Natural England Commissioned Report NECR303

Holderness Inshore MCZ 2018 Survey Report

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Foreword

Natural England commission a range of reports from external contractors to provide evidence and advice to assist us in delivering our duties. The views in this report are those of the authors and do not necessarily represent those of Natural England.

Background

Following designation, Natural England started a baseline monitoring programme across all marine protected areas.

This report was commissioned as part of an inshore benthic marine survey of the Holderness Inshore MCZ.

This report should be cited as:

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Further information
This report can be downloaded from the Natural England Access to Evidence Catalogue: **http://publications.naturalengland.org.uk/** . For information on Natural England publications contact the Natural England Enquiry Service on 0300 060 3900 or e-mail **enquiries@naturalengland.org.uk**.

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Holderness Inshore MCZ 2018 Survey Report

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Holderness Inshore MCZ 2018 Survey Report

Project Code: MB0129

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M. Marsh	Natural England Marine Ecology Environmental Specialist
C. Miller	Natural England/Environment Agency Marine Technical Specialist
T. Smith	North Eastern IFCA Senior Scientific Officer
M. Young	Natural England Senior Marine Monitoring Specialist

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1. Introduction

Following the introduction of the Marine and Coastal Access Act in 2009, the UK Government is creating an ecologically coherent network of Marine Conservation Zones (MCZs) in British waters. The MCZ network will exist alongside other Marine Protected Areas (MPAs), including Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Sites of Special Scientific Interest (SSSIs) and Ramsar sites to help conserve marine biodiversity, in particular habitats and species of national importance.

Forming part of this network, the Holderness Inshore MCZ was formally designated on the 17th January 2016[1]. The site has been created to protect important intertidal sand and mud habitats, as well as a range of subtidal sediment and rock features. Following designation, Natural England* have started a programme of monitoring and the initial datasets gathered will be used, along with all other available information, to assess the condition of the features in the site using Natural England marine condition assessment methodology. The method uses attributes set out in the sites supplementary advice on conservation objectives to form an overall decision about the condition of the features, and this work will inform the assessment of specific attributes. The results from the condition assessment will inform future monitoring planning and management of the site.

*inshore Statutory Nature Conservation Body

1.1 Site Description

The Holderness Inshore MCZ is located north of the Humber Estuary mouth (Figure 1). The site boundary covers an area of approximately 309 km^2 along the East Riding coast from Spurn Point to Skipsea and extends approximately 3.3 nm offshore. Spurn Point, in the south of the MCZ is a geological feature demonstrating an example of an 'active spit system' which extends across the mouth of the Humber Estuary (Natural England, 2016).

The seabed is composed of a variety of habitats including rock, sand, mud and sediment, which helps to support a diverse range of organisms such as red algae, sponges and encrusting fauna (Natural England, 2016). The various habitat types also support commercially significant crustaceans, such as edible crabs (*Cancer pagurus*), velvet swimming crabs (*Necora puber*) and lobsters (*Homarus gammarus*) as well as

[1] This report was produced before the Tranche 3 designation announcement on 31st May 2019 and as such all content was correct at the time of writing.

pelagic species, European eel (*Anguilla anguilla*), dab (*Limanda limanda*) and wrasse (Natural England, 2016).

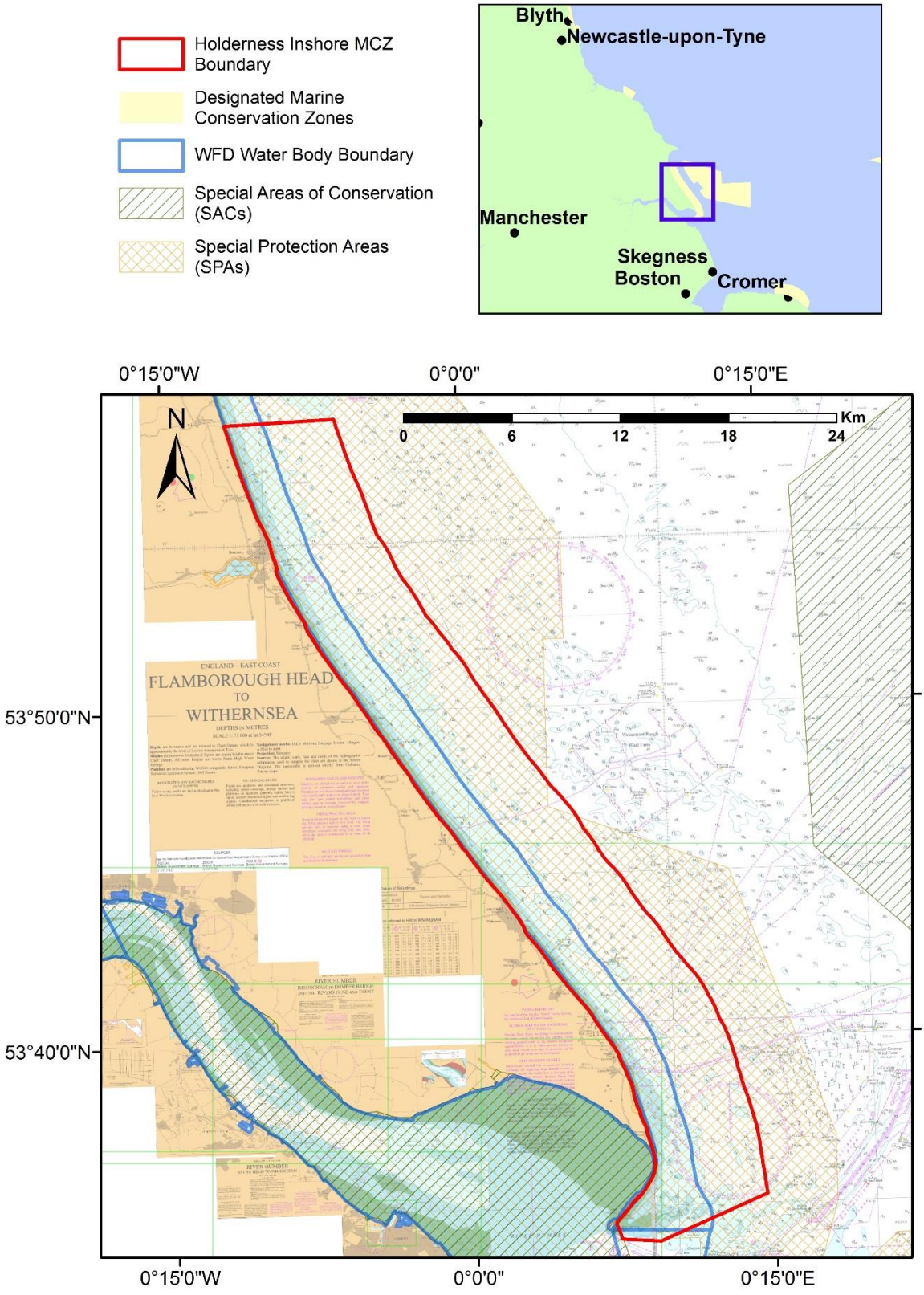

Figure 1. Location of the Holderness Inshore Marine Conservation Zone (MCZ) in the context of other MCZs off the East of England.

Within the Holderness Inshore MCZ there are four MPAs that overlap the southern tip of the site. These are; Spurn National Nature Reserve (NNR), Humber Estuary Ramsar, Humber Estuary SAC and Humber Estuary SPA.

The Features of Conservation Importance (FOCI) protected under the MCZ designation order are presented in Table 1, alongside the general management approach. The survey planned here will focus on those features indicated by blue shading (Table 1). The current North Eastern Inshore Fisheries Conservation Authority (IFCA) management measures for the Holderness Inshore MCZ cover both temporal and spatial restrictions of commercial and recreational fishing activities. In particular, the Regulation of Shellfish beds which allows for the closure of shellfish beds to protect from the disturbance of fishing activities. Further information can be found on North Eastern IFCA website: http://www.ne-ifca.gov.uk/legislation-and-byelaws/.

Table 1. Designation status and the current General Management Approach (GMA) for the features of conservation importance present in the Holderness Inshore Marine Conservation Zone. The survey planned here will focus on those features indicated by blue shading.

Feature Type	Features Present	Designated	GMA
Broadscale Habitat (BSH)	Intertidal sand and muddy sand	✓	Maintain
	Moderate energy circalittoral rock	✓	Maintain
	High energy circalittoral rock	✓	Maintain
	Subtidal coarse sediment	✓	Maintain
	Subtidal mixed sediments	✓	Maintain
	Subtidal sand	✓	Maintain
	Subtidal mud	✓	Maintain
Feature of Geological Interest	Spurn head (subtidal)	✓	Maintain

1.2 Survey Aim and Objectives

To undertake a survey of Holderness Inshore MCZ designated features (Table 1) to obtain new evidence which can be used by Natural England, alongside all other relevant information, to detect change over time and ascribe condition to inform future monitoring and management measures.

Objective: Collect data to investigate structure, function and distribution of MCZ features (Table 1).

The data acquired will:

a.) Provide data for a monitoring time series.
b.) Provide information for condition assessment of the Broadscale Habitats.
c.) Improve understanding of the MCZ communities and their distribution.
d.) Inform site management decisions.

A survey will be undertaken to assess the relative extent, distribution and community composition of the sediment features based on a stratified survey design of 110 grab and drop down video (DDV) stations as shown in Figure 3.

1.3 Survey Team

The Holderness Inshore MCZ survey took place between the 10th January and 7th August 2018. The survey team comprised marine monitoring specialists from the Environment Agency, Natural England and APEM. The coastal survey vessel *Humber Guardian,* staffed and operated by Briggs Marine (Figure 2, Annex 7.1) was used to conduct the survey work reported here.

Figure 2. Coastal survey vessel *Humber Guardian,* operated by Briggs Marine.

2. Survey Design and Methods

2.1 Survey Design and Planning Phase

Grab Survey Design

A verification survey was undertaken at Holderness Inshore MCZ in 2012, but only three successful grab samples were collected (Fraser and Godsell, 2013). Therefore, a densely sampled survey inside the MCZ was considered a suitable survey design, to provide as much information as possible on the distribution of Broadscale Habitats across the site.

92 0.1 m^2 Mini-Hamon Grab stations were selected using a 2 km triangular grid across the site. A further 18 grab stations were selected within the inshore strip of the MCZ, with their locations stratified by subtidal sediment presence as mapped from the 2011 and 2016 Coastal Programme surveys. The grab sampling design for this survey was therefore a combination of 2 km triangular grid and stratified sampling, with 110 grab stations in total (Figure 3). No contaminant samples were planned to be collected during this survey.

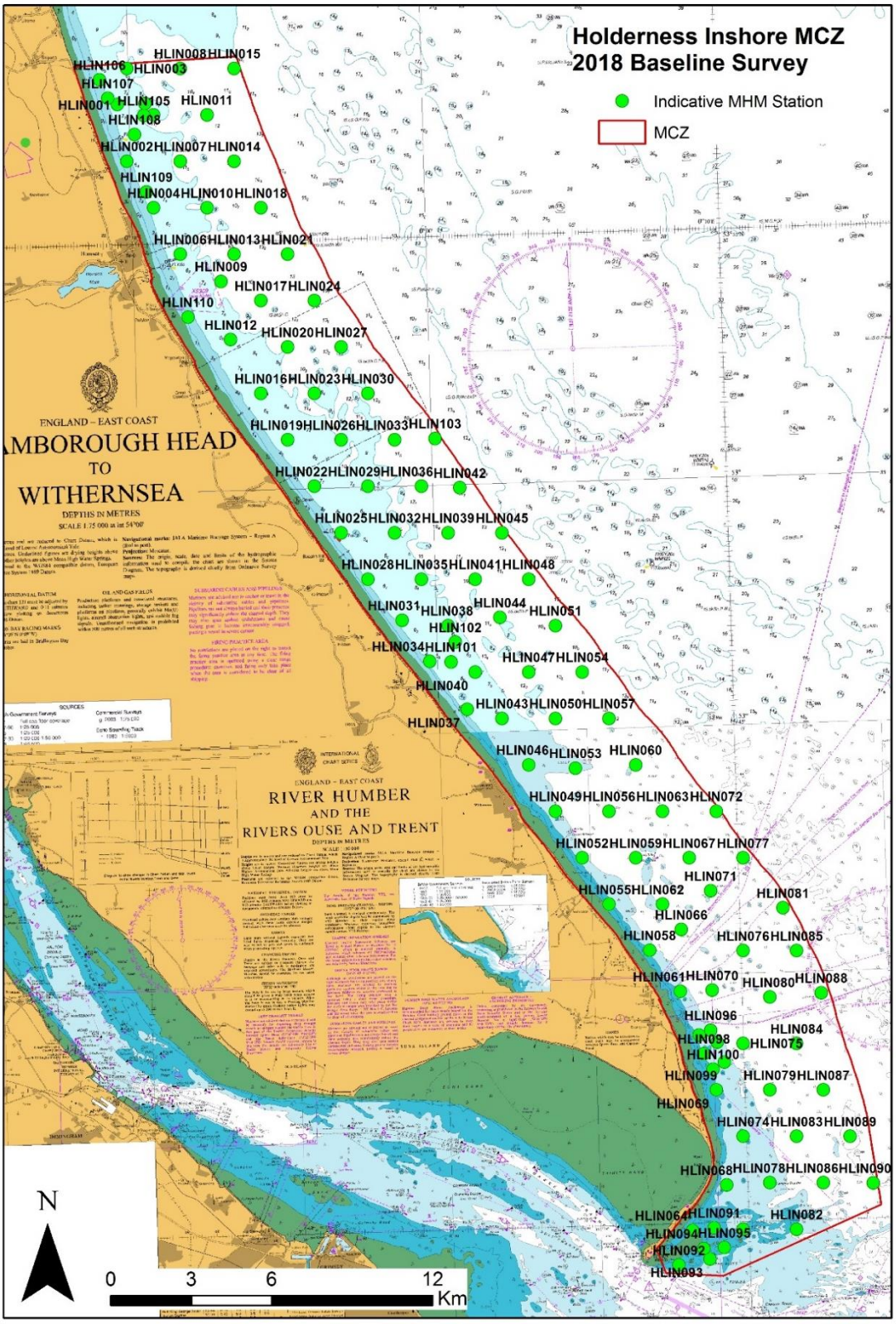

Figure 3. Holderness Inshore MCZ 2018 survey plan showing the target Mini-Hamon Grab sampling stations.

Drop Down Video Survey Design

A verification survey was undertaken at Holderness Inshore MCZ in 2012, but only 21 video tows where visibility was poor were collected (Fraser and Godsell, 2013).

Station selection for the Drop Down Video (DDV) survey was planned after the completion of the grab survey, so no DDV survey maps were produced at the planning stage. Stations would be located where it wasn't possible to obtain a viable grab sample. Due to the poor visibility historically noted at the site (Fraser and Godsell, 2013), a camera system with a freshwater lens was deemed most suitable.

Marine specialists from the Environment Agency and Natural England reviewed the plan. The following hazards were identified from the UKHO Admiralty charts: gas and high voltage power lines, outfalls, underwater obstructions and the firing range near Hornsea. Sampling stations were relocated to avoid these hazards as far as possible. A 'Notification of an exempt activity form' for 'samples and investigations' was submitted to the Marine Management Organisation prior to the survey being carried out.

