

Marine Aquaculture Site Loch Hourn Appendix 9. Habitat Assessment - Loch Hourn Fish Farm (BSL)

Mowi Scotland Limited November 2021







Habitat Assessment Survey – Loch Hourn Fish Farm

Date of Survey:

17/03/2021 - 18/03/2021

Prepared By:

Benthic Solutions Ltd





Document Ref.	Revision	Date	Author	Review	Approved
2104_LH_HAS	00	09/07/21			





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Glossary

Abbreviation	Meaning
BSL	Benthic Solutions Limited
СМ	Central Meridian
COG	Course over ground
Cr	Habitat code: Circalittoral Rock
CR.LCR.BrAs.AmenCio	Habitat code: Solitary ascidians on wave sheltered rock
DGPS	Differential Global Positioning System
EOL	Camera end of line
FeAST	Feature Activity Sensitivity Tool
GeMS	Geodatabase of Marine features adjacent to Scotland
HAS	Habitat Assessment Survey
HD	High definition video quality
JNCC	Joint Nature Conservation Committee
LED	Light emitting diode
OSGB36	Ordnance Survey of Great Britain 1936 or British Grid
OSPAR	Oslo and Paris Convention for the Protection of the Marine Environment of the North-East Atlantic
PMF	Priority Marine Feature
SACFOR	Superabundant, Abundant, Common, Frequent, Occasional and Rare classification system
SAMS	Scottish Association of Marine Science
SD	Standard defintion video quality
SEPA	Scottish Environment Protection Agency
SOG	Speed over ground
SOL	Camera start of line
SS.SCS	Habitat code: Sublittoral coarse sediment
SS.SCS.CCS	Habitat code: Circalittoral coarse sediment
SS.SMu	Habitat code: Sublittoral cohesive mud and sandy mud communities SS.SMu/
SS.SMu.CfiMu.SpnMeg	Habitat code: Seapens and burrowing megafauna in circalittoral fine mud
SS.Smu.CfiMu.SpnMeg.Fun	Habitat code: Seapens, including <i>Funiculina quadrangularis</i> , and burrowing megafauna in undisturbed circalittoral fine mud
SS.SMu.CSaMu	Habitat code: Circalittoral sandy mud
SS.SMx	Habitat code: Sublittoral mixed sediment
UKBAP	United Kingdom Biodiversity Action Plan
WGS84	World Geodetic System 1984





1 Overview

Client:	MOWI Limited
Project:	Loch Hourn Habitat Assessment Survey
Contractor:	Benthic Solutions Ltd (BSL)
Contractor Reference:	2104
Survey Areas:	West coast Scotland – Loch Hourn
Survey Type:	Visual sampling for habitat assessment
Survey Period:	17/03/2021 – 18/03/2021
Survey Vessel:	Lyrawa Bay
Survey Equipment:	BSL MOD 4.3 camera system. Towed camera sled and drop- camera system and overlay
Client Project Manager:	
BSL Project Manager:	

2 Introduction

MOWI Ltd (MOWI) contracted Benthic Solutions Limited (BSL) to carry out a habitat assessment survey within the Loch Hourn fish farm area. The scope required particular emphasis on assessment of Norway lobster (Nephrops norvegicus) and northern feather star (Leptometra celtica) to evaluate any potential impacts from the farming activity. Northern feather stars are listed as a limited-mobility species Priority Marine Feature (PMF) and were previously recorded in the area by SEPA. The water depth of the Loch Hourn survey area was highly variable, ranging from approximately 35m to 150m.

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3 Scope of Work

In March 2021, MOWI Limited commissioned BSL to complete a video inspection survey of the Loch Hourn fish farm and surrounding area. The scope of work required survey of five high quality camera transects to assess the distribution and character of seabed habitats and species in the vicinity of the fish farm.

The main objectives of the survey were:

- To provide video footage surrounding the Loch Hourn fish farm and to assess the identity and distribution of seabed habitats in the surrounding area.
- To assess the burrow density of *Nephrops norvegicus* surrounding the Loch Hourn fish farm and to record any occurrences of the northern feather star (*Leptometra celtica*).
- To evaluate potential environmental impact from the fish farm, as evidenced by the observed distribution of seabed habitats, *Nephrops norvegicus* burrows and northern feather star (*Leptometra celtica*).

4 Survey Geodesy

Table 4.1 Geodetic Parameters					
Required Datum					
Reference Spheroid OSGB36					
Projection	Parameters				
Projection	British Grid				
Central Meridian	-2.0000				
Scale Factor	0.9996				
Latitude of Natural Origin	49.0000				
False Easting	400,000m				
False Northing	-100,000m				
Scale Factor at Origin	0.9996 at CM				

The geodetic parameters used are provided below in Table 4.1.

Client supplied coordinates was given in both geographical (Latitude and longitude) as well as British Grid (OSGB36)

5 Field Operations

The work scope was completed by BSL aboard the vessel *Lyrawa Bay* on a day-working basis. The vessel was mobilised for the environmental survey in Mallaig, before transiting to the Loch Hourn fish farm where underwater camera operations were conducted. After the survey lines were completed at Loch Hourn, further operations were carried out at Loch Ewe over a two-day period (to be presented in a separate report) prior to demobilising in Mallaig. A summary of the different operational components of the survey are outlined in Table 5.1.





Table 5.1 Survey Operational Timings

Date	Activity	Details of Activity				
16/03/2021	Personnel Travel	Survey package loaded and driven from Norfolk to Mallaig				
		07:00-10:00 Survey team mobilised vessel with the equipment. Navigation				
17/03/2021	Mobilisation	package installed and frames made ready for operations. Transit to Loch Hourn				
		Iocation. Camera Operations conducted at Loch Hourn 08:00 – 12:00 Camera operations completed at Loch Hourn 12:00 – 19:00 Vessel Transit to Isle of Ewe Location				
	Operations	Camera Operations conducted at Loch Hourn				
18/02/2021	Operations	08:00 – 12:00 Camera operations completed at Loch Hourn				
10/03/2021	Operations	08:00 – 12:00 Camera operations completed at Loch Hourn 12:00 – 19:00 Vessel Transit to Isle of Ewe Location				
19/03/2021	Operations	07:00 – 19:00 18 grab locations sampled at Isle of Ewe				
20/02/2021	Operations	07:00 – 15:00 12 remaining grab locations and two camera transects sampled at Isle of Ewe (Reported separately)				
20/03/2021	Operations	12:00 – 19:00 Vessel Transit to Isle of Ewe Location 07:00 – 19:00 18 grab locations sampled at Isle of Ewe 07:00 – 15:00 12 remaining grab locations and two camera transects sampled at Isle of Ewe (Reported separately) 15:00 – 19:00 Vessel transit to Kyle of Loch Alsh				
21/03/2021	Demobilisation	Vessel alongside Mallaig at 10:00. Personnel drive back to Norfolk				

5.1 Environmental Survey Operations

Visual survey operations were carried out using a towed underwater camera system acquiring high quality stills and HD video. The scope of the survey was to carry out five video assessment lines on the seabed surrounding the Loch Hourn fish farm. These were based on the following:

- One approximately 700m long survey line running north of the Loch Hourn fish farm, towards an area previously demarcated by GeMS as 'burrowed mud' and starting approximately 50m northwest of the farm. The transect was split into two separate survey lines due to a creel pot entanglement, with the two constituent lines measuring approximately 150m and 650m.
- One approximately 750m survey line running north of the Loch Hourn fish farm, adjacent to an area previously demarcated as 'burrowed mud' and starting approximately 600m northwest of the farm.
- Two 150m transects arranged in a cruciform pattern approximately 2km east of the fish farm, centred on an area of previously sighted northern feather stars (*Leptometra celtica*).
- An additional 450m long BSL-proposed transect, starting 500m east of the farm and running south-southeast to assess any habitats and potential environmental impacts east of the farm.

The prevailing weather conditions and water clarity were generally good. However, operations were impacted by some challenges found within the survey area as outlined below in Table 5.2, and a summary of the recovered video data acquired are outlined in Table 5.3.





Table 5.2 Survey Challenges

Issue	Challenge
Maaringlings	The presence of mooring and cage anchor lines prevented camera operations in close proximity
infractructure	to the cage edge, therefore survey lines were offset from the edges of the cages to prevent
mirastructure	entanglement.
	Several areas were marked with lines of creel pots. Unfortunately, a poorly marked creel pot
Creel lines	wrapped around the camera system, which had to be recovered to deck and removed before
	camera operations could resume.
Stoop bodrock sliffs	One of the cruciform survey lines was directly parallel to the steep cliff face, so to improve the
Steep bedrock cliffs	video and stills image quality the survey line was offset before the line was re-run.

Table 5.3 Video Data Acquired

British Grid OSGB36								
Transect	Date (DD/MM/YY)	SOL/ EOL	Time (HH:MM)	Latitude Longitude		HD/SD Video	Video Duration (mins)	No. Stills
HT01	17/03/21	SOL	16:10	57 08.0852N	005 38.5139W	νος/νος	46	57
11101	17/03/21	EOL	15:56	57 07.8522N	005 38.5039W	163/163		
НТ01 А	18/03/21	SOL	10:16	57 07.8232N	005 38.3869W	Voc/Voc	12	27
IIIUIA	18/03/21	EOL	10:28	57 07.7397N	005 38.4268W	103/103		
	18/03/21	SOL	08:47	57 07.9975N	005 38.8268W	Voc/Voc	18	71
11102		EOL	09:35	57 08.3989N	005 38.8050W	103/105	40	,1
	17/03/21	SOL	12:57	57 07.1846N	005 35.8700W	Voc/Voc	10	21
11105		EOL	13:07	57 07.1854N	005 35.6634W	103/105		
НТОЗА	17/03/21	SOL	14:10	57 07.2025N	005 35.7231W	Voc/Voc	17	44
IIIUSA		EOL	14:27	57 07.2093N	005 35.9379W	103/103	1/	44
HT04	17/02/21	SOL	13:28	57 07.1951N	005 35.8120W	Voc/Voc	16	20
	17/03/21	EOL	13:44	57 07.2657N	005 35.7644W	103/103	10	39
	19/02/21	SOL	11:01	57 07.4250N	005 37.3438W		20	F 1
11105	10/05/21	EOL	11:29	57 07.3287N	005 36.9157W	105/105	20	51

SOL = camera start of line

EOL = camera end of line





Figure 5.1 Camera Transects Overview at Loch Hourn





6 Survey Equipment

6.1 Towed High-Definition Video

The video survey was carried out using Benthic Solutions MOD 4.3 camera system fitted onto a tow-frame (Figure 6.1). This consists of a stainless-steel tow-frame on which the camera system is mounted at approximately 45° viewing angle <1m from the seabed and illuminated by a 2000lux LED light and twin parallel scaling lasers (8cm separation).



Figure 6.1 Towed Camera System

The system is lowered to the seabed and is ideally towed at an optimal speed of 0.5 to 1 knot (0.25-0.54 m/sec). However, as the vessel struggled to maintain any steering at this speed, variable speeds of up to 2 knots (1m/sec) were encountered during the survey. The unit was maintained at, or just above, the seabed, for the majority of the footage along the line. Periods where the seabed was not visible were limited to sections where the seabed deepened quickly, areas of increased turbidity, or when the frame was partially lifted to prevent the camera from damage due to contact with hard substrate (cobbles, boulders and bedrock).

The seabed and orientation of the camera equipment were continuously monitored from the surface where the tow cable was adjusted using a capstan to maintain contact with the seabed. This surface video feed was annotated with vessel speed and position and recorded separately to the high-definition video data. Both datasets were time-stamped to support later data harmonisation. Further details for the camera system are provided in Appendix I.

6.2 Survey Positioning and Surface Navigation

Surface positioning was acquired using a differential GPS (DGPS) system with an external antenna located behind the wheelhouse, close to the deployment location of the camera frame. The data string was continuously recorded and monitored using a computer, whilst a further string was overlaid directly onto the video recording system for annotation on the standard definition targeting video file. The overlay string also indicated time, date, speed over ground (SOG) and course over ground (COG).

7 Methods

7.1 Habitat and Nephrops norvegicus Burrow Density Assessment

The habitat assessment was based on review of high resolution still images as well as the recorded HD video footage (Table 5.3). The sediment type in each screenshot was used in conjunction with the HD video footage as a basis for habitat determination, while the conspicuous species composition was used to define suspected variation (biotopes) within the general habitat (Appendix III and IV). In addition to the general habitat classifications, the densities of *Nephrops norvegicus* burrows were determined using the SAMS adapted 'International Council for the Exploration of the Seas protocol' (Brook and Vare, 2020; Table 8.3 and Figure 8.6). While the SAMS report used the raw burrow count data as a basis for comparison between transects, the BSL approach built on the methods outlined by the SAMS report and used the SACFOR scale in conjunction with sediment variability to standardise and quantitatively compare the *Nephrops norvegicus* densities between transects. The full matrix of burrow density is given in Appendix III and the SAMS and BSL adapted protocol is listed below:

- The HD video footage was reviewed once the towed camera frame was stable on the seabed. Subsequent sediment changes along the survey lines were treated as separate counting intervals to mitigate counter fatigue, especially during sections with high burrow abundance. Each counting interval was reviewed twice, with the average of both counts used for graphical representation. In addition to burrow abundances, *Nephrops norvegicus* activity in and out of burrows was counted and recorded.
- *Nephrops norvegicus* burrows can form complexes with multiple openings, so care was taken when counting to only count these complexes as one burrow.
- Counting areas of high burrow density was aided by slowing the video playback speed. Sections of unsuitable seabed quality for burrow counting was excluded from burrow density analysis. The main cause of unsuitable footage was a result of steep seabed slopes, as the deployment rate of the capstan could not keep pace with the rate of seabed drop off. This was exacerbated in certain sections by high turbidity due to the suspension of fine particles and marine snow.
- Due to the relatively small size and non-uniform pattern of the survey no stock assessment was carried out. Instead burrow densities were calculated for comparison between survey lines.

8 Environmental Habitats

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A detailed review of the seabed photography data confirmed the presence of four main sediment types. Habitats ranged from exposed bedrock to gravelly sand and silty sand with cobble, pebble and shell fragment variations in between. The sediments northwest of the farm predominantly consisted of silty sand, while the sediments east of the farm were generally more variable with instances of exposed bedrock, shelly/rocky gravelly sand and rocky silty sand. All substrate categories are outlined in Table 8.1 below. The matrix of photographs and ascribed categories is given in full in Appendix II.

Substrate Category	Description
Exposed Bedrock (Circalittoral Rock Cr/MC1)	This exists as extensive reefs showing relief of up to several metres above the surrounding sediments and localised outcrops of small boulders. This habitat type was predominantly observed along the eastern side of the survey area. Mostly covered by encrusting species including coralline algae and Serpulidae tubes along with sessile epifauna including hydroids and sea squirts. Exposed bedrock was one of the habitats favoured by the northern feather star (<i>Leptometra celtica</i>)
Rocky Shelly Gravelly Sand (Sublittoral Coarse Sediment SS.SCS/MC3)	Pebbles and cobbles overlying gravelly sand. More common on the eastern side of the survey area, particularly along transects HT03 and HT03A near to the areas of exposed bedrock. Coarse biotope based on mobile sands and more stable coarser gravels. Cobbles and pebbles were mostly covered by encrusting species such as Serpulidae tubes, with the gravelly sand predominantly inhabited by the tube anemone (<i>Cerianthus lloydii</i>).
Shelly Gravelly Sand (Sublittoral Coarse Sediment SS.SCS/MC3)	Similar to the substrate category mentioned above but excludes the presence of pebbles and cobbles. An intermediate sediment type found predominantly along transect HT03A, where the base sediment is more influenced by shell fragments and coarser material. One of the most prominent species in this substrate type was the tube anemone (<i>Cerianthus</i> <i>lloydii</i>).
Rocky Silty Sand (Sublittoral Mixed Sediment SS.SMx/MB441)	Pebbles and cobbles overlying low energy silty sand. This substrate category was found along every transect excluding transects HT03, HT03A and HT02, with a greater occurrence along transect HT05. This sediment forms isolated patches that are scattered across the northwestern side of the survey area. Pebbles and cobbles were mostly covered by encrusting species such as Serpulidae tubes and epifauna such as bryozoan turf, sea squirts and hydroids. Rocky silty sand is another habitat favoured by the northern feather star (<i>Leptometra celtica</i>)
Silty Sand (Sublittoral Cohesive Mud and Sandy Mud Communities SS.SMu/MB6)	Low energy, bioturbated, silty sand overlaying mud predominantly found on the eastern side of the fish farm. This is the base sediment of the deeper waters (>35m) across the survey area and was dominated by bioturbation and the burrows of <i>Nephrops norvegicus</i> .

Table 8.1 Seabed Substrate Categories Identified



Using the seabed substrate categories outlined in Table 8.1, it was possible to delineate sections of camera transects characterised by different substrate (Figure 8.1). The video footage recorded across the site shows that the shallower coastal regions (<35m water depth) recorded along transects HT03 and HT03A were dominated by exposed bedrock and coarser rocky/shelly gravelly sand substrate types. The majority of exposed bedrock was observed along the eastern transects (HT03, HT03A, HT04 and HT05), in the form of geogenic reef with the steep vertical surfaces providing suitable attachment points for a range of sessile and encrusting organisms. Deeper areas (>35m) along transects HT01, HT01A and HT02 were less exposed to energetic water movements and hence were dominated by bioturbated silty sand. Transects HT04 and HT05 were situated in a transition zone between the shallow coarser substrate and the deeper finer substrate, with both transects revealing a mix of exposed bedrock, pebbles and cobbles in conjunction with bioturbated silty sand.

Building upon the substrate classification process, the photographs and video were further examined to identify the species and biotopes corresponding to each of the four main substrate types. The identified biotopes are described in the following sections along with example photographs.





