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**Shoreline Studies Program**
**Virginia Institute of Marine Science**
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# Executive Summary

Parrotts Creek is located along the Rappahannock River in Middlesex County, VA. The mouth of the creek is about 850 ft wide, but just inside the mouth of the creek, a spit extends from the upland narrowing the creek to about 300 ft before it widens again. Overall, this is a relatively short, undeveloped creek. Most of the development (wharfs, ramps, piers) occur near the mouth. Most of the more inland areas of the creek are surrounded by woodland. The federally-authorized channel was established in 1955 due to the presence of a public ramp and landing area, as well as oyster and seafood packing houses located on the creek. It is a 4,800 ft long, 60 ft wide channel with a 120 ft by 120 ft turning basin, and a controlling depth of -6 ft MLLW.

Parrotts Creek was first dredged in 1956, removing 66,823 cy of material, and, as far is as known, has not been dredged since. Longshore transport is south along the shore of the Rappahannock and a spit at the mouth of the creek has developed from downstream sediment flow and shoaling. The spit has been bulkheaded on the backside and a low sill occurs on part of the front. However, the bulkhead is in complete disrepair and the entire spit is disintegrating. The private marina and waterfront have seen a decline in business due to the shoaling in the channel. Parrotts Creek needs dredging in order to improve the safety and accessibility of the channel to boaters.

The overall ecosystem health of the Rappahannock River is in good condition, and the benthic community health is in average condition, but has been declining in recent years. The Rappahannock River as a whole is an important nursey habitat for local fish populations, but the area of Parrotts Creek contains no submerged aquatic vegetation (SAV) and experiences periods of seasonal hypoxia, making it an unlikely nursery habitat, and, therefore, unlikely that dredging activities will have a significant impact on juvenile fish populations. Dredging activities may impact the local benthic community, but because of the conditions of Parrotts Creek, the benthic community consists primarily of disturbance-related annelids and one species of bivalve. The area has also been listed as a Shellfish Condemnation Zone by the Virginia Department of Health (VDH), meaning that dredging will not impact local shellfish harvesting.

The preferred scenario for dredging of Parrots Creek is to create a -6 ft MLLW with 1 ft overdepth channel. An estimated 24,300 cy of material will need to be removed in order to accomplish this. Because the sediment in the area contains a high percentage of fines, it will need to be disposed of at a confined upland disposal site. The sediment in the creek does not contain any contaminants outside of acceptable parameters. The dredged material can be placed in dewatering Geotubes property owned by the Upper Middlesex Volunteer Fire Department (UMV-FD) located near the creek or can be replicated on any other available site in proximity to the creek. The site would cover about 5.7 acres. Because the amount of material is relatively small, rather than build a dyke out of Geotubes®, one layer of dewatering tubes can be used for the Parrotts Creek dredge material. Seven tubes that are about 37 ft wide and 6.5 ft tall would be placed at the site and filled with dredge material. Once the tubes dewater, they can either be left

in place, the bags cut and the material either reused for beneficial use or hauled to the landfill. The water coming out of the Geotubes® would be filtered and should meet water quality standards for return to the creek. The cost for this placement area is $154,000.

Using $^{210}$Pb radioisotopes found within our core, it was found that Parrotts Creek has an average sediment accretion rate of 0.43 cm/yr (0.02 ft/yr) inside the creek. $^{137}$Cs radioisotopes are used to determine the approximate age of the sediments at a particular depth by assuming the peak of $^{137}$Cs is the year 1963. As the $^{137}$Cs peak is located at a shallow depth (approximately 24 to 28 cm), it supports the findings of a relatively low (0.46 cm/yr) accretion rate. In the outer channel, calculation of change between the USACE survey of the channel in 2016 and 2019 indicates that the rate of accretion is about 0.3 ft/yr. However, in any given year, the change can be both erosional or accretionary suggesting that the useful life of this project can be roughly estimated to be 10 to 20 years.