2.2 Sample Collection Methodology

2.2.1 Habitat characterisation and in-situ benthic epifauna identification

Drop video camera equipment (Annex 7.2.2 and 7.2.3) was deployed in accordance with the MESH 'Recommended Operating Guidelines (ROG) for underwater video and photographic imaging techniques' (Coggan *et al*., 2007). The Subsea Technology & Rentals (STR) SeaSpyder camera system was deployed from the stern of the survey vessel, as shown in Figure 4. Real time navigation data acquisition and manual position fixing when the gear contacted the seabed was captured via Trimble® HYDRO*pro*™ software and logged by the survey officer. The mid-point of the vessel's stern gantry was used as the default offset for position fixing (see Annex 7.2.1 for further details). Video files and digital still images were transmitted via the sea cable to be captured and saved directly to a computer in the survey cabin. The video footage was annotated with time and position using a GPS (SIMRAD MX512 DGPS) referenced video overlay (uncorrected position data). Images of the seabed were captured approximately every 10 to 15 metres over a distance of > 150 metres. Extra photographs were taken in heterogeneous areas of BSH and if particular habitat/species FOCI were observed. If a BSH habitat boundary was detected towards the end of a tow, the camera deployment was extended to confirm the change. The drop frame depth was controlled via a winch operator receiving instructions from the survey cabin. For further deployment details please see the 'EA underwater video procedure_version 2.5' in Annex 7.3.

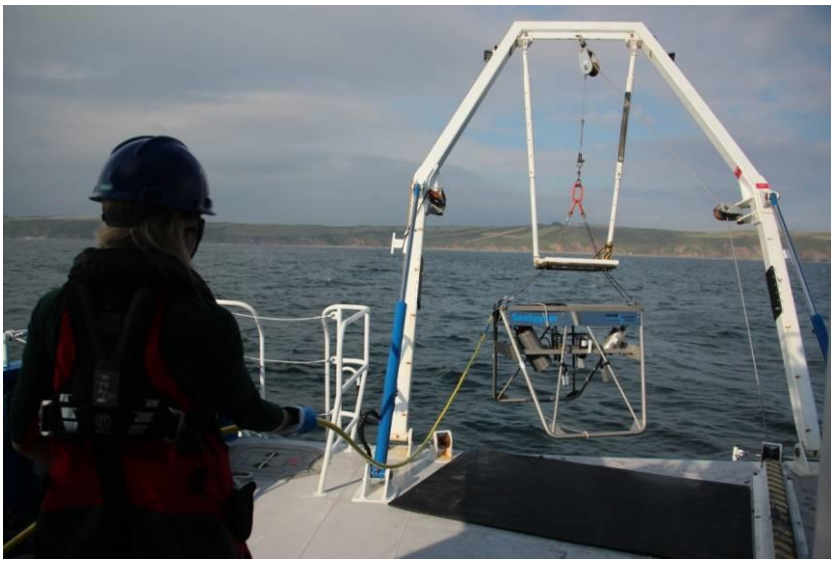

Figure 4. STR SeaSpyder drop camera system being deployed from the stern of the coastal survey vessel.

During each drop camera deployment, a member of the survey team continuously monitored the real-time video feed, recording general station notes, underwater visibility (Annex 7.4), habitat information and fauna observations. Please see Annex 7.5 for a worked example of the video logsheet.

2.2.2 Broadscale Habitat Groundtruthing

A Mini-Hamon Grab (Figure 5), with a sampling area of 0.1 m^2, was deployed from the stern gantry of the vessel to collect sediment from the seabed, as described by Ware and Kenny (2011). Sampling positions were recorded (fixed) using Hydropro data acquisition software when the gear contacted the seabed, with the mid-point of the vessel's stern gantry being used as the default offset for position fixing (see Annex 7.2.1 for further details).

Once recovered, the sample was emptied into a suitable container, photographed, and the sample volume measured. A minimum of three attempts was made at each station to obtain a valid grab sample before the station was abandoned. A sample volume of 5 litres was required to qualify as a valid sample. Samples of < 5 litres were ordinarily discarded. However, when it was difficult to obtain a valid sample, a sample with < 5 litres of material was retained at the discretion of the lead scientist if it was deemed representative across all attempts made at that station. For valid samples, a small scoop was used to remove a sub-sample (approx. 500 ml) of sediment for particle size analysis (PSA). The remaining sample was washed over a 1 mm sieve to retain the faunal fraction (Figure 5), photographed and preserved with a buffered 4 % formaldehyde solution for transfer ashore to a specialist laboratory for analysis.

If the volume of sediment collected was insufficient for faunal analysis in each grab attempt made at a station, a photograph was taken and if possible, material removed for PSA. The station was then abandoned.

Figure 5. Mini-Hamon Grab (left), and equipment for sieving benthic fauna samples (right).

Sediment descriptions were recorded for each sample collected. For consistency across all the MCZ benthic habitat surveys, these were based on a pictorial field guide produced by Cefas marine sedimentologists, a modified Folk seabed sediment classification system (Long, 2006) (Figure 6) and the Wentworth Scale (Table 2).

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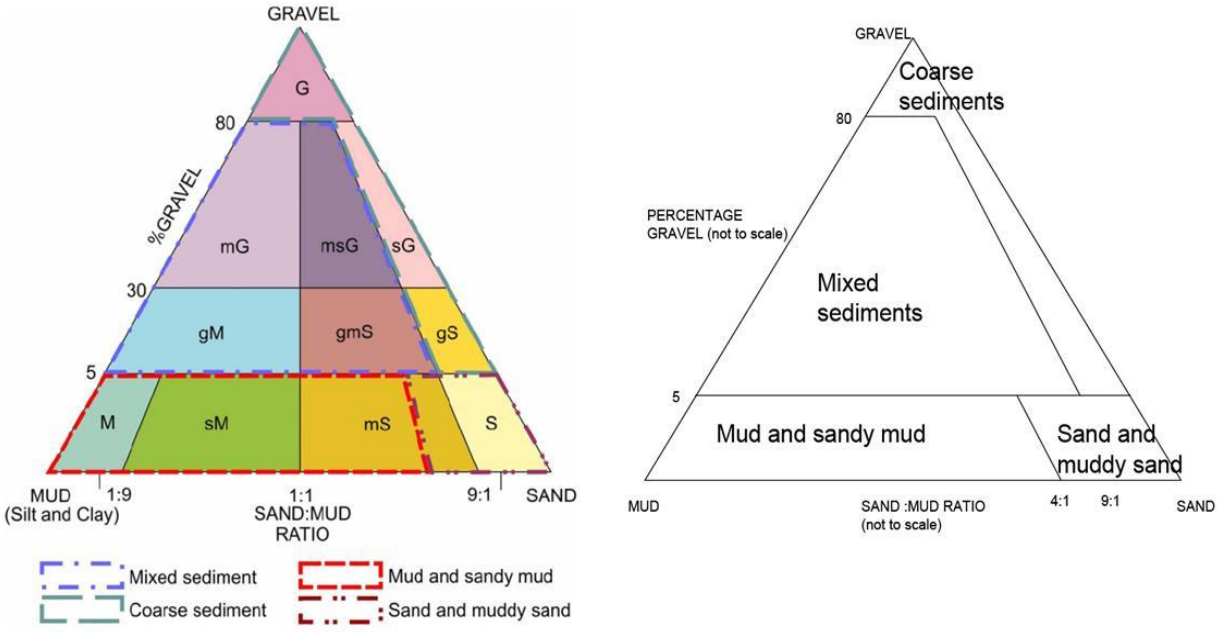

Figure 6. Simplified sediment classification of the Folk triangle for UK SeaMap (Long, 2006).

Table 2. Sediment grade terms and size limits (Wentworth, 1922).

Size	Grade Terms
> 256 mm	Boulder
> 64 - 256 mm	Cobble
4 - 64 mm	Pebble

3. Survey Narrative

The Holderness Inshore MCZ grabbing survey was carried-out from the MV *Humber Guardian* over the course of six 'on-task' days beginning on the 10th January 2018 and concluding on the 7th April 2018. One further 'on-task' day was allocated to DDV survey work on the 7th August 2018.

Table 3. Summary of equipment deployments during the 2018 Holderness Inshore Marine Conservation Zone survey.

Equipment	Dates	Duration
Mini-Hamon Grab deployments	10th and 11th January 30th and 31st January 4th April and 7th April	six days
Drop camera deployments	7th August	one day

The initial plan was for grab operations to be completed during the second week of January. To this end, survey personnel travelled to the vessel in Grimsby on Tuesday 9th January 2018 and survey gear was transferred on board the following morning.

Once this process was complete, the vessel sailed from Grimsby Fish Docks at 08:55 UTC on Wednesday 10th January, bound for the southern edge of the MCZ. Shortly after departure, a general safety induction was provided for each new member of the survey team and upon arrival at the survey area, a toolbox talk was held with all personnel in attendance. This included a briefing on the day's survey activities and provided the opportunity to discuss any questions or concerns about the proposed work and the expected conditions. This process was followed for each day of survey operations.

Grabbing started at 10:50 UTC off Easington and over the course of the next two hours, sampling was attempted at seven stations. Weather conditions were good with light and variable winds, but viable infauna samples were collected at only three of these stations. However, a total of six samples were collected for PSA.

At around 12:55 UTC, the vessel's starboard alternator failed, forcing the suspension of survey activities. This fault, which prevented charging of the battery, could not be repaired at sea so it was necessary to return to Grimsby because of the risk of the starboard engine failing when electrical power was lost. The vessel berthed in Grimsby at 15:25 UTC where an engineer attended and identified the part(s) for replacement.

The following morning, Thursday 11th January, the engineer returned and replaced the alternator. Again, weather conditions were favourable with northerly or north-westerly force 2-3 winds and the vessel was ready to sail by 12:10 UTC, arriving at the survey area off Spurn Head by 13:10 UTC. For the next three hours, grabbing was carried out at 16 stations, with infauna samples collected at eight of these and PSA samples at 15.

At around 16:30 UTC it became apparent that the Mini-Hamon Grab bucket welds were starting to fail, likely caused by the coarse substratum. The damage caused sample material to be lost each time the grab was retrieved, so survey operations were again suspended and the vessel steamed back to Grimsby, berthing at 18:15 UTC. The grab with its associated survey gear were then craned ashore for repair by local contractors and the vessel was tasked to other survey activities.

Following repair of the grab, survey work on the MCZ was resumed on Tuesday 30th January. *Humber Guardian* left Grimsby Fish Docks at 08:35 UTC after survey gear had been transferred aboard and arrived at the south end of the MCZ at 09:50 UTC. With south-westerly force 3-4 winds and a slight sea state, grabbing operations were conducted at 24 station during the next six hours and 20 minutes. Five infauna and 23 PSA samples were collected. The vessel left the survey area at 16:10 UTC and berthed in Grimsby at 18:20 UTC.

The following day, Wednesday 31st January, winds remained from the south-west and the vessel sailed from Grimsby at 07:50 UTC, arriving on station near Kilnsea at 08:20 UTC. Grab sampling was then carried out until 18:50 UTC with six infauna and 23 PSA samples collected at the 25 stations visited. *Humber Guardian* berthed in Grimsby at around 19:50 UTC, at which point about 65% of the stations had been surveyed.

Winds for the subsequent day were forecast to be westerly, veering north-westerly later, force 5-7 with the sea state increasing from slight to rough. These conditions were unsuitable for safe deployment of the survey gear, so the vessel was tasked to other activities.

In the latter part of February, Great Britain and Ireland were affected by a prolonged Arctic anticyclonic weather system which brought snowfall and storm force easterly winds. This, along with the return of strong easterly winds in the latter half of March meant it was to be April before the next opportunity to complete the grabbing presented itself.

On Wednesday 4th April, survey gear was again transferred on board the *Humber Guardian* and the vessel departed from Grimsby fish docks at 08:30 UTC arriving in the survey area off Spurn Head at 09:35 UTC. With southerly or south-easterly force 4 to 5 winds, the sea state was somewhat marginal for Mini-Hamon Grab operations, but it was decided to proceed with caution and review conditions throughout the day. The team managed to complete around six hours of grabbing at a further 20 stations. Only a single viable infauna sample could be collected, although 16 PSA samples were retrieved. Survey operations ceased at 15:45 UTC and the vessel returned to Grimsby by 18:05 UTC.

A strong wind warning was issued for Thursday 5th April, with winds forecast to become northerly force 6 to gale 8, veering north-westerly force 4 or 5 then becoming variable force 3 or 4 later. Although it was hoped that a window may present itself to complete the grabbing operations, the vessel remained down-weathered in port throughout the day. The following day conditions were only suitable for alternative work in the Humber estuary and the vessel was tasked accordingly.

Conditions had improved by Saturday 7th April, with force 1-3 winds generally from the north-east. *Humber Guardian* sailed from Grimsby at 07:35 UTC, arriving in the survey area off Aldbrough at 10:30 UTC. Over the next five hours the remaining 18 stations were visited. It was not possible to collect a viable infauna sample at any station. However, 15 samples were collected for PSA. Grabbing operations within the MCZ survey area were finally concluded at 15:15 UTC and the vessel berthed back in Grimsby at 18:20 UTC prior to survey gear being transferred ashore.

In total, grabbing operations at the 110 Holderness Inshore MCZ stations took 28 hours and 45 minutes, with a further 24 hours and 25 minutes being used for transit to and from the survey area.

On Saturday 4th August, the Subsea Technology Rentals (STR) Ltd. 'SeaSpyder' drop camera was delivered to *Humber Guardian* in Hartlepool Marina where it was set up and tested for deployment in the Runswick Bay (RNSB) MCZ. After completion of this work the camera system was available for half a day whilst the vessel transited from Hartlepool to Grimsby. As the favourable weather conditions and underwater visibility which had allowed successful completion of the RNSB survey persisted, the camera was used for as many stations as possible in the Holderness Inshore MCZ en route.

Humber Guardian departed from Hartlepool Marina at around 04:00 UTC on Tuesday 7th August and arrived on the MCZ at 09:50 UTC. Video and stills footage was collected at four stations with excellent or good underwater visibility at each. Survey operations were concluded at 11:25 UTC and the vessel berthed in Grimsby Fish Docks at 13:30 UTC. The camera system was subsequently down-rigged and transferred ashore for delivery back to STR Ltd.

4. Data Acquisition

4.1 Survey plan changes

For five of the grab stations (HLIN043, HLIN044, HLIN104, HLIN107 and HLIN108) a variant of the grab methodology was followed. PSA and infauna samples were collected separately as it was difficult to find viable samples with sufficient material for analysis. At each of the five grab stations where this was followed, the sediment was visually assessed to ensure consistency across the independent PSA and infauna samples. It was decided by the Scientist in Charge that the removal of material for PSA would have reduced the infauna sample volume significantly, resulting in no data being obtained.

Following the successful completion of the grab survey 11 stations (HLIN14, 20, 24, 31, 40, 55, 60, 67, 71, 97 and 102) were selected for the DDV survey. These were stations where no successful grab (infauna or PSA) sample was obtained. Due to the small number of DDV stations and the size of the MCZ, Natural England decided that it was not cost-effective to survey those stations using a freshwater lens camera system. Instead, the survey team made use of the extended calm conditions in summer 2018 and an opportunistic survey of four stations was completed using the STR SeaSpyder camera (Annex 7.2.2 and 7.2.3) during a vessel passage period. Due to further resource reprioritisation by Natural England, the remaining seven DDV stations were not surveyed.

4.1 Sample collection summary

Samples collected during the 2018 Holderness Inshore MCZ survey are summarised in Table 4.

Table 4. Summary of samples collected during the 2018 Holderness Inshore Marine Conservation Zone survey.