Figure 8.1 Summary of Habitats Along Each Transect

Summary of Seabed Habitats around the Loch Hourn Survey Area

The different Seabed Habitats recorded in video transects conducted at the Loch Hourn fish farm site

Projection: British Grid. Datum: OSGB36 (7 - param transform). Not to be used for navigation

Exposed Bedrock
 (Circalittoral Rock Cr/MC1)

 Rocky Shelly Gravelly Sand (Sublittoral Coarse Sediment SS.SCS/MC3)

Shelly Gravelly Sand (Sublittoral Coarse Sediment SS.SCS/MC3)

 Rocky Silty Sand (Sublittoral Mixed Sediment SS.SMx/MB441)

 Silty Sand
 (Sublittoral Cohesive Mud and Sandy Mud Communities SS.SMu/MB6)

Seabed Out Of View

Approximate Cage Locations

Approximate Creel Positions



8.1 Exposed Bedrock (Circalittoral Rock CR/MC1)

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Bedrock exposures were recorded to the east of the fish farm along transects HT03, HT03A, HT04 and HT05 that were close to coastal regions of the survey area (Figure 8.1). This substrate type was generally recorded as a continuous structure that had slight variations in morphology depending on where it was located. For example, exposed bedrock along transect HT04 formed tabletop shelves with relatively low-lying steep edges whereas exposed bedrock formed more prominent cliffs along transects HT03, HT03A and HT05. Both morphologies of bedrock found in the survey area had steep vertical sides colonised by dense epifaunal assemblages, while the horizontal surfaces were covered by a layer of sediment. The combination of the habitat, faunal community and the sedimentation of the horizontal surfaces are best described by the biotope of CR.LCR.BrAs.AmenCio – Solitary ascidians, including Ascidia mentula and Ciona intestinalis, on wave sheltered circalittoral rock. The biotope is dominated by ascidians, Serpulidae tubes, Devonshire cup corals and pink coralline algae on upper faces of wave-sheltered (often sealochs) circalittoral bedrock, boulders and cobble slopes with little tidal flow. Conspicuous epifauna included the northern feather star (Leptometra celtica), the Devonshire cup coral (Caryophyllia smithii), hydroids (Tubulariidae sp.), sponges (Phakellia ventilabrum), anemones (Actiniaria sp.), tall seapens (Funiculina quadrangularis), coralline algae, sea squirts (Ascidiacea sp. and Ciona intestinalis), bryozoan turf and Serpulidae tubes. Mobile fauna was also observed on the exposed bedrock and included crustaceans such as squat lobsters (Munida sp.) and edible crabs (*Cancer pagurus*), along with echinoderms such as cushion stars (*Porania pulvillus*), spiny starfish (Marthasterias glacialis), common sea urchin (Echinus esculentus) and other starfish species (Asteroidea sp.).

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Given the elevation and extent of the bedrock formations, the areas delineated would classify as JNCC Annex I reefs, which are described as: *"Rocky reefs occur where bedrock or stable boulders and cobbles arise from the surrounding seabed creating a habitat that is colonised by many different marine animals and plants. Rocky reefs can be very variable in terms of both their structure and the communities they support. They provide a home to many species such as corals, sponges and sea squirts as well as giving shelter to fish and crustaceans such as lobsters and crabs" (JNCC, 2016). As illustrated in Figure 8.2, the bedrock exposures observed during the current survey were colonised by encrusting coralline algae and sessile epifauna including hydroids, sea squirts and Devonshire cup corals.*







Figure 8.2 Example Images of Exposed Bedrock Habitat

8.2 Rocky and Shelly Gravelly Sand (Sublittoral Coarse Sediment SS.SCS/MC3)

This coarse sediment type was isolated to the shallower transects HT03, HT03A and HT04, which were 2km east of the Loch Hourn fish farm. The composition of this substrate was of fragmented shell and coarser material overlying sand, with the rocky variant (pebbles and cobbles) exclusively observed along transects HT03 and HT03A near the exposed bedrock (Figure 8.1). The most abundant species observed within this substrate type was the tube anemone (*Cerianthus lloydii*), with other conspicuous fauna present at lower abundances such as starfish (Asteroidea sp.), squat lobsters (*Munida* sp.), anemones (Actiniaria sp.), grey gurnard (*Eutrigla gurnardus*) and sea squirts (Ascidiacea sp. and *Ciona intestinalis*). The rocky variant of this substrate type provided more attachment points for sessile species such as Serpulidae tubes and provided a refuge for squat lobsters (*Munida* sp.). The substrate type and associated fauna is illustrated in Figure 8.3 and could be further refined to the biotope, 'circalittoral coarse sediment' (SS.SCCS). The habitat may be characterised by robust infaunal polychaetes such as *Mediomastus fragilis* and *Lumbrineris* spp.; however, no grab sampling was undertaken to enable a more detailed biotope description so the characterisation of this habitat was limited to a combination of the substratum, water depth and conspicuous fauna.







Figure 8.3 Example Images of Coarse Sediment Habitat Variation

8.3 Rocky Silty Sand (Sublittoral Mixed Sediment SS.SMx/MB441)

Mixed sediments composed of muddy silty sand with pebbles and shells fragments were observed across the transects HT04, HT01, HT01A and HT05, with a greater occurrence observed along transect HT05 due to the weathering of exposed bedrock providing a supply of pebbles and cobbles to the underlying silty sand substrate (Figure 8.1). Rocky substrate enabled attachment points for Devonshire cup corals (Caryophyllia smithii), feather duster worms (Sabellidae sp.), Serpulidae tubes, cushion stars (Porania pulvillus), spiny starfish (Marthasterias glacialis), northern feather star (Leptometra celtica), common whelk eggs (Buccinum sp. eggs), bryozoan turf, sponges (Phakellia ventilabrum), hydroids (Tubulariidae sp.), brittle stars (Ophiuroidea sp.) and sea squirts (Ascidiacea sp. and Ciona intestinalis). The rocky substrate also acted as a refuge for edible crabs (Cancer pagurus) and squat lobsters (Munida sp.). The conspicuous faunal assemblages observed were similar to those observed on exposed bedrock, so the mixed substrate represented an intermediate habitat between the exposed bedrock and silty sand habitats. The silty sand component of the substrate type provided a habitat for sessile species such as slender seapens (Virgularia mirabilis), tall seapens (Funiculina guadrangularis), tube anemones (Cerianthus Iloydii) and fireworks anemones (Pachycerianthus multiplicatus), and more mobile species such as the common dragonet (*Callionymus lyra*). This habitat type generally conformed to the biotope 'sublittoral mixed sediments' (SS.SMx), but further refinements to the biotope were not possible with the current conspicuous fauna dataset. Example images are presented in Figure 8.4.







Figure 8.4 Example Images of Mixed Sand Habitat

8.4 Silty Sand (Sublittoral Cohesive Mud and Sandy Mud Communities SS.SMu/MB6)

This sediment type was predominantly found northeast of the fish farm along transects HT01, HT01A and HT02, which coincided with the deeper water depths (>35m) when compared to the transects closer to the coastal zone (HT03, HT03A; Figure 8.1). The substrate type consisted of silty sand with minor proportions of shell fragments and was characterised by bioturbation, "lebensspuren", burrows and furrows left behind by fishing gear (Figure 8.5). The conspicuous faunal community recorded was fairly diverse and included: Crustacea such as Norway lobsters (Nephrops norvegicus), edible crabs (Cancer pagurus), squat lobsters (Munida sp.), hermit crabs (Paguroidea sp.) and shrimps (Caridea sp. and Euphausiacea sp). Echinoderms were represented by the seven-armed starfish (Luidia ciliaris), northern feather stars (Leptometra celtica), cushion stars (Porania pulvillus), brittle stars (Ophiuroidea sp.), common sea urchins (Echinus esculentus), sea cucumbers (Holothuroidea sp.) and starfish (Asteroidea sp.). Cnidaria such as the slender seapen (Virgularia mirabilis), tall sea pen (Funiculina quadrangularis), fireworks anemone (Pachycerianthus multiplicatus) and tube anemone (Cerianthus lloydii) were also observed, along with polychaetes (Sabellidae sp.), sea squirts (Ascidiacea sp. and Ciona intestinalis) and free-swimming demersal species such as Gadidae sp., juvenile conger eels (Conger conger), gobies (Gobiiformes sp.), common dragonets (Callionymus lyra) and a thornback ray (Raja clavata).

The silty sand habitat recorded showed some affinity to the biotope SS.SMu.CSaMu- circalittoral sandy mud. The presence of burrowing macrofauna such as *Nephrops norvegicus* and associated bioturbated nature of the seabed may indicate the sediment type also has an affinity to the biotope of SS.SMu.CFiMu.SpnMeg – Seapens and burrowing megafauna in circalittoral fine mud. The presence of the tall seapen (*Funiculina quadrangularis*) and the rare fireworks anemone (*Pachycerianthus multiplicatus*) may also indicate some conformance to the SS.SMu.CFiMu.SpnMeg.Fun – Seapens,

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including *Funiculina quadrangularis*, and burrowing megafauna in undisturbed circalittoral fine mud. The biotopes may be components of the UK Post-2010 Biodiversity Framework (JNCC and Defra, 2012; formerly known as UKBAP) 'mud habitats in deep water' and OSPAR Commission 'seapens and burrowing megafauna' communities, which are classified as priority habitats (UKBAP, 2008), or threatened and/or declining habitats (OSPAR, 2010) respectively. The UKBAP 'mud habitats in deep water' and OSPAR Commission 'seapens and burrowing megafauna' definitions are as follows:

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"Mud habitats in deep water (circalittoral muds) occur below 20-30m in many areas of the UK's marine environment, including marine inlets such as sea lochs. The relatively stable conditions associated with deep mud habitats often lead to the establishment of communities of burrowing megafaunal species where bathyal species may occur with coastal species. The burrowing megafaunal species include burrowing crustaceans such as <u>Nephrops norvegicus</u> and <u>Callianassa subterranea</u>. The mud habitats in deep water can also support seapen populations and communities with <u>Amphiura</u> spp." (UKBAP, 2008).

"Plains of fine mud, at water depths ranging from 15-200m or more, which are heavily bioturbated by burrowing megafauna with burrows and mounds typically forming a prominent feature of the sediment surface. The habitat may include conspicuous populations of seapens, typically <u>Virgularia mirabilis</u> and <u>Pennatula phosphorea</u>. The burrowing crustaceans present may include <u>Nephrops norvegicus</u>, <u>Calocaris macandreae</u> or <u>Callianassa subterranea</u>. In the deeper fiordic lochs which are protected by an entrance sill, the Tall seapen <u>Funiculina quadrangularis</u> may also be present. The burrowing activity of megafauna creates a complex habitat, providing deep oxygen penetration. This habitat occurs extensively in sheltered basins of fjords, sea lochs, voes and in deeper offshore waters such as the North Sea and Irish Sea basins" (OSPAR, 2010).

The environmental conditions described by both the UK Post-2010 Biodiversity Framework and OSPAR habitats are commensurate with that recorded northeast of the Loch Hourn fish farm, where depositional silty sands and burrows were prevalent. The absence of the phosphorescent seapen (*Pennatula phosphorea*) from the habitat may not negate the classification, as while burrowing megafauna is an essential element of the habitat, seapens may, and by extension may not, be present (JNCC, 2014).







Figure 8.5 Example Images of a Fine to Medium Sand Habitat

8.5 Burrow Density (Nephrops norvegicus)

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The survey lines were split into their respective substrate categories, which were then used as independent counting intervals to mitigate against counting fatigue, especially within areas of high burrow counts. Burrows were counted and categorised based on the associated size of the Nephrops norvegicus that occupied them, using the medium (3 to 15cm) SACFOR size class for N. norvegicus burrows was the dominant size of N. norvegicus across the Loch Hourn survey area. The average burrow counts taken from two independent video assessments were combined with the distance travelled by the vessel to calculate N. norvegicus burrow density in relation to the SACFOR scale for each counting interval (Table 8.2). A conservative approach was used throughout the burrow analysis, as burrow complexes (multiple burrow openings to the same chamber) were only counted once to avoid overcounting and any sections of poor visibility attributed to increased turbidity were noted and excluded from burrow counts and density calculations. The medium burrow density for each transect across the survey area are presented in (Table 8.3) while the extent of burrow density in relation to substrate variability is mapped in (Figure 8.6).

Cover (%)	Crust/ Meadow	Massive/ Turf	<1cm	1-3cm	3-15cm	>15cm	De	nsity
>80%	S		S				>1/0.001m ² (1x1 cm)	>10,000/m ²
40-79%	А	S	А	S			1-9/0.001m ²	1000-99999/m ²
20-39%	С	A	С	А	S		1-9 / 0.01m ² (10 x 10 cm)	100-999/m ²
10-19%	F	С	F	С	А	S	1-9 / 0.1m ²	10-99/m²
5-9%	0	F	0	F	С	A	1-9/m²	
1-5% or density	R	0	R	0	F	С	1-9 / 10m ² (3.16 x 3.16m)	0.1 to 0.9
<1% or density		R		R	0	F	1-9 / 100m ² (10 x 10m)	0.01
					R	0	1-9 / 1000m ² (31.6 x 31.6m)	
						R	<1/1000m ²	
Кеу	Key							
S		А	C		F		0	R
Super-abun	dant	Abundant	Comr	mon	Frequer	nt	Occasional	Rare
Notoc	Notes:							

Table 8.2 SACFOR Abundance Scale

Although larger Nephrops norvegicus burrows can be confidently assigned, smaller N. norvegicus burrows can 1. easily be mistaken for other burrowing crustaceans, especially during periods of high burrow densities. To mitigate against the potential confusion initial playback of the video concentrated on identifying the burrow shapes visibly inhabited by N. norvegicus individuals. Identical shaped burrows were then included in the Nephrops norvegicus burrow counts and density calculations.

2. Although occasional *Nephrops norvegicus* individuals were recorded outside of their burrows, the size of every observed individual could not be applied to the surrounding burrows as there was no way to conclusively link every individual to a specific burrow. Therefore, only a select number of N. norvegicus that were observed crawling out of their respective burrows, in conjunction with the laser scale, were used to estimate typical N. norvegicus size in relation to the SACFOR scale.



Broad scale comparisons between each camera transects indicate that burrow densities were greater on the northwestern side of the survey area, with transects HT01, HT01A and HT02 having the greatest medium sized *N. norvegicus* burrow densities of 3.81/m² to 2.47m² and 2.83/m², respectively when compared to 0.20/m² and 0.02/m² for transects HT04 and HT05 and 0/m² for transects HT03 and HT03A, respectively (Table 8.3). These broad transect comparisons indicate that SACFOR densities across the northeastern side of the Loch Hourn survey area were 'Common' for medium sized *N. norvegicus* (3-15cm), while SACFOR densities of between 'Occasional' and 'Frequent' were seen to the east and none were evident on transects HT03 and HT03. The minimum SACFOR burrow density required for an area to be classified as burrowed mud habitat is 'Frequent', therefore the northwestern side of the Hourn survey area can be described as burrowed mud habitat, while the burrowed mud habitat to the east of the site was limited to transect HT04 (OSPAR 2010). The lower densities of *N. norvegicus* on the eastern side of the survey area can be attributed to the coarser substrate in this region, as *N. norvegicus* prefer silty and muddy sediments (Johnson et al. 2013).

When sections of consistent substrate were assessed separately during *N. norvegicus* burrow density calculations (Appendix III) slight variations in densities were evident. For example, on the northwestern side of the survey area medium sized *N. norvegicus* burrow densities ranged between 11.68/m² and 0/m², representing SACFOR classifications of 'Abundant' to 'Absent', while medium sized *N. norvegicus* burrow densities to the east ranged between 1.07/m² (Common) and 0/m² (Absent). Areas of lower *N. norvegicus* density across the survey area coincided with areas of mixed sediment (rocky silty sand) and exposed bedrock, with these habitats tending to be favoured by squat lobsters (*Munida* sp.; Figure 8.1 and Figure 8.6). Therefore, localised habitat and substrate variations existed within the broad burrowed mud habitat on the northwestern side of the fish farm and along transect HT04 to the east.

Anthropogenic activities such as fish farming can also potentially influence *N. norvegicus* densities across the survey area. However, the variability in *N. norvegicus* density within close proximity to the Loch Hourn fish farm (~35m from the farm cages) were not dissimilar from the variability in *N. norvegicus* density observed further afield (~650m from the farm cages). Furthermore, no obvious substrate changes related to fish farming, i.e. organic detritus build up and enrichment, were detected during video analysis, with the silty sand seabed across the northwestern side of the survey area indicative of natural seabed. Fishing activity can also influence *N. norvegicus* density through the removal of stock and abrasion of the underlying seabed. Although, linear scars were a ubiquitous feature across the northwestern side of the survey area, no variation in burrow density could be attributed to fishing activity. Therefore, based on the current visual assessment, the variability in *N. norvegicus* densities across the northwestern side of the survey area was more likely attributed to natural variation in sediment types.



Survey Yea	ar	2021							
Transect		HT01	HT01A	HT02	HT03	HT03A	HT04	HT05	
Transect Length	Total	431	161	771	213	219	170	474	
(m)	Analysed	364	161	421	181	210	149	466	
Time (a)	Total	2,763	743	2,875	589	1,042	952	1,685	
Time (s)	Analysed	1,516	743	1,614	486	974	852	1,610	
Analysed Area (m²) (Analysed Transect Length x 0.59m)		214.8	95.0	248.4	106.8	123.9	87.9	274.9	
Number of Medium	Run 1	807	230	709	0	0	18	6	
N. norvegicus (3 to 15cm)	Run 2	830	240	699	0	0	18	6	
Burrows	Average	818.5	235	704	0	0	18	6	
Medium <i>N. nor</i> (3 to 15cm) Burrow D	<i>vegicus</i> Density (/m²)	3.81	2.47	2.83	0	0	0.20	0.02	
Active N. norv	egicus	16	1	10	0	0	0	0	
<i>N. norvegicus</i> Ob Burrows	served in	5	2	0	0	0	4	0	

Table 8.3 Summary of Medium <u>N. norvegicus</u> Densities Along Each Transect





Figure 8.6 Summary of N. norvegicus Density Along Each Transect

Summary of N. norvegicus **Burrow Density around the** Loch Hourn Survey Area

The variability in *Nephrops* burrow density recorded in video transects conducted at the Loch Hourn fish farm site during 2021

Projection: British Grid. Datum: OSGB36 (7 - param transform). Not to be used for navigation

SACFOR Burrow Density Legend:

Medium sized individuals per m² (3cm - 15cm)

100 - 999 (Superabundant)

10 - 99 (Abundant)

0.1 - 0.9 (Frequent)

0.01 - 0.09 (Occasional)

0.001 - 0.009 (Rare)

Not Analysed for Burrows (Reduced Visibilty)

Not Analysed for Burrows (Creel Entanglement)

Approximate Cage Locations

Approximate Creel Positions





9 Priority Marine Features (Species)

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Priority Marine Features (PMFs) are a collection of habitats and species that are considered to be of conservation importance within Scotland, the UK, Northeast Atlantic and globally. During the video analysis three PMF species, the northern feather stars (*Leptometra celtica*), tall seapens (*Funiculina quadrangularis*) and fireworks anemones (*Pachycerianthus multiplicatus*) were identified, and their approximate locations are displayed in Figure 10.2.

