Aquatic Biosecurity Pty Ltd

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SEDIMENT CORING OF PORT STANVAC WATERS BY VIBECORING

A Report for the Department of Environment and Water

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Ms Roberta Rice (GeoOceans Horizons) who performed all core logging, preparation and sediment interpretation.

Mr Joe Pedicini, Environmental who took delivery of the large core tubes, decanted and processed.

This project is an initiative of the Minister for the Environment the Honourable Mr David Speirs MP, and the Department for the Environment and Water.

1. COPYRIGHT STATEMENT, PURPOSE, DISCLAIMER & DOCUMENTS

1.1 COPYRIGHT

1.2 PURPOSE

This Report is a summary of events for the conduct of a sediment coring exercise from the 25th August to the 13th October 2020. This inspection is a factual report on the work carried out and the opinions expressed are given in good faith. This Report is issued without prejudice. In the opinion of the author the report constitutes a statement of the conditions at the time the work was carried out.

It is to be clearly understood that the condition/state of items hereafter reported upon are strictly the opinion of the undersigned and that opinion reflects the condition/state found on the 25th August to the 13th October 2020 only.

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1.3 STANDARD DISCLAIMER

This report implies no guarantee, no safeguard against latent defects, subsequent defects, or defects not discovered at the time of the operation. Cores were retrieved and either capped both ends and transported upright to shore or decanted, capped both ends and delivered to GeoOceans/Environmental Projects but no sediment interpretation was performed. No advice was intentionally or otherwise given on testing or use of the sediment samples.

Aquatic Biosecurity Pty Ltd accepts no responsibility or liability in relation to the success of any future works that might refer to this work as the seafloor is a moving and evolving entity which changes daily, due to tides, pollution, habitat degradation, commercial industry, recreational exercises and other impacts.

This report carries no warranty. This work is personal and confidential to our client and has no extended warranty if disposed of to a third party for any purpose without the permission of Aquatic Biosecurity Pty Ltd.

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2. EXECUTIVE SUMMARY

This technical report illustrates the procedure undertaken in the vibecore sediment coring of 42 sites in the waters at Port Stanvac, South Australia. No interpretation or testing of the collected sediment core samples was performed by Aquatic Biosecurity Pty Ltd. Core logging, sampling, and testing duties were undertaken separately by Environmental Projects, GeoOceans, the Australian Water Quality Centre (AWQC) and other contractors. A sediment core retrieval service only was given by Aquatic Biosecurity Pty Ltd in this project.

The project was undertaken to retrieve 42 sediment cores near sites supplied by the Department of Environment and Water– S.A. Global Positioning System (GPS) coordinates (32 sites) were provided to Aquatic Biosecurity on 21st August 2020 and coring began on the 25th of August 2020. One site (SS05) was exchanged from the original GPS point by DEW.

The second set of GPS coordinates (10 sites) was provided on the 8th of October and coring began and concluded on the 13th of October 2020.

The first 32 sites were cored with 3.665m core tubes and a further 10 were then taken with 1.8m core tubes for a total of 42 sites. The core tubes with sediment intact were then delivered to 3rd parties for all processing, preserving, and testing operations.