Equipment	Data Type	No. of samples
Drop Down Video	Video and still images	4 videos, 59 images
Mini-Hamon Grab	Infauna and PSA	18
	PSA only	76
	Infauna only	5
	Epibiota (Rock)	1
	Epibiota (Rock w. *Sabellaria* sp.)	1

Video footage and digital photographs of the seabed were captured at four stations within the Holderness Inshore MCZ boundary (Figure 7). EUNIS Level 3 BSH

classifications and species identifications will be assigned to each station following detailed independent analysis of the usable video footage and stills.

Viable grab samples were successfully recovered from across the survey area. Samples for both infaunal analysis and PSA were collected at 18 stations, using the Mini-Hamon Grab (Figure 8). At 76 stations, the quantity of sediment collected was only sufficient for PSA. 11 stations (HLIN014, HLIN020, HLIN024, HLIN031, HLIN040, HLIN055, HLIN060, HLIN067, HLIN071, HLIN097 and HLIN102) selected for groundtruthing yielded only discards. Definitive classification of habitat features present was not possible prior to the results of the more detailed sample analyses carried out in the laboratory being available.

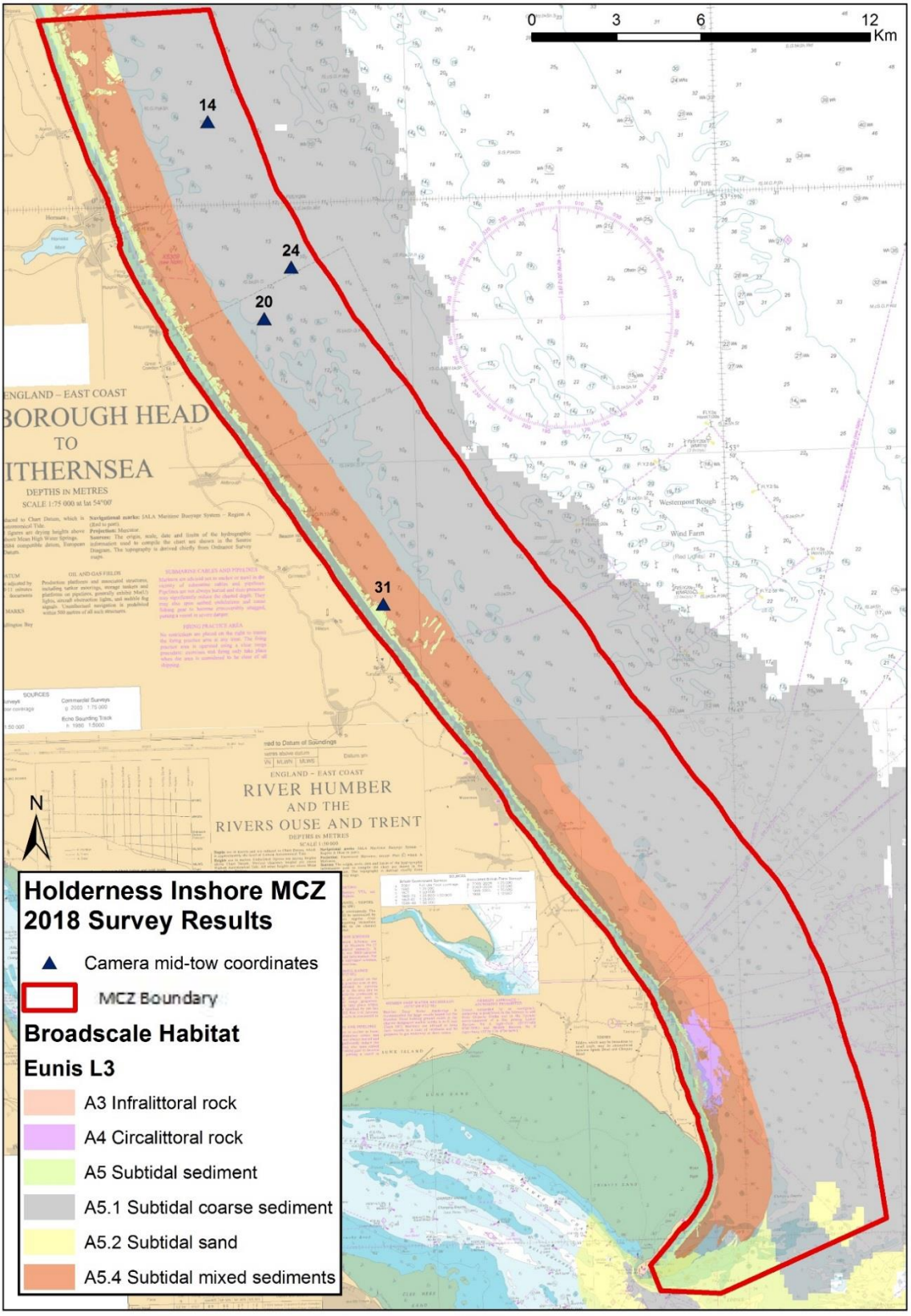

Figure 7. Drop Down Video (DDV) camera data acquired during the Holderness Inshore MCZ 2018 Summer survey, mapped over interpreted Broadscale Habitat data from the 2013 verification survey (Natural England, 2018).

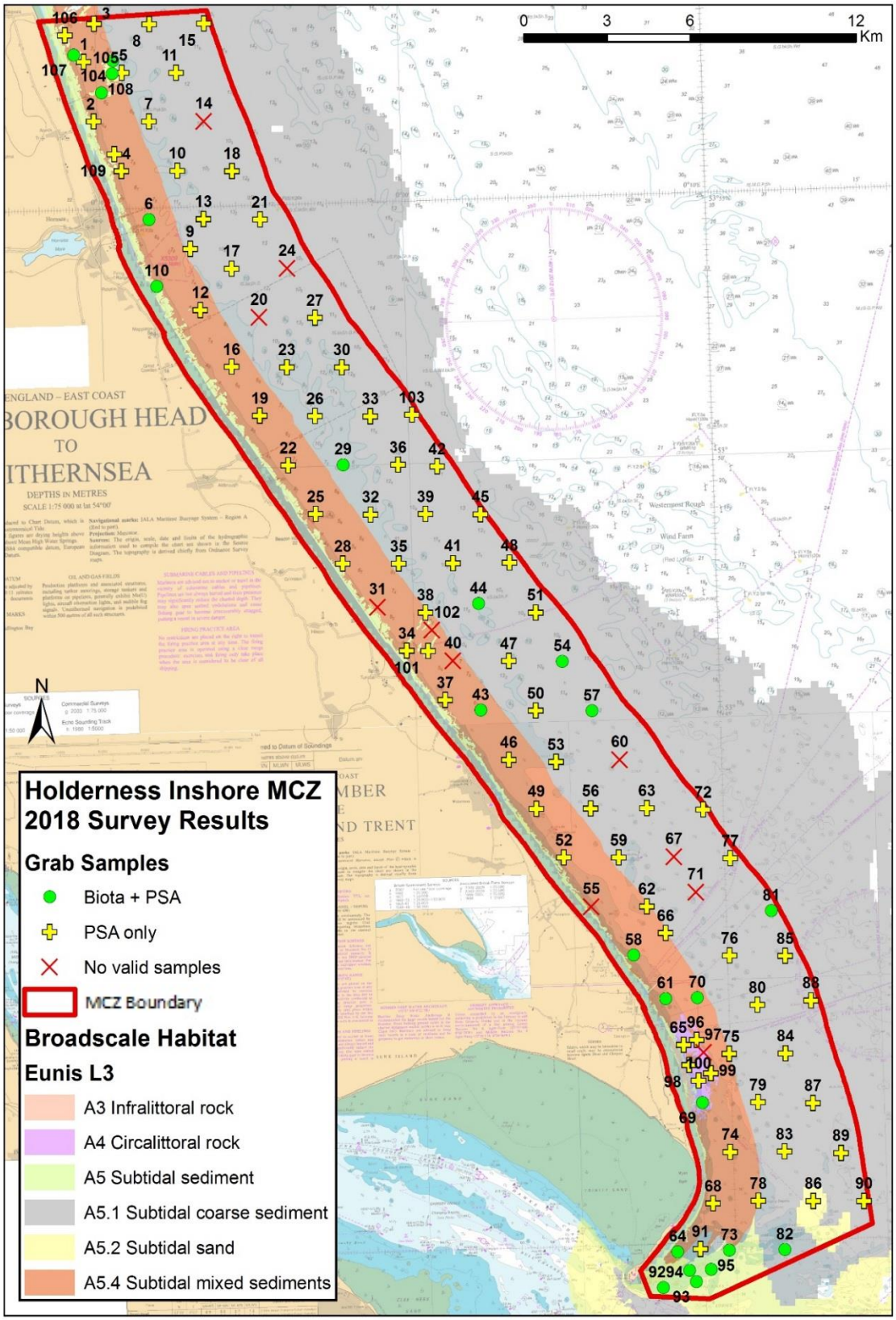

Figure 8. Mini-Hamon Grab data acquired during the Holderness Inshore MCZ 2018 Summer survey, mapped over interpreted Broadscale Habitat data from the 2013 verification survey (Natural England, 2018).

4.2 Evidence of anthropogenic impacts

No anthropogenic impacts were identified during the survey within the Holderness Inshore MCZ.

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6. General List of Abbreviations

BSH	Broadscale Habitat
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CHP	Civil Hydrography Programme
CS	Camera Sledge
CSV	Coastal Survey Vessel
DC	Drop Video Camera
Defra	Department for Environment, Food and Rural Affairs
DG	Day Grab
EA	Environment Agency
ECMAS	Estuarine and Coastal Monitoring & Assessment Service
ENG	Ecological Network Guidance
FOCI	Features Of Conservation Importance
IFCA	Inshore Fisheries and Conservation Authority
MCZ	Marine Conservation Zone
MESH	Mapping European Seabed Habitats
PSA	Particle Size Analysis
REC	Regional Environmental Characterisation
RSG	Regional Stakeholder Group
SAC	Special Area of Conservation
SAD	Site Assessment Document
SNCB	Statutory Nature Conservation Body
SOP	Standard Operating Procedure
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
STR	Subsea Technology and Rentals
UTC	Coordinated Universal Time

7. Annexes

7.1 Coastal Survey Vessel General Information

Briggs Marine and Environmental Services Ltd.
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Tel: +44(0)1592 872939
Email: marketing@briggsmarine.com
Website: www.briggsmarine.com

Humber Guardian

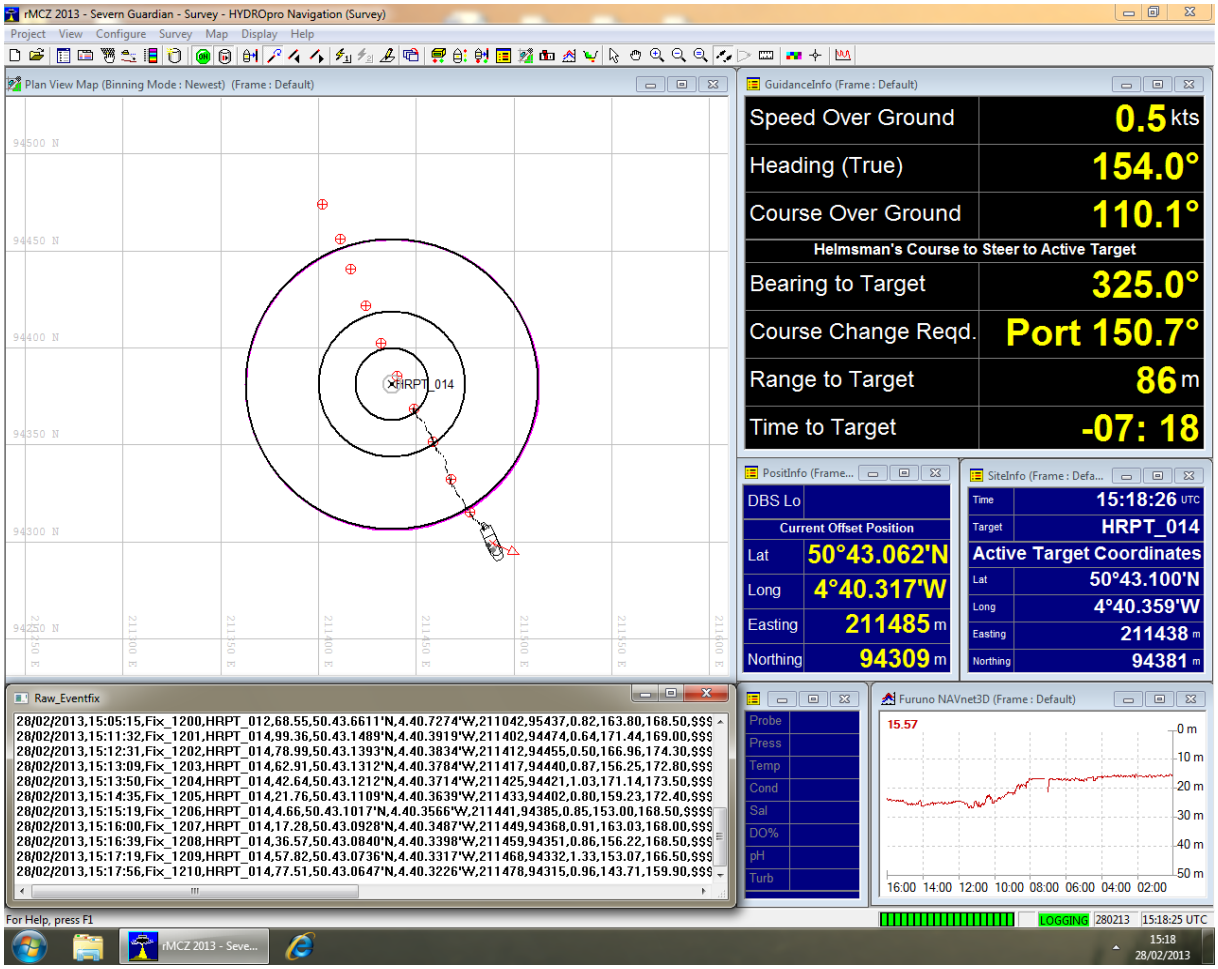
General Information
Length: 18.3 m
Beam: 6.3 m
Draft (baseline): 1.15 m
Draught (skegs): 1.65 m
Displacement (light ship): 22 T
Displacement (full load): 30 T
Service Speed: 16 knots
Maximum Speed: 18 knots

Main Equipment
Main Engines: 2 x Volvo D9-MH 261 bkW @ 2200 rpm. Twin Disc MGX-5075 integral vee-drive
Crew: 2
Scientific Officers: Up to 10
Accommodation: 3 x twin cabins and mess
Data network to share information around vessel
Wet lab/bench for processing water, sediment and ecology samples
Fridge/freezer for sample storage
Dry lab space for two computers and data processing
Large aft deck working area
A frame – 2 T SWL
Double Independent Drum Trawl Winch – 2 T SWL
Hydraulic crane

7.2 Survey Equipment

7.2.1 Navigation and Positioning

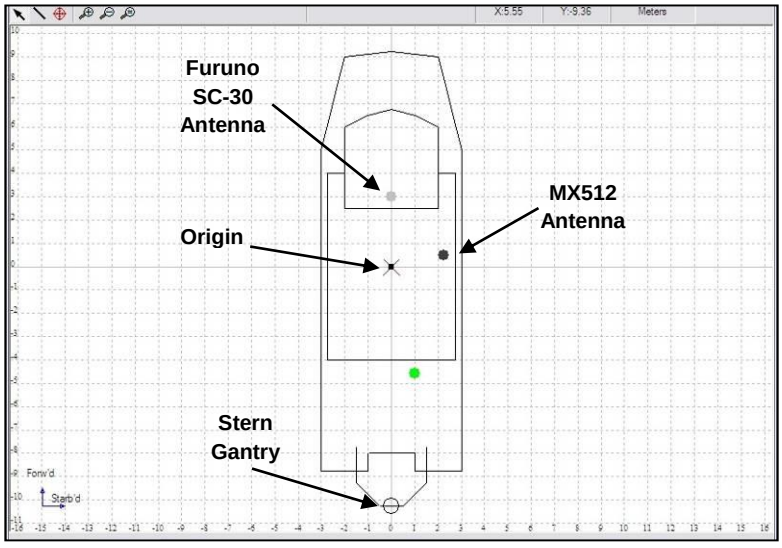
Trimble® HYDRO*pro*™ software is utilised for real-time navigation and survey data acquisition.