9.1 Northern feather star (Leptometra celtica)

Northern feather stars are listed as a limited-mobility species PMF and were previously recorded by SEPA approximately. 2km east of the Loch Hourn fish farm on an area of exposed bedrock which was also investigated with cruciform survey lines (HT03 and HT04) during the current survey. Northern feather stars were widely recorded across the survey area, with aggregations observed on pebbles, cobbles and exposed bedrock. The hard substrate dominated habitat preference of the northern feather star was also stated by Doggett et al. (2019) *'Crinoids or feather stars occur on a wide variety of substrates including rocky reefs and sedimentary habitats. In the latter, they live attached to pebbles, cobbles and other hard surfaces scattered across the habitat using their grasping, curved cirri'. The most prominent aggregations were observed on exposed bedrock along transect HT04 and on pebbles and cobbles along transect HT01. Feather stars were also observed on hard substrates along transects HT05 and HT03, with aggregations observed approximately 70m from the edge of the Loch Hourn fish farm along transect HT01A.*

The Marine Scotland (2018) FeAST database provides summary tables for each PMF detailing their respective sensitivity and classified northern feather stars sensitivity to organic enrichment and siltation, which can result from fish farm activity, as 'Medium' and 'High', respectively. The 'High' and 'Medium' sensitivities arise from the risk of feeding and respiratory structures becoming clogged and non-functioning through the accumulation of excess sediment. Marine Scotland (2018) states 'if populations [of Northern feather stars] are completely removed by a factor recovery may take longer than five years'. Therefore, the presence of northern feather stars close to the edge of the farm may indicate no or only minor impact from fish farming activities. However, the confidence in the sensitivity assessment of the northern feather stars was listed as 'Low', so the sensitivity of northern feather stars distribution observed across the survey area could also be influenced by the availability of hard substrate.

9.2 Tall seapen (Funiculina quadrangularis)

Tall seapens are protected as a component species of the burrowed mud PMF. The current survey observed tall seapens to be widely distributed across the survey area, with greater abundances observed on the northwestern side along transects HT01, HT01A and HT02 due to the greater water depth (>35m) and abundance of silty sand. The soft, muddy sediment and water depth preferences of the tall seapen have been described by multiple studies (Greathead et al., 2007 and Doggett et al.,

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2019). Tall seapens were observed approximately 140m from edge of the fish farm along transect HT01.

The Marine Scotland (2018) FeAST database describes burrowed mud habitat as having 'Medium' sensitivity to potential organic enrichment and siltation impacts from fish farming. This 'Medium' sensitivity arises from the energetic cost of re-positioning the peduncle along with the energetic cost of cleaning of feeding structures during extended time periods of excessive sediment accumulation, which could potentially lead to a decline in population size (Marine Scotland, 2018). The presence of tall seapens close to the farm may indicate no or only minor impact from fish farming activity. However, the confidence in the sensitivity of the feature is listed as 'Low', so the absence of tall seapens nearer the cages could also potentially be due to the change in sediment characteristics as silty sand gives way to patches of mixed sediment close to the fish farm. For example, JNCC (2019) states *'species [Funiculina quadrangularis] was absent from sediments containing more than 30% gravel'*. Therefore, natural sediment variability could be influencing the distribution of the tall seapen across the survey area.

9.3 Fireworks anemones (Pachycerianthus multiplicatus)

The fireworks anemone is another species listed as a component species of the burrowed mud PMF. Fireworks anemones were exclusively located within the burrowed mud habitat along transects HT01 and HT02 located on the northwestern side of the survey area, with a greater abundance observed along transect HT02. This habitat preference was previously stated by Marine Scotland (2018) '*This large burrowing sea anemone lives in a long thick tube buried in mud or muddy sand at depths of 10-130m in very sheltered areas*'. The closest sighting of the fireworks anemone to the edge of the fish farm was approximately 380m along transect HT01. Similarly, to the tall seapen, the fireworks anemone has a 'Medium' sensitivity to organic enrichment and siltation from fish farm related activities due to the energetic cost of re-positioning in the sediment along with the energetic cost of cleaning of feeding structures over extended time periods of excessive sediment accumulation, which could potentially lead to a decline in population size (Marine Scotland, 2018).

The absence of fireworks anemones up to approximately 380m away from the fish farm could indicate limited impact to the sediment surrounding the fish farm or, as discussed for the tall seapen, this could potentially indicate natural changes in sediment composition close to the farm. As with all the PMF species discussed above, the exact zone of effect for the fish farm was not known, so interpretation of potential seabed recovery in relation to species locations and sediment changes are based exclusively on underwater video footage taken during March 2021. Furthermore, the identification of fireworks anemones across the Loch Hourn survey area provides a conservative estimate of their locations, as some Actiniaria sp. present across transects HT01 and HT02 could not be confidently identified to genus or species levels. Therefore, fireworks anemones could be located closer to the fish farm cages but this was limited as HT01A, which was the closest transect to the cage edges, had no observable Actiniaria species.





10 Anthropogenic Debris

Incidences of anthropogenic debris were rare across the survey area and was limited to a single sighting of a discarded fishing net along transect HT05 (Figure 10.1). The presence of anthropogenic debris introduces additional hard substrates for epifauna to colonise and creates refuges for mobile megafauna. However, no evidence of epifaunal colonisation on the fishing net was observed from the video footage, so it was presumed that the fishing net was a recent addition to the marine environment.



Figure 10.1 Example Image of Anthropogenic Debris





Figure 10.2 Summary of Priority Marine Feature Species Observed Along Each Transect

Approximate locations of Priority Marine Feature (PMF) species around the Loch Hourn Survey Area

The approximate locations of L. celtica, F. quadrangularis and P. multiplicatus observed in video transects conducted at the Loch Hourn fish farm site during 2021

Projection: British Grid. Datum: OSGB36 (7 - param transform). Not to be used for navigation

Northern feather star (Leptometra celtica) Limited-mobility species PMF

(Funiculina quadrangularis) Burrowed mud PMF

Fireworks anemone • (Pachycerianthus multiplicatus) Burrowed mud PMF

Approximate Cage Locations

Approximate Creel Positions







11 Conclusion

This survey was conducted at the request of MOWI to provide visual footage of the seabed northwest and east of the Loch Hourn fish farm to investigate the habitats surrounding this area, to record any observations of the northern feather star and to assess *N. norvegicus* density. High-quality video inspection lines were run approximately 30m and 600m northwest and 450m and 2km east of the fish farm to create a detailed map of the dominant habitats encountered along with the calculation of *N. norvegicus* densities across the survey area. Five main substrate types within four main habitat types were identified relating to exposed bedrock, coarse sediment (rocky and shelly gravelly sand), mixed sediment (rocky silty sand) and cohesive mud/sandy mud (silty sand). The exposed bedrock predominantly located 2km east of the fish farm within the coastal zone, which would classify as an Annex I reef, supported a fairly diverse epifaunal community, while the cohesive mud/sandy mud habitat predominantly observed northwest of the fish farm was characterised by bioturbation, "lebensspuren" and *N. norvegicus* burrows. Coarse and mixed sediments across the Loch Hourn survey area formed distinct patches and were an intermediate habitat between the mud/sandy mud and the exposed bedrock habitats.

This report provides evidence of the priority habitats of the UK Post-2010 Biodiversity Framework 'mud habitats in deep water' and OSPAR Commission 'seapens and burrowing megafauna' communities across the northwestern side of the Loch Hourn survey area, as medium sized *N. norvegicus* met the minimum SACFOR scale requirement of 'Frequent'. The maximum medium sized *N. norvegicus (3 to 15cm)* burrow density recorded to the northwest of the farm was 11.68/m², while the maximum recorded *N. norvegicus* burrow density to the east was 1.07/m². *N. norvegicus* burrows were present approximately 35m away from the edge of the fish farm, with the visual variability in *N. norvegicus* density unlikely to be a result of fish farm activity but more likely attributed to substrate variability. For example, *N. norvegicus* burrows were absent from coarse sediment, mixed sediment and exposed bedrock substrates, with squat lobsters more likely to be the dominant burrowing megafauna present within these habitats.

Northern feather stars, listed as a limited mobility species PMF, were widely distributed across the Loch Hourn survey area on areas of exposed bedrock, pebbles and cobbles, with prominent aggregations observed on exposed bedrock along transects HT01 and pebbles/cobbles along transect HT04. Tall seapens and fireworks anemones which are species listed under the burrowed mud PMF were also observed across the Loch Hourn survey area, with greater abundances recorded northwest of the fish farm which correlated with the distribution of the mud/sandy mud sediment type. All three PMF listed species were found in close proximity to the fish farm, between approximately 70m and 380m from the cage edges, which could indicate either no or only minor impact from fish farm activities or some sort of resistance of these species to this influence. However, it is presumed that the distribution and hence close proximity of these PMF species to the Loch Hourn fish farm was more likely to be attributed to the natural variation in substrate across the survey area.



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Appendix I – Field Operations and Survey Methods

Appendix I presents a summary of the different methods employed during the field operations.

Seabed Photography and Video

Seabed video footage was acquired at five main transects using a BSL MOD4 underwater camera system mounted within a BSL camera sled equipped with a separate strobe, LED lamp. The camera system itself can acquire images at 24MP resolution (6000 x 4000 pixels).

Once at the seabed, the camera was moved along the length of the transect at as slow a speed as possible (ideally <1 knot). Still photographs were captured remotely using a surface control unit via an



umbilical to the camera system. The stills were uploaded in real-time and saved to the laptop via specialist software. Live video footage, overlaid with date, time, position and site details were viewed in real time. The live video stream was used to assist with the targeting of the stills camera. HD footage was saved internally by the video camera and data was downloaded at the end of each shift of environmental operations and backed-up onto a hard drive.

Full camera specification can be found in the table below.

Standard Features	Comment
Image Resolution	Up to 24 megapixels (13.5 megapixel standard)
Standard Lens	F 2.8 – f 22 / 20mm Nikon Prime lens
Sensor Type	DX-format CMOS
Light source	2 x 1500 lumens LED array lamps
Typical settings	Aperture priority at F6.3, shutter speed typically 1/100 second
Framing Video Used	720 x 540 resolution video camera
High Definition video used	1920 x 1080 30FPS, internal SD card recording
Manufacturer	Benthic Solutions Limited



Appendix II – Seabed Photographic Positions

Transect	Photo ID	Projection Datum	: Geographic n: WGS84	Projection: British Grid Datum: OSGB36		
		Latitude	Longitude	Easting (m)	Northing (m)	
HT01	HT01_0001.jpg		Dec	k Slate		
HT01	HT01_0002.jpg		No Nav	Recorded		
HT01	HT01_0003.jpg	57 08.0807N	005 38.5173W	179 712	810 750	
HT01	HT01_0004.jpg	57 08.0675N	005 38.5264W	179 702	810 726	
HT01	HT01_0005.jpg	57 08.0630N	005 38.5300W	179 698	810 718	
HT01	HT01_0006.jpg	57 08.0566N	005 38.5361W	179 691	810 707	
HT01	HT01_0007.jpg	57 08.0533N	005 38.5401W	179 687	810 701	
HT01	HT01_0008.jpg	57 08.0454N	005 38.5410W	179 685	810 686	
HT01	HT01_0009.jpg	57 08.0425N	005 38.5388W	179 687	810 681	
HT01	HT01_0010.jpg	57 08.0419N	005 38.5384W	179 687	810 680	
HT01	HT01_0011.jpg	57 08.0394N	005 38.5372W	179 688	810 675	
HT01	HT01_0012.jpg	57 08.0362N	005 38.5362W	179 689	810 669	
HT01	HT01_0013.jpg	57 08.0335N	005 38.5357W	179 689	810 664	
HT01	HT01_0014.jpg	57 08.0339N	005 38.5358W	179 689	810 665	
HT01	HT01_0015.jpg	57 08.0274N	005 38.5351W	179 689	810 653	
HT01	HT01_0016.jpg	57 08.0247N	005 38.5322W	179 692	810 647	
HT01	HT01_0017.jpg	57 08.0222N	005 38.5302W	179 693	810 643	
HT01	HT01_0018.jpg	57 08.0209N	005 38.5293W	179 694	810 640	
HT01	HT01_0019.jpg	57 08.0178N	005 38.5280W	179 695	810 634	
HT01	HT01_0020.jpg	57 08.0135N	005 38.5272W	179 696	810 626	
HT01	HT01_0021.jpg	57 07.9992N	005 38.5281W	179 693	810 600	
HT01	HT01_0022.jpg	57 07.9927N	005 38.5297W	179 691	810 588	
HT01	HT01_0023.jpg	57 07.9860N	005 38.5319W	179 688	810 576	
HT01	HT01_0024.jpg	57 07.9809N	005 38.5342W	179 685	810 566	
HT01	HT01_0025.jpg	57 07.9750N	005 38.5360W	179 683	810 555	
HT01	HT01_0026.jpg	57 07.9697N	005 38.5371W	179 681	810 546	
HT01	HT01_0027.jpg	57 07.9656N	005 38.5377W	179 680	810 538	
HT01	HT01_0028.jpg	57 07.9638N	005 38.5381W	179 680	810 535	
HT01	HT01_0029.jpg	57 07.9635N	005 38.5381W	179 680	810 534	
HT01	HT01_0030.jpg	57 07.9607N	005 38.5351W	179 682	810 529	
HT01	HT01_0031.jpg	57 07.9457N	005 38.5250W	179 691	810 501	
HT01	HT01_0032.jpg	57 07.9486N	005 38.5220W	179 694	810 506	
HT01	HT01_0033.jpg	57 07.9469N	005 38.5153W	179 701	810 502	
HT01	HT01_0034.jpg	57 07.9445N	005 38.5132W	179 703	810 498	
HT01	HT01_0035.jpg	57 07.9396N	005 38.5122W	179 703	810 489	
HT01	HT01_0036.jpg	57 07.9352N	005 38.5123W	179 703	810 480	
HT01	HT01_0037.jpg	57 07.9325N	005 38.5127W	179 702	810 475	
HT01	HT01_0038.jpg	57 07.9288N	005 38.5140W	179 700	810 469	
HT01	HT01_0039.jpg	57 07.9267N	005 38.5152W	179 699	810 465	
HT01	HT01_0040.jpg	57 07.9227N	005 38.5163W	179 698	810 457	
HT01	HT01_0041.jpg	57 07.9169N	005 38.5138W	179 700	810 447	
HT01	HT01_0042.jpg	57 07.9086N	005 38.5153W	179 697	810 431	
HT01	HT01_0043.jpg	57 07.9013N	005 38.5176W	179 694	810 418	
HT01	HT01_0044.jpg	57 07.8992N	005 38.5186W	179 693	810 414	
HT01	HT01_0045.jpg	57 07.8943N	005 38.5203W	179 691	810 405	
HT01	HT01_0046.jpg	57 07.8863N	005 38.5235W	179 687	810 390	
HT01	HT01_0047.jpg	57 07.8836N	005 38.5255W	179 684	810 385	
HT01	HT01_0048.jpg	57 07.8819N	005 38.5270W	179 683	810 382	
HT01	HT01_0049.jpg	57 07.8807N	005 38.5258W	179 684	810 380	





Transect	Photo ID	Projection Datum	: Geographic 1: WGS84	Projection: British Grid Datum: OSGB36		
		Latitude	Longitude	Easting (m)	Northing (m)	
HT01	HT01_0050.jpg	57 07.8790N	005 38.5230W	179 686	810 377	
HT01	HT01_0051.jpg	57 07.8721N	005 38.5157W	179 693	810 364	
HT01	HT01_0052.jpg	57 07.8493N	005 38.4928W	179 714	810 320	
HT01	HT01_0053.jpg	57 07.8436N	005 38.4905W	179 716	810 309	
HT01	HT01_0054.jpg	57 07.8397N	005 38.4904W	179 715	810 302	
HT01	HT01_0055.jpg	57 07.8336N	005 38.4908W	179 714	810 291	
HT01	HT01 0056.jpg	57 07.8441N	005 38.5157W	179 690	810 312	
HT01	HT01_0057.jpg	57 07.8514N	005 38.5058W	179 701	810 325	
HT01	HT01_0058.jpg	57 07.8441N	005 38.5251W	179 681	810 312	
HT01A	HT1A 0001.jpg		Decl	k Slate		
HT01A	HT1A 0002.jpg		No Nav	Recorded		
HT01A	HT1A 0003.jpg	57 07.8125N	005 38.3945W	179 809	810 247	
HT01A	HT1A 0004.jpg	57 07.8069N	005 38.3967W	179 807	810 236	
HT01A	HT1A 0005.jpg	57 07.8035N	005 38.3983W	179 805	810 230	
HT01A	HT1A 0006.jpg	57 07.7983N	005 38.4040W	179 798	810 221	
HT01A	HT1A 0007.jpg	57 07.7983N	005 38.4065W	179 796	810 221	
HT01A	HT1A 0008.jpg	57 07.7965N	005 38.4085W	179 794	810 218	
HT01A	HT1A 0009.jpg	57 07.7850N	005 38.4102W	179 791	810 196	
HT01A	HT1A 0010.jpg	57 07.7822N	005 38.4138W	179 787	810 191	
HT01A	HT1A 0011.jpg	57 07.7795N	005 38.4162W	179 784	810 187	
HT01A	HT1A 0012 ipg	57 07 7775N	005 38.4171W	179 783	810 183	
HT01A	HT1A_0013 ing	57 07 7753N	005 38 4175W	179 783	810 179	
HT01A	HT1A_0014.jpg	57 07 7714N	005 38.4159W	179 784	810 172	
HT01A	HT1A_0015 ing	57 07 7691N	005 38 4162W	179 783	810 167	
HT01A	HT1A_0016 ing	57 07 7621N	005 38 4168W	179 782	810 154	
HT01A	HT1A_0017.jpg	57 07 7610N	005 38.4187W	179 780	810 152	
HT01A	HT1A_0018 ing	57 07 7596N	005 38 4203W	179 778	810 150	
HT01A	HT1A_0019 ing	57 07 7590N	005 38 4204W	179 778	810 149	
HT01A	HT1A_0020.ipg	57 07 7566N	005 38.4208W	179 777	810 144	
HT01A	HT1A_0021.jpg	57 07 7532N	005 38.4237W	179 774	810 138	
HT01A	HT1A 0022.jpg	57 07 7512N	005 38.4243W	179 773	810 135	
HT01A	HT1A_0023 ing	57 07 7505N	005 38 4249W	179 773	810 133	
HT01A	HT1A 0024.jpg	57 07.7480N	005 38.4254W	179 772	810 129	
HT01A	HT1A_0025.ipg	57 07 7464N	005 38.4263W	179 771	810 126	
HT01A	HT1A 0026.jpg	57 07 7429N	005 38.4273W	179 769	810 119	
HT01A	HT1A 0027.jpg	57 07 7414N	005 38.4272W	179 769	810 116	
HT01A	HT1A 0028.jpg	57 07.7397N	005 38.4268W	179 770	810 113	
HT02	HT02_0001.jpg		Dec	k Slate		
HT02	HT02_0002_jpg		No Nav	Recorded		
HT02	HT02_0003.jpg	57.07.9956N	005 38.8272W	179 391	810 609	
HT02	HT02_0004.jpg	57 08.0006N	005 38.8257W	179 393	810 618	
HT02	HT02_0005.jpg	57.08.0057N	005 38.8223W	179 397	810 628	
HT02	HT02_0006 ing	57 08 0113N	005 38 8215W	179 399	810.638	
HT02	HT02_0007.ing	57 08.0206N	005 38.8194W	179 402	810 655	
HT02	HT02_0008.ing	57 08.0246N	005 38.8184W	179 403	810 663	
нт02	HT02 0009 ing	57 08.0272N	005 38.8190\/	179 403	810 667	
НТ02	HT02_0010 ing	57 08.0300N	005 38.8202\/	179 402	810 673	
НТ02	HT02_0011 ing	57 08.0352N	005 38.8226W	179 400	810 682	
нто2	HT02 0012 ing	57 08 0432N	005 38 8254\\/	179 398	810 697	
НТ02	HT02_0013 ing	57 08.0443N	005 38.8251W	179 398	810 699	
HT02	HT02 0014.jpg	57 08.0460N	005 38.8257W	179 398	810 703	