| Dredge Depth +Overdepth | Volume Fines | Mob/Demob | Dredging | Total Cost |
|---|---|---|---|---|
| (ft MLLW) | (cy) | ($) | ($) | ($) |
| Full Channel Hydraulic Dredging | | | | |
| -6 | 12,000 | $700,000 | $120,000 | $820,000 |
| -7 | 24,300 | $700,000 | $218,700 | $918,000 |
| -8 | 39,000 | $700,000 | $312,000 | $1,012,000 |
| Full Channel Mechanical Dredging* | | | | |
| -6 | 12,000 | $50,000 | $480,000 | $530,000 |
| -7 | 24,300 | $50,000 | $972,000 | $1,022,000 |
| -8 | 39,000 | $50,000 | $1,560,000 | $1,610,000 |
| *Cost assumes placement site is within 1 mile of the channel. | | | | |

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# Introduction

Parrotts Creek is located along the Rappahannock River in Middlesex County, VA. (Figure 1). Since the 2004 breach of the Embrey Dam in Fredericksburg, the Rappahannock River is the longest free-flowing river in the Chesapeake Bay watershed and the eastern U.S. Parrotts Creek is located about 20 miles upstream from the mouth of the river. The mouth of the creek is about 850 feet (ft) wide, but just inside the mouth of the creek, a spit extends from the upland narrowing the creek to about 300 ft before it widens again. Overall, this is a relatively short, undeveloped creek. Most of the development (wharfs, ramps, piers) occur near the mouth. Most of the more inland areas of the creek are surrounded by woodland.

The development and morphology of the creek has not changed much since 1937 (Figure 2). Sand shoals in the nearshore and the spit in Parrotts Creek indicate that sediment transport is down river. In 1937, land use in the area north of Parrotts Creek was undeveloped agricultural, but the steamship wharf is visible on the southside of the creek. Though still in use at this time, steamship travel declined after World War II (Gray, 1991).

The federal channel was authorized by Congress in 1955 due to the presence of a public ramp and landing area, as well as oyster and seafood packing houses located on the creek (Figure 3). The channel is 4,800 ft long, 60 ft wide channel with a 120 ft by 120 ft turning basin, and a controlling depth of -6 ft MLLW. The channel was first dredged in 1956, when 66,823 cy of material was removed (US Army COE). Some dredge material was placed inside Parrotts Creek, but most was placed along the Rappahannock River, possibly the sandier material (Figure 3). To the best of our knowledge, Parrotts Creek was only dredged this one time.

By 1968, residences and piers began to occur north of the creek (Figure 4). The dredge material that was placed along the Rappahannock is visible along the shoreline. Parrotts Creek in 2017 is very similar in morphology to 1937. However, many residences occur north of the creek (Figure 5). The dredge material that was placed along the Rappahannock has eroded completely away, and the shoreline has a revetment on it. Bulkheads and revetments have also been built upstream of Parrotts Creek over time. As the shoreline is hardened by shore protection structures, less sediment will be available in the littoral transport system. Overall, little change has occurred along this reach of shoreline between 1937 and 2017 (Figure 6). Rates of change are less than -1 ft/yr with some areas showing very low accretion. The spit extending into Parrotts Creek was bulkheaded, likely in the 1950s or 1960s, and, as such, had changed very little.

Parrotts Creek has historically provided critical access for an active working waterfront hub, identified by the Middle Peninsula Planning District Commission: Millstone Landing (Figure 5). Watermen and recreational users moor, launch, and dock their boats and land their daily catch at this public facility. With multiple informal business-zoned parcels, bulkheads, and marginal wharfs, workboats are able to tie-up and store gear. In addition to commercial activities, the creek is used for recreational activities and is home to a private marina that has seen a decline in business due to shoaling.

# Channel Condition Assessment

## Channel Condition Survey and Base Mapping

The channel condition surveys were performed by licensed surveyors at Waterway Surveys & Engineering, Ltd. to determine the depth to the bottom in the projected channel both inside and outside the creek, on either side of the channel, inside the creek in the area of the turning basin, and far enough seaward to reach the channel design depth in the natural system. Soundings were taken using a single beam sonar system operating at 208 kilohertz, and a differential global positioning system (DGPS) was used to obtain horizontal positions.

Coordinates were taken in US survey feet and referred to the Virginia State Plane coordinate system south zone based on NAD83 (Figure 7). Soundings were taken on November 19, 2020 about 10 ft apart in lines spaced approximately 100 ft apart and referred to feet mean lower low water (MLLW). MLLW, National Tidal Epoch of 1983-2001, was determined by the National Ocean Service (NOS) at Parrotts Creek. Mean tide range is 1.54 ft based on NOS observations.