Trimble® HYDRO*pro*™ software screen grab displaying real-time navigation and survey data acquisition for a MCZ drop camera survey line.

Navigational and survey equipment offsets on the Coastal Survey Vessel *Humber Guardian* (Environment Agency Estuarine and Coastal Monitoring & Assessment Service).

NMEA Device	Make/Model	Offset Name	Offset (m) X (Starb'd)	Y (Forw'd)	Z +ve (Up)
Gyrocompass	Simrad Robertson RGC50	n/a	-	-	-
Navigation Echosounder	Furuno DFF1, 525ST-MSD transducer	n/a	-	-	-
Survey Echosounder	Kongsberg EA400	n/a	-	-	-
Origin	n/a	Origin	0.0	0.0	0.0
Navigation GPS (Secondary)	Furuno SC-30 DGPS	Furuno SC-30 Antenna	0.0	3.0	0.0
Survey GPS (Primary)	SIMRAD MX512 DGPS	MX512 Antenna	2.25	0.5	0.0
n/a	n/a	Sediment Grab (Stern Gantry)	0.0	-10.25	0.0



Trimble® HYDROpro™ vessel editor screen showing survey equipment offsets from the origin (Environment Agency Estuarine and Coastal Monitoring & Assessment Service).

7.2.2 SeaSpyder Drop Camera System

STR
SUBSEA TECHNOLOGY & RENTALS

SEASPYDER DROP CAMERA SYSTEM

Surface Control Unit & Processor

The SeaSpyder Underwater Drop Camera System is part of a family of field proven camera systems manufactured by STR for the marine survey and environmental communities. The SeaSpyder is ideally suited for operation in shallow-medium water depths with the standard system having a working depth range of 500m. For applications demanding a deeper rating, a "telemetry" model is offered which operates over longer cable lengths for operation down to 1000m. Both models are fitted with a new generation digital SLR Camera offering high resolution digital stills and HD Video for the highest imagery detail. The high specification digital SLR Camera offers an impressive 18.0 mega pixels resolution and both manual and automatic focus for achieving the sharpest images. The captured digital stills are framed with the aid of dedicated real-time video and can be transferred to the topside 'on the fly' for rapid online review.

A 19" rack mount Surface Control Unit and powerful topside processor give full remote control of the camera via the easy to use SeaView GUI software. As standard, the purpose designed camera deployment frame is fitted with a subsea electronics and camera housing, high power underwater flash, an array of four high intensity LED lamps and dual scaling laser pointers to provide accurate imagery scaling. There is the option to install additional sensors with the availability of three user defined serial interfaces with optional power.

SYSTEM FEATURES

- Latest generation 18 Mega Pixels Digital SLR Camera
- Full remote control of camera functions including automatic and manual focus control
- 'On-the-fly' image download
- Real time HD Video
- High Intensity LED Lamps
- Dual lasers for precise imagery scaling
- High speed digital telemetry link to camera and sensors
- Additional user defined RS232 ports and 24VDC power interfaces

SEASPYDER SHALLOW WATER CAMERA SYSTEM

SEASPYDER RACK MOUNT PROCESSOR

Hardware: Standard 19" Rack Mountable
Processor: Intel I5 3.1GHz Quad-Core
Memory: 4GB DDR3 RAM
Storage: 500GB hard drive
Interface: DVD-RW, 2 x 1 GigE, 6 x USB, 4 x RS232
Display: 2 x 22" LED HDMI Monitor
Power: 110/240 VAC, 50 Hz (900W)
Dimensions: 19" 3U rack mountable 550 mm (L) x 485 mm (W) x 132mm (H)

SEASPYDER SEAVIEW SOFTWARE

Key Features:

- Remote control of SeaSpyder Digital Stills Camera
- Digital stills and video capture
- "On-the-fly" image download
- External overlay functions
- Realtime composite video
- HD video capture
- Remote control of lights, scaling lasers and additional sensors

SEASPYDER SURFACE CONTROL UNIT

ELECTRICAL

Power Input: 85 – 264 VAC (47 – 63 Hz) ≈ 500 W max
Cable Power: +/- 48VDC Nominal (≈ 400W max.)
with built in electrical leakage detector

SIGNAL INTERFACE

Cable Interface #1: High bandwidth VDSL2
Cable Interface #2: Differential Colour Composite Video with automatic cable length compensation

MECHANICAL

Dimensions: 19" 2U rack mountable 550 mm (L) 485 mm (W), 88 mm (H)

SEASPYDER SUBSEA ELECTRONICS

ELECTRICAL

Power Output: 24VDC Output (200 W Max Subsea Power)
Interface: 1 x SeaSpyder Camera & Underwater Flash
4 x 24VDC LED Lamps
2 x RS232 Ports with 24VDC
1 x RS232 Port with 12 VDC/ 24VDC
1 x Dual Scaling Lasers

MECHANICAL

Diameter: 200mm
Length: 409mm
Standard Housing: Hard Anodised Aluminium
Depth Rating: 500m

SEASPYDER 18 MEGA PIXELS UNDERWATER DIGITAL STILLS CAMERA

ELECTRICAL

Image Size: JPEG (720 x 480) to (5184 x 3456)
Image Size: RAW (5184 x 3456)
Video: Full HD (1920 x 1080)
ISO Sensitivity: Auto (100 – 6400), 100 – 12800
Sensor Type: 22.3 x 14.9mm CMOS
Aspect Ratio: 3:2
Shutter Speed: 30 – 1/4000 Sec
Interface: Ethernet

OPTICAL

Standard Lens: 10 – 24mm
Macro Mode: F/3.5 – 4.5
Zoom: Fixed
Focus: Manual & Automatic mode
Angle of View: ≈65° in water
Vertical View: ≈1m²@ 80cm in water

SEASPYDER COLOUR VIDEO CAMERA

ELECTRICAL

Image Resolution: 600 TV lines
Video Format: PAL Composite Colour Video
Sensitivity: 0.01 Lux
Sensor Type: 1/3 Sony Super HAD CCD
Frame Rate: 50 FPS
Video Output: ≈1.3Vpp into 75Ω

OPTICAL

Lens Type: 3.6 mm Wide Angle

SEASPYDER HIGH POWER CAMERA FLASH

ELECTRICAL

Control: TTL control via digital stills camera
Power Input: Power supply via stills camera

MECHANICAL

Diameter: 150mm
Length: 230mm
Weight in Air: 7.6kg
Weight in Water: 3.54kg
Standard Housing: Hard Anodised Aluminium
Depth Rating: 3000 m

SEASPYDER 20W LED LIGHT

ELECTRICAL

Lighting: LED Lamp
Luminous Flux: 1500Lm
Wavelength: Neutral White
Power Input: 24 VDC @ 1.1 A (Built in thermal protection)

MECHANICAL

Diameter: 70mm
Length: 110mm
Weight in Air: 1kg
Weight in Water: 0.58kg
Standard Housing: Hard Anodised Aluminium
Depth Rating: 3000m

SEASPYDER DUAL SCALING SUBSEA LASERS

ELECTRICAL

Power Input: 8 V – 30VDC; 60 m A @ 24VDC

LASER

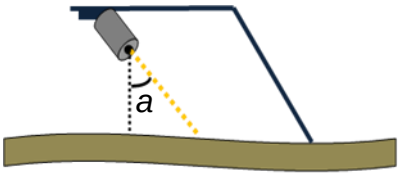
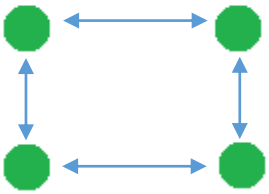
Type: 2 X Class II Safety Classification (<1 milliwatt output)
Beam Shape: Elliptical (Approx 6 mm Red Dot output)
Beam Divergence: - 0.75mrad
Wavelength: 650nm
Temperature Range: -10°C to 40°C

SEASPYDER DROP CAMERA FRAME

MECHANICAL

Length: 2.21m
Width: 1.43m
Height: 1.40m
Weight in Air: 125kg (Inc sensors)

7.2.3 Camera Setup

Survey	
Date	**7th August 2018**
Manufacturer and Model	**STR Sea Spyder**
Survey Vessel	**Humber Guardian**
Separate video/stills camera	**Yes – Stills: Canon EOS 700D**
Approximate video/stills camera line of sight angle (*a*) 	**45**
Distance of video/stills camera above seabed	**60 cm**
Flash unit angle relative to the seabed (approx.)	**45**
Number of lights (dimmable?)	**4 (No)**
Distance between horizontal and vertical vertices of FOV scaling laser points 	**O 19cm O** **22.5cm 19cm** **O 20cm O**
Comments	
Camera settings	
Date and Time	Yes
Image quality	Large Normal (5184 x 3456, 24 bit, 72 dpi)
Flash setup	Compulsory (Manually adjusted per-site based on depth/ambient light.)
Shutter speed	1/160
Aperture size	F5.0
ISO setting	AUTO (ISO-400)
White balance	AWB
Light metering mode	Pattern
Focus	Fixed pre-focus

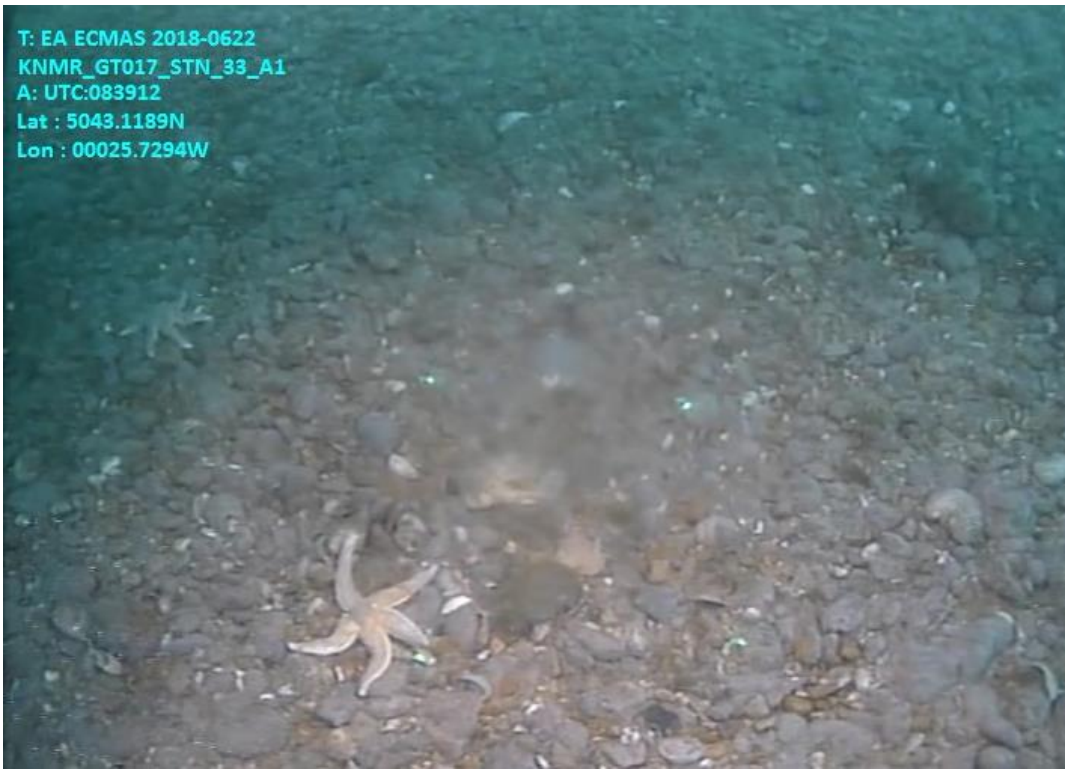
7.3 EA underwater video procedure_version 2.5 (STR Systems)

The procedure outlined below has developed through a series of discussions involving the Environment Agency, Cefas and Natural England. Due to the heterogeneous nature of the inshore coastal seabed habitat, strong tidal streams, various underwater hazards and no dynamic positioning system, a flexible approach is recommended for the underwater video camera deployment. The procedure must be used in accordance with the MESH 'recommended operating guidelines (ROG) for underwater video and photographic imaging techniques' (Coggan *et al*., 2007).

Important points to remember:

- Select stern gantry offset in Hydropro
- Synchronise all survey equipment (camera, laptops, etc.) with primary survey GPS time (UTC).
- Ensure the correct date, station code, STN number, time and position are displayed on the video overlay and clapperboard (if used).

Overlay Example:
EA ECMAS_2018-0622
KNMR_GT017_STN_33_A1 (annotate if station has been attempted on a previous occasion)
UTC: 083912 (real time feed from survey GPS)
Lat: 5043.1189N (real time feed from survey GPS – **uncorrected**)
Lon: 00025.7294W (real time feed from survey GPS – **uncorrected**)

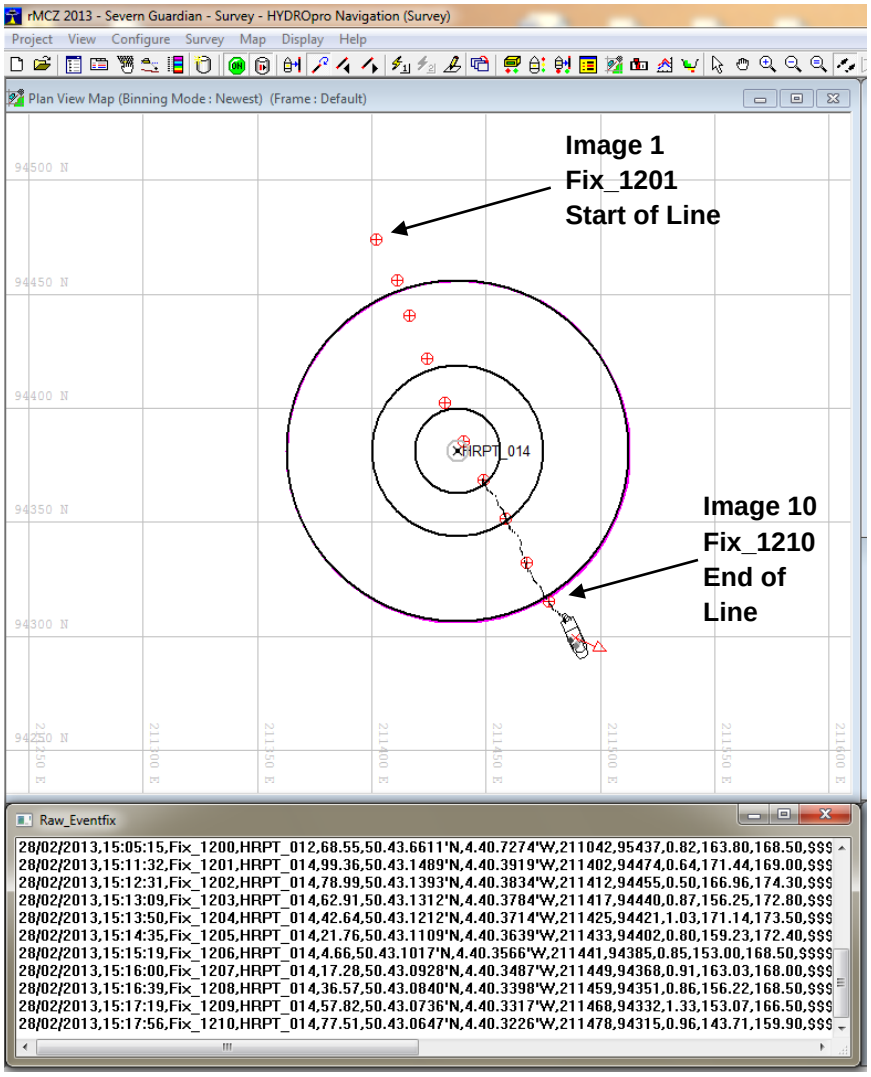


Clapperboard Example:

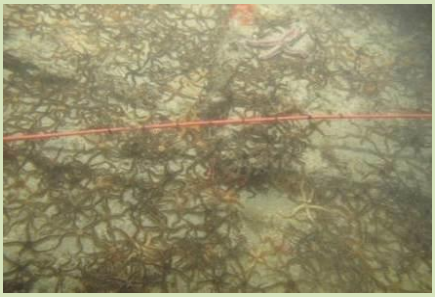
- Alter the stills prefix to the correct station code.