Transect	Photo ID	Projection Datum	: Geographic n: WGS84	Projection: British Grid Datum: OSGB36		
		Latitude	Longitude	Easting (m)	Northing (m)	
HT02	HT02_0015.jpg	57 08.0467N	005 38.8258W	179 398	810 704	
HT02	HT02_0016.jpg	57 08.0476N	005 38.8255W	179 398	810 706	
HT02	HT02_0017.jpg	57 08.0589N	005 38.8241W	179 401	810 726	
HT02	HT02_0018.jpg	57 08.0622N	005 38.8218W	179 403	810 732	
HT02	HT02_0019.jpg	57 08.0648N	005 38.8212W	179 404	810 737	
HT02	HT02_0020.jpg	57 08.0686N	005 38.8185W	179 407	810 744	
HT02	HT02_0021.jpg	57 08.0720N	005 38.8136W	179 413	810 750	
HT02	HT02_0022.jpg	57 08.0743N	005 38.8150W	179 411	810 755	
HT02	HT02_0023.jpg	57 08.0776N	005 38.8161W	179 411	810 761	
HT02	HT02_0024.jpg	57 08.0813N	005 38.8199W	179 407	810 768	
HT02	HT02_0025.jpg	57 08.0860N	005 38.8212W	179 406	810 777	
HT02	HT02_0026.jpg	57 08.0897N	005 38.8215W	179 406	810 783	
HT02	HT02_0027.jpg	57 08.0952N	005 38.8250W	179 403	810 794	
HT02	HT02_0028.jpg	57 08.1001N	005 38.8252W	179 404	810 803	
HT02	HT02_0029.jpg	57 08.1075N	005 38.8255W	179 404	810 817	
HT02	HT02_0030.jpg	57 08.1116N	005 38.8264W	179 404	810 824	
HT02	HT02 0031.jpg	57 08.1133N	005 38.8280W	179 402	810 828	
HT02	HT02 0032.jpg	57 08.1181N	005 38.8336W	179 397	810 837	
HT02	HT02 0033.jpg	57 08.1225N	005 38.8352W	179 396	810 845	
HT02	HT02 0034.jpg	57 08.1254N	005 38.8351W	179 396	810 850	
HT02	HT02 0035.ipg	57 08.1281N	005 38.8380W	179 394	810 856	
HT02	HT02 0036.jpg	57 08.1465N	005 38.8356W	179 398	810 889	
HT02	HT02_0037.jpg	57 08.1495N	005 38.8336W	179 400	810 895	
HT02	HT02 0038.ipg	57 08.1557N	005 38.8281W	179 406	810 906	
HT02	HT02 0039.ipg	57 08.1673N	005 38.8216W	179 414	810 927	
HT02	HT02_0040.jpg	57 08.1685N	005 38.8215W	179 414	810 930	
HT02	HT02 0041.jpg	57 08.1693N	005 38.8212W	179 415	810 931	
HT02	HT02 0042.jpg	57 08.1752N	005 38.8204W	179 416	810 942	
HT02	HT02 0043.jpg	57 08.1788N	005 38.8196W	179 417	810 949	
HT02	HT02 0044.jpg	57 08.1796N	005 38.8195W	179 417	810 950	
HT02	HT02 0045.ipg	57 08.1817N	005 38.8213W	179 416	810 954	
HT02	HT02_0046.jpg	57 08.1871N	005 38.8225W	179 415	810 964	
HT02	HT02 0047.jpg	57 08.2010N	005 38.8241W	179 415	810 990	
HT02	HT02 0048.jpg	57 08.2071N	005 38.8259W	179 414	811 001	
HT02	HT02 0049.ipg	57 08.2103N	005 38.8270W	179 413	811 007	
HT02	HT02 0050.ipg	57 08.2144N	005 38.8269W	179 413	811 015	
HT02	HT02 0051.jpg	57 08.2159N	005 38.8271W	179 413	811 018	
HT02	HT02 0052.ipg	57 08.2196N	005 38.8271W	179 414	811 025	
HT02	HT02 0053.jpg	57 08.2336N	005 38.8258W	179 416	811 050	
HT02	HT02_0054.jpg	57 08.2351N	005 38.8254W	179 417	811 053	
HT02	HT02_0055.ipg	57 08.2500N	005 38.8178W	179 426	811 080	
HT02	HT02_0056.jpg	57 08.2550N	005 38.8171W	179 427	811 090	
HT02	HT02_0057.jpg	57 08.2578N	005 38.8160W	179 429	811 095	
HT02	HT02 0058.ipg	57 08.2641N	005 38.8142W	179 431	811 106	
HT02	HT02_0059.jpg	57 08.2735N	005 38.8160W	179 430	811 124	
HT02	HT02 0060.ipg	57 08.2784N	005 38.8170W	179 430	811 133	
HT02	HT02_0061_ing	57 08.2846N	005 38.8223W	179 425	811 145	
HT02	HT02 0062 ing	57 08.2891N	005 38.8235W	179 424	811 153	
HT02	HT02 0063.ipg	57 08.3030N	005 38.8216W	179 428	811 179	
HT02	HT02 0064.ing	57 08.3086N	005 38.8201W	179 430	811 189	
HT02	HT02_0065.jpg	57 08.3213N	005 38.8163W	179 435	811 213	





Transect	Photo ID	Projection Datum	: Geographic 1: WGS84	Projection: British Grid Datum: OSGB36		
		Latitude	Longitude	Easting (m)	Northing (m)	
HT02	HT02_0066.jpg	57 08.3249N	005 38.8154W	179 436	811 219	
HT02	HT02_0067.jpg	57 08.3391N	005 38.8085W	179 444	811 245	
HT02	HT02_0068.jpg	57 08.3439N	005 38.8112W	179 442	811 254	
HT02	HT02_0069.jpg	57 08.3568N	005 38.8104W	179 444	811 278	
HT02	HT02_0070.jpg	57 08.3622N	005 38.8132W	179 442	811 288	
HT02	HT02_0071.jpg	57 08.3619N	005 38.8141W	179 441	811 288	
HT02	HT02 0072.jpg	57 08.3884N	005 38.8109W	179 447	811 337	
HT02	HT02_0073.jpg	57 08.3967N	005 38.8058W	179 453	811 352	
HT03	HT3_0001.jpg		Dec	k Slate		
HT03	HT3_0002.jpg		Dec	k Slate		
HT03	HT3_0003.jpg		No Nav	Recorded		
HT03	HT3 0004.jpg	57 07.1845N	005 35.8687W	182 294	808 947	
HT03	HT3 0005.jpg	57 07.1882N	005 35.8464W	182 317	808 953	
HT03	HT3 0006.jpg	57 07.1903N	005 35.8341W	182 330	808 956	
HT03	HT3 0007.jpg	57 07.1926N	005 35.8091W	182 355	808 959	
HT03	HT3 0008.jpg	57 07.1927N	005 35.8057W	182 359	808 959	
HT03	HT3 0009.jpg	57 07.1928N	005 35.8000W	182 364	808 959	
HT03	HT3 0010.jpg	57 07.1933N	005 35.7750W	182 390	808 958	
HT03	HT3 0011.jpg	57 07.1939N	005 35.7648W	182 400	808 959	
HT03	HT3 0012.jpg	57 07.1945N	005 35.7570W	182 408	808 960	
НТОЗ	HT3 0013.jpg	57 07.1953N	005 35.7485W	182 417	808 961	
НТОЗ	HT3_0014.jpg	57 07 1946N	005 35.7183W	182 447	808 958	
НТОЗ	HT3_0015.ipg	57 07 1943N	005 35.7154W	182 450	808 957	
НТОЗ	HT3_0016.jpg	57 07 1937N	005 35.7089W	182 456	808 956	
НТОЗ	HT3_0017.jpg	57 07 1931N	005 35.7028W	182 462	808 954	
НТОЗ	HT3 0018.jpg	57 07.1926N	005 35.6964W	182 469	808 953	
НТОЗ	HT3 0019.jpg	57 07.1919N	005 35.6889W	182 476	808 951	
НТОЗ	HT3_0020.ipg	57 07 1905N	005 35.6801W	182 485	808 948	
НТОЗ	HT3_0021.jpg	57 07 1899N	005 35.6774W	182 488	808 947	
НТОЗ	HT3_0022.jpg	57 07.1887N	005 35.6723W	182 493	808 944	
НТОЗ	HT3 0023.jpg	57 07.1861N	005 35.6648W	182 500	808 939	
НТОЗА	HT3A_0001.ipg	0, 0, 12001.1	Dec	k Slate	000 000	
HT03A	HT3A 0002.jpg		Dec	k Slate		
НТОЗА	HT3A_0003.jpg		No Nav	Recorded		
HT03A	HT3A 0004.jpg		No Nav	Recorded		
HT03A	HT3A_0005.jpg		No Nav	Recorded		
HT03A	HT3A 0006.jpg	57 07.2026N	005 35.7231W	182 443	808 973	
HT03A	HT3A_0007.jpg	57 07.2004N	005 35.7262W	182 440	808 969	
HT03A	HT3A_0008.ipg	57 07 2006N	005 35.7277W	182 438	808 969	
HT03A	HT3A 0009.jpg	57 07.2047N	005 35.7386W	182 427	808 978	
HT03A	HT3A 0010.jpg	57 07.2052N	005 35.7426W	182 423	808 979	
HT03A	HT3A 0011.jpg	57 07.2051N	005 35.7458W	182 420	808 979	
HT03A	HT3A 0012.ing	57 07.2051N	005 35.7491W	182 417	808 979	
HT03A	HT3A 0013.jpg	57 07.2044N	005 35.7553W	182 411	808 978	
HT03A	HT3A 0014.ipg	57 07.2044N	005 35.7575W	182 408	808 978	
HT03A	HT3A 0015.ing	57 07.2041N	005 35.7618W	182 404	808 978	
HT03A	HT3A 0016 ing	57 07.2033N	005 35.7651W	182 401	808 976	
НТОЗА	HT3A 0017.ing	57 07.2031N	005 35.7657W	182 400	808 976	
HT03A	HT3A 0018 ing	57 07.2015N	005 35.7717W	182 394	808 973	
HT03A	HT3A 0019 ing	57 07.2012N	005 35.7775W	182 388	808 973	
HT03A	HT3A 0020.jpg	57 07.2011N	005 35.7860W	182 379	808 973	





Transect	Photo ID	Projection Datum	: Geographic : WGS84	Projection: British Grid Datum: OSGB36		
		Latitude	Longitude	Easting (m)	Northing (m)	
HT03A	HT3A_0021.jpg	57 07.2011N	005 35.7921W	182 373	808 974	
HT03A	HT3A_0022.jpg	57 07.2011N	005 35.7948W	182 370	808 974	
HT03A	HT3A_0023.jpg	57 07.2008N	005 35.7989W	182 366	808 974	
HT03A	HT3A_0024.jpg	57 07.2006N	005 35.8006W	182 365	808 973	
HT03A	HT3A_0025.jpg	57 07.2002N	005 35.8078W	182 357	808 973	
HT03A	HT3A_0026.jpg	57 07.1995N	005 35.8159W	182 349	808 972	
HT03A	HT3A_0027.jpg	57 07.1984N	005 35.8253W	182 339	808 971	
HT03A	HT3A_0028.jpg	57 07.1982N	005 35.8356W	182 329	808 971	
HT03A	HT3A_0029.jpg	57 07.1971N	005 35.8470W	182 317	808 969	
HT03A	HT3A_0030.jpg	57 07.1964N	005 35.8501W	182 314	808 968	
HT03A	HT3A_0031.jpg	57 07.1965N	005 35.8544W	182 310	808 969	
HT03A	HT3A_0032.jpg	57 07.1963N	005 35.8586W	182 306	808 968	
HT03A	HT3A_0033.jpg	57 07.1991N	005 35.8755W	182 289	808 974	
HT03A	HT3A 0034.jpg	57 07.1991N	005 35.8765W	182 288	808 975	
HT03A	HT3A 0035.jpg	57 07.1992N	005 35.8782W	182 286	808 975	
HT03A	HT3A 0036.jpg	57 07.1999N	005 35.8840W	182 280	808 976	
HT03A	HT3A 0037.jpg	57 07.2021N	005 35.8947W	182 270	808 981	
HT03A	HT3A 0038.jpg	57 07.2022N	005 35.8950W	182 269	808 981	
HT03A	HT3A 0039.jpg	57 07.2046N	005 35.9031W	182 262	808 986	
HT03A	HT3A 0040.jpg	57 07.2125N	005 35.9171W	182 248	809 002	
HT03A	HT3A 0041.jpg	57 07.2127N	005 35.9208W	182 244	809 002	
НТОЗА	HT3A_0042.jpg	57 07.2113N	005 35.9263W	182 239	809 000	
НТОЗА	HT3A_0043.jpg	57 07 2099N	005 35.9311W	182 234	808 997	
НТОЗА	HT3A_0044.jpg	57 07.2101N	005 35.9364W	182 229	808 998	
НТОЗА	HT3A_0045.ipg	57 07.2098N	005 35.9377W	182 227	808 998	
HT04	HT4 0001.jpg	07 07 12 00 011	Dec	k Slate		
HT04	HT4_0002.jpg	57 07,1956N	005 35.8122W	182 352	808 965	
HT04	HT4_0003.jpg	57 07.2009N	005 35.8146W	182 350	808 975	
HT04	HT4_0004.jpg	57 07.2039N	005 35.8168W	182 349	808 980	
HT04	HT4_0005.ipg	57 07 2054N	005 35.8184W	182 347	808 983	
HT04	HT4_0006.jpg	57 07 2063N	005 35.8219W	182 344	808 985	
HT04	HT4_0007 ing	57 07 2068N	005 35 8269W	182 339	808 986	
HT04	HT4_0008.jpg	57 07.2103N	005 35.8279W	182 338	808 993	
HT04	HT4_0009.jpg	57 07.2116N	005 35.8275W	182 338	808 995	
HT04	HT4_0010.jpg	57 07.2141N	005 35.8263W	182 340	809.000	
HT04	HT4_0011 ing	57 07 2175N	005 35 8235W	182 343	809.006	
HT04	HT4_0012.jpg	57 07.2190N	005 35.8239W	182 343	809.009	
HT04	HT4_0013 ing	57 07 2219N	005 35 8240W	182 343	809.014	
HT04	HT4_0014 ing	57 07 2233N	005 35 8235W	182 344	809.017	
HT04	HT4_0015 ing	57 07 2243N	005 35 8229W	182 344	809.018	
HT04	HT4_0015.jpg	57 07 2257N	005 35.8217W	182 346	809.021	
HT04	HT4_0017 ing	57 07 2292N	005 35 8213W	182 346	809 027	
HT04	HT4_0017.jpg	57 07 2322N	005 35.8217W	182 346	809.033	
HT04	HT4 0019 ing	57 07 2351N	005 35 8211W	182 347	809 038	
HT04	HT4_0020.jpg	57 07 2376N	005 35 8199\/	182 349	809 043	
HT04	HT4 0021 ing	57 07 2423N	005 35 8166W	182 352	809.051	
нто4	HT4 0022.JP5	57 07 24/QN	005 35 8168\//	182 352	809 051	
HT04	HT4 0022.jpg	57 07 2468N	005 35 8174\/	182 353	809.050	
нточ	HT4_0023.jpg	57 07 2/100N	005 35 8163\/	182 352	809.066	
нто4	HT4 0025 ing	57 07 2528N	005 35.8103W	182 354	809 000	
HT04	HT4 0026.ing	57 07.2545N	005 35.8091W	182 361	809 072	