3. PROJECT DETAILS AND METHODS

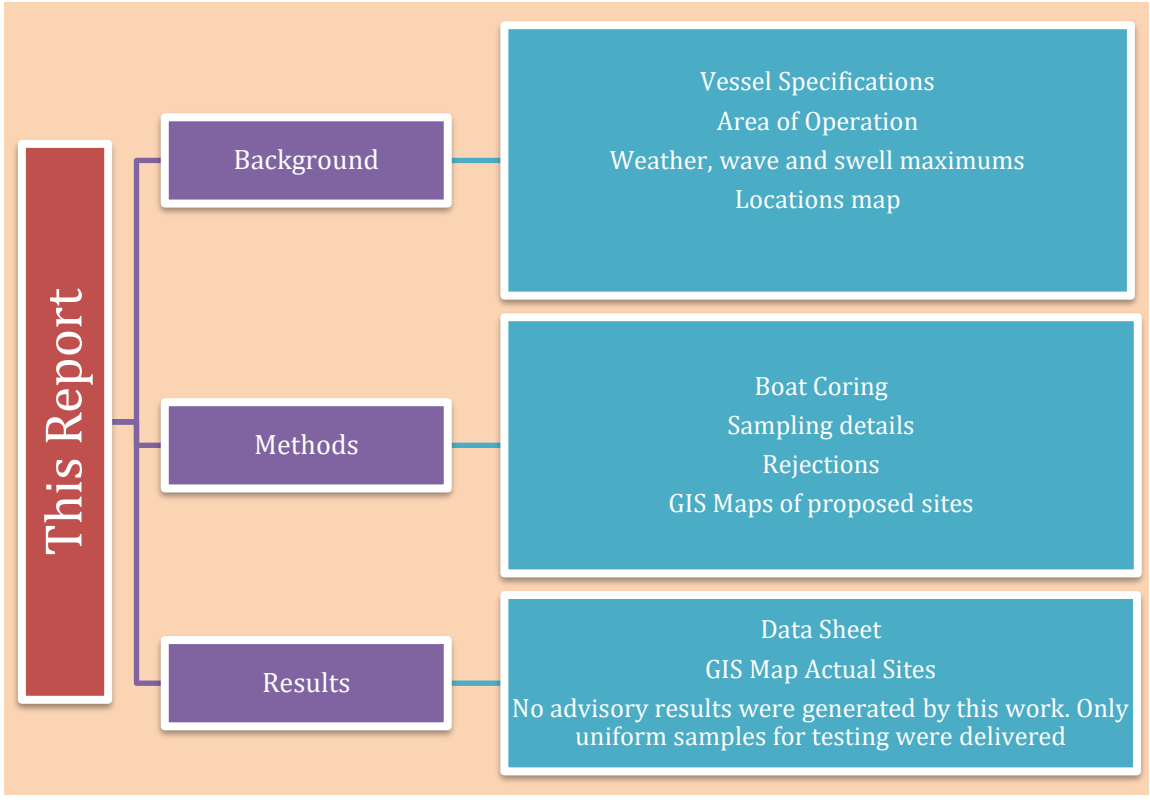
Table 1. Background details

	Details
Principal	Dr Michael Sierp Relevant Qualifications: BSc.(Hons).PhD. MBA. Dip. Marine Surveying, CertIVOcc. Div. CertIII Transport and Logistics Master <24m
Location	Port Stanvac, Gulf St Vincent S.A.
Equipment	Vibecorer mounted to AMSA surveyed vessel R.V. ORCA
Contract manager	Mrs Robyn Morcom Project Officer, Investigations. Department for Environment and Water 81-95 Waymouth Street Adelaide SA 5001

4. INTRODUCTION

The following figure shows the elements of this report

Figure 1. Diagram of report elements



5. BACKGROUND

5.1 Vessel specifications

Table 2. Vessel specifications for the research vessel ORCA

VESSEL NAME	RV ORCA
PORT OF REGISTRY	SOUTH AUSTRALIA
TYPE OF WORK	SEDIMENT CORING (Retrieval only)
VESSEL ID	458243
OWNER	AQUATIC BIOSECURITY PTY LTD
OWNER'S ADDRESS	CYCSA
VESSEL MASTER	DR MICHAEL SIERP
PROJECT FIELD WORK DURATION	25th August – 13th October 2020

5.2 Area of operations

The sediment core retrieval project was conducted in the metropolitan Adelaide waters of Port Stanvac, South Australia.

The following maps were supplied (Figure 2; Figure 3). Two files with Global Positioning Satellite (GPS) markers were supplied by Environmental Projects Pty Ltd (on 21/08/2020 (Sites 1- 32) & 08/10/2020 (Sites 33- 42)) and transferred to a SIMRAD NSS EVO9 Chart plotter for navigation site to site using the WGS84 datum. Site SS05 was substituted from the original requested site. Once anchored, the actual location was checked to be as close as possible but within ~30 metres of the provided GPS point and recorded into the chart plotter. The track taken between sites was recorded using the SIMRAD Chart plotter.