Survey points were imported to Esri ArcMap, and a vector-based triangular irregular networks (TIN) surface was created. A TIN is a representation of a continuous surface consisting entirely of triangular facets. The vertices of these triangles are created from field recorded spot elevations from the bathymetric survey. From the TIN, a digital elevation model (DEM) was created. The DEM is a 3D computer graphics model of elevation data to represent terrain. In this case, the raster DEM grid cell size was 5ft x 5 ft and represents the bathymetry in feet relative to MLLW (Figure 8). The DEM can be used to calculate the amount of material that will be removed during dredging by assigning the grid cells the desired dredge depth values, and determining the difference between the existing bathymetry and the depth values represented by the DEM.

## Sediment Sampling

### Physical Sampling

A geotechnical analysis provides a sediment profile through direct sampling and testing studies of the in-situ benthic material. Eight vibracores were taken by VIMS in the channel on October 6, 2020 (Figure 9). The cores were photographed (Appendix A), logged (Appendix B), and sampled by VIMS to provide the types, configuration, and geotechnical character of the benthic subbottom soils present.

Samples for grain size testing was channel-sampled along a visually-identified lithologic section within the core. Grain size analysis included percent gravel, sand, silt, and clay (Appendix C), as well as a detailed representation of the sand portion using the Rapid Sediment Analyzer (RSA) settling tube. Overall sample statistics, including the median grain size (D50), were calculated using the percent data and the sand results. Percent moisture also was determined.

## Sedimentation Sampling

Sediments contain a background level of $^{210}$Pb that is continuously deposited over time as it becomes fixed on sediment particles. With a half-life time of 22.3 years, $^{210}$Pb is the sole natural radioactive lead isotope, the presence of which in the environment is directly related to the presence of the parent isotope. $^{210}$Pb that was incorporated into the sediments 22.3 years ago will be only one half as radioactive as when initially deposited. This property of radioactive decay can be used to calculate the approximate age of sediments at other depths in the sediment column and/or the rate of sediment accumulation over about the last 100 years.

Sedimentation rates were obtained by analyzing core samples for $^{210}$Pb and $^{137}$Cs radioisotopes using gamma spectroscopy. Dried and homogenized samples were packed in Petri dishes and sealed with electrical tape and paraffin wax 30 days prior to analysis to allow for equilibration between 226Ra and its daughter isotopes, 214Pb and 214Bi (supported $^{210}$Pb). Total $^{210}$Pb (46.5 keV photopeak) and $^{137}$Cs (662 keV photopeak) activity was measured for all samples along each core using a Canberra GL 2020 Low Energy Germanium detector (Virginia Institute of Marine Science Geochronology Lab). Total $^{210}$Pb counts were corrected for detector efficiency and self-attenuation using the point-source method (Cutshall et al., 1983). Concentrations of excess $^{210}$Pb used to obtain age models were determined as the difference between total $^{210}$Pb and supported $^{210}$Pb (Table 1). $^{137}$Cs is a bomb-produced radionuclide used to verify accumulation rates determined by $^{210}$Pb geochronology. $^{137}$Cs is a by-product of nuclear weapons testing. It first occurred in the atmosphere in about 1952 and peaked during 1963-64. It adsorbs strongly to fine-grained sediments and therefore can be used to determine the time of deposition of sediments that have been exposed to atmospheric fallout. Peak $^{137}$Cs activity is assumed to be 1963.

The constant flux-constant sedimentation (CFCS) model (Corbett & Walsh, 2015) was used to calculate sedimentation rates over the last ~100 years at all sites, assuming a constant rate of accumulation and flux of excess $^{210}$Pb. These rates were calculated using the following formulas:

$$Az = A0\ e^{-\lambda t}$$

$$t = z / S$$

where Az is the excess (unsupported) $^{210}$Pb activity for a sample at depth z, A0 is the excess $^{210}$Pb activity at the time of sample collection, $\lambda$ is the $^{210}$Pb decay constant, and t is elapsed time since burial. To calculate a vertical accretion rate (S), the natural log of excess $^{210}$Pb activities were plotted against depth to obtain a slope of the best-fit line (m):

$$S = \lambda / m$$

Using Parrott Creek's core 7, 4-centimeter (cm) samples were taken from the top of the core at 12 cm intervals until a depth of 140 cm was reached. Each sample farther along the core was still 4 cm along the length of the core, but it occurred at 28 cm intervals (Table 1).