Transect	Photo ID	Projection Datum	: Geographic :: WGS84	Projection: British Grid Datum: OSGB36			
		Latitude	Longitude	Easting (m)	Northing (m)		
HT04	HT4_0027.jpg	57 07.2553N	005 35.8072W	182 363	809 075		
HT04	HT4_0028.jpg	57 07.2560N	005 35.8056W	182 365	809 076		
HT04	HT4_0029.jpg	57 07.2583N	005 35.7997W	182 371	809 080		
HT04	HT4_0030.jpg	57 07.2583N	005 35.7997W	182 371	809 080		
HT04	HT4_0031.jpg	57 07.2599N	005 35.7953W	182 376	809 083		
HT04	HT4_0032.jpg	57 07.2616N	005 35.7930W	182 378	809 086		
HT04	HT4_0033.jpg	57 07.2643N	005 35.7899W	182 382	809 091		
HT04	HT4_0034.jpg	57 07.2647N	005 35.7894W	182 382	809 092		
HT04	HT4_0035.jpg	57 07.2670N	005 35.7861W	182 386	809 096		
HT04	HT4_0036.jpg	57 07.2676N	005 35.7847W	182 387	809 097		
HT04	HT4_0037.jpg	57 07.2686N	005 35.7768W	182 395	809 098		
HT04	HT4_0038.jpg	57 07.2682N	005 35.7733W	182 399	809 097		
HT04	HT4_0039.jpg	57 07.2676N	005 35.7707W	182 401	809 096		
HT04	HT4 0040.jpg	57 07.2663N	005 35.7662W	182 406	809 093		
HT05	HT05 0001.jpg		Dec	k Slate			
HT05	HT05 0002.jpg		Dec	s Slate			
HT05	HT05 0003.jpg		Dec	k Slate			
HT05	HT05_0004.jpg		No Nav	Recorded			
HT05	HT05_0005.ipg	57 07.4226N	005 37.3375W	180 837	809 467		
HT05	HT05_0006.ipg	57 07.4214N	005 37.3349W	180 839	809 465		
HT05	HT05_0007.ipg	57 07 4200N	005 37.3321W	180 842	809 462		
HT05	HT05_0008.ipg	57 07.4180N	005 37.3259W	180 848	809 458		
HT05	HT05_0009.jpg	57 07 4173N	005 37.3197W	180 854	809 456		
HT05	HT05_0010.ipg	57 07.4172N	005 37.3178W	180 856	809 456		
HT05	HT05_0011.jpg	57 07.4172N	005 37.3165W	180 857	809 456		
НТО5	HT05_0012.jpg	57 07 4156N	005 37.3033W	180 870	809 452		
НТО5	HT05_0013 ing	57 07 4122N	005 37 2976W	180 876	809 446		
нтоз	HT05_0013.jpg	57 07 4108N	005 37 2954W	180 878	809 443		
HT05	HT05_0015.jpg	57 07 4110N	005 37.2885W	180 885	809 443		
НТО5	HT05_0016 ing	57 07 4106N	005 37 2850W	180 888	809 442		
нтоз	HT05_0017.jpg	57 07 4084N	005 37 2698W	180 903	809 437		
нтоз	HT05_0017.jpg	57 07 4066N	005 37 2593W	180 914	809.433		
HT05	HT05_0010.jpg	57 07 4042N	005 37 2506W	180 922	809 428		
нтоз	HT05_0020.jpg	57 07 4010N	005 37 2404W	180 932	809 422		
нтоз	HT05_0020.jpg	57 07 3983N	005 37 2324W	180 940	809 416		
нтоз	HT05_0022.jpg	57 07 3964N	005 37 2273W	180 945	809.412		
HT05	HT05_0022.jpg	57 07 3913N	005 37 2151W	180 957	809 402		
нтоз	HT05_0023.jpg	57 07 3874N	005 37 2033W	180 968	809 394		
нтоз	HT05_0024.jpg	57 07 3865N	005 37 1935W	180 978	809 392		
нтоз	HT05_0025.jpg	57 07 3851N	005 37 1835W	180 978	809 389		
нтоз	HT05_0020.jpg	57 07 3837N	005 37 1738\/	180 988	809 385		
нтоз	HT05_0027.jpg	57 07 3823N	005 37 1607W	180 558	809 383		
нтоз	HT05_0020.jpg	57 07 2821N	005 27 1/12W/	181 011	800 383		
нтоз		57 07 3818N	005 37.141300	181 041	800 380		
нтоз	HT05_0030.jpg	57 07 3812N	005 37 1200 \	181 051	809 379		
		57 07 200EN	005 37.120900	101 001	ورو و00 حدد ۵۵۵		
		57 07 270CN	005 37.11227	101 000	003 377 000 375		
			005 37.103477	101 000	003 373 800 360		
		57 07.3772N	002 27.002100	101 003	003 503 000 267		
		57 07.3701N	005 37.062999	101 003	800 264		
НТОБ		57 07 2720N		181 101	809 262		
піоз	11102_0037.Jpg	JI UI.3/39N	003 37.07070	101 101	009 302		





Transect	Photo ID	Projection Datum	: Geographic n: WGS84	Projection: British Grid Datum: OSGB36		
		Latitude	Longitude	Easting (m)	Northing (m)	
HT05	HT05_0038.jpg	57 07.3724N	005 37.0617W	181 110	809 359	
HT05	HT05_0039.jpg	57 07.3714N	005 37.0561W	181 115	809 357	
HT05	HT05_0040.jpg	57 07.3705N	005 37.0507W	181 121	809 355	
HT05	HT05_0041.jpg	57 07.3700N	005 37.0479W	181 123	809 354	
HT05	HT05_0042.jpg	57 07.3685N	005 37.0395W	181 132	809 351	
HT05	HT05_0043.jpg	57 07.3679N	005 37.0356W	181 136	809 349	
HT05	HT05_0044.jpg	57 07.3666N	005 37.0285W	181 143	809 347	
HT05	HT05_0045.jpg	57 07.3618N	005 37.0034W	181 167	809 336	
HT05	HT05_0046.jpg	57 07.3571N	005 36.9832W	181 187	809 327	
HT05	HT05_0047.jpg	57 07.3534N	005 36.9703W	181 200	809 319	
HT05	HT05_0048.jpg	57 07.3502N	005 36.9609W	181 209	809 313	
HT05	HT05_0049.jpg	57 07.3466N	005 36.9517W	181 218	809 305	
HT05	HT05_0050.jpg	57 07.3414N	005 36.9424W	181 227	809 295	
HT05	HT05_0051.jpg	57 07.3381N	005 36.9343W	181 235	809 289	
HT05	HT05_0052.jpg	57 07.3341N	005 36.9266W	181 242	809 281	





Appendix III – Camera Transect Log Sheet



Station	Easting (m)	Northing (m)	Distance Travelled (m)	Date (DD/MM/YY)	Time HD Video (HH:MM:SS)	Sediment Type	Conspicuous Fauna	Transect area (m²)	Medium <i>N. norvegicus</i> (3 to 15cm) Burrow Density (/m ²)
	179 716.1	810 758.5	2.4	17/03/21	16:10:56	Silty sand	Shrimp (Caridea sp.) and tall seapen (Funiculina	1.40	0.00
	179 715.2	810 756.3		17/03/21	16:11:00		quadrangularis) before start of transect	1	
	179 715.2	810 756.3	67	17/03/21	16:11:00	Not analysed for	No conspicuous fauna	3 93	
	179 712.2	810 750.4	0.7	17/03/21	16:11:34	unsuitable seabed		5.55	
	179 712.2	810 750.4	47	17/03/21	16:11:34	Silty sand	Shrimp (Caridea sp.) and tall seapen (Funiculina	2.80	1 97
	179 710.4	810 746.0	4.7	17/03/21	16:11:46	Sitty sand	quadrangularis)	2.00	1.57
	179 710.4	810 746.0	10.1	17/03/21	16:11:46	Not analysed for	Tall soapon (Euniculing guadrangularis)	5.06	
	179 706.3	810 736.7	10.1	17/03/21	16:12:06	unsuitable seabed		5.50	
	179 706.3	810 736.7	20	17/03/21	16:12:06	Silty sand	No conspicuous fauna	1 77	0.00
	179 705.1	810 734.0	3.0	17/03/21	16:12:12	Sitty salid		1.77	0.00
	179 705.1 81	810 734.0	70	17/03/21	16:12:12	Not analysed for	Tall seapen (Funiculina quadrangularis) and	4.67	
	179 702.0	810 726.7	17/03/21	17/03/21	16:12:29	unsuitable seabed	anemone (Actiniaria sp.)	4.07	
HT01	179 702.0	810 726.7	74.9	17/03/21	16:12:29	Silty sand	Tall seapen (<i>Funiculina quadrangularis</i>), anemone (Actiniaria sp.), fireworks anemone	44.12	2.22
	179 689.0	810 653.1	74.0	17/03/21	16:16:45		(Virgularia mirabilis), shrimp (Caridea sp.), feather duster worms (Sabellidae sp.) and Gadidae sp.	44.15	2.35
	179 689.0	810 653.1	2.0	17/03/21	16:16:45	Not analysed for	Tall seapen (Funiculina quadrangularis), Gadidae	1.04	
	179 689.9	810 650.4	2.8	17/03/21	16:16:56	unsuitable seabed	Norway lobster (<i>Nephrops norvegicus</i>)	1.64	
	179 689.9	810 650.4	49.8	17/03/21	16:16:56	Silty sand	Tall seapen (<i>Funiculina quadrangularis</i>), Gadidae sp., shrimp (Caridea sp.), slender seapen	29.37	3.05
	179 693.5	810 600.8	45.0	17/03/21	16:20:08	Sirty Suria	(Virgularia mirabilis) and Norway lobster (Nephrops norvegicus)	25.57	5.05
	179 693.5	810 600.8	15	17/03/21	16:20:08	Not analysed for Nephrons due to	Tall seapen (Funiculing gugdrangularis)	0.89	
	179 693.1	810 599.3	1.5	17/03/21	16:20:18	unsuitable seabed		0.05	
	179 693.1	810 599.3	83.4	17/03/21	16:20:18	Silty sand	Tall seapen (Funiculina quadrangularis), shrimp	49 18	10.45
	179 689.3	810 516.0	05.4	17/03/21	16:25:09	Sity salu	(Nephrops norvegicus)	45.10	10.45
	179 689.3	810 516.0	20.6	17/03/21	16:25:09			12.15	0.86





Station	Easting (m)	Northing (m)	Distance Travelled (m)	Date (DD/MM/YY)	Time HD Video (HH:MM:SS)	Sediment Type	Conspicuous Fauna	Transect area (m²)	Medium <i>N. norvegicus</i> (3 to 15cm) Burrow Density (/m²)
	179 692.0	810 495.6		17/03/21	16:27:01	Camera towing on side	Edible crab (<i>Cancer pagurus</i>) and tall seapen (Funiculina quadrangularis)		
	179 692.0	810 495.6	2.0	17/03/21	16:27:01	Camera towing on	Northern feather star (<i>Leptometra celtica</i>), squat	2.20	0.00
	179 691.0	810 499.4	3.9	17/03/21	16:28:51	(cobbles)	(Porania) pulvillus)	2.30	0.00
	179 691.0	810 499.4	5.0	17/03/21	16:28:51	Rocky silty sand (Increased	Northern Feather star (<i>Leptometra celtica</i>), tall seapen (<i>Funiculina quadrangularis</i>), Serpulidae tubes, Devonshire cup corals (<i>Caryophyllia smithii</i>),	2.04	1.02
	179 692.5	810 504.1	5.0	17/03/21	16:29:50	cobbles) (feather stars attached)	edible crab (<i>Cancer pagurus</i>), squat lobster (<i>Munida</i> sp.) and Northern feather star (<i>Leptometra celtica</i>)	2.94	1.02
	179 692.5	810 504.1	2.0	17/03/21	16:29:50	Not analysed for		1.21	
	179 694.0	810 505.6	2.0	17/03/21	16:30:31	unsuitable seabed	Tall seapen (<i>Funiculina quaarangularis</i>)	1.21	
	179 694.0	810 505.6	0.5	17/03/21	16:30:31	Ciltureand	Northern feather star (<i>Leptometra celtica</i>), shrimp	0.22	2.15
	179 694.5	810 505.7	0.5	17/03/21	16:30:43	Silty Sand	squat lobster (Munida sp.)	0.32	3.15
	179 694.5	810 505.7	5.2	17/03/21	16:30:43	Not analysed for	No conspicuous fauna	2.04	
	179 699.0	810 503.2	5.2	17/03/21	16:31:08	unsuitable seabed	No conspicuous rauna	5.04	
	179 699.0	810 503.2	13.0	17/03/21	16:31:08	Silty sand	Northern feather star (<i>Leptometra celtica</i>), Norway lobster (<i>Nephrops norvegicus</i>), shrimp	7.69	1.30
	179 703.3	810 490.9		17/03/21	16:32:02		(Caridea sp.), slender seapen (Virgularia mirabilis) and tall seapen (Funiculina quadrangularis)		
	179 703.3	810 490.9	4.2	17/03/21	16:32:02	Bedrock partly	Northern feather star (Leptometra celtica) and	2.52	0.00
	179 703.3	810 486.7	4.3	17/03/21	16:32:17	covered in silty sand	Serpulidae tubes	2.52	0.00
	179 703.3	810 486.7	2 5	17/03/21	16:32:17	Not analysed for	Tall soapon (Euniculing guadrangularis)	2.09	
	179 703.1	810 483.1	3.5	17/03/21	16:32:28	unsuitable seabed	Tali seapen (Funiculna quadrangularis)	2.08	
	179 703.1	810 483.1	0.0	17/03/21	16:32:28	Silty cond	Tall seapen (Funiculina quadrangularis), shrimp	5.92	2.40
	179 701.7	810 473.3	5.5	17/03/21	16:33:03	Silty Saliu	(Caridea sp.), Gadidae sp.	5.65	2.40
	179 701.7	810 473.3	23	17/03/21	16:33:03	Not analysed for	Tall seapen (Euniculing guadrangularic)	1 3/	
	179 701.2	810 471.1	2.3	17/03/21	16:33:16	unsuitable seabed		1.34	
	179 701.2	810 471.1	11.7	17/03/21	16:33:16	Silty sand		6.93	1.44



Station	Easting (m)	Northing (m)	Distance Travelled (m)	Date (DD/MM/YY)	Time HD Video (HH:MM:SS)	Sediment Type	Conspicuous Fauna	Transect area (m²)	Medium <i>N. norvegicus</i> (3 to 15cm) Burrow Density (/m²)
	179 696.9	810 460.2		17/03/21	16:34:14		Tall seapen (<i>Funiculina quadrangularis</i>), squat lobster (<i>Munida</i> sp.) and Norway lobster (<i>Nephrops norvegicus</i>)		
	179 696.9	810 460.2	17	17/03/21	16:34:14	Not analysed for	No conspiruous found	0.00	
	179 696.9	810 458.5	1.7	17/03/21	16:34:24	unsuitable seabed	No conspicuous fauna	0.99	
	179 696.9	810 458.5	0 /	17/03/21	16:34:24	Rocky silty sand	Squat lobster (Munida sp.), fireworks anemone	4.06	0.20
	179 699.6	810 450.6	0.4	17/03/21	16:34:37	and shell fragments)	worm (Sabellidae sp.)	4.90	0.20
	179 699.6	810 450.6	2.0	17/03/21	16:34:37	Not analysed for	No conspicuous fauna	2 20	
	179 699.5	810 446.7	3.9	17/03/21	16:34:59	unsuitable seabed		2.30	
	179 699.5	810 446.7	2.7	17/03/21	16:34:59	Silty sand	Norway lobster (Nephrops norvegicus) and tall	1 97	2.14
	179 699.0	810 443.6	5.2	17/03/21	16:35:10		seapen (Funiculina quadrangularis)	1.07	2.14
	179 699.0	810 443.6	12.1	17/03/21	16:35:10	Not analysed for Nephrops due to unsuitable seabed	Tall seapen (Funiculina quadrangularis)	7 71	
	179 697.0	810 430.7	15.1	17/03/21	16:35:34			7.71	
	179 697.0	810 430.7	25.2	17/03/21	16:35:34	Silty cond	Squat lobster (<i>Munida</i> sp.), Norway lobster	14.05	1 47
	179 690.9	810 406.1	25.5	17/03/21	16:36:38	Sitty Salid	quadrangularis)	14.95	1.47
	179 690.9	810 406.1	27	17/03/21	16:36:38	Rocky silty sand	Sorpulidae tubes and squat lebster (Munida sp.)	2 20	0.45
	179 690.3	810 402.4	3.7	17/03/21	16:36:49	and shell fragments)	Serpundae tubes and squat lobster (<i>Muniau</i> sp.)	2.20	0.45
	179 690.3	810 402.4	20.4	17/03/21	16:36:49	Silty sand	Slender seapen (<i>Virgularia mirabilis</i>), Norway lobster (<i>Nephrops norvegicus</i>), Devonshire cup	12.04	1.99
	179 683.2	810 383.2	20.1	17/03/21	16:37:58	Sitty Salid	coral (Caryophyllia smithii), tall seapen (Funiculina quadrangularis) and squat lobster (Munida sp.)	12.01	1.55
	179 683.2	810 383.2		17/03/21	16:37:58	Rocky silty sand	Serpulidae tubes, squat lobster (<i>Munida</i> sp.), bryozoan turf, cushion star (<i>Porania pulvillu</i> s).		
	179 683.0	810 380.6	2.6	17/03/21	16:38:16	(frequent cobbles and shell fragments)	northern feather stars (<i>Leptometra celtica</i>), slender seapen (<i>Virgularia mirabilis</i>)	1.53	0.00
	179 683.0	810 380.6	5.4	17/03/21	16:38:16	silty sand	Squat lobster (Munida sp.) and slender seapen	3 10	1.00
	179 686.6	810 376.6	5.4	17/03/21	16:38:58	Sity Saliu	(Virgularia mirabilis)	5.15	1.00
	179 686.6	810 376.6	9.9	17/03/21	16:38:58			5.84	0.00