- The field of view scale bar/laser points should be set up/calibrated prior to the survey commencing. Laser pointers are ineffective in moderate/poor visibility conditions; a rope with a visible scale will be required as a replacement
- Set the image resolution to Large Normal (14.7 Megapixels, 18 sec upload time)
- Check the camera settings are appropriate for the conditions; the LED lights are on if required and ensure the video is recording throughout the deployment.
- If a broadscale habitat (BSH) boundary is detected extend the deployment to gather as much information on habitat extent as possible.
- Take extra stills if habitat/species FOCI are observed – note these in the survey log.
- If possible, work a downhill seabed profile to avoid slack cable during deployment.
- Beware of sudden depth changes when surveying rocky areas.
- Abandon the station if survey conditions are hazardous.

Video Camera Type	Survey Conditions	Deployment
Drop Down	Good visibility SOG <1.5 knots	*Deploy camera initially working across the HYDRO*pro* 75 m radius target area, as shown in the diagram below. Hover/rest camera above/on the seabed; take a still every 15 m. If tide/wind conditions do not allow a survey line to be followed across the bull ring, use the outer circle as a guide to ensure a distance of 150 m is covered (minimum) nearby.
	Poor visibility SOG >1.5 knots	Hover/rest camera above/on the seabed, take a still every 15 m. If the visibility is very poor, retrieve the equipment after taking 3-4 stills.



7.4 Underwater Visibility Scale

Example image	Scale	Definition
	Excellent	clear, sharp images - no suspended particulate matter
	Good	seabed features and epifauna clearly discernible
	Moderate	seabed features discernible - epifauna difficult to discern
	Poor	both seabed features and epifauna difficult to discern, low confidence in preliminary habitat assessment
	Very Poor	no seabed features or epifauna visible

7.5 MCZ Video logsheet

MCZ Video Logsheet (v1)

Station data

Contract Code: C5433 Vessel: Solent Guardian Date: 09/04/2016

MCZ Name: Mounts Bay Station Code: MNTB071

Nav-Log filename: SW 2016-0409 SL_log Sampling Gear: DC Water Depth: 10·5 m

Cable Out: _____ (metres). Speed Over Ground (SOG): 1·0 (knots)

Notes on Station:
(including any times & adjustments to Cable Out)

Position Reference Point: Stern gantry

Sample data

Digital Video Tape label: n/a

Filename on Hard-Drive: MNTB_2GDK70416_GT071_STN_1_A1_153751

No. of camera stills: 14 Stills folder name: GT071_STN_1

	GPS Time hh:mm		Fix No	Position in Lat/Long (WGS84)	DV tape counter Mins	Secs
Start of Video (SOV)	15	40	3862	50° 06·3266' N; 5° 32·2924' W	n/a	n/a
End of Video (EOV)	15	45	3875	50° 06·3893' N; 5° 32·2093' W	n/a	n/a

Visual / Video notes: (ground-type, terrain, visibility, species, FOCI, sketch of transect)

Broad-scale habitats observed

Infralittoral Rock ✓		Circalittoral Rock		Sediment habitats		Others	
high energy		high energy		subtidal mixed		macrophyte dominated sed's	✓
mod.energy		mod.energy		subtidal coarse			
low energy		low energy		subtidal mud		biogenic reef	
				subtidal sand	✓	deep-sea bed	

Completed by: K· Arnold Checked by: N· Godsell Entered by: K· Arnold

7.6 Video Survey Metadata

Date	Time UTC	Station Code	WGS84 Latitude DD.DDDDD	WGS84 Longitude DD.DDDDD	STN no.	Hpro fix no.	Fix Description	Still Label	Water depth (m)	SOG (kts)
Sampling Gear: SeaSpyder Drop Camera, FOV Scale: 4 x laser points arranged in an approx square 22.5 cm (left) x 19 cm (furthest from camera) x 19 cm (right) x 20 cm (closest to camera)										
07/08/2018	09:53:37	HLIN014(2)	53.94380	-0.10699	111	Fix_5917	SoL (Start of Line)	HLIN_2ENC30818_GT014_STN_111_A1_0001_015241	15.82	0.75
07/08/2018	09:54:15	HLIN014(2)	53.94367	-0.10705	111	Fix_5918		HLIN_2ENC30818_GT014_STN_111_A1_0002_015319	15.86	0.77
07/08/2018	09:54:51	HLIN014(2)	53.94355	-0.10710	111	Fix_5919		HLIN_2ENC30818_GT014_STN_111_A1_0003_015354	15.96	0.72
07/08/2018	09:55:31	HLIN014(2)	53.94342	-0.10718	111	Fix_5920		HLIN_2ENC30818_GT014_STN_111_A1_0004_015435	15.94	0.71
07/08/2018	09:56:00	HLIN014(2)	53.94333	-0.10723	111	Fix_5921		HLIN_2ENC30818_GT014_STN_111_A1_0005_015503	15.57	0.71
07/08/2018	09:56:18	HLIN014(2)	53.94328	-0.10727	111	Fix_5922		HLIN_2ENC30818_GT014_STN_111_A1_0006_015522	15.47	0.71
07/08/2018	09:57:00	HLIN014(2)	53.94317	-0.10731	111	Fix_5923		HLIN_2ENC30818_GT014_STN_111_A1_0007_015604	16.13	0.59
07/08/2018	09:57:22	HLIN014(2)	53.94312	-0.10734	111	Fix_5924		HLIN_2ENC30818_GT014_STN_111_A1_0008_015626	16.16	0.53
07/08/2018	09:58:03	HLIN014(2)	53.94301	-0.10737	111	Fix_5925		HLIN_2ENC30818_GT014_STN_111_A1_0009_015707	16.22	0.56
07/08/2018	09:58:36	HLIN014(2)	53.94293	-0.10740	111	Fix_5926		HLIN_2ENC30818_GT014_STN_111_A1_0010_015739	16.15	0.57
07/08/2018	09:58:59	HLIN014(2)	53.94287	-0.10741	111	Fix_5927		HLIN_2ENC30818_GT014_STN_111_A1_0011_015803	16.19	0.56
07/08/2018	09:59:02	HLIN014(2)	53.94286	-0.10742	111	Fix_5928		HLIN_2ENC30818_GT014_STN_111_A1_0012_015805	16.19	0.55
07/08/2018	09:59:29	HLIN014(2)	53.94279	-0.10744	111	Fix_5929		HLIN_2ENC30818_GT014_STN_111_A1_0013_015832	16.15	0.57
07/08/2018	09:59:53	HLIN014(2)	53.94273	-0.10746	111	Fix_5930		HLIN_2ENC30818_GT014_STN_111_A1_0014_015857	16.28	0.55
07/08/2018	10:00:16	HLIN014(2)	53.94267	-0.10747	111	Fix_5931		HLIN_2ENC30818_GT014_STN_111_A1_0015_015920	16.32	0.60
07/08/2018	10:00:54	HLIN014(2)	53.94257	-0.10751	111	Fix_5932	EoL (End of Line)	HLIN_2ENC30818_GT014_STN_111_A1_0016_015958	16.36	0.59
07/08/2018	10:19:45	HLIN024(2)	53.89672	-0.06453	112	Fix_5933	SoL	HLIN_2ENC30818_GT024_STN_112_A1_0017_021848	17.56	0.96
07/08/2018	10:20:15	HLIN024(2)	53.89660	-0.06447	112	Fix_5934		HLIN_2ENC30818_GT024_STN_112_A1_0018_021918	17.74	0.87
07/08/2018	10:20:49	HLIN024(2)	53.89647	-0.06442	112	Fix_5935		HLIN_2ENC30818_GT024_STN_112_A1_0019_021952	17.72	0.87
07/08/2018	10:21:29	HLIN024(2)	53.89632	-0.06436	112	Fix_5936		HLIN_2ENC30818_GT024_STN_112_A1_0020_022032	17.62	0.82
07/08/2018	10:22:05	HLIN024(2)	53.89618	-0.06431	112	Fix_5937		HLIN_2ENC30818_GT024_STN_112_A1_0021_022108	17.56	0.88
07/08/2018	10:22:35	HLIN024(2)	53.89606	-0.06426	112	Fix_5938		HLIN_2ENC30818_GT024_STN_112_A1_0022_022138	17.68	0.82

Date	Time UTC	Station Code	WGS84 Latitude DD.DDDDD	WGS84 Longitude DD.DDDDD	STN no.	Hpro fix no.	Fix Description	Still Label	Water depth (m)	SOG (kts)
Sampling Gear: SeaSpyder Drop Camera, FOV Scale: 4 x laser points arranged in an approx square 22.5 cm (left) x 19 cm (furthest from camera) x 19 cm (right) x 20 cm (closest to camera)										
07/08/2018	10:23:13	HLIN024(2)	53.89593	-0.06420	112	Fix_5939		HLIN_2ENC30818_GT024_STN_112_A1_0023_022216	17.64	0.82
07/08/2018	10:23:52	HLIN024(2)	53.89579	-0.06413	112	Fix_5940		HLIN_2ENC30818_GT024_STN_112_A1_0024_022255	17.68	0.85
07/08/2018	10:24:29	HLIN024(2)	53.89565	-0.06407	112	Fix_5941		HLIN_2ENC30818_GT024_STN_112_A1_0025_022333	17.75	0.82
07/08/2018	10:25:03	HLIN024(2)	53.89553	-0.06401	112	Fix_5942		HLIN_2ENC30818_GT024_STN_112_A1_0026_022406	17.77	0.87
07/08/2018	10:25:28	HLIN024(2)	53.89544	-0.06397	112	Fix_5943		HLIN_2ENC30818_GT024_STN_112_A1_0027_022432	17.64	0.80
07/08/2018	10:25:57	HLIN024(2)	53.89534	-0.06392	112	Fix_5944		HLIN_2ENC30818_GT024_STN_112_A1_0028_022500	17.67	0.77
07/08/2018	10:26:17	HLIN024(2)	53.89527	-0.06389	112	Fix_5945	EoL	HLIN_2ENC30818_GT024_STN_112_A1_0029_022520	17.81	0.80
07/08/2018	10:33:52	HLIN020(2)	53.88079	-0.07940	113	Fix_5946	SoL	HLIN_2ENC30818_GT020_STN_113_A1_0030_023255	16.58	0.89
07/08/2018	10:34:21	HLIN020(2)	53.88069	-0.07946	113	Fix_5947		HLIN_2ENC30818_GT020_STN_113_A1_0031_023324	16.47	0.63
07/08/2018	10:34:42	HLIN020(2)	53.88061	-0.07949	113	Fix_5948		HLIN_2ENC30818_GT020_STN_113_A1_0032_023346	16.58	0.66
07/08/2018	10:35:19	HLIN020(2)	53.88048	-0.07953	113	Fix_5949		HLIN_2ENC30818_GT020_STN_113_A1_0033_023423	16.51	0.67
07/08/2018	10:35:45	HLIN020(2)	53.88039	-0.07955	113	Fix_5950		HLIN_2ENC30818_GT020_STN_113_A1_0034_023449	16.64	0.81
07/08/2018	10:36:13	HLIN020(2)	53.88028	-0.07957	113	Fix_5951		HLIN_2ENC30818_GT020_STN_113_A1_0035_023517	16.53	0.78
07/08/2018	10:36:45	HLIN020(2)	53.88015	-0.07960	113	Fix_5952		HLIN_2ENC30818_GT020_STN_113_A1_0036_023549	16.54	0.96
07/08/2018	10:37:18	HLIN020(2)	53.88003	-0.07963	113	Fix_5953		HLIN_2ENC30818_GT020_STN_113_A1_0037_023621	16.47	0.97
07/08/2018	10:37:56	HLIN020(2)	53.87989	-0.07966	113	Fix_5954		HLIN_2ENC30818_GT020_STN_113_A1_0038_023700	16.44	0.85
07/08/2018	10:38:27	HLIN020(2)	53.87977	-0.07969	113	Fix_5955		HLIN_2ENC30818_GT020_STN_113_A1_0039_023731	16.52	0.76
07/08/2018	10:38:57	HLIN020(2)	53.87967	-0.07971	113	Fix_5956		HLIN_2ENC30818_GT020_STN_113_A1_0040_023800	16.62	0.76
07/08/2018	10:39:25	HLIN020(2)	53.87957	-0.07973	113	Fix_5957		HLIN_2ENC30818_GT020_STN_113_A1_0041_023829	16.58	0.73
07/08/2018	10:39:47	HLIN020(2)	53.87951	-0.07974	113	Fix_5958		HLIN_2ENC30818_GT020_STN_113_A1_0042_023850	16.57	0.68
07/08/2018	10:40:16	HLIN020(2)	53.87941	-0.07974	113	Fix_5959		HLIN_2ENC30818_GT020_STN_113_A1_0043_023920	16.53	0.70
07/08/2018	10:40:42	HLIN020(2)	53.87933	-0.07975	113	Fix_5960	EoL	HLIN_2ENC30818_GT020_STN_113_A1_0044_023945	16.49	0.71
07/08/2018	11:12:52	HLIN031(2)	53.78884	-0.02002	114	Fix_5961	SoL	HLIN_2ENC30818_GT031_STN_114_A1_0045_031156	13.34	0.56
07/08/2018	11:13:25	HLIN031(2)	53.78875	-0.01993	114	Fix_5962		HLIN_2ENC30818_GT031_STN_114_A1_0046_031229	13.50	0.71
07/08/2018	11:13:58	HLIN031(2)	53.78864	-0.01985	114	Fix_5963		HLIN_2ENC30818_GT031_STN_114_A1_0047_031302	13.60	0.80