Table 1. Summary table of $^{210}$Pb and $^{137}$Cs chemical analysis of Parrotts Creek sample cores.

| Sample ID | Depth Range (cm) | Mean Depth (cm) | Depth Range ± (cm) | Excess $^{210}$Pb DPM/g | $^{210}$Pb Error (±DPM/g) | Ln(Excess) | Total $^{137}$Cs (DPM/g) | $^{137}$Cs Error (±DPM/g) |
|---|---|---|---|---|---|---|---|---|
| PC-07_8-12cm | 8 - 12 cm | 10 | 2 | 4.239 | 0.2328 | 1.44 | 0.2171 | 0.01720 |
| PC-07_24-28cm | 24- 28 cm | 26 | 2 | 3.309 | 0.2044 | 1.20 | 0.3475 | 0.02123 |
| PC-07_40-44cm | 40 - 44 cm | 42 | 2 | 0.604 | 0.1116 | -0.50 | 0.0000 | 0.00000 |
| PC-07_56-60cm | 56 - 60 cm | 58 | 2 | 0.453 | 0.1069 | -0.79 | 0.0000 | 0.00000 |
| PC-07_72-76cm | 72 - 76 cm | 74 | 2 | 0.409 | 0.1214 | -0.89 | 0.0454 | 0.00882 |
| PC-07_88-92cm | 88 - 92 cm | 90 | 2 | 0.554 | 0.1196 | -0.59 | 0.0000 | 0.00000 |
| PC-07_104-108cm | 104 - 108 cm | 106 | 2 | 0.438 | 0.1076 | -0.83 | 0.0000 | 0.00000 |
| PC-07_120-124cm | 120 - 124 cm | 122 | 2 | 0.428 | 0.1048 | -0.85 | 0.0000 | 0.00000 |
| PC-07_136-140cm | 136 - 140 cm | 138 | 2 | 0.722 | 0.1219 | -0.33 | 0.0000 | 0.00000 |
| PC-07_168-172cm | 168 - 172 cm | 170 | 2 | 0.389 | 0.0945 | -0.94 | 0.0000 | 0.00000 |
| PC-07_200-204cm | 200 - 204 cm | 202 | 2 | 0.591 | 0.1152 | -0.53 | 0.0000 | 0.00000 |
| PC-07_232-236cm | 232 - 236 cm | 234 | 2 | 0.481 | 0.1137 | -0.73 | 0.0000 | 0.00000 |
| PC-07_264-268cm | 264 - 268 cm | 266 | 2 | 0.615 | 0.1159 | -0.49 | 0.0000 | 0.00000 |
| PC-07_304-308cm | 304 - 308 cm | 306 | 2 | 0.495 | 0.1139 | -0.70 | 0.0000 | 0.00000 |
| PC-07_336-340cm | 336 - 340 cm | 338 | 2 | 0.488 | 0.1133 | -0.72 | 0.0000 | 0.00000 |
| PC-07_368-372cm | 368 - 372 cm | 370 | 2 | 0.797 | 0.1114 | -0.23 | 0.0000 | 0.00000 |
| PC-07_400-404cm | 400 - 404 cm | 402 | 2 | 0.706 | 0.1269 | -0.35 | 0.0000 | 0.00000 |
| PC-07_432-436cm | 432 - 436 cm | 434 | 2 | 0.862 | 0.1297 | -0.15 | 0.0000 | 0.00000 |
| PC-07_464-468cm | 464 - 468 cm | 466 | 2 | 0.777 | 0.1243 | -0.25 | 0.0000 | 0.00000 |
| PC-07_496-500cm | 496 - 500 cm | 498 | 2 | 0.540 | 0.1159 | -0.62 | 0.0000 | 0.00000 |

## Chemical Sampling

The Evaluation of Dredged Material Proposed for Discharge in the Waters of the U.S. – Testing Manual was developed as a joint effort by the Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (EPA&USACE, 1998) and is referred to as the "Inland Testing Manual (ITM)." The purpose of the manual was to "establish procedures applicable to the evaluation of potential contaminant-related environmental impacts associated with the discharge of dredged materials in inland waters, near coastal waters and surrounding environs." The ITM was primarily developed to establish testing protocols associated with the disposal of dredged material discharges associated with navigation dredging.