Station	Easting (m)	Northing (m)	Distance Travelled (m)	Date (DD/MM/YY)	Time HD Video (HH:MM:SS)	Sediment Type	Conspicuous Fauna	Transect area (m²)	Medium <i>N. norvegicus</i> (3 to 15cm) Burrow Density (/m²)
	179 688.3	810 366.8		17/03/21	16:40:07	Rocky silty sand (frequent cobbles and shell fragments)	Edible crab (Cancer pagurus), cushion star (Porania pulvillus), Northern feather star (Leptometra celtica), Serpulidae tubes, squat lobster (Munida sp.) and tall seapen (Funiculina quadrangularis)		
	179 688.3	810 366.8	45	17/03/21	16:40:07	Not analysed for Nephrops due to unsuitable seabed	Northern feather star (Leptometra celtica)	2 67	
	179 692.0	810 364.2	1.5	17/03/21	16:40:58	Rocky silty sand (frequent cobbles and shell fragments)		2.07	
	179 692.0	810 364.2		17/03/21	16:40:58	Silty sand with infrequent patches of shell fragments (Camera keeps coming off the	Northern feather star (<i>Leptometra celtica</i>), squat lobster (<i>Munida</i> sp.), slender seapen (Virgularia		
	179 703.1	810 326.0	_	17/03/21	16:56:59	pot snag which wasn't detected at this point so burrow density count suspended	mirabilis), tall seapen (Funiculina quadrangularis) and Norway lobster (Nephrops norvegicus)		
	179 818.1	810 266.0	75.4	17/03/21	10:16:12	Silty sand	Shrimp (Caridea sp.), hermit crab (Paguroidea sp.), seven-armed starfish (<i>Luidia ciliaris</i>), northern feather star (<i>Lentometra celtica</i>) tall seapen	44 46	4 14
	179 791.0	810 195.7	, 3.1	17/03/21	10:21:17	Sinty Sund	(Funiculina quadrangularis), juvenile conger eel (Conger conger) and squat lobster (Munida sp.)		
	179 791.0	810 195.7	11.3	17/03/21	10:21:17	Rocky silty sand	Squat lobsters (<i>Munida</i> sp.), Serpulidae tubes,	6 66	0.00
HT01A	179 784.4	810 186.5	11.5	17/03/21	10:22:08	and pebbles)	bryozoan turf	0.00	0.00
	179 784.4	810 186.5	36.0	17/03/21	10:22:08	Silty sand with	Squat lobsters (Munida sp.), slender seapen	21 25	1 98
	179 778.7	810 151.0	50.0	17/03/21	10:25:12	fragments	squirt (Ascidiacea sp.)	21.25	1.50
	179 778.7	810 151.0	15.3	17/03/21	10:25:12	Rocky silty sand (frequent pebbles,	Northern feather stars (<i>Leptometra celtica</i>), edible crab (<i>Cancer pagurus</i>), squat lobster (<i>Munida</i> sp.),	9.02	0.00
	179 773.6	810 136.5	15.5	17/03/21	10:26:47	cobbles and boulders)	Serpulidae tubes, cushion star (<i>Porania pulvillus</i>), common whelk eggs (Buccinum sp. eggs)	5.02	0.00



Station	Easting (m)	Northing (m)	Distance Travelled (m)	Date (DD/MM/YY)	Time HD Video (HH:MM:SS)	Sediment Type	Conspicuous Fauna	Transect area (m²)	Medium <i>N. norvegicus</i> (3 to 15cm) Burrow Density (/m ²)
	179 773.6	810 136.5		17/03/21	10:26:47		Sea squirt (<i>Ciona intestinalis</i>) Hermit crab, (Paguroidea sp.) squat lobster, (<i>Munida</i> sp.)		
	179 769.5	810 120.8	16.3	17/03/21	10:28:05	Silty sand	juvenile conger eel (<i>Conger conger</i>) and tube anemone (<i>Cerianthus lloydii</i>)	9.61	0.94
	179 769.5	810 120.8		17/03/21	10:28:05	Rocky silty sand	Squat lobsters, northern feather star (<i>Leptometra celtica</i>), Serpulidae on hard substrate, tube		
	179 769.7	810 113.3	7.4	17/03/21	10:28:35	(frequent cobbles and pebbles)	anemone (<i>Cerianthus lloydii</i>) and brittle star (Ophiuroidea sp.)	4.39	0.00
	179 392.0	810 612.8		17/03/21	08:47:14		Shrimp (Euphausiacea sp.), Norway lobster		
	179 396.2	810 625.4	13.3	17/03/21	08:47:43	Silty sand	(Nephrops norvegicus) and slender seapen (Virgularia mirabilis)	7.84	1.02
	179 396.2	810 625.4		17/03/21	08:47:43	Not analysed for			
	179 398.3	810 634.8	9.6	17/03/21	08:48:06	Nephrops due to unsuitable seabed	No conspicuous fauna	5.67	
	179 398.3	810 634.8		17/03/21	08:48:06	Ciltureand		1.00	4.50
	179 398.7	810 638.1	3.3	17/03/21	08:48:11	Silty sand	Shrimp (Euphausiacea sp.)	1.98	1.52
	179 398.7	810 638.1	6.2	17/03/21	08:48:11	Not analysed for		2.72	
	179 399.4	810 644.4	6.3	17/03/21	08:48:25	Nephrops due to unsuitable seabed	No conspicuous fauna	3./3	
(3-	179 399.4	810 644.4	47	17/03/21	08:48:25	Cilturand	Shrimen (Funkausiasaa sen)	2.76	1.01
15cm)H	179 400.3	810 649.0	4.7	17/03/21	08:48:32	Sitty Sand	Sininp (Euphausiacea sp.)	2.70	1.81
T02	179 400.3	810 649.0	10.0	17/03/21	08:48:32	Not analysed for		F 02	
	179 402.8	810 658.7	10.0	17/03/21	08:49:00	unsuitable seabed	No conspicuous fauna	5.93	
	179 402.8	810 658.7	2.0	17/03/21	08:49:00	Silty cand	Shrimp (Euphousiacoo sp.)	2 20	2.17
	179 403.1	810 662.6	5.9	17/03/21	08:49:10	Sitty Salid	Sinnip (Euphausiacea sp.)	2.50	2.17
	179 403.1	810 662.6	17	17/03/21	08:49:10	Not analysed for	No conspicuous fauna	1.01	
	179 402.8	810 664.3	1.7	17/03/21	08:49:17	unsuitable seabed		1.01	
	179 402.8	810 664.3	3.2	17/03/21	08:49:17	Siltycond	Shrimp (Euphousiacoo sp.)	1 97	1.61
	179 402.8	810 667.4	5.2	17/03/21	08:49:30	Sitty Saliu	אין	1.07	1.01
	179 402.8	810 667.4	2.1	17/03/21	08:49:30		No conspicuous fauna	1.21	



Station	Easting (m)	Northing (m)	Distance Travelled (m)	Date (DD/MM/YY)	Time HD Video (HH:MM:SS)	Sediment Type	Conspicuous Fauna	Transect area (m²)	Medium <i>N. norvegicus</i> (3 to 15cm) Burrow Density (/m ²)
	179 403.1	810 669.5		17/03/21	08:49:38	Not analysed for <i>Nephrops</i> due to unsuitable seabed			
	179 403.1	810 669.5	2.0	17/03/21	08:49:38	Cilturand	Chrimp (Fundausiassa sp.)	1.60	1 22
	179 402.3	810 672.1	2.8	17/03/21	08:49:52	Silty Sand	Sinnip (Euphausiacea sp.)	1.02	1.23
	179 402.3	810 672.1	ГЭ	17/03/21	08:49:52	Not analysed for		2.00	
	179 400.6	810 677.0	5.2	17/03/21	08:50:25	unsuitable seabed	No conspicuous fauna	3.09	
	179 400.6	810 677.0	2.6	17/03/21	08:50:25	Cilture	Christen (Europeusianes en)	2.11	2.27
	179 400.2	810 680.6	3.6	17/03/21	08:50:38	Sity sand	Shrimp (Euphausiacea sp.)	2.11	2.37
	179 400.2	810 680.6	2.0	17/03/21	08:50:38	Not analysed for		2.11	
	179 399.7	810 684.2	3.0	17/03/21	08:50:52	unsuitable seabed	No conspicuous fauna	2.11	
	179 399.7	810 684.2	5.0	17/03/21	08:50:52	Cilture	Christen (Europeusianes en)	2.07	1.60
	179 399.6	810 689.2	5.0	17/03/21	08:51:07	Sity sand	Shrimp (Euphausiacea sp.)	2.97	1.69
	179 399.6	810 689.2	9.6	17/03/21	08:51:07	Not analysed for	Norway lobster (Nephrops norvegicus) and slender	F 09	
	179 397.9	810 697.6	0.0	17/03/21	08:51:54	unsuitable seabed	seapen (Virgularia mirabilis)	5.08	
	179 397.9	810 697.6	4.6	17/03/21	08:51:54	Cilturand	Shrimp (Euphausiacea sp.), Gadidae sp. and	2.74	11.69
	179 398.1	810 702.3	4.0	17/03/21	08:52:19	Sitty Sand	slender seapen (Virgularia mirabilis)	2.74	11.08
	179 398.1	810 702.3	1 5	17/03/21	08:52:19	Not analysed for	No conspiruous fauna	0.80	
	179 397.9	810 703.8	1.5	17/03/21	08:52:46	unsuitable seabed		0.85	
	179 397.9	810 703.8	0.6	17/03/21	08:52:46	Silty cond	Shrimp (Euphousiagoo on)	0.22	8 <u>0</u> 8
	179 398.0	810 704.3	0.0	17/03/21	08:52:51	Sitty Salid	Sinnip (Euphausiacea sp.)	0.55	8.98
	179 398.0	810 704.3	17	17/03/21	08:52:51	Not analysed for	Tall coopen (Eurisuling guadrangularis)	0.00	
	179 398.3	810 706.0	1.7	17/03/21	08:52:59	unsuitable seabed	ran seapen (runncunna quaarangulans)	0.33	
	179 398.3	810 706.0	25	17/03/21	08:52:59	Silty sand	Shrimp (Euphausiacoa sp.)	2.08	2.16
	179 398.3	810 709.5	5.5	17/03/21	08:53:09		Sinnip (cupilausiacea sp.)	2.08	2.10
	179 398.3	810 709.5	2.6	17/03/21	08:53:09		Tall seapen (Funiculina quadrangularis)	1.53	



Station	Easting (m)	Northing (m)	Distance Travelled (m)	Date (DD/MM/YY)	Time HD Video (HH:MM:SS)	Sediment Type	Conspicuous Fauna	Transect area (m²)	Medium <i>N. norvegicus</i> (3 to 15cm) Burrow Density (/m ²)
	179 398.3	810 712.1		17/03/21	08:53:16	Not analysed for <i>Nephrops</i> due to unsuitable seabed			
	179 398.3	810 712.1	26	17/03/21	08:53:16	Silty cond	Norway lobster (Nephrops norvegicus) and shrimp	1 5 2	2.20
	179 398.4	810 714.7	2.0	17/03/21	08:53:20	Silty Saliu	(Euphausiacea sp.)	1.55	2.28
	179 398.4	810 714.7	2.0	17/03/21	08:53:20	Not analysed for	No constitueus found	1 75	
	179 398.7	810 717.7	5.0	17/03/21	08:53:28	unsuitable seabed		1.75	
	179 398.7	810 717.7	1 Г	17/03/21	08:53:28	Cilturand	Chrimp (Funkausiagaa en)	0.80	6.71
	179 399.1	810 719.1	1.5	17/03/21	08:53:32	Silty Saliu	Smmp (Euphausiacea sp.)	0.89	0.71
	179 399.1	810 719.1	C A	17/03/21	08:53:32	Not analysed for	Toll cooper (Funiculing guadrangularis)	רד כ	
	179 400.4	810 725.4	0.4	17/03/21	08:53:49	unsuitable seabed	ran seapen (<i>rumcuma quadrangularis</i>)	3.77	
	179 400.4	810 725.4	2.2	17/03/21	08:53:49	Cilture and		1.20	1 57
	179 401.2	810 727.4	2.2	17/03/21	08:53:55	Silty sand	No conspicuous rauna	1.28	1.57
	179 401.2	810 727.4	25	17/03/21	08:53:55	Not analysed for		2.09	
	179 402.5	810 730.7	3.5	17/03/21	08:54:07	unsuitable seabed	No conspicuous fauna	2.08	
	179 402.5	810 730.7	2.2	17/03/21	08:54:07	Cilturand	Norway labetar (Norbrane paryorisus)	1 07	1.60
	179 403.8	810 733.6	3.2	17/03/21	08:54:15	Silty Saliu	Norway lobster (wephrops horvegicus)	1.87	1.00
	179 403.8	810 733.6	17	17/03/21	08:54:15	Not analysed for	No conspiruous fauna	0.00	
	179 404.1	810 735.2	1.7	17/03/21	08:54:25	unsuitable seabed		0.99	
	179 404.1	810 735.2	2.4	17/03/21	08:54:25	Silty cond	Shrimp (Europausiasaa so)	1 0.9	1.01
	179 404.6	810 738.6	5.4	17/03/21	08:54:37	Silty Saliu	Smmp (Euphausiacea sp.)	1.98	1.01
	179 404.6	810 738.6	0.7	17/03/21	08:54:37	Not analysed for	No conspiruous fauna	0.44	
	179 404.7	810 739.3	0.7	17/03/21	08:54:44	unsuitable seabed		0.44	
	179 404.7	810 739.3	1.0	17/03/21	08:54:44	Silty cond	Shrimp (Europausiasaa so)	0.60	10.05
	179 405.2	810 740.2	1.0	17/03/21	08:54:48	Siity sand	Shrimp (Euphausiacea sp.)	0.60	10.05
	179 405.2	810 740.2	2.0	17/03/21	08:54:48		No conspicuous fauna	1.19	



Station	Easting (m)	Northing (m)	Distance Travelled (m)	Date (DD/MM/YY)	Time HD Video (HH:MM:SS)	Sediment Type	Conspicuous Fauna	Transect area (m²)	Medium <i>N. norvegicus</i> (3 to 15cm) Burrow Density (/m ²)
	179 406.1	810 742.0		17/03/21	08:54:57	Not analysed for <i>Nephrops</i> due to unsuitable seabed			
	179 406.1	810 742.0	2 5	17/03/21	08:54:57	Silty cond	Shrimp (Euphyusiassa sp.)	2.05	1 46
	179 408.0	810 744.9	5.5	17/03/21	08:55:10	Sitty Saliu	Simility (Eupitausiacea sp.)	2.05	1.40
	179 408.0	810 744.9	10.2	17/03/21	08:55:10	Not analysed for	No conspicuous fauna	6.06	
	179 411.5	810 754.5	10.3	17/03/21	08:55:44	unsuitable seabed	No conspicuous rauna	0.00	
	179 411.5	810 754.5	1.0	17/03/21	08:55:44	Cilturand	Shrima (Fundausiasaa sa)	1 10	0.01
	179 411.5	810 756.4	1.9	17/03/21	08:55:52	Sitty sand	Shrimp (Euphausiacea sp.)	1.10	0.91
	179 411.5	810 756.4	2.4	17/03/21	08:55:52	Not analysed for		1.42	
	179 411.4	810 758.8	2.4	17/03/21	08:56:08	unsuitable seabed	No conspicuous fauna	1.43	
	179 411.4	810 758.8	1.0	17/03/21	08:56:08	Cilture		0.05	2.11
	179 410.9	810 760.3	1.6	17/03/21	08:56:18	Slity sand	Shrimp (Euphausiacea sp.)	0.95	2.11
	179 410.9	810 760.3	сг	17/03/21	08:56:18	Not analysed for		2.92	
	179 407.9	810 766.1	0.5	17/03/21	08:56:47	unsuitable seabed	No conspicuous fauna	3.83	
	179 407.9	810 766.1	2.0	17/03/21	08:56:47	Cilture		1.67	1.00
	179 406.9	810 768.7	2.8	17/03/21	08:56:53	Sitty Sand	Similip (Euphausiacea sp.)	1.07	1.80
	179 406.9	810 768.7	4.0	17/03/21	08:56:53	Not analysed for		2.25	
	179 406.3	810 772.7	4.0	17/03/21	08:57:14	unsuitable seabed	No conspicuous rauna	2.55	
	179 406.3	810 772.7		17/03/21	08:57:14	Cilturand	Shrima (Fundausiasaa sa)	1.07	1 5 2
	179 406.4	810 776.0	3.5	17/03/21	08:57:26	Sitty Sand	Similip (Euphausiacea sp.)	1.97	1.52
	179 406.4	810 776.0	4.6	17/03/21	08:57:26	Not analysed for		2.74	
	179 406.8	810 780.6	4.0	17/03/21	08:57:50	unsuitable seabed	No conspicuous rauna	2.74	
	179 406.8	810 780.6	1 5	17/03/21	08:57:50	Ciltar and	Chrimp (Funk-susiana ar)	0.00	2.05
	179 406.9	810 782.1	1.5	17/03/21	08:57:59	Slity sand	Snrimp (Euphausiacea sp.)	0.88	2.85
	179 406.9	810 782.1	5.4	17/03/21	08:57:59		No conspicuous fauna	3.16	



Station	Easting (m)	Northing (m)	Distance Travelled (m)	Date (DD/MM/YY)	Time HD Video (HH:MM:SS)	Sediment Type	Conspicuous Fauna	Transect area (m²)	Medium <i>N. norvegicus</i> (3 to 15cm) Burrow Density (/m ²)
	179 404.8	810 787.1		17/03/21	08:58:30	Not analysed for <i>Nephrops</i> due to unsuitable seabed			
	179 404.8	810 787.1	4 7	17/03/21	08:58:30	Cilturand	Shrima (Fundausiasaa sa)	2.76	1.00
	179 403.7	810 791.6	4.7	17/03/21	08:58:37	Silly Sanu	Similip (Euphausiacea sp.)	2.70	1.09
	179 403.7	810 791.6	16.2	17/03/21	08:58:37	Not analysed for	No conspicuous fauna	0.64	
	179 404.1	810 807.9	10.5	17/03/21	08:59:30	unsuitable seabed	No conspicuous rauna	9.04	
	179 404.1	810 807.9	26	17/03/21	08:59:30	Cilturand	Shrima (Fundausiasaa sa)	1 5 2	1.06
	179 404.3	810 810.5	2.0	17/03/21	08:59:37	Sitty sand	Similip (Euphausiacea sp.)	1.55	1.96
	179 404.3	810 810.5	8.0	17/03/21	08:59:37	Not analysed for	No concriguous found	4 72	
	179 404.0	810 818.5	8.0	17/03/21	09:00:13	unsuitable seabed	No conspicuous rauna	4.75	
	179 404.0	810 818.5	4.0	17/03/21	09:00:13	Cilturand	Shrima (Fundauciacoa ca.)	2.25	0.95
	179 403.4	810 822.5	4.0	17/03/21	09:00:35	Sitty sand	Similip (Euphausiacea sp.)	2.35	0.85
	179 403.4	810 822.5	2.0	17/03/21	09:00:35	Not analysed for	Tall coapon (Euriquing quadrangularic)	1 70	
	179 404.1	810 825.4	5.0	17/03/21	09:00:55	unsuitable seabed	Tan seapen (Funiculnu quuurunguuns)	1.70	
	179 404.1	810 825.4	25	17/03/21	09:00:55	Cilturand	Shrima (Fundausiasaa sa)	1 47	1.26
	179 402.8	810 827.5	2.5	17/03/21	09:01:20	Sitty sand	Similip (Euphausiacea sp.)	1.47	1.30
	179 402.8	810 827.5	1.0	17/03/21	09:01:20	Not analysed for	No conspicuous fauna	0.59	
	179 401.9	810 827.9	1.0	17/03/21	09:01:36	unsuitable seabed		0.58	
	179 401.9	810 827.9	2.1	17/03/21	09:01:36	Cilturand	Shrima (Fundausiasaa sa)	1.25	0.80
	179 400.7	810 829.7	2.1	17/03/21	09:01:43	Sitty sand	Similip (Euphausiacea sp.)	1.25	0.80
	179 400.7	810 829.7	2 7	17/03/21	09:01:43	Not analysed for	No concriguous found	1 50	
	179 399.3	810 832.0	2.7	17/03/21	09:01:54	unsuitable seabed		1.59	
	179 399.3	810 832.0	0.9	17/03/21	09:01:54	Silty cond	Shrimp (Euphousiages on)	0.50	4.01
	179 398.9	810 832.7	0.8	17/03/21	09:01:57	Siity sand	Snrimp (Euphausiacea sp.)	0.50	4.01
	179 398.9	810 832.7	5.4	17/03/21	09:01:57		Tall seapen (Funiculina quadrangularis)	3.19	