Date	Time UTC	Station Code	WGS84 Latitude DD.DDDDD	WGS84 Longitude DD.DDDDD	STN no.	Hpro fix no.	Fix Description	Still Label	Water depth (m)	SOG (kts)
Sampling Gear: SeaSpyder Drop Camera, FOV Scale: 4 x laser points arranged in an approx square 22.5 cm (left) x 19 cm (furthest from camera) x 19 cm (right) x 20 cm (closest to camera)										
07/08/2018	11:14:29	HLIN031(2)	53.78854	-0.01978	114	Fix_5964		HLIN_2ENC30818_GT031_STN_114_A1_0048_031333	13.64	0.81
07/08/2018	11:15:07	HLIN031(2)	53.78840	-0.01970	114	Fix_5965		HLIN_2ENC30818_GT031_STN_114_A1_0049_031411	13.41	0.85
07/08/2018	11:15:39	HLIN031(2)	53.78829	-0.01963	114	Fix_5966		HLIN_2ENC30818_GT031_STN_114_A1_0050_031442	13.42	0.82
07/08/2018	11:16:05	HLIN031(2)	53.78819	-0.01957	114	Fix_5967		HLIN_2ENC30818_GT031_STN_114_A1_0051_031509	13.42	0.82
07/08/2018	11:16:37	HLIN031(2)	53.78808	-0.01950	114	Fix_5968		HLIN_2ENC30818_GT031_STN_114_A1_0052_031541	13.41	0.80
07/08/2018	11:17:10	HLIN031(2)	53.78797	-0.01943	114	Fix_5969		HLIN_2ENC30818_GT031_STN_114_A1_0053_031613	13.45	0.78
07/08/2018	11:17:41	HLIN031(2)	53.78786	-0.01935	114	Fix_5970		HLIN_2ENC30818_GT031_STN_114_A1_0054_031644	13.19	0.77
07/08/2018	11:18:18	HLIN031(2)	53.78774	-0.01928	114	Fix_5971		HLIN_2ENC30818_GT031_STN_114_A1_0055_031722	13.19	0.70
07/08/2018	11:18:44	HLIN031(2)	53.78767	-0.01922	114	Fix_5972		HLIN_2ENC30818_GT031_STN_114_A1_0056_031747	13.09	0.72
07/08/2018	11:19:04	HLIN031(2)	53.78760	-0.01917	114	Fix_5973		HLIN_2ENC30818_GT031_STN_114_A1_0057_031807	13.30	0.75
07/08/2018	11:19:24	HLIN031(2)	53.78754	-0.01911	114	Fix_5974		HLIN_2ENC30818_GT031_STN_114_A1_0058_031827	13.21	0.79
07/08/2018	11:19:41	HLIN031(2)	53.78748	-0.01907	114	Fix_5975	EoL	HLIN_2ENC30818_GT031_STN_114_A1_0059_031844	13.31	0.77

7.7 Grab Survey Metadata

Date	Time UTC	Station Code	WGS84 Latitude DD.DDDDD	WGS84 Longitude DD.DDDDD	CEFAS STN number	Hpro fix no.	Water depth (m)	Sediment vol. (litres) calculated	Sediment use
Sampling gear = Mini-Hamon grab, sieve mesh = 1 mm									
10/01/2018	10:56:27	HLIN061	53.66117	0.13212	1	Fix_4421	14.57	-	Discarded
10/01/2018	10:59:13	HLIN061	53.66117	0.13217	1	Fix_4422	14.89	3.0	Biota/PSA
10/01/2018	11:15:55	HLIN058	53.67531	0.11521	2	Fix_4423	13.11	1.8	Biota/PSA
10/01/2018	11:19:41	HLIN058	53.67522	0.11528	2	Fix_4424	14.04	-	Discarded
10/01/2018	11:22:25	HLIN058	53.67523	0.11548	2	Fix_4425	14.16	-	Discarded
10/01/2018	11:32:33	HLIN055	53.69109	0.09297	3	Fix_4426	10.60	-	Discarded
10/01/2018	11:36:10	HLIN055	53.69110	0.09299	3	Fix_4427	10.58	-	Discarded
10/01/2018	11:39:25	HLIN055	53.69096	0.09320	3	Fix_4428	10.65	-	Discarded
10/01/2018	11:53:06	HLIN052	53.70693	0.07861	4	Fix_4429	15.63	0.8	PSA
10/01/2018	11:57:10	HLIN052	53.70684	0.07834	4	Fix_4430	14.93	-	Discarded
10/01/2018	12:00:14	HLIN052	53.70700	0.07890	4	Fix_4431	15.34	0.3	Discarded
10/01/2018	12:09:25	HLIN049	53.72272	0.06438	5	Fix_4432	16.94	0.5	Discarded
10/01/2018	12:13:01	HLIN049	53.72268	0.06438	5	Fix_4433	16.77	0.5	PSA
10/01/2018	12:16:15	HLIN049	53.72277	0.06462	5	Fix_4434	16.95	0.2	Discarded
10/01/2018	12:25:38	HLIN046	53.73849	0.04999	6	Fix_4435	16.89	-	Discarded
10/01/2018	12:28:32	HLIN046	53.73853	0.04992	6	Fix_4436	16.75	-	Discarded
10/01/2018	12:31:01	HLIN046	53.73840	0.04998	6	Fix_4437	17.02	-	Grab Misfired
10/01/2018	12:33:33	HLIN046	53.73846	0.05010	6	Fix_4438	17.32	0.5	PSA
10/01/2018	12:44:35	HLIN043	53.75443	0.03539	7	Fix_4439	16.42	1.2	Biota
10/01/2018	12:47:44	HLIN043	53.75430	0.03545	7	Fix_4440	16.16	0.6	PSA
10/01/2018	12:50:45	HLIN043	53.75427	0.03516	7	Fix_4441	16.54	0.5	Discarded
11/01/2018	14:59:13	HLIN069	53.62795	0.15035	17	Fix_4463	10.66	0.4	Epibiota (rock)
11/01/2018	15:06:42	HLIN100	53.63486	0.14897	18	Fix_4464	11.23	-	Discarded
11/01/2018	15:09:10	HLIN100	53.63490	0.14882	18	Fix_4465	10.67	0.4	PSA
11/01/2018	15:12:54	HLIN100	53.63482	0.14892	18	Fix_4466	11.24	-	Discarded
11/01/2018	15:17:58	HLIN098	53.63991	0.14395	19	Fix_4467	11.80	1.8	PSA
11/01/2018	15:20:36	HLIN098	53.63995	0.14410	19	Fix_4468	11.49	-	Discarded
11/01/2018	15:23:05	HLIN098	53.63994	0.14392	19	Fix_4469	10.64	-	Discarded
11/01/2018	15:27:47	HLIN065	53.64641	0.14158	20	Fix_4470	12.88	1.0	Discarded
11/01/2018	15:30:07	HLIN065	53.64636	0.14169	20	Fix_4471	11.86	0.2	Discarded
11/01/2018	15:33:07	HLIN065	53.64637	0.14128	20	Fix_4472	11.75	1.0	PSA
11/01/2018	15:41:35	HLIN070	53.66121	0.14943	21	Fix_4473	18.12	-	Discarded
11/01/2018	15:44:33	HLIN070	53.66117	0.14980	21	Fix_4474	18.08	-	Epibiota (rock w. sabellaria)

Date	Time UTC	Station Code	WGS84 Latitude DD.DDDDD	WGS84 Longitude DD.DDDDD	CEFAS STN number	Hpro fix no.	Water depth (m)	Sediment vol. (litres) calculated	Sediment use
Sampling gear = Mini-Hamon grab, sieve mesh = 1 mm									
11/01/2018	15:47:12	HLIN070	53.66119	0.14938	21	Fix_4475	18.10	1.0	Biota/PSA
11/01/2018	15:55:46	HLIN076	53.67428	0.16779	22	Fix_4476	15.97	0.5	PSA
11/01/2018	15:59:35	HLIN076	53.67437	0.16782	22	Fix_4477	16.42	-	Discarded
11/01/2018	16:02:25	HLIN076	53.67428	0.16819	22	Fix_4478	15.31	-	Discarded
11/01/2018	16:15:04	HLIN080	53.65841	0.18212	23	Fix_4479	17.60	-	Grab Misfired
11/01/2018	16:17:20	HLIN080	53.65837	0.18209	23	Fix_4480	17.62	0.8	PSA
11/01/2018	16:20:11	HLIN080	53.65843	0.18251	23	Fix_4481	17.31	-	Grab Misfired
11/01/2018	16:22:35	HLIN080	53.65856	0.18221	23	Fix_4482	17.25	0.4	Discarded
11/01/2018	16:25:52	HLIN080	53.65836	0.18225	23	Fix_4483	17.31	0.4	Discarded
30/01/2018	09:52:51	HLIN082 grab 1	53.58041	0.19310	24	Fix_4515	7.10	8.0	Biota/PSA
30/01/2018	10:01:20	HLIN086 grab 1	53.59582	0.20918	25	Fix_4516	16.37	-	Discarded
30/01/2018	10:04:17	HLIN086 grab 2	53.59560	0.20925	25	Fix_4517	16.20	-	Grab Misfired
30/01/2018	10:05:45	HLIN086 grab 3	53.59585	0.20964	25	Fix_4518	16.17	-	Discarded
30/01/2018	10:08:27	HLIN086 grab 4	53.59562	0.20948	25	Fix_4519	16.49	0.8	PSA
30/01/2018	10:16:08	HLIN090 grab 1	53.59524	0.23751	26	Fix_4520	16.86	0.5	Discarded
30/01/2018	10:19:22	HLIN090 grab 2	53.59507	0.23717	26	Fix_4521	16.56	-	Grab Misfired
30/01/2018	10:21:33	HLIN090 grab 3	53.59510	0.23771	26	Fix_4522	16.49	-	Grab Misfired
30/01/2018	10:23:58	HLIN090 grab 4	53.59491	0.23783	26	Fix_4523	16.75	-	Grab Misfired
30/01/2018	10:29:45	HLIN090 grab 5	53.59510	0.23715	26	Fix_4524	16.84	-	Discarded
30/01/2018	10:33:07	HLIN090 grab 6	53.59504	0.23730	26	Fix_4525	16.78	-	Grab Misfired
30/01/2018	10:36:17	HLIN090 grab 7	53.59511	0.23729	26	Fix_4526	16.78	-	Grab Misfired
30/01/2018	10:38:06	HLIN090 grab 8	53.59593	0.23772	26	Fix_4527	16.57	-	Grab Misfired
30/01/2018	10:44:28	HLIN090 grab 9	53.59506	0.23717	26	Fix_4528	16.84	0.8	PSA
30/01/2018	10:53:16	HLIN089 grab 1	53.61083	0.22526	27	Fix_4529	17.75	0.6	Discarded
30/01/2018	10:56:14	HLIN089 grab 2	53.61055	0.22552	27	Fix_4530	17.46	0.7	PSA
30/01/2018	10:59:48	HLIN089 grab 3	53.61067	0.22515	27	Fix_4531	17.51	0.5	Discarded
30/01/2018	11:09:03	HLIN087 grab 1	53.62668	0.21094	28	Fix_4532	15.89	0.6	PSA
30/01/2018	11:11:57	HLIN087 grab 2	53.62661	0.21099	28	Fix_4533	15.71	0.2	Discarded
30/01/2018	11:14:58	HLIN087 grab 3	53.62648	0.21064	28	Fix_4534	16.06	-	Discarded
30/01/2018	11:23:17	HLIN084 grab 1	53.64244	0.19669	29	Fix_4535	15.11	-	Discarded
30/01/2018	11:26:14	HLIN084 grab 2	53.64234	0.19678	29	Fix_4536	15.27	0.1	Discarded
30/01/2018	11:29:02	HLIN084 grab 3	53.64268	0.19669	29	Fix_4537	15.16	0.5	PSA
30/01/2018	11:38:54	HLIN088 grab 1	53.65922	0.21170	30	Fix_4538	15.18	-	Discarded
30/01/2018	11:41:35	HLIN088 grab 2	53.65923	0.21159	30	Fix_4539	14.38	0.3	PSA
30/01/2018	11:44:27	HLIN088 grab 3	53.65924	0.21144	30	Fix_4540	14.70	-	Discarded
30/01/2018	11:52:30	HLIN085 grab 1	53.67354	0.19827	31	Fix_4541	16.94	0.5	Discarded
30/01/2018	11:55:45	HLIN085 grab 2	53.67360	0.19822	31	Fix_4542	17.43	1.2	PSA

Date	Time UTC	Station Code	WGS84 Latitude DD.DDDDD	WGS84 Longitude DD.DDDDD	CEFAS STN number	Hpro fix no.	Water depth (m)	Sediment vol. (litres) calculated	Sediment use
Sampling gear = Mini-Hamon grab, sieve mesh = 1 mm									
30/01/2018	11:58:41	HLIN085 grab 3	53.67348	0.19811	31	Fix_4543	17.37	0.5	Discarded
30/01/2018	12:07:05	HLIN081 grab 1	53.68810	0.19151	32	Fix_4544	16.96	0.1	Discarded
30/01/2018	12:09:56	HLIN081 grab 2	53.68800	0.19122	32	Fix_4545	17.20	-	Discarded
30/01/2018	12:12:30	HLIN081 grab 3	53.68799	0.19130	32	Fix_4546	17.06	1.3	Biota/PSA
30/01/2018	12:23:24	HLIN077 grab 1	53.70541	0.16945	33	Fix_4547	17.75	0.2	Discarded
30/01/2018	12:26:15	HLIN077 grab 2	53.70513	0.16977	33	Fix_4548	17.86	0.7	PSA
30/01/2018	12:29:10	HLIN077 grab 3	53.70520	0.16953	33	Fix_4549	17.82	-	Discarded
30/01/2018	12:38:39	HLIN072 grab 1	53.72128	0.15514	34	Fix_4550	17.82	-	Discarded
30/01/2018	12:41:41	HLIN072 grab 2	53.72079	0.15570	34	Fix_4551	18.29	0.6	PSA
30/01/2018	12:44:33	HLIN072 grab 3	53.72120	0.15485	34	Fix_4552	17.84	0.1	Discarded
30/01/2018	12:54:15	HLIN063 grab 1	53.72171	0.12514	35	Fix_4553	18.12	0.5	Discarded
30/01/2018	12:57:00	HLIN063 grab 2	53.72183	0.12495	35	Fix_4554	17.98	0.8	PSA
30/01/2018	13:00:04	HLIN063 grab 3	53.72175	0.12516	35	Fix_4555	17.95	0.6	Discarded
30/01/2018	13:09:34	HLIN060 grab 1	53.73741	0.11080	36	Fix_4556	16.22	-	Discarded
30/01/2018	13:12:14	HLIN060 grab 2	53.73765	0.11053	36	Fix_4557	15.80	-	Discarded
30/01/2018	13:14:48	HLIN060 grab 3	53.73725	0.11085	36	Fix_4558	17.44	-	Discarded
30/01/2018	13:24:50	HLIN057 grab 1	53.75330	0.09603	37	Fix_4559	18.16	1.2	Discarded
30/01/2018	13:27:43	HLIN057 grab 2	53.75323	0.09624	37	Fix_4560	17.58	1.5	Discarded
30/01/2018	13:31:26	HLIN057 grab 3	53.75314	0.09632	37	Fix_4561	18.00	2.3	Biota/PSA
30/01/2018	13:41:56	HLIN054 grab 1	53.76924	0.08113	38	Fix_4562	18.34	1.7	Discarded
30/01/2018	13:44:48	HLIN054 grab 2	53.76911	0.08089	38	Fix_4563	18.08	2.0	Biota/PSA
30/01/2018	13:47:39	HLIN054 grab 3	53.76919	0.08108	38	Fix_4564	18.60	1.4	Discarded
30/01/2018	13:58:04	HLIN051 grab 1	53.78500	0.06734	39	Fix_4565	18.59	1.6	Discarded
30/01/2018	14:00:59	HLIN051 grab 2	53.78490	0.06709	39	Fix_4566	18.46	1.8	PSA
30/01/2018	14:03:52	HLIN051 grab 3	53.78520	0.06752	39	Fix_4567	18.79	0.3	Discarded
30/01/2018	14:13:30	HLIN048 grab 1	53.80082	0.05269	40	Fix_4568	20.36	-	Discarded
30/01/2018	14:16:34	HLIN048 grab 2	53.80099	0.05296	40	Fix_4569	20.35	0.5	Discarded
30/01/2018	14:19:35	HLIN048 grab 3	53.80096	0.05339	40	Fix_4570	20.05	1.6	PSA
30/01/2018	14:29:28	HLIN045 grab 1	53.81659	0.03831	41	Fix_4571	19.56	1.4	PSA
30/01/2018	14:34:09	HLIN045 grab 2	53.81661	0.03849	41	Fix_4572	19.76	-	Discarded
30/01/2018	14:37:16	HLIN045 grab 3	53.81632	0.03879	41	Fix_4573	19.72	0.5	Discarded
30/01/2018	14:48:03	HLIN042 grab 1	53.83226	0.01511	42	Fix_4574	19.37	-	Discarded
30/01/2018	14:51:02	HLIN042 grab 2	53.83216	0.01517	42	Fix_4575	19.63	0.3	PSA
30/01/2018	14:53:51	HLIN042 grab 3	53.83200	0.01546	42	Fix_4576	19.19	0.2	Discarded
30/01/2018	15:03:03	HLIN103 grab 1	53.84895	0.00205	43	Fix_4577	18.84	-	Discarded
30/01/2018	15:05:45	HLIN103 grab 2	53.84890	0.00235	43	Fix_4578	18.78	-	Discarded
30/01/2018	15:08:30	HLIN103 grab 3	53.84879	0.00222	43	Fix_4579	18.69	0.6	PSA