5.3 Weather, wave height and swell maximums

Winds forecasted or experienced at 15 knots were the cut off point for boat-based coring exercises due to manual handling safety, core integrity and potential for damage to the corer apparatus.

No boat coring was performed in winds over 15 knots or adverse combined wave heights.

5.4 Site locations maps

Two maps of sampling locations (Figure 2, Figure 3) and two GPS files (sites 1-32 and sites 1 – 42) were provided to Aquatic Biosecurity Pty Ltd to navigate to the locations.

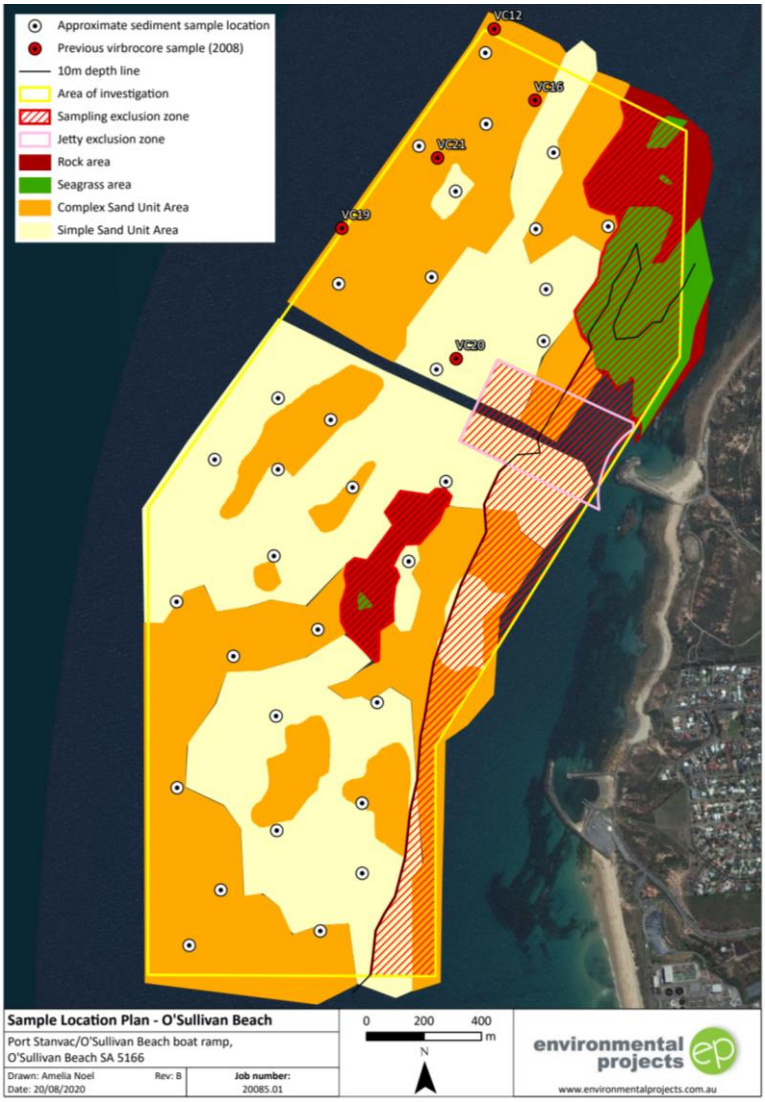


Figure 2. Site location map and GPS points provided to Aquatic Biosecurity on 21/08/2020 by Environmental Projects Pty Ltd