The ITM utilizes a tiered approach to determine test requirements for dredged material disposal. There are four tiers: Tier I is an evaluation based on existing information; Tier II

includes a chemical evaluation of identified contaminants of concern; Tier III is associated with general toxicity and bioaccumulation tests; and Tier IV provides for project specific toxicity and bioaccumulation tests.

The development of testing requirements always starts with a Tier I evaluation, which is an analysis based on existing information. The evaluation can be based on previously collected physical, chemical or biological data; physical sediment characteristics (i.e. is the material comprised of sand, gravel or inert materials); or if the dredged material is associated with known sources of contamination. If there is no available chemical data at the dredging site, but the material is a sandy or inert material or there are no known sources of contamination or contaminant pathways to the dredging site, then there is "no reason to believe" that the disposal of the dredged material would have an adverse impact at the disposal site. Once it has been determined that there is "no reason to believe," then the dredged material passes the Tier I and no additional evaluation is required. If, however, there is "reason to believe" that there is the potential for contaminants to exist at the dredging site, then a Tier II evaluation would be initiated. The "contaminants of concern" must be identified and a sampling plan should be designed to address the concentration of those specific contaminants in the site sediment and water. The results of the Tier II evaluation determine the need for evaluation at higher tiers. If the dredging site passes a Tier I evaluation, the only other time that chemical testing may be required is for disposal of dredged material into a regulated area such as a landfill.

Parrotts Creek passes the Tier I evaluation, but because this creek has a high percentage of fines, the material will likely go to a confined upland disposal area. Two samples were collected from Parrotts Creek in the Rappahannock River for chemical testing – one at an up-creek location and one at a down-creek location (Figure 9). A grab sampler was used for data collection. The grab sampler was thoroughly cleaned before samples were extracted by rinsing in water, with any excess debris scrubbed off with a brush. Once retrieved with sediment inside, the grab sampler was set on the side of the boat to allow any excess water to drain. The closed grab sampler was then positioned on the side of the boat with the mouth of the sampler hanging over the edge, to prevent the sediment from coming in contact with the surface of the boat and potentially contaminating the sample. Sediment was scooped into sterile glass containers of various sizes provided by *Enthalpy Analytical* using a stainless-steel spoon. Samples were then placed in coolers below 43$^{o}$F and taken to *Enthalpy Analytical* the following day.

The samples were then tested for a variety of different chemicals, toxins, and metals. Table 2 illustrates what each sample was analyzed for, as well as potential sources. The results are shown in Appendix D, but neither sample location had any of the contaminants in quantities larger than the limits of the tests used and therefore, no contamination-related issues are anticipated regarding placement or disposal of dredged material.

*Table 2. A list of chemicals and metals tested in samples taken from Parrotts Creek as well as their possible source*

| Analysis: | Source: |
|---|---|
| MTBEX* | fuel component for gasoline engines |
| TCLP Silver | Industrial use |
| TCLP Mercury | Industrial use |
| TCLP Arsenic | Industrial use |
| TCLP Lead | Industrial use |
| TCLP Barium | Industrial use |
| TCLP Selenium | Industrial use |
| TCLP Cadmium | Industrial use |
| TCLP Chromium | Industrial use |
| PCB** | Commercial electrical equipment |
| TCLP Predetermination SVOC*** | Occurs naturally/Industrial use |
| TCLP Pest | Industrial use |
| TCLP Herb | Industrial use |
| Semi-Volatile Hydrocarbons as TPH Diesel Range Organics**** | Compounds in diesel fuel |
| Organochlorine Pesticides and PCB's as Aroclor | Pesticides in agriculture |
| TCLP Organochlorine Herbicides | Pesticides in agriculture/plant removal |
| TCLP Organochlorine Pesticides and PCB's | Pesticides in agriculture |