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Sampling gear = Mini-Hamon grab, sieve mesh = 1 mm									
30/01/2018	15:17:36	HLIN036 grab 1	53.83311	-0.00626	44	Fix_4580	18.81	-	Discarded
30/01/2018	15:20:18	HLIN036 grab 2	53.83304	-0.00615	44	Fix_4581	18.81	0.9	PSA
30/01/2018	15:22:53	HLIN036 grab 3	53.83299	-0.00624	44	Missed fix	18.74	0.6	Discarded
30/01/2018	15:31:02	HLIN039 grab 1	53.81719	0.00803	45	Fix_4582	18.67	0.9	PSA
30/01/2018	15:33:52	HLIN039 grab 2	53.81708	0.00801	45	Fix_4583	18.62	-	Discarded
30/01/2018	15:36:52	HLIN039 grab 3	53.81713	0.00811	45	Fix_4584	18.85	0.3	Discarded
30/01/2018	15:44:53	HLIN041 grab 1	53.80135	0.02235	46	Fix_4585	18.67	0.7	PSA
30/01/2018	15:47:41	HLIN041 grab 2	53.80132	0.02256	46	Fix_4586	18.78	-	Discarded
30/01/2018	15:50:24	HLIN041 grab 3	53.80137	0.02283	46	Fix_4587	18.68	0.4	Discarded
30/01/2018	15:58:26	HLIN044 grab 1	53.78819	0.03646	47	Fix_4588	18.67	0.5	Discarded
30/01/2018	16:01:06	HLIN044 grab 2	53.78824	0.03577	47	Fix_4589	18.78	1.5	Biota
30/01/2018	16:03:51	HLIN044 grab 3	53.78829	0.03568	47	Fix_4590	18.68	1.0	PSA
31/01/2018	09:35:57	HLIN099 grab 1	53.63712	0.15565	48	Fix_4591	11.37	0.6	PSA
31/01/2018	09:38:55	HLIN099 grab 2	53.63702	0.15552	48	Fix_4592	11.35	0.4	Discarded
31/01/2018	09:41:33	HLIN099 grab 3	53.63708	0.15530	48	Fix_4593	11.27	-	Discarded
31/01/2018	09:46:21	HLIN097 grab 1	53.64374	0.15206	49	Fix_4594	11.71	-	Discarded
31/01/2018	09:48:35	HLIN097 grab 2	53.64371	0.15157	49	Fix_4595	11.59	-	Discarded
31/01/2018	09:51:04	HLIN097 grab 3	53.64373	0.15173	49	Fix_4596	11.52	-	Discarded
31/01/2018	09:54:41	HLIN096 grab 1	53.64786	0.14839	50	Fix_4597	9.73	0.2	Discarded
31/01/2018	09:57:13	HLIN096 grab 2	53.64787	0.14837	50	Fix_4598	10.44	0.6	PSA
31/01/2018	09:59:18	HLIN096 grab 3	53.64782	0.14829	50	Fix_4599	10.29	-	Discarded
31/01/2018	10:12:05	HLIN066 grab 1	53.68199	0.13306	51	Fix_4600	15.78	0.7	PSA
31/01/2018	10:14:38	HLIN066 grab 2	53.68203	0.13334	51	Fix_4601	15.83	0.1	Discarded
31/01/2018	10:17:09	HLIN066 grab 3	53.68192	0.13329	51	Fix_4602	15.77	0.6	Discarded
31/01/2018	10:22:10	HLIN062 grab 1	53.69064	0.12339	52	Fix_4603	14.36	1.0	PSA
31/01/2018	10:25:00	HLIN062 grab 2	53.69069	0.12362	52	Fix_4604	14.56	0.3	Discarded
31/01/2018	10:27:39	HLIN062 grab 3	53.69056	0.12301	52	Fix_4605	14.45	0.5	Discarded
31/01/2018	10:34:52	HLIN059 grab 1	53.70632	0.10870	53	Fix_4606	14.30	0.2	Discarded
31/01/2018	10:37:16	HLIN059 grab 2	53.70628	0.10914	53	Fix_4607	14.31	0.4	Discarded
31/01/2018	10:40:11	HLIN059 grab 3	53.70639	0.10865	53	Fix_4608	14.34	0.5	PSA
31/01/2018	10:48:49	HLIN056 grab 1	53.72209	0.09467	54	Fix_4609	14.45	-	Discarded
31/01/2018	10:51:30	HLIN056 grab 2	53.72227	0.09412	54	Fix_4610	14.62	0.2	PSA
31/01/2018	10:54:45	HLIN056 grab 3	53.72221	0.09459	54	Fix_4611	14.47	0.3	Discarded
31/01/2018	11:17:53	HLIN037 grab 1	53.75799	0.01609	55	Fix_4612	10.81	0.5	PSA
31/01/2018	11:20:20	HLIN037 grab 2	53.75788	0.01575	55	Fix_4613	10.05	0.2	Discarded
31/01/2018	11:22:40	HLIN037 grab 3	53.75763	0.01607	55	Fix_4614	10.41	0.5	Discarded
31/01/2018	11:31:39	HLIN034 grab 1	53.77409	-0.00461	56	Fix_4615	9.76	0.3	Discarded

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Sampling gear = Mini-Hamon grab, sieve mesh = 1 mm									
31/01/2018	11:33:52	HLIN034 grab 2	53.77399	-0.00428	56	Fix_4616	9.98	0.4	PSA
31/01/2018	11:36:14	HLIN034 grab 3	53.77424	-0.00423	56	Fix_4617	10.04	-	Grab Misfired
31/01/2018	11:36:56	HLIN034 grab 4	53.77414	-0.00381	56	Fix_4618	10.33	-	Discarded
31/01/2018	11:44:52	HLIN031 grab 1	53.78807	-0.01944	57	Fix_4619	10.61	-	Discarded
31/01/2018	11:47:04	HLIN031 grab 2	53.78814	-0.01945	57	Fix_4620	10.65	-	Discarded
31/01/2018	11:49:40	HLIN031 grab 3	53.78819	-0.01920	57	Fix_4621	10.73	-	Discarded
31/01/2018	11:58:02	HLIN028 grab 1	53.80218	-0.03811	58	Fix_4622	9.61	0.7	PSA
31/01/2018	12:00:20	HLIN028 grab 2	53.80241	-0.03785	58	Fix_4623	9.69	-	Discarded
31/01/2018	12:02:37	HLIN028 grab 3	53.80228	-0.03838	58	Fix_4624	9.24	-	Discarded
31/01/2018	12:12:04	HLIN025 grab 1	53.81799	-0.05248	59	Fix_4625	10.92	-	Discarded
31/01/2018	12:14:24	HLIN025 grab 2	53.81818	-0.05226	59	Fix_4626	11.09	1.0	PSA
31/01/2018	12:16:51	HLIN025 grab 3	53.81793	-0.05258	59	Fix_4627	10.97	0.3	Discarded
31/01/2018	12:52:05	HLIN110 grab 1	53.89170	-0.13611	60	Fix_4628	7.34	0.5	Discarded
31/01/2018	12:54:17	HLIN110 grab 2	53.89165	-0.13650	60	Fix_4629	7.24	2.0	Discarded
31/01/2018	12:56:42	HLIN110 grab 3	53.89170	-0.13621	60	Fix_4630	7.44	2.3	Biota/PSA
31/01/2018	13:06:22	HLIN006 grab 1	53.91296	-0.13952	61	Fix_4631	13.83	1.9	Biota/PSA
31/01/2018	13:09:52	HLIN006 grab 2	53.91293	-0.13947	61	Fix_4632	13.11	-	Discarded
31/01/2018	13:12:18	HLIN006 grab 3	53.91257	-0.13947	61	Fix_4633	13.64	-	Discarded
31/01/2018	13:21:13	HLIN004 grab 1	53.92862	-0.15394	62	Fix_4634	12.00	1.0	Discarded
31/01/2018	13:23:40	HLIN004 grab 2	53.92857	-0.15408	62	Fix_4635	12.01	1.7	PSA
31/01/2018	13:26:05	HLIN004 grab 3	53.92868	-0.15398	62	Fix_4636	12.33	0.6	Discarded
31/01/2018	13:30:20	HLIN109 grab 1	53.93409	-0.15771	63	Fix_4637	12.51	1.6	Discarded
31/01/2018	13:33:01	HLIN109 grab 2	53.93402	-0.15779	63	Fix_4638	12.47	1.6	PSA
31/01/2018	13:35:31	HLIN109 grab 3	53.93392	-0.15805	63	Fix_4639	12.04	1.2	Discarded
31/01/2018	13:42:30	HLIN002 grab 1	53.94444	-0.16829	64	Fix_4640	9.98	-	Discarded
31/01/2018	13:44:51	HLIN002 grab 2	53.94454	-0.16856	64	Fix_4641	9.72	0.1	PSA (combined)
31/01/2018	13:47:17	HLIN002 grab 3	53.94424	-0.16880	64	Fix_4642	9.80	0.1	PSA (combined)
31/01/2018	13:53:32	HLIN108 grab 1	53.95342	-0.16385	65	Fix_4643	14.10	1.1	PSA
31/01/2018	13:56:23	HLIN108 grab 2	53.95342	-0.16428	65	Fix_4644	13.90	1.7	Discarded
31/01/2018	13:58:53	HLIN108 grab 3	53.95355	-0.16390	65	Fix_4645	13.92	1.8	Biota
31/01/2018	14:08:20	HLIN001 grab 1	53.96361	-0.17335	66	Fix_4646	14.16	0.8	PSA
31/01/2018	14:10:58	HLIN001 grab 2	53.96368	-0.17277	66	Fix_4647	14.35	0.7	Discarded
31/01/2018	14:13:35	HLIN001 grab 3	53.96352	-0.17288	66	Fix_4648	14.35	0.8	Discarded
31/01/2018	14:22:54	HLIN107 grab 1	53.96568	-0.17860	67	Fix_4649	11.77	0.7	PSA
31/01/2018	14:26:41	HLIN107 grab 2	53.96572	-0.17881	67	Fix_4650	12.12	2.0	Biota

Date	Time UTC	Station Code	WGS84 Latitude DD.DDDDD	WGS84 Longitude DD.DDDDD	CEFAS STN number	Hpro fix no.	Water depth (m)	Sediment vol. (litres) calculated	Sediment use
Sampling gear = Mini-Hamon grab, sieve mesh = 1 mm									
31/01/2018	14:29:08	HLIN107 grab 3	53.96571	-0.17864	67	Fix_4651	12.06	1.9	Discarded
31/01/2018	14:35:17	HLIN106 grab 1	53.97204	-0.18299	68	Fix_4652	12.00	0.6	Discarded
31/01/2018	14:38:43	HLIN106 grab 2	53.97209	-0.18326	68	Fix_4653	11.69	1.4	PSA
31/01/2018	14:41:23	HLIN106 grab 3	53.97200	-0.18291	68	Fix_4654	11.95	0.2	Discarded
31/01/2018	14:49:20	HLIN104 grab 1	53.96365	-0.15719	69	Fix_4655	16.33	1.5	Discarded
31/01/2018	14:52:33	HLIN104 grab 2	53.96360	-0.15721	69	Fix_4656	16.41	1.6	PSA
31/01/2018	14:55:17	HLIN104 grab 3	53.96365	-0.15726	69	Fix_4657	16.40	1.9	Biota
31/01/2018	15:00:24	HLIN005 grab 1	53.95990	-0.15271	70	Fix_4658	16.94	0.3	Discarded
31/01/2018	15:03:15	HLIN005 grab 2	53.95984	-0.15254	70	Fix_4659	17.02	1.4	PSA
31/01/2018	15:05:47	HLIN005 grab 3	53.95977	-0.15280	70	Missed fix	17.13	-	Discarded
31/01/2018	15:11:15	HLIN105 grab 1	53.95968	-0.15878	71	Fix_4660	17.40	1.9	Discarded
31/01/2018	15:14:05	HLIN105 grab 2	53.95959	-0.15786	71	Fix_4661	17.15	2.1	Biota/PSA
31/01/2018	15:16:58	HLIN105 grab 3	53.95964	-0.15859	71	Fix_4662	17.32	1.4	Discarded
31/01/2018	15:25:25	HLIN007 grab 1	53.94397	-0.13822	72	Fix_4663	17.81	1.1	Discarded
31/01/2018	15:28:10	HLIN007 grab 2	53.94401	-0.13841	72	Fix_4664	17.94	-	Discarded
31/01/2018	15:30:55	HLIN007 grab 3	53.94417	-0.13820	72	Fix_4665	17.81	1.3	PSA
04/04/2018	09:39:57	HLIN078 grab 1	53.59626	0.17896	73	Fix_4670	15.63	-	Grab Misfired
04/04/2018	09:42:46	HLIN078 grab 2	53.59646	0.17923	73	Fix_4671	15.40	0.5	Discarded
04/04/2018	09:47:47	HLIN078 grab 3	53.59637	0.17906	73	Fix_4672	15.31	-	Grab Misfired
04/04/2018	09:50:19	HLIN078 grab 4	53.59626	0.17907	73	Fix_4673	15.28	-	Discarded
04/04/2018	09:54:26	HLIN078 grab 5	53.59621	0.17947	73	Fix_4674	15.10	0.6	PSA
04/04/2018	10:14:30	HLIN083 grab 1	53.61157	0.19457	74	Fix_4675	18.25	0.6	PSA
04/04/2018	10:17:37	HLIN083 grab 2	53.61170	0.19482	74	Fix_4676	17.77	-	Grab Misfired
04/04/2018	10:20:35	HLIN083 grab 3	53.61152	0.19469	74	Fix_4677	17.56	-	Grab Empty
04/04/2018	10:24:53	HLIN083 grab 4	53.61160	0.19465	74	Fix_4678	17.24	-	Grab Empty
04/04/2018	10:36:27	HLIN079 grab 1	53.62748	0.18050	75	Fix_4679	15.89	-	Grab Empty
04/04/2018	10:39:19	HLIN079 grab 2	53.62747	0.18085	75	Fix_4680	15.96	1.7	PSA
04/04/2018	10:42:12	HLIN079 grab 3	53.62743	0.17998	75	Fix_4681	16.60	-	Grab Empty
04/04/2018	10:51:28	HLIN075 grab 1	53.64310	0.16598	76	Fix_4682	15.31	0.4	PSA
04/04/2018	10:54:24	HLIN075 grab 2	53.64328	0.16603	76	Fix_4683	15.63	-	Grab Empty
04/04/2018	10:57:36	HLIN075 grab 3	53.64317	0.16620	76	Fix_4684	15.51	-	Boulder
04/04/2018	11:32:00	HLIN071 grab 1	53.69469	0.15043	77	Fix_4685	15.48	-	Discarded
04/04/2018	11:35:53	HLIN071 grab 2	53.69470	0.15067	77	Fix_4686	15.74	-	Discarded
04/04/2018	12:01:28	HLIN071 grab 3	53.69437	0.14998	77	Fix_4687	15.65	-	Discarded
04/04/2018	12:07:16	HLIN067 grab 1	53.70614	0.13891	78	Fix_4688	15.71	-	Discarded
04/04/2018	12:10:06	HLIN067 grab 2	53.70595	0.13919	78	Fix_4689	15.87	-	Discarded
04/04/2018	12:13:01	HLIN067 grab 3	53.70576	0.13891	78	Fix_4690	15.52	-	Discarded

