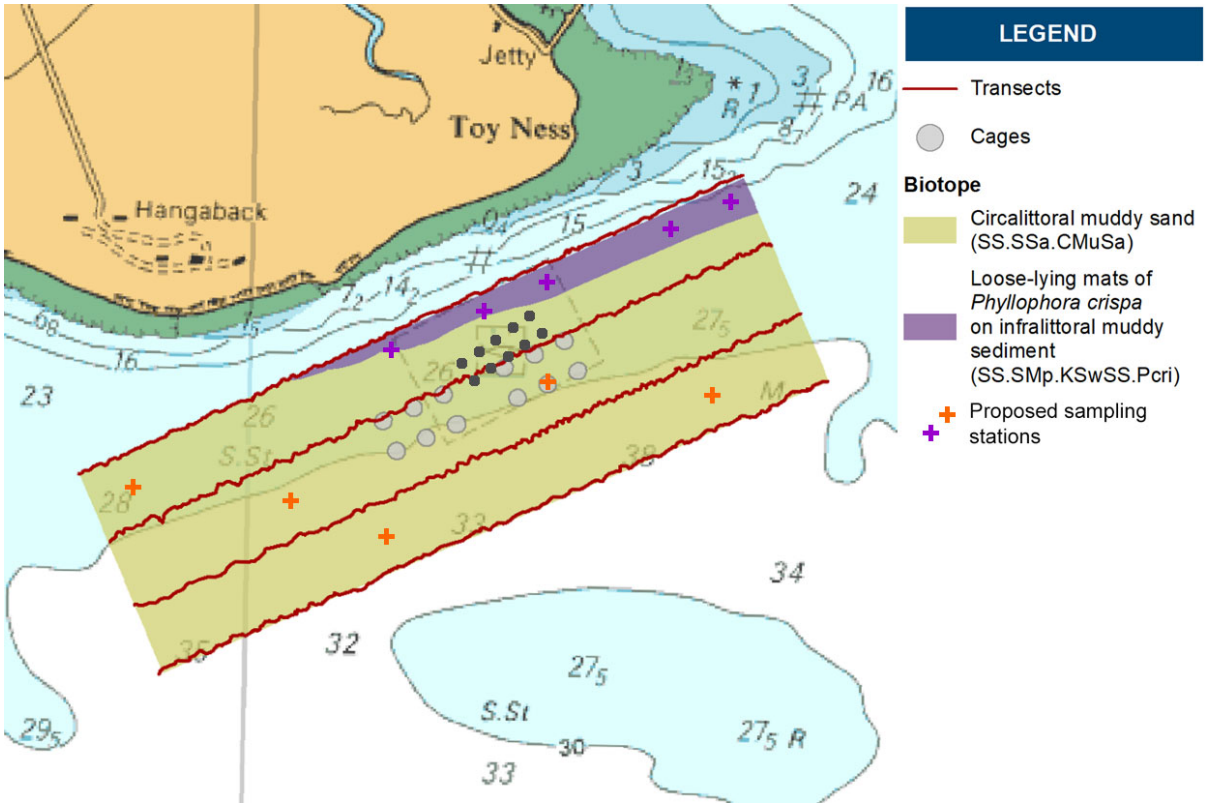


Figure 3: Proposed biotope sampling stations at Toyness.