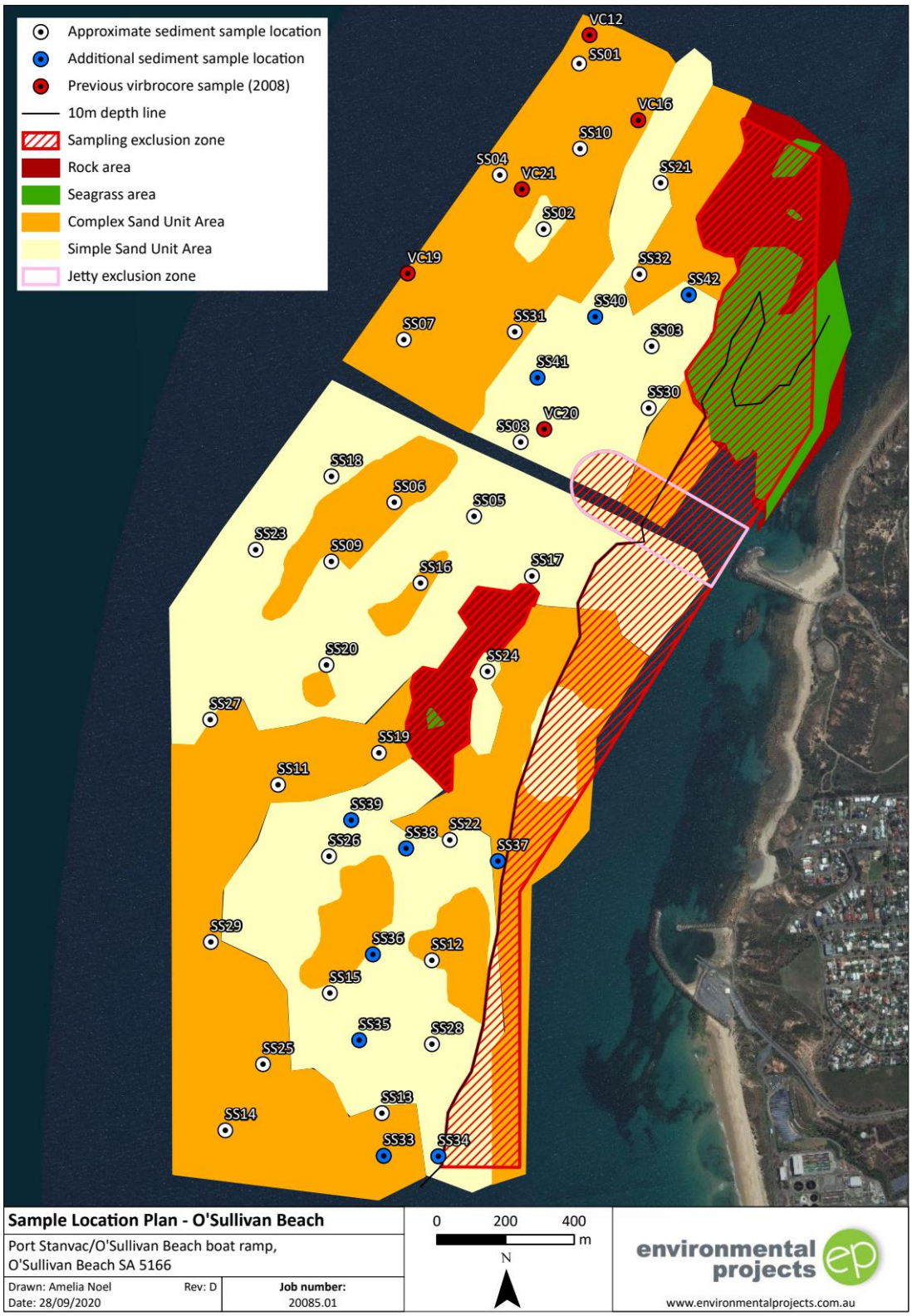


Figure 3. Site location map including additional sites provided to Aquatic Biosecurity Pty Ltd on 29/09/2020 (DEW Ammendment provided 27/10/2020) and GPS Points supplied on 8/10/2020 by Environmental Projects Pty Ltd

6. SAMPLING

6.1 Sampling core tubes

Sampling tubes were purpose manufactured for the operation by an Australian manufacturer. They arrived pre-cleaned and sealed individually into plastic sleeves. The OEM tubes used were 2.09mm tube thickness, 76.2mm in outer diameter aluminium. Sites 1 – 32 used tubes 3.665m long and Sites 33 – 42 used tubes 1.8m long. OEM core keepers were installed with rivets and the leading edge was sharpened with an angle grinder (41of 42 core tubes).