Station	Easting (m)	Northing (m)	Distance Travelled (m)	Date (DD/MM/YY)	Time HD Video (HH:MM:SS)	Sediment Type	Conspicuous Fauna	Transect area (m²)	Medium <i>N. norvegicus</i> (3 to 15cm) Burrow Density (/m ²)
	179 396.7	810 837.7		17/03/21	09:02:19	Not analysed for <i>Nephrops</i> due to unsuitable seabed			
	179 396.7	810 837.7		17/03/21	09:02:19	Cilturand	Chrimp (Fundausiassa sp.)	2.60	0.00
	179 395.9	810 842.0	4.4	17/03/21	09:02:33	Sitty Sanu	Sinnip (Euphausiacea sp.)	2.60	0.00
	179 395.9	810 842.0	2 7	17/03/21	09:02:33	Not analysed for		2 10	
	179 396.1	810 845.7	5.7	17/03/21	09:02:52	unsuitable seabed		2.19	
	179 396.1	810 845.7	2.0	17/03/21	09:02:52	Cilturand	Shrima (Funkausiagaa sa)	1 70	0.56
	179 396.7	810 848.7	3.0	17/03/21	09:03:02	Sitty Sanu	Sinnip (Euphausiacea sp.)	1.78	0.50
	179 396.7	810 848.7	2.2	17/03/21	09:03:02	Not analysed for		1 22	
	179 395.9	810 850.7	2.2	17/03/21	09:03:19	unsuitable seabed	No conspicuous rauna	1.32	
	179 395.9	810 850.7	1.4	17/03/21	09:03:19	Cilture	Tall seapen (Funiculina quadrangularis), hermit	0.05	1 17
	179 394.9	810 851.7	1.4	17/03/21	09:03:27	Sitty sand	sp.)	0.85	1.17
	179 394.9	810 851.7		17/03/21	09:03:27	Not analysed for		2 5 7	
	179 393.6	810 855.9	4.4	17/03/21	09:03:47	unsuitable seabed	No conspicuous rauna	2.57	
	179 393.6	810 855.9	4.0	17/03/21	09:03:47	Cilturand	Anemone (Actiniaria sp.) and shrimp	2.96	0.25
	179 393.3	810 860.7	4.9	17/03/21	09:04:08	Sitty Sanu	(Euphausiacea sp.)	2.80	0.35
	179 393.3	810 860.7	27.0	17/03/21	09:04:08	Not analysed for	Tall cooper (Eurisuling guadrangularis)	15.05	
	179 397.2	810 887.5	27.0	17/03/21	09:05:28	unsuitable seabed	Tali seapen (Funiculna quadrangularis)	15.95	
	179 397.2	810 887.5	2.2	17/03/21	09:05:28	Cilturand		1.06	1.52
	179 398.4	810 890.6	3.3	17/03/21	09:05:36	Sitty Sanu	No conspicuous fauna	1.90	1.55
	179 398.4	810 890.6	26	17/03/21	09:05:36	Not analysed for	Tall seapen (Funiculina quadrangularis) and shrimp	2.10	
	179 399.8	810 893.9	5.0	17/03/21	09:05:49	unsuitable seabed	(Euphausiacea sp.)	2.10	
	179 399.8	810 893.9	1.9	17/03/21	09:05:49	Silty cand	Fireworks anemone (Pachycerianthus	2 02	0.71
	179 401.7	810 898.2	4.8	17/03/21	09:06:08	Siity sand	multiplicatus) and shrimp (Euphausiacea sp.)	2.82	0.71
	179 401.7	810 898.2	8.8	17/03/21	09:06:08		No conspicuous fauna	5.18	



Station	Easting (m)	Northing (m)	Distance Travelled (m)	Date (DD/MM/YY)	Time HD Video (HH:MM:SS)	Sediment Type	Conspicuous Fauna	Transect area (m²)	Medium <i>N. norvegicus</i> (3 to 15cm) Burrow Density (/m ²)
	179 406.2	810 905.8		17/03/21	09:06:44	Not analysed for <i>Nephrops</i> due to unsuitable seabed			
	179 406.2	810 905.8	1 1	17/03/21	09:06:44	Ciltureand	No concriguous found	0.62	0.63
	179 406.7	810 906.7	1.1	17/03/21	09:06:48	Silty Saliu	No conspicuous fauna	0.62	9.03
	179 406.7	810 906.7	10.4	17/03/21	09:06:48	Not analysed for		11.47	
	179 414.5	810 924.5	19.4	17/03/21	09:07:14	unsuitable seabed	No conspicuous fauna	11.47	
	179 414.5	810 924.5	11.7	17/03/21	09:07:14	Silty sand	Tube anemone (<i>Cerianthus lloydii</i>), cushion star (<i>Porania pulvillus</i>), slender seapen (<i>Virgularia</i>	6.90	6.23
	179 415.1	810 936.2		17/03/21	09:08:16	,	<i>mirabilis</i>), anemone (Actiniaria sp.) and shrimp (Caridea sp.)		
	179 415.1	810 936.2	2.0	17/03/21	09:08:16	Not analysed for Nephrops due to unsuitable seabed		4.70	
	179 415.5	810 939.1	3.0	17/03/21	09:08:27		No conspicuous fauna	1.76	
	179 415.5	810 939.1	12.1	17/03/21	09:08:27	Silty sand with a	Fireworks anemone (Pachycerianthus multiplicatus), tube anemone (Cerianthus lloydii), slender seapen (Virgularia mirabilis), tall seapen	7 1 2	4.07
	179 416.6	810 951.2	12.1	17/03/21	09:09:44	single cobble	(Funiculina quadrangularis), feather duster worm (Sabellidae sp.), Serpulidae tubes and bryozoan turf	7.12	4.07
	179 416.6	810 951.2	0.0	17/03/21	09:09:44	Not analysed for	Fireworks anemone (Pachycerianthus	F 20	
	179 414.9	810 960.0	9.0	17/03/21	09:10:20	unsuitable seabed	multiplicatus)	5.50	
	179 414.9	810 960.0	6.1	17/03/21	09:10:20	Cilture and	Tube anemone (Cerianthus lloydii) and shrimp	2.62	1.02
	179 415.6	810 966.1	6.1	17/03/21	09:10:43	Silty sand	(Caridea sp.)	3.62	1.93
	179 415.6	810 966.1	10.1	17/03/21	09:10:43	Not analysed for	Tell concer (Curiculian curdumentaria)	F 07	
	179 414.9	810 976.2	10.1	17/03/21	09:11:13	unsuitable seabed	ran seapen (<i>rumcuma quadrangularis</i>)	5.97	
	179 414.9	810 976.2	2.8	17/03/21	09:11:13	Cilturand		1.67	0.60
	179 414.5	810 979.0	2.8	17/03/21	09:11:19	Siity sand	No conspicuous rauna	1.67	0.60
	179 414.5	810 979.0	4.0	17/03/21	09:11:19	Not analysed for		2.00	
	179 414.4	810 983.8	4.8	17/03/21	09:11:35	unsuitable seabed	No conspicuous rauna	2.80	



Station	Easting (m)	Northing (m)	Distance Travelled (m)	Date (DD/MM/YY)	Time HD Video (HH:MM:SS)	Sediment Type	Conspicuous Fauna	Transect area (m²)	Medium <i>N. norvegicus</i> (3 to 15cm) Burrow Density (/m ²)
	179 414.4	810 983.8	44.6	17/03/21	09:11:35	Silty sand	Shrimp (Caridea sp.), fireworks anemone (Pachycerianthus multiplicatus), Gadidae sp., Tall seapen (Funiculina quadrangularis), slender	26.32	2.13
	179 414.5	811 028.4	-	17/03/21	09:14:07		seapen (Virgularia mirabilis), feather duster worm (Sabellidae sp.) and tube anemone (Cerianthus Iloydii)		
	179 414.5	811 028.4	2.7	17/03/21	09:14:07	Not analysed for		1 50	
	179 415.4	811 031.0	2.7	17/03/21	09:14:20	unsuitable seabed	Tall seapen (Funiculina quadrangularis)	1.59	
	179 415.4	811 031.0	102.5	17/03/21	09:14:20	Silty sand	Tall seapen (Funiculina quadrangularis), tube anemone (Cerianthus Iloydii), shrimp (Caridea sp.), fireworks anemone (Pachycerianthus	60.50	2.62
	179 430.2	811 132.4		17/03/21	09:20:43		multiplicatus), brittle star (Ophiuroidea sp.) and Gadidae sp.		
	179 430.2	811 132.4	69	17/03/21	09:20:43	Not analysed for	Fireworks anemone (Pachycerianthus	4.05	
	179 427.1	811 138.5	0.9	17/03/21	09:21:08	unsuitable seabed	multiplicatus)	4.05	
	179 427.1	811 138.5	16.7	17/03/21	09:21:08	Silty cond	Tall seapen (Funiculina quadrangularis) and shrimp	0.85	2.22
	179 424.6	811 155.0	10.7	17/03/21	09:21:52	Silty sand	(Caridea sp.)	9.65	2.25
	179 424.6	811 155.0	12.0	17/03/21	09:21:52	Not analysed for	No conspicuous fauna	7 5 9	
	179 426.1	811 167.8	12.8	17/03/21	09:22:33	unsuitable seabed		7.58	
	179 426.1	811 167.8	0.7	17/03/21	09:22:33	Silty sand	No conspicuous fauna	0.44	2.26
	179 426.3	811 168.5	0.7	17/03/21	09:22:34	Sitty Salid		0.44	2.20
	179 426.3	811 168.5	36.0	17/03/21	09:22:34	Not analysed for	Tall seapon (Funiculing guadrangularis)	21 23	
	179 433.1	811 203.8	50.0	17/03/21	09:23:52	unsuitable seabed		21.25	
	179 433.1	811 203.8		17/03/21	09:23:52		Tall seapen (<i>Funiculina quadrangularis</i>), thornback		
	179 443.0	811 289.8	86.5	17/03/21	09:30:11	Silty sand	(Paguroidea sp.) and tube anemone (<i>Cerianthus</i> <i>Iloydii</i>)	51.03	3.86
	179 443.0	811 289.8	27	17/03/21	09:30:11	Not analysed for	No conspicuous fauna	1 61	
	179 441.1	811 287.8	2.7	17/03/21	09:30:32	unsuitable seabed		1.01	
	179 441.1	811 287.8	0.4	17/03/21	09:30:32	Silty sand	Tube anemone (<i>Cerianthus lloydii</i>)	0.25	8.01



Station	Easting (m)	Northing (m)	Distance Travelled (m)	Date (DD/MM/YY)	Time HD Video (HH:MM:SS)	Sediment Type	Conspicuous Fauna	Transect area (m²)	Medium <i>N. norvegicus</i> (3 to 15cm) Burrow Density (/m²)
	179 440.8	811 287.5		17/03/21	09:30:40				
	179 440.8	811 287.5	0.7	17/03/21	09:30:40	Not analysed for			
	179 440.9	811 286.7	0.7	17/03/21	09:30:56	unsuitable seabed	No conspicuous fauna	0.44	
	179 440.9	811 286.7		17/03/21	09:30:56			0.40	0.01
	179 441.0	811 286.5	0.2	17/03/21	09:30:58	Silty sand	No conspicuous fauna	0.12	8.01
	179 441.0	811 286.5	4.5	17/03/21	09:30:58	Not analysed for		0.00	
	179 442.5	811 286.5	1.5	17/03/21	09:31:20	unsuitable seabed	Shrimp (Caridea sp.)	0.89	
	179 442.5	811 286.5		17/03/21	09:31:20		Shrimp (Caridea sp.), shrimp (Euphausiacea sp.)		0.00
	179 444.2	811 287.5	2.0	17/03/21	09:31:41	Silty sand	and Norway lobster (Nephrops norvegicus)	1.16	0.00
	179 444.2	811 287.5	24.0	17/03/21	09:31:41	Not analysed for		42.20	
	179 444.8	811 308.5	21.0	17/03/21	09:32:51	unsuitable seabed	Shrimp (Euphausiacea sp.)	12.38	
	179 444.8	811 308.5	0.7	17/03/21	09:32:51	Cilture and		0.44	0.00
	179 444.9	811 309.2	0.7	17/03/21	09:32:53	Sitty sand	No conspicuous fauna	0.44	0.00
	179 444.9	811 309.2	25.2	17/03/21	09:32:53	Not analysed for		1100	
	179 446.3	811 334.4	25.2	17/03/21	09:33:55	unsuitable seabed	Shrimp (Euphausiacea sp.)	14.90	
	179 446.3	811 334.4	2.4	17/03/21	09:33:55	C'h an d		2.02	2.00
	179 447.2	811 337.7	3.4	17/03/21	09:34:03	Slity sand	Shrimp (Euphausiacea sp.)	2.02	2.98
	179 447.2	811 337.7	F 7	17/03/21	09:34:03	Not analysed for		2.22	
	179 449.2	811 343.0	5.7	17/03/21	09:34:20	unsuitable seabed	No conspicuous fauna	3.33	
	179 449.2	811 343.0	13.6	17/03/21	09:34:20	Silty sand	Shrimp (Caridea sp.), slender seapen (Virgularia mirabilis), tube anemone (Cerianthus lloydii),	8 01	5 12
	179 453.8	811 355.7	13.0	17/03/21	09:35:09	Sity Sund	shrimp (Euphausiacea sp.) and Norway lobster (Nephrops norvegicus)	0.01	5.12
нтоз	182 293.0	808 947.3	6.0	17/03/21	12:57:36	Shelly gravelly sand	Tube anemone (Cerianthus lloydii), squat lobster	3.52	0.00
11105	182 298.9	808 946.8	0.0	17/03/21	12:57:54	(sloped bed)	(Munida sp.) and sea squirt (Ciona intestinalis)	5.52	0.00



Station	Easting (m)	Northing (m)	Distance Travelled (m)	Date (DD/MM/YY)	Time HD Video (HH:MM:SS)	Sediment Type	Conspicuous Fauna	Transect area (m²)	Medium <i>N. norvegicus</i> (3 to 15cm) Burrow Density (/m ²)
	182 298.9	808 946.8	17.8	17/03/21	12:57:54	Not analysed for Nephrops due to	No conspicuous fauna	10 51	
	182 315.9	808 952.2	17.5	17/03/21	12:58:52	(Lost sight of seabed due to slope)		10.51	
	182 315.9	808 952.2	6.0	17/03/21	12:58:52	Shelly gravelly sand	Serpulidae tubes and tube anemone (Cerianthus	2 5 5	0.00
	182 321.6	808 954.0	0.0	17/03/21	12:59:01	(sloped bed)	lloydii)	5.55	0.00
	182 321.6	808 954.0	79	17/03/21	12:59:01	Not analysed for Nephrops due to	No conspicuous fauna	4 66	
	182 329.3	808 955.8	7.5	17/03/21	12:59:26	(lost sight of seabed due to slope)		4.00	
	182 329.3	808 955.8	17.0	17/03/21	12:59:26	Shelly gravelly sand (sloped bed) Not analysed for <i>Nephrops</i> due to unsuitable seabed (Lost sight of seabed due to slope)	Tube anemone (Cerianthus Iloydii) and squat	10.57	0.00
	182 347.1	808 958.4	17.5	17/03/21	12:59:39		lobster (<i>Munida</i> sp.)	10.57	0.00
	182 347.1	808 958.4	7.0	17/03/21	12:59:39		No conspicuous fauna	1 13	
	182 354.1	808 958.8	7.0	17/03/21	12:59:59		No conspicuous fauna	4.15	
	182 354.1	808 958.8		17/03/21	12:59:59	Rocky shelly gravelly			
	182 407.6	808 959.7	53.5	17/03/21	13:02:30	cobbles and pebbles (sloped bed) (camera dragged up slope causing it dig and drag backwards)	Serpulidae tubes, tube anemone (<i>Cerianthus lloydii)</i> and squat lobster (<i>Munida</i> sp.)	31.59	0.00
	182 407.6	808 959.7	76.3	17/03/21	13:02:30	Bedrock (boulders forming a steep cliff face) covered in	Bryozoan turf, Serpulidae tubes, Devonshire cup corals (<i>Caryophyllia smithii</i>), coralline algae, sea squirt (Ascidiacea sp.), cushion star (<i>Porania</i> <i>pulvillus</i>), northern feather star (<i>Leptometra</i>	45.04	0.00
	182 483.2	808 949.0	, 0.5	17/03/21	13:06:15	shelly gravelly sand and encrusting species	celtica), common sea urchin (Echinus esculentus), spiny starfish (Marthasterias glacialis), Starfish (Asteroidea sp.) and Sponge (Phakellia ventilabrum)	-5.04	0.00