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Sampling gear = Mini-Hamon grab, sieve mesh = 1 mm									
04/04/2018	12:29:50	HLIN053 grab 1	53.73702	0.07640	79	Fix_4691	13.41	-	Discarded
04/04/2018	12:32:43	HLIN053 grab 2	53.73731	0.07586	79	Fix_4692	13.91	0.5	PSA
04/04/2018	12:35:39	HLIN053 grab 3	53.73679	0.07642	79	Fix_4693	12.98	-	Discarded
04/04/2018	12:43:03	HLIN050 grab 1	53.75380	0.06559	80	Fix_4694	14.40	0.5	PSA
04/04/2018	12:46:31	HLIN050 grab 2	53.75383	0.06598	80	Fix_4695	14.42	-	Discarded
04/04/2018	12:49:42	HLIN050 grab 3	53.75382	0.06621	80	Fix_4696	14.39	0.3	Discarded
04/04/2018	12:57:05	HLIN047 grab 1	53.76981	0.05158	81	Fix_4697	15.00	0.6	PSA
04/04/2018	12:59:35	HLIN047 grab 2	53.76958	0.05136	81	Fix_4698	15.10	0.1	Discarded
04/04/2018	13:01:58	HLIN047 grab 3	53.76961	0.05161	81	Fix_4699	14.93	0.1	Discarded
04/04/2018	13:09:56	HLIN040 grab 1	53.77031	0.02095	82	Fix_4700	12.39	0.1	Discarded
04/04/2018	13:12:21	HLIN040 grab 2	53.77028	0.02107	82	Fix_4701	12.07	-	Grab Empty
04/04/2018	13:14:38	HLIN040 grab 3	53.77031	0.02110	82	Fix_4702	12.37	-	Discarded
04/04/2018	13:19:51	HLIN101 grab 1	53.77420	0.00768	83	Fix_4703	12.44	-	Discarded
04/04/2018	13:22:43	HLIN101 grab 2	53.77373	0.00741	83	Fix_4704	12.21	0.4	PSA
04/04/2018	13:25:19	HLIN101 grab 3	53.77384	0.00735	83	Fix_4705	12.14	0.1	Discarded
04/04/2018	13:30:22	HLIN102 grab 1	53.78026	0.00987	84	Fix_4706	11.95	0.2	Discarded
04/04/2018	13:33:44	HLIN102 grab 2	53.78044	0.01033	84	Fix_4707	11.56	0.1	Discarded
04/04/2018	13:36:46	HLIN102 grab 3	53.78034	0.01002	84	Fix_4708	11.72	0.2	Discarded
04/04/2018	13:40:53	HLIN038 grab 1	53.78596	0.00692	85	Fix_4709	11.24	-	Discarded
04/04/2018	13:43:20	HLIN038 grab 2	53.78601	0.00643	85	Fix_4710	11.47	-	Discarded
04/04/2018	13:46:05	HLIN038 grab 3	53.78592	0.00658	85	Fix_4711	11.75	0.6	PSA
04/04/2018	14:16:14	HLIN035 grab 1	53.80202	-0.00770	86	Fix_4712	13.08	0.2	Discarded
04/04/2018	14:18:41	HLIN035 grab 2	53.80168	-0.00740	86	Fix_4713	12.97	0.5	PSA
04/04/2018	14:21:04	HLIN035 grab 3	53.80169	-0.00746	86	Fix_4714	13.18	0.1	Discarded
04/04/2018	14:29:11	HLIN032 grab 1	53.81749	-0.02204	87	Fix_4715	11.91	0.3	PSA
04/04/2018	14:31:44	HLIN032 grab 2	53.81745	-0.02203	87	Fix_4716	12.08	-	Discarded
04/04/2018	14:34:12	HLIN032 grab 3	53.81769	-0.02220	87	Fix_4717	11.96	0.1	Discarded
04/04/2018	14:43:33	HLIN029 grab 1	53.83325	-0.03677	88	Fix_4718	11.82	0.2	Discarded
04/04/2018	14:45:56	HLIN029 grab 2	53.83332	-0.03653	88	Fix_4719	12.12	1.6	Discarded
04/04/2018	14:48:39	HLIN029 grab 3	53.83348	-0.03643	88	Fix_4720	12.30	2.0	Biota + PSA
04/04/2018	14:57:16	HLIN022 grab 1	53.83379	-0.06687	89	Fix_4721	11.31	0.2	Discarded
04/04/2018	14:59:45	HLIN022 grab 2	53.83407	-0.06701	89	Fix_4722	10.83	-	Discarded
04/04/2018	15:02:03	HLIN022 grab 3	53.83381	-0.06651	89	Fix_4723	11.54	0.8	PSA
04/04/2018	15:10:24	HLIN019 grab 1	53.84980	-0.08108	90	Fix_4724	12.41	0.4	Discarded
04/04/2018	15:13:05	HLIN019 grab 2	53.84959	-0.08147	90	Fix_4725	12.20	0.2	Discarded
04/04/2018	15:15:46	HLIN019 grab 3	53.84984	-0.08148	90	Fix_4726	12.43	0.5	PSA
04/04/2018	15:24:05	HLIN026 grab 1	53.84921	-0.05112	91	Fix_4727	13.62	0.6	PSA

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Sampling gear = Mini-Hamon grab, sieve mesh = 1 mm									
04/04/2018	15:26:34	HLIN026 grab 2	53.84925	-0.05135	91	Fix_4728	13.56	-	Discarded
04/04/2018	15:29:14	HLIN026 grab 3	53.84927	-0.05141	91	Fix_4729	13.29	0.1	Discarded
04/04/2018	15:37:35	HLIN033 grab 1	53.84861	-0.02064	92	Fix_4730	16.20	-	Discarded
04/04/2018	15:40:10	HLIN033 grab 2	53.84869	-0.02099	92	Fix_4731	16.45	0.5	Discarded
04/04/2018	15:42:59	HLIN033 grab 3	53.84870	-0.02071	92	Fix_4732	16.33	0.5	PSA
07/04/2018	10:33:11	HLIN023 grab 1	53.86499	-0.06583	93	Fix_4733	17.35	0.3	PSA
07/04/2018	10:36:10	HLIN023 grab 2	53.86485	-0.06573	93	Fix_4734	17.23	0.2	Discarded
07/04/2018	10:38:40	HLIN023 grab 3	53.86494	-0.06559	93	Fix_4735	16.72	0.2	Discarded
07/04/2018	10:46:38	HLIN016 grab 1	53.86542	-0.09613	94	Fix_4736	15.25	0.2	Discarded
07/04/2018	10:49:07	HLIN016 grab 2	53.86558	-0.09596	94	Fix_4737	15.18	-	Grab Misfired
07/04/2018	10:50:12	HLIN016 grab 3	53.86558	-0.09607	94	Fix_4738	15.24	0.1	Discarded
07/04/2018	10:53:24	HLIN016 grab 4	53.86560	-0.09622	94	Fix_4739	15.09	0.5	PSA
07/04/2018	11:02:43	HLIN012 grab 1	53.88388	-0.11256	95	Fix_4740	15.93	1.4	PSA
07/04/2018	11:06:15	HLIN012 grab 2	53.88377	-0.11251	95	Fix_4741	15.87	1.0	Discarded
07/04/2018	11:10:00	HLIN012 grab 3	53.88382	-0.11244	95	Fix_4742	16.06	0.5	Discarded
07/04/2018	11:18:08	HLIN017 grab 1	53.89674	-0.09472	96	Fix_4743	17.62	1.2	PSA
07/04/2018	11:21:04	HLIN017 grab 2	53.89673	-0.09463	96	Fix_4744	17.26	-	Discarded
07/04/2018	11:32:47	HLIN017 grab 3	53.89659	-0.09472	96	Fix_4745	16.91	-	Grab Misfired
07/04/2018	11:33:57	HLIN017 grab 4	53.89659	-0.09487	96	Fix_4746	16.83	-	Grab Misfired
07/04/2018	11:42:26	HLIN017 grab 5	53.89660	-0.09433	96	Fix_4747	16.91	-	Discarded
07/04/2018	11:56:44	HLIN009 grab 1	53.90331	-0.11723	97	Fix_4748	16.06	0.5	PSA
07/04/2018	11:59:30	HLIN009 grab 2	53.90345	-0.11672	97	Fix_4749	15.57	0.3	Discarded
07/04/2018	12:02:15	HLIN009 grab 3	53.90336	-0.11711	97	Fix_4750	15.33	0.1	Discarded
07/04/2018	12:08:26	HLIN013 grab 1	53.91270	-0.10947	98	Fix_4751	16.55	1.1	PSA
07/04/2018	12:11:44	HLIN013 grab 2	53.91251	-0.10891	98	Fix_4752	17.01	0.1	Discarded
07/04/2018	12:14:36	HLIN013 grab 3	53.91252	-0.10909	98	Fix_4753	16.52	0.5	Discarded
07/04/2018	12:23:05	HLIN010 grab 1	53.92827	-0.12351	99	Fix_4754	14.72	0.2	Discarded
07/04/2018	12:25:56	HLIN010 grab 2	53.92830	-0.12332	99	Fix_4755	14.79	0.4	PSA
07/04/2018	12:28:54	HLIN010 grab 3	53.92839	-0.12345	99	Fix_4756	14.61	0.1	Discarded
07/04/2018	12:49:26	HLIN003 grab 1	53.97566	-0.16743	100	Fix_4757	14.44	0.4	Discarded
07/04/2018	12:52:09	HLIN003 grab 2	53.97560	-0.16708	100	Fix_4758	14.20	0.9	PSA
07/04/2018	12:54:14	HLIN003 grab 3	53.97565	-0.16711	100	Fix_4759	14.19	0.2	Discarded
07/04/2018	13:02:50	HLIN008 grab 1	53.97500	-0.13659	101	Fix_4760	15.17	0.8	PSA
07/04/2018	13:05:25	HLIN008 grab 2	53.97502	-0.13696	101	Fix_4761	15.21	0.7	Discarded
07/04/2018	13:08:08	HLIN008 grab 3	53.97522	-0.13685	101	Fix_4762	15.25	0.7	Discarded
07/04/2018	13:16:18	HLIN015 grab 1	53.97482	-0.10617	102	Fix_4763	14.68	0.5	Discarded
07/04/2018	13:18:46	HLIN015 grab 2	53.97457	-0.10673	102	Fix_4764	14.28	-	Grab Misfired

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Sampling gear = Mini-Hamon grab, sieve mesh = 1 mm									
07/04/2018	13:19:52	HLIN015 grab 3	53.97461	-0.10652	102	Fix_4765	13.96	-	Grab Misfired
07/04/2018	13:20:58	HLIN015 grab 4	53.97473	-0.10663	102	Fix_4766	14.16	0.7	PSA
07/04/2018	13:25:59	HLIN015 grab 5	53.97465	-0.10599	102	Fix_4767	14.14	0.5	Discarded
07/04/2018	13:34:42	HLIN011 grab 1	53.95949	-0.12235	103	Fix_4768	16.58	0.9	Discarded
07/04/2018	13:38:13	HLIN011 grab 2	53.95940	-0.12233	103	Fix_4769	16.28	-	Grab Misfired
07/04/2018	13:40:14	HLIN011 grab 3	53.95933	-0.12259	103	Fix_4770	16.79	1.7	PSA
07/04/2018	13:44:00	HLIN011 grab 4	53.95931	-0.12246	103	Fix_4771	16.27	1.1	Discarded
07/04/2018	13:53:34	HLIN014 grab 1	53.94367	-0.10797	104	Fix_4772	14.53	0.1	Discarded
07/04/2018	13:56:40	HLIN014 grab 2	53.94359	-0.10774	104	Fix_4773	14.68	-	Discarded
07/04/2018	13:59:10	HLIN014 grab 3	53.94367	-0.10764	104	Fix_4774	14.44	-	Discarded
07/04/2018	14:08:11	HLIN018 grab 1	53.92792	-0.09336	105	Fix_4775	16.20	0.1	Discarded
07/04/2018	14:10:40	HLIN018 grab 2	53.92764	-0.09328	105	Fix_4776	16.15	0.3	Discarded
07/04/2018	14:13:10	HLIN018 grab 3	53.92770	-0.09319	105	Fix_4777	15.90	0.5	PSA
07/04/2018	14:22:19	HLIN021 grab 1	53.91195	-0.07868	106	Fix_4778	16.12	0.2	Discarded
07/04/2018	14:24:52	HLIN021 grab 2	53.91208	-0.07848	106	Fix_4779	16.21	1.5	PSA
07/04/2018	14:27:57	HLIN021 grab 3	53.91192	-0.07882	106	Fix_4780	16.30	0.2	Discarded
07/04/2018	14:37:26	HLIN024 grab 1	53.89627	-0.06426	107	Fix_4781	16.12	-	Discarded
07/04/2018	14:40:31	HLIN024 grab 2	53.89618	-0.06447	107	Fix_4782	15.88	-	Discarded
07/04/2018	14:44:13	HLIN024 grab 3	53.89602	-0.06451	107	Fix_4783	16.11	-	Grab Misfired
07/04/2018	14:46:23	HLIN024 grab 4	53.89644	-0.06460	107	Fix_4784	15.84	0.1	Discarded
07/04/2018	14:54:57	HLIN020 grab 1	53.88103	-0.08040	108	Fix_4785	14.74	-	Discarded
07/04/2018	14:58:52	HLIN020 grab 2	53.88111	-0.08007	108	Fix_4786	14.75	-	Discarded
07/04/2018	15:00:27	HLIN020 grab 3	53.88081	-0.08007	108	Fix_4787	14.91	-	Discarded
07/04/2018	15:09:08	HLIN027 grab 1	53.88039	-0.04967	109	Fix_4788	15.47	1.5	PSA
07/04/2018	15:11:35	HLIN027 grab 2	53.88018	-0.05006	109	Fix_4789	15.55	0.2	Discarded
07/04/2018	15:13:58	HLIN027 grab 3	53.88056	-0.04992	109	Fix_4790	14.60	0.2	Discarded
07/04/2018	15:23:34	HLIN030 grab 1	53.86445	-0.03527	110	Fix_4791	15.33	0.1	Discarded
07/04/2018	15:26:12	HLIN030 grab 2	53.86434	-0.03542	110	Fix_4792	15.25	0.8	Discarded
07/04/2018	15:29:06	HLIN030 grab 3	53.86448	-0.03559	110	Fix_4793	15.56	1.6	PSA

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