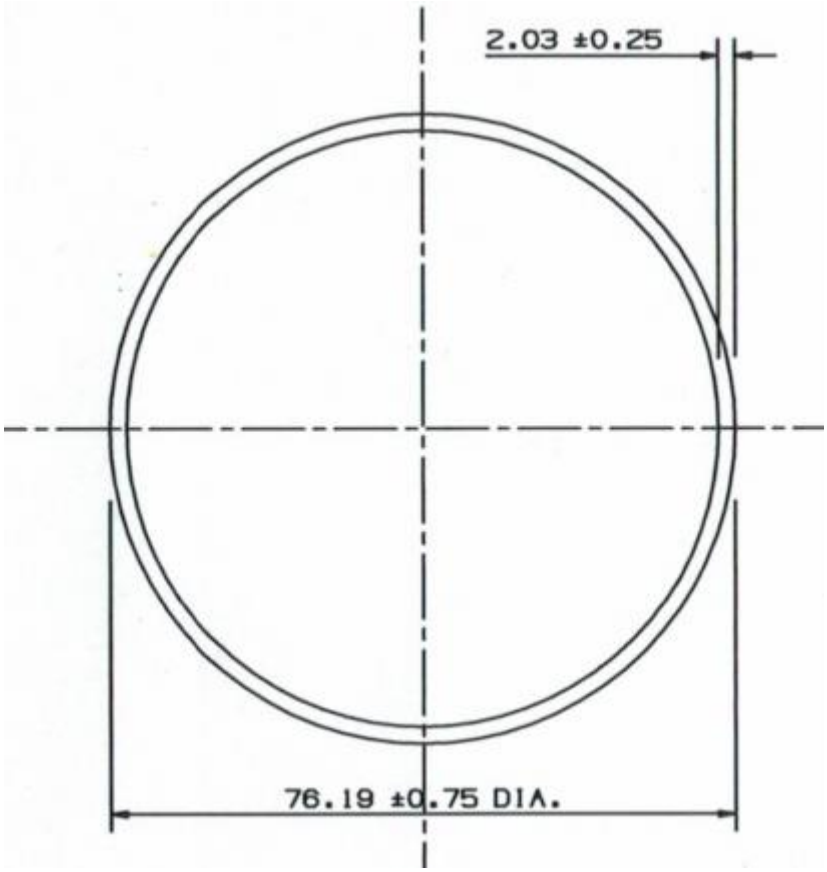


Figure 4. Tube dimensions

Figure 5. Sampling core tubes

6.2 Sampling core tube cleaning

Sampling core tubes, rivets, core keepers and end caps were further cleaned on the following dates (3 dates) 24/08/2020, 20/09/2020 & 11/10/2020.

Cleaning core tubes consisted of the following process;

1. Wet with high pressure water @ 1810 PSI (Gerni Classic 125.5)
2. PFAS and Phosphate free detergent wash (Aurora Pty Ltd cleaning products Aussie Platinum commercial detergent) with high pressure Gerni attachment
3. Sponge and brush scrub of outside and inside of tubes
4. High pressure water rinse @1810 PSI
5. Acid spray inside and outside of tubes using 10%HCL solution
6. Sponge and brush scrub of outside and inside of tubes
7. High pressure water rinse @1810 PSI
8. Demineralised water rinse outside and inside tube
9. Cap both ends and cover in pallet wrap plastic sheet until use.

Figure 5. Sampling core tube cleaning chemicals

Figure 6. Sampling core tube cleaning

Figure 6. Sampling core tube cleaning (Cont.)

6.3 Core keepers

Core keepers were OEM made by the manufacturer and installed into the core tubes as per OEM instructions using rivets.

Figure 7. Core keepers

6.4 Boat Core Method

The OEM vibrating corer was set up with a new 3.665m core tube for the first 32 cores. Once the corer operated it was retrieved to the surface where the core tube was dismantled from the unit upright, capped each end and the core tube was transported vertically to shore for processing. Once on shore decanting, logging and processing was undertaken by other contractors. Two cores from two sites at a time were transported back to the wharf each time for processing which limited the number of cores achievable per day. Thirty two 3.665m tube sites were processed in this manner.