Station	Easting (m)	Northing (m)	Distance Travelled (m)	Date (DD/MM/YY)	Time HD Video (HH:MM:SS)	Sediment Type	Conspicuous Fauna	Transect area (m²)	Medium <i>N. norvegicus</i> (3 to 15cm) Burrow Density (/m ²)	
	182 483.2	808 949.0	21.4	17/03/21	13:06:15	Rocky shelly gravelly sand with frequent	Serpulidae tubes and Tube anemone (Cerianthus	12.61	0.00	
	182 501.4	808 937.8		17/03/21	13:07:25	cobbles and pebbles (sloped bed)	lloydii)			
	182 442.9	808 972.7	0.7	17/03/21	14:10:09	Bedrock covered by	Sponge (<i>Phakellia ventilabrum</i>), Northern feather star (<i>Leptometra celtica</i>), Devonshire cup coral	F 70	0.00	
	182 433.2	808 973.6	9.7	17/03/21	14:11:36	(cliff face)	(Caryophyllia smithii), sea squirts (Ascidiacea sp.), Serpulidae tubes, starfish (Asteroidea sp.)	5.72	0.00	
	182 433.2	808 973.6	75	17/03/21	14:11:36	Not analysed for <i>Nephrops</i> due to unsuitable seabed	No conspicuous fauna	4.40		
	182 427.1	808 977.8	7.5	17/03/21	14:12:29	(lost sight of seabed due to steep drop off)		4.40		
	182 427.1	808 977.8	5.0	17/03/21	14:12:29	Rocky shelly gravelly				
НТОЗА	182 422.2	808 978.8		5.0	5.0	17/03/21	14:13:00	cobbles) with reduced abundance of shell fragments at base of the steep cliff form a gradual slope	Bryozoan turf, Devonshire cup coral skeletons (<i>Caryophyllia smithii</i>) and sea squirts (Ascidiacea sp.)	2.95
	182 422.2	808 978.8	1.0	17/03/21	14:13:00	Not analysed for Nephrops due to unsuitable seabed	N			
	182 420.2	808 978.7	1.9	17/03/21	14:13:15	(lost sight of seabed due to steep drop off)	No conspicuous tauna	1.14		
	182 420.2	808 978.7	27.7	17/03/21	14:13:15	Rocky shelly gravelly sand (frequent pebbles and	Squat lobster (Munida sp.), Serpulidae tubes and	16.33	0.00	
	182 393.1	808 973.1		17/03/21	14:15:19	cobbles) forms a gradual slope.	tube anemone (<i>Cerianthus lloydii</i>)			
	182 393.1	808 973.1	167.0	17/03/21	14:15:19	Shelly gravelly sand with less frequent	Tube anemone (<i>Cerianthus lloydii</i>), squat lobster (<i>Munida</i> sp.), Serpulidae tubes, Gadidae sp.,	00.05	0.00	
	182 226.9	808 996.7	107.9	17/03/21	14:27:31	pebbles that form a gradual slope	starfish (Asteroidea sp.) and grey gurnard (Eutrigla gurnardus)	99.05	0.00	



Station	Easting (m)	Northing (m)	Distance Travelled (m)	Date (DD/MM/YY)	Time HD Video (HH:MM:SS)	Sediment Type	Conspicuous Fauna	Transect area (m²)	Medium <i>N. norvegicus</i> (3 to 15cm) Burrow Density (/m²)
	182 352.5	808 963.7	22	17/03/21	13:28:22	Sholly gravely sand	Tube anemone (Cerianthus lloydii) and squat	1 26	0.00
	182 352.0	808 965.9	2.5	17/03/21	13:28:35	Sheny graveny sand	lobster (<i>Munida</i> sp.),	1.50	0.00
	182 352.0	808 965.9	8.0	17/03/21	13:28:35	Not analysed for		4 72	
	182 350.6	808 973.8		17/03/21	13:29:15	unsuitable seabed		4.72	
	182 350.6	808 973.8	2.1	17/03/21	13:29:15	shally grouply cond	Squat lobster (<i>Munida</i> sp.), anemone (Actiniaria	1.05	0.54
	182 349.7	808 976.8	5.1	17/03/21	13:29:36	shelly gravelly salid	sp.) and sea squirt (Ascidiacea sp.)	1.85	0.54
	182 349.7	808 976.8	3.2	17/03/21	13:29:36	Not analysed for Nephrops due to unsuitable seabed	No conspicuous fauna	1.00	
	182 348.7	808 979.9		17/03/21	13:29:59			1.89	
HT04	182 348.7	808 979.9	12.4	17/03/21	13:29:59	- Shelly silty sand	Gadidae sp., squat lobster (<i>Munida</i> sp.), tube anemone (<i>Cerianthus lloydii</i>)	7.00	0.14
	182 338.2	808 986.6		17/03/21	13:31:29			7.33	0.14
	182 338.2	808 986.6	EG	17/03/21	13:31:29	Not analysed for		2.24	
	182 337.9	808 992.2	5.6	17/03/21	13:31:49	unsuitable seabed	No conspicuous fauna	3.31	
	182 337.9	808 992.2	11.4	17/03/21	13:31:49	- Shelly silty sand	Squat lobster (Munida sp.) and tube anemone	6 70	0.00
	182 341.5	809 002.9		17/03/21	13:32:38		(Cerianthus lloydii)	6.70	0.00
	182 341.5	809 002.9	3.7	17/03/21	13:32:38	Not analysed for	No conspicuous fauna	2.40	
	182 343.3	809 006.2		17/03/21	13:32:55	unsuitable seabed		2.19	
	182 343.3	809 006.2	20.4	17/03/21	13:32:55	Silty sand with	Squat lobster (<i>Munida</i> sp.), Gadidae sp., slender seapen (<i>Virgularia mirabilis</i>), common sea urchin (<i>Echinus esculentus</i>) and tube anemone (<i>Cerianthus lloydii</i>)	22.25	0.26
	182 349.6	809 045.1	39.4	17/03/21	13:35:45	of shell debris		25.25	0.20
	182 349.6	809 045.1	3.4	17/03/21	13:35:45	Rocky silty sand (frequent cobbles)	Slender seapen (<i>Virgularia mirabilis</i>) and bryozoan turf,	1.00	0.00
	182 351.0	809 048.2		17/03/21	13:35:58			1.99	0.00
	182 351.0	809 048.2	15.8	17/03/21	13:35:58	Silty sand with reduced abundance of shell debris	Bryozoan turf, squat lobster (Munida sp.), tube anemone (Cerianthus Iloydii), slender seapen (Virgularia mirabilis), sea squirt (Ascidiacea sp.) and Norway lobster (Nephrops norvegicus)	9 32	1.07
	182 352.6	809 063.9	12.9	17/03/21	13:37:09			5.52	1.07



Station	Easting (m)	Northing (m)	Distance Travelled (m)	Date (DD/MM/YY)	Time HD Video (HH:MM:SS)	Sediment Type	Conspicuous Fauna	Transect area (m²)	Medium <i>N. norvegicus</i> (3 to 15cm) Burrow Density (/m ²)
	182 352.6	809 063.9	61.6	17/03/21	13:37:09	Bedrock covered in silty sand	Sea squirt (Ascidiacea sp.), bryozoan turf, Gadidae sp., squat lobster (<i>Munida</i> sp.), Devonshire cup corals (<i>Caryophyllia smithii</i>), Serpulidae tubes, northern feather stars (<i>Leptometra celtica</i>), cushion star (<i>Porania pulvillus</i>) and hydroid (Tubulariidae sp.)	36.34	0.00
	182 407.4	809 092.0		17/03/21	13:44:14				
	180 830.5	809 471.7	35.4	18/03/21	11:01:34	Rocky silty sand (frequent pebbles and cobbles)	Possible Common dragonet (<i>Callionymus lyra</i>), Slender seapen (<i>Virgularia mirabilis</i>), squat lobster (<i>Munida</i> sp.), northern feather star (<i>Leptometra</i> <i>celtica</i>), Serpulidae tubes, bryozoan turf, tall seapen (<i>Funiculina quadrangularis</i>) and sponge (<i>Phakellia ventilabrum</i>) No conspicuous fauna	20.88	0.00
	180 861.9	809 455.4	55.4	18/03/21	11:04:59				
	180 861.9	809 455.4	1.6	18/03/21	11:04:59	Not analysed for Nephrops due to unsuitable seabed. Rocky silty sand (frequent pebbles and cobbles)		0.02	
	180 863.3	809 454.9		18/03/21	11:05:34			0.92	
	180 863.3	809 454.9		18/03/21	11:05:34	Silty sand with low abundance of shell	Squat lobster (<i>Munida</i> sp.), bryozoan turf, slender seapen (<i>Virgularig mirgbilis</i>) and edible crab	14.19	0.00
HT05	180 884.1	809 442.8		18/03/21	11:07:27	fragments, pebbles and cobbles	(Cancer pagurus)	11.15	0.00
	180 884.1	809 442.8	7.1	18/03/21	11:07:27	Rocky silty sand (frequent pebbles	Bryozoan turf, hydroid (Tubulariidae sp.), squat lobster (<i>Munida</i> sp.), sea squirt (Ascidiacea sp.) and slender seapen (<i>Virgularia mirabilis</i>)	4.20	0.00
	180 891.0	809 441.0		18/03/21	11:08:09	and cobbles)		-	
	180 891.0	809 441.0	1.8	18/03/21	11:08:09	Not analysed for Nephrops due to	No conspicuous fauna	1.06	
	180 892.7	809 440.3	1.0	18/03/21	11:08:32	unsuitable seabed		1.00	
	180 892.7	809 440.3	103.6	18/03/21	11:08:32	Silty sand with low – abundance of shell debris	Goby (Gobiiformes sp.), bryozoan turf, possible common dragonet (<i>Callionymus lyra</i>), squat lobster (<i>Munida</i> sp.), slender seapen (<i>Virgularia</i> <i>mirabilis</i>) tube anemone (<i>Cerianthus lloydii</i>)	61 10	0.10
	180 983.6	809 390.7		18/03/21	11:13:52		Gadidae sp., possible sea cucumber (Holothuroidea sp.), Serpulidae tubes and starfish (Asteroidea sp.)	01.10	0.10
	180 983.6	809 390.7	32.9	18/03/21	11:13:52			19.40	0.00





Station	Easting (m)	Northing (m)	Distance Travelled (m)	Date (DD/MM/YY)	Time HD Video (HH:MM:SS)	Sediment Type	Conspicuous Fauna	Transect area (m²)	Medium <i>N. norvegicus</i> (3 to 15cm) Burrow Density (/m²)	
	181 015.3	809 382.0		18/03/21	11:15:14	Rocky silty sand (frequent pebbles)	Squat lobster (<i>Munida</i> sp.), Bryozoan turf, Serpulidae tubes, sea squirt (Ascidiacea sp.) and hydroid (Tubulariidae sp.)			
	181 015.3	809 382.0	49.6	18/03/21	11:15:14	Bedrock form steep	Bryozoan turf, sea squirts (Ascidiacea sp., <i>Ciona</i> intestinalis), squat lobster (<i>Munida</i> sp.), tall seapen by (<i>Funiculina quadrangularis</i>), Devonshire cup coral (<i>Caryophyllia smithii</i>), common sea urchin (<i>Echinus</i> esculentus) and Serpulidae tubes	28.68	0.00	
	181 063.5	809 375.7	48.6	18/03/21	11:18:15	silty sand				
	181 063.5	809 375.7	6.2	18/03/21	11:18:15	Rocky silty sand	Squat lobster (<i>Munida</i> sp.), bryozoan turf,	2.74	0.00	
	181 069.6	809 373.9	0.3	18/03/21	11:18:29	sloped seabed	Serpulidae tubes and sea squirt (Ascidiacea sp.)	3.74	0.00	
	181 069.6	809 373.9		18/03/21	11:18:29	Rodrock form stoon	Bryozoan turf, Serpulidae tubes, Devonshire cup			
	181 090.1	809 366.5	21.8	18/03/21	11:19:50	cliff face covered by silty sand	cliff face covered by silty sand (Tubulariidae sp.), edible crab (Cancer pagurus) and sponge (Phakellia ventilabrum)	12.88	0.00	
	181 090.1	809 366.5	4.5	18/03/21	11:19:50	Not analysed for <i>Nephrops</i> due to	No conspicuous fauna	2.65		
	181 094.3	809 364.8		18/03/21	11:20:07	unsuitable seabed (Loss of cliff face)				
	181 094.3	809 364.8	0.2	18/03/21	11:20:07	Cilture	Squat lobster (<i>Munida</i> sp.), slender seapen Silty sand (<i>Virgularia mirabilis</i>) and tall seapen (<i>Funiculina quadrangularis</i>)	4.02	0.00	
	181 102.1	809 361.9	8.3	18/03/21	11:20:36	Slity sand		4.92	0.00	
	181 102.1	809 361.9	17	18/03/21	11:20:36	Bedrock covered by		1.01	0.00	
	181 103.7	809 361.3	1.7	18/03/21	11:20:42	silty sand		1.01	0.00	
	181 103.7	809 361.3	8.0	18/03/21	11:20:42	Silty sand	Squat lobster (<i>Munida</i> sp.), slender seapen (Virgularia mirabilis), tall seapen (<i>Funiculina</i> quadrangularis), bryozoan turf, sea squirts	4 75	0.00	
	181 111.2	809 358.5	0.0	18/03/21	11:21:12	(Ascidiacea sp., <i>Ciona intestinalis</i>), northern feather star (<i>Leptometra celtica</i>), hydroid (Tubulariidae sp.) and Serpulidae tubes	(Ascidiacea sp., <i>Ciona intestinalis</i>), northern feather star (<i>Leptometra celtica</i>), hydroid (Tubulariidae sp.) and Serpulidae tubes	4.75	0.00	
	181 111.2	809 358.5	24.6	18/03/21	11:21:12	Rocky silty sand	Northern feather star (<i>Leptometra celtica</i>), sea squirts (Ascidiacea sp., <i>Ciona intestinalis</i>), horgene turf, caust lebeter (<i>Muside</i> sp.)	14.50	0.00	
	181 134.2	809 349.8	2	18/03/21	11:22:40	and cobbles)	and cobbles)	Serpulidae tubes, tall seapen (<i>Funiculina</i> <i>quadrangularis</i>) and hydroid (Tubulariidae sp.)	1	0.00



Station	Easting (m)	Northing (m)	Distance Travelled (m)	Date (DD/MM/YY)	Time HD Video (HH:MM:SS)	Sediment Type	Conspicuous Fauna	Transect area (m²)	Medium <i>N. norvegicus</i> (3 to 15cm) Burrow Density (/m ²)
	181 134.2	809 349.8	85	18/03/21	11:22:40	Bedrock form steep	Bryozoan turf, sea squirt (Ascidiacea sp.), common Bedrock form steep cliff face covered by silty sand (<i>Caryophyllia smithii</i>) and cushion star (<i>Porania</i> <i>pulvillus</i>)	5.01	0.00
	181 142.1	809 346.8	0.5	18/03/21	11:23:05	silty sand		5.01	0.00
	181 142.1	809 346.8	72	18/03/21	11:23:05	On top of the cliff.	On top of the cliff. Rocky silty sand frequent pebbles) Squat lobster (<i>Munida</i> sp.), tall seapen (<i>Funiculina</i> <i>quadrangularis</i>) and Bryozoan turf,	1 20	0.00
	181 148.9	809 344.0	7.5	18/03/21	11:23:30	(frequent pebbles)		4.25	0.00
	181 148.9	809 344.0	5.9	18/03/21	11:23:30	Bedrock covered in	Bedrock covered in silty sand Squat lobster (<i>Munida</i> sp.), bryozoan turf, hydroid (Tubulariidae sp.), sea squirts (Ascidiacea sp., <i>Ciona intestinalis</i>)	2 40	0.00
	181 154.2	809 341.9	5.8	18/03/21	11:23:52	silty sand		3.40	0.00
	181 154.2	809 341.9	15 1	18/03/21	11:23:52	Rocky silty sand	y sand Sea squirt (Ascidiacea sp), edible crab (<i>Cancer</i>	0.00	0.00
	181 168.1	809 335.9	15.1	18/03/21	11:24:31	with shell debris <i>pagurus),</i> tall seapen (<i>Funiculina quadrangularis</i>)	8.89	0.00	
	181 168.1	809 335.9	50.0	18/03/21	11:24:31	Silty sand with low	Slender seapen (Virgularia mirabilis), squat lobster (Munida sp.), tube anemone (Cerianthus lloydii),	25.22	0.00
	181 219.1	809 304.6	33.3	18/03/21	11:28:02	pebbles tubes, seven-armed starfish (<i>Luidia ciliaris</i>) and possible common dragonet (<i>Callionymus lyra</i>)	33.33	0.00	
	181 219.1	809 304.6	24.8	18/03/21	11:28:02	Silty sand with shell	shell Squat lobster (Munida sp.) and sea squirt	14 61	0.00
	181 236.4	809 286.9	21.0	18/03/21	11:28:53	debris (Ascidiacea sp.)	1.01	0.00	
	181 236.4	809 286.9	23.2	18/03/21	11:28:53	Squat lobster (Munida sp.), sea squirt (AscidiaceaRocky silty sandsp.), bryozoan turf, Serpulidae tubes, spiny starfish(frequent pebbles)(Marthasterias glacialis) and cushion star (Porania pulvillus)	13 71	0.00	
	181 252.6	809 270.3	-512	18/03/21	11:29:39		(Marthasterias glacialis) and cushion star (Porania pulvillus)		





Appendix IV – Conspicuous Macrofauna









	Loch Hourn Conspicuous Fauna						
Virgularia mirabilis	Funiculina quadrangularis	Caryophyllia smithii					
Ophiuroidea sp.	Poss. Holothuroidea sp.	Marthasterias glacialis					
	X						
Asteroidea sp.	Luidia ciliaris	Porania pulvillus					
Leptometra celtica	Echinus esculentus	Sabellidae sp.					





	Loch Hourn Conspicuous Fauna	
Nephrops norvegicus	Caridea sp.	Munida sp.
R		
Cancer pagurus	Euphausiacea sp.	Paguroidea sp.
Gobiiformes sp.	Eutrigla gurnardus	Gadidae sp.
	Poss Callianumus lura	Paiidaa se
Juv. Conger conger	Poss. cumonymus iyru	Rajiude sp.





Loch Hourn Conspicuous Fauna
Serpulidae tubes





Appendix V – Service Warranty

This report, with its associated works and services, has been designed solely to meet the requirements of the contract agreed with you, our client. If used in other circumstances, some or all of the results may not be valid and we can accept no liability for such use. Such circumstances include different or changed objectives, use by third parties, or changes to, for example, site conditions or legislation occurring after completion of the work. In case of doubt, please consult Benthic Solutions Limited.

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