Table 3: Co-ordinates of proposed sampling stations

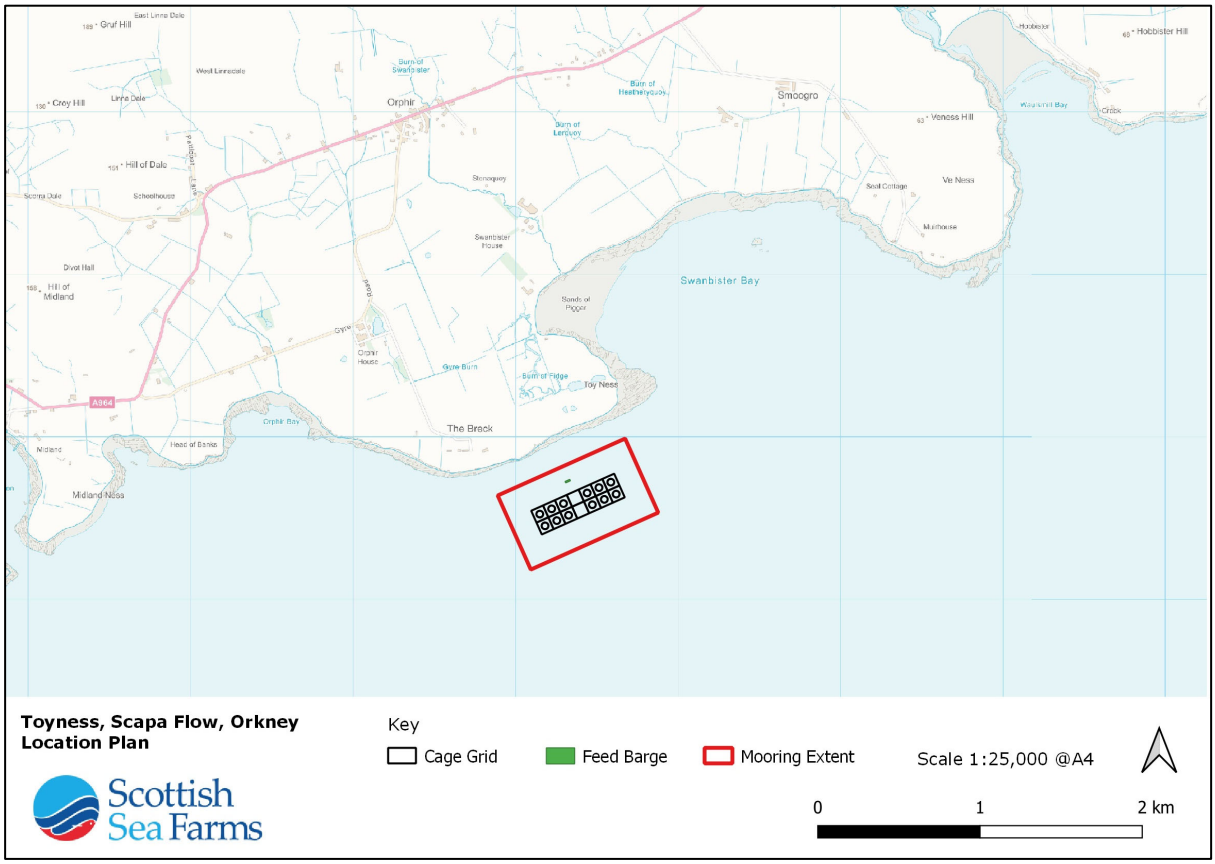
Station ID	Easting	Northing	Latitude	Longitude
CMS-1	334550	1003363	58°54.752'N	03°08.284'W
CMS-2	334929	1003330	58°54.738'N	03°07.888'W
CMS-3	335161	1003242	58°54.693'N	03°07.646'W
CMS-4	335554	1003618	58°54.899'N	03°07.243'W
CMS-5	335950	1003585	58°54.884'N	03°06.830'W
IMS-1	335996	1004054	58°55.138'N	03°06.790'W
IMS-2	335850	1003988	58°55.101'N	03°06.941'W
IMS-3	335399	1003790	58°54.990'N	03°07.407'W
IMS-4	335173	1003696	58°54.937'N	03°07.641'W
IMS-5	335549	1003859	58°55.029'N	03°07.252'W

References

Aquatera 2021. Toyness Benthic Video Survey Report, Version 1: Report to Scottish Sea Farms. P969 – August 2021.

JNCC (2015) The Marine Habitat Classification for Britain and Ireland Version 15.03 [online]. Available from: https://mhc.jncc.gov.uk

Appendix A – Proposed site location, Toyness



PROPOSED EXPANSION OF TOYNESS FISH FARM, SCAPA FLOW, ORKNEY

	Coordinates			
	WGS84		OSGB36	
Midpoint	58.9146634	-3.1236303	335385.24	1003586.54
Feed Barge	58.9159153	-3.1247742	335321.37	1003725.59
Mooring Extent				
	58.9183392	-3.1187300	335674.51	1003988.73
	58.9142644	-3.1150498	335878.23	1003533.33
	58.9109979	-3.1285727	335093.37	1003181.77
	58.9150602	-3.1322434	334889.18	1003637.13
Cage Grid				
	58.9163730	-3.1198403	335606.78	1003772.29
	58.9150858	-3.1186607	335672.83	1003627.41
	58.9129493	-3.1274642	335161.31	1003398.47
	58.9142506	-3.1286366	335096.34	1003544.62