With the 1.8m cores the sample was removed to the surface, decanted onboard immediately, a piece of bubble wrap was pushed down on top of the sample and end caps installed. The samples were then stored upright in the bow of the vessel. Nine 1.8m tubes were recovered including 1 double rejection (10 sites) for processing from ~0800hrs to 1430hrs.

6.5 Rejections

Vibecore deployments at Sites: 20, 23 and 33 resulted in rejections where a sediment sample could not be retrieved due to either impenetrable hard bottom, rocks, reef or other impediment. SS36 gave a rejection then a core. Where a rejection occurred, it was repeated. Where two rejections occurred, the site was determined to be a final site rejection. The Vibecore unit has proved that it can cut through segments of calcrete, seagrass, and rhizome matte in previous projects such that some hard reef can be penetrated with the system. A relatively perfect cut disc of calcrete was cut through in one core in a different project which required removal by chisel illustrating the performance of the unit (Figure 7).

6.6 A note on core retrievals vs interpretations

A core taken from an area may or may not represent an average sample for that area, as within a GPS range, sites can change remarkably from seagrass, to sand, to reef, to clay, to rocks, shells, different types of macrophytes and other types of substrate.

6.7 Depth recording

Depth was recorded using the SIMRAD depth sounder with high power transponder and the time was recorded. It should be noted that this depth is uncorrected for tide, waves and swell to AHD and from the draft of the vessel down (0.7m).

6.8 Sea conditions

It should be noted that winds and sea conditions (waves and swell) were un-measured visual estimates only and as such uncorrected water depths should not be relied upon for capital works. Any capital works operators should undertake and rely on their own measurements and calculations of AHD water depth.

Figure 8. Calcrete cut through by OEM Vibecore from previous project (not Pt Stanvac area) shows cutting potential of Vibecore unit. (A disc shape until chiselled out of the end of the core).

In these cases where core rejection was experienced the Vibecore unit was retrieved from the seafloor, the tube dismantled, cleaned and the process was repeated.

7.0 RESULTS

7.1 Logistics Timeline

The table below shows biofouling related timelines with respect to the Figure 2:

Table 3. Relevant logistics

Day	Itinerary	Dates	Number of sites
1	Vibecoring from boat	25 August 2020	2
2	Vibecoring from boat	26 August 2020	5
3	Vibecoring from boat	28 August 2020	6
4	Vibecoring from boat	31 August 2020	8
5	Vibecoring from boat	5 September 2020	6
6	Vibe coring from boat	9 September 2020	5
7	Vibecoring from boat	13 October 2020	10
		Total	42 sites

The actual sites vibe coring was performed at are shown in Figure 9 below.

7.2 A note on Waypoints

The SIMRAD chart-plotter uses on ORCA is WGS84 which is within 0.45m accuracy. The RMS2 GNSS is accepted to be approximately 8m on vessels at sea such that the difference between datums (WGS84/GDA94/GDA2020) is suggested to be an order of magnitude lower than the GNSS and as such a lesser error. Sampling occurred most often within 10m - 30m of the target GPS point whereby the Actual GPS point was recorded (Figure 9).

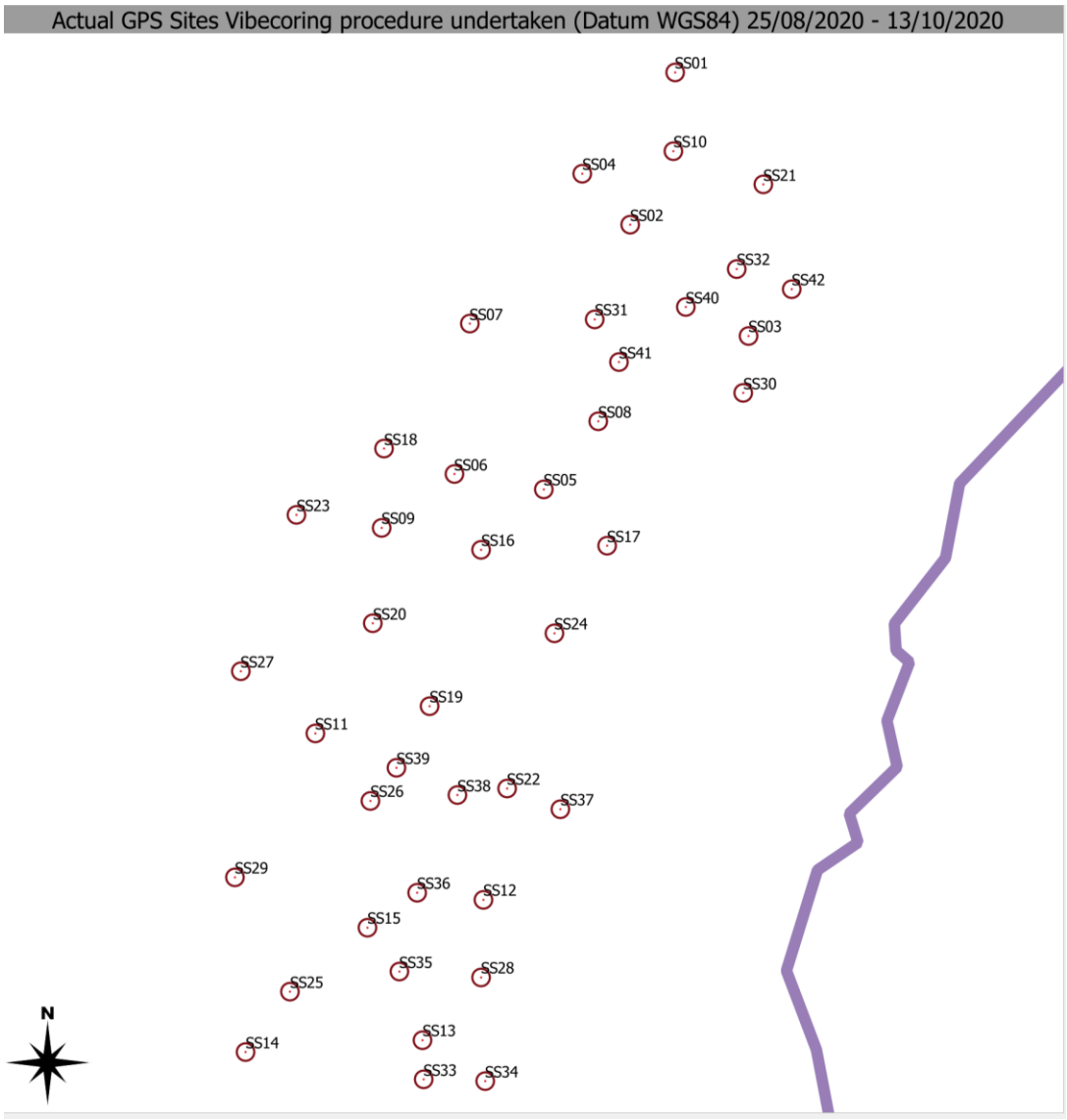


Figure 9. 2020 Actual Port Stanvac Coring locations cored by Aquatic Biosecurity Pty Ltd 25/08/2020 – 13/10/2020

Appendix 1 Actual core site waypoints and data

ID	Actual Latitude (S)	Actual Longitude (E)	Date Sampled	Time Uncorrected Water Depth Recorded (24hrs)	Uncorrected Water Depth Below Vessel(m)@ Time	Uncorrected Waterline Depth to benthose (m) @ time	Wind (Direction & Knots)	Swell (m)	Waves (m)
SS01	-35.0963	138.46451	26082020	925	19.6	20.3	N 10	<0.5	<0.5
SS02	-35.10038	138.46298	26082020	1229	18.5	19.2	N 5kts	<0.5	<0.5
SS03	-35.10368	138.46641	26082020	1128	14.3	15	N 5	<0.5	0.5
SS04	-35.09878	138.46149	9092020	728	20.3	21	SE 5-10	0.5	<0.5
SS05	-35.10788	138.46048	9092020	1248	17.5	18.2	E 5-10	0.5	0.5
SS06	-35.10715	138.45841	5092020	1306	18.8	19.5	NW <5	1	0.5
SS07	-35.10301	138.45853	5092020	1406	19.4	20.1	NW <5	1	0.5
SS08	-35.10611	138.46218	26082019	1339	16.9	17.6	N 5	0.5	0.5
SS09	-35.1092	138.45595	26082020	1436	19.5	20.2	N 5	<0.5	<0.5
SS10	-35.09831	138.46409	9092020	823	19.7	20.4	SE 5-10	0.5	<0.5
SS11	-35.11504	138.45401	5092020	927	19.2	19.9	NW <5	1	1
SS12	-35.11934	138.45896	31082020	1031	15	15.7	S 5	1 - 1.2	0.5 - 1
SS13	-35.12319	138.45737	31082020	1153	14.5	15.2	S 5	<0.5	<0.5
SS14	-35.1236	138.45233	31082020	1229	18.7	19.4	S 5	<0.5	<0.5
SS15	-35.12006	138.45559	31082020	750	17	17.7	S 5-10	1 - 1.2	0.50 - 1
SS16	-35.10964	138.45919	5092020	1221	17.1	17.8	NW <5	1	1
SS17	-35.10957	138.46254	28082020	1007	15	15.7	N<5	0.5	<0.5
SS18	-35.10694	138.45634	28082020	1213	20.4	21.1	N<5	0.5	<0.5
SS19	-35.11403	138.45752	5092020	1043	17.1	17.8	NW<5	1	1
SS20	-35.11181	138.45584	28082020	1436	19.5	20.2	N<5	<0.5	<0.5
SS21	-35.09942	138.46681	28082020	800	17.4	18.1	N <5	0.5	<0.5
SS22	-35.11634	138.45967	25082020	1550	15.4	16.1	Light Winds 0-5	<0.5	<0.5
SS23	-35.1087	138.45386	28082020	1334	20.6	21.3	N 5	0.5	<0.5
SS24	-35.11178	138.46112	31082020	952	14.8	15.5	S 5-10	1 - 1.2	0.50 - 1
SS25	-35.12183	138.45359	31082020	1344	18.5	19.2	S 5	<0.5	<0.5
SS26	-35.11669	138.45579	25082020	1508	17.01	17.71	Light Winds 0-5	<0.5	<0.5
SS27	-35.11314	138.45202	5092020	757	20.7	21.4	W <5	2	1
SS28	-35.12161	138.45904	31082020	853	13.6	14.3	S 5 - 10	1-1.2	0.5-1
SS29	-35.11855	138.45213	31082020	1446	19	19.7	S 5	0.5	<0.5
SS30	-35.10533	138.46636	28082020	916	13.5	14.2	N <5	0.5	<0.5
SS31	-35.10303	138.46207	9092020	944	19.3	20	E 10-15	0.5	0.5
SS32	-35.10175	138.46622	9092020	1047	16.4	17.1	E 10-15	0.5	0.5
SS33	-35.1247	138.45716	13102020	830	13.9	14.6	E <5	<0.5m	<0.5m
SS34	-35.12475	138.45911	13102020	917	11.9	12.6	E <5	<0.5m	<0.5m
SS35	-35.12164	138.45673	13102020	946	15.6	16.3	E <5	<0.5m	<0.5m
SS36	-35.11945	138.45722	13102020	1017	15.6	16.3	E <5	<0.5m	<0.5m
SS37	-35.1171	138.46116	13102020	1110	12.6	13.3	E 10	<0.5m	<0.5m
SS38	-35.11667	138.45834	13102020	1134	16.5	17.2	E 10	<0.5m	<0.5m
SS39	-35.11587	138.45658	13102020	1205	16.4	17.1	E 10	<0.5m	<0.5m
SS40	-35.10273	138.46499	13102020	1253	16.8	17.5	E 5	<0.5m	<0.5m
SS41	-35.10432	138.46304	13102020	1330	17.6	18.3	E 5	<0.5m	<0.5m
SS42	-35.10226	138.46784	13102020	1400	14.8	15.5	E 5	<0.5m	<0.5m