Note: TCLP stands for "Toxicity Characteristic Leaching Procedure"
*MTBEX refers to methyl tert-butyl ether (MtBE) which is the analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX)
**PCB refers to polychlorinated biphenyls, a harmful and highly toxic industrial compound
***SVOC refers to Semi Volatile Organic Compounds
****TPH refers to Total Petroleum Hydrocarbons

## Benthic and Fisheries Assessment

Parrotts Creek is located in the mesohaline salinity zone of the lower Rappahannock River. Salinity ranges from about 5 to 18 ppt. The benthic communities around the Bay and its watersheds have been assessed using the Index of Biological Integrity. This index ranks the relative value of bottom communities around the Chesapeake Bay by comparing values of key benthic community attributes ("metrics") to reference values expected under non-degraded conditions in similar habitat types. It is therefore a measure of deviation from reference conditions. Overall, the Rappahannock River had good ecosystem health (B-) in 2020 (EcoHealth, 2020). Nitrogen and phosphorous indicator scores remained the same between 2019 and 2020, but the benthic community and turbidity indicator scores declined. In 2020, the Rappahannock was classified as average, 40% to <60%, on the benthic IBI scale (EcoHealth, 2020).

The lower Rappahannock River experiences annual periods of seasonal hypoxia where dissolved oxygen concentrations drop below 2 mg $O_2$ per liter during the summer due to a variety of anthropogenic factors. Areas experiencing seasonal hypoxia can see reductions in macrobenthic production as high as 85%. During these hypoxic periods, mobile, non-hypoxia resistant benthic fauna migrate out of the area, and sessile fauna decrease or stop all non-respiratory activity, leaving the majority of macrobenthic production to hypoxia resistant species. In this area of the river, those species are primarily disturbance-related annelids such as *Paraprionospio pinnata, Nereis succinea,* and *Streblospio benedicti.* The primary hypoxia resistant bivalve in the area contributing to macrobenthic production is the Baltic clam (*Limecola balthica*) (Sturdivant et al., 2013). However, despite being both hypoxia resistant and the dominant bivalve in the area, hypoxic conditions can still cause up to a 40% reduction in Baltic clam fecundity, and in extreme cases, lead to local population extinctions (Long et al., 2014).

The abundance and distribution of juvenile fish are monitored as indicators of ecologically important finfish stocks. Recent VIMS seine surveys of the Rappahannock River found that levels of juvenile commercially and recreationally valued striped bass (*Morone saxatilis*) were similar to historical averages. However, the same survey found that levels of juvenile American shad (*Alosa sapidissima*), alewife (*Alosa pseudoharengus*), blueback herring (*Alosa aestivalis*), and white perch (*Morone americana*) were all lower than historical averages (Buchanan et al., 2021).

Schloesser and Fabrizio (2019) found that a particular area or habitat type may disproportionately support juveniles of one species due to the influence of spatially varying environmental factors which ultimately reveals spatial patterns. The estimation of habitat suitability for each forage species includes consideration of environmental and physical conditions (e.g., distance to shore, percent fine sediment). The study found that the Rappahannock River was potentially a higher-value habitat for valuable striped bass juveniles compared to other Chesapeake Bay tributaries.

Dredging impacts to fisheries is a concern that has been evaluated and researched by the Army Corps of Engineers over the years. Motile forms of biota should be able to avoid the dredging operation; as such, most fish will not be impacted. The main potential impact is by entrainment of the species in the hydraulic dredging operation itself. The proposed project would result in the temporary destruction of marine habitat and the associated benthos in the channel. For bivalves, larval stage impacts have been reported. However, after dredging, repopulation of benthic organisms within the dredging will begin quickly (Newell et al., 1998). In estuaries, communities are well adapted to rapid recolonization of deposits because they are typically subject to frequent natural disturbances. Rates of recovery vary from 6-8 months in estuarine muds, and possibly 2-3 years in sand and gravel habitats.

Sometimes permitting agencies will invoke a time of year (TOY) restriction on dredging when species are migrating and/or overwintering. In addition, deeper dredging projects will limit the frequency and duration of impacts over time, because additional cycles of dredging may not be needed. In general, this project will not cause long-term adverse effects on the surrounding ecosystem. Any effects on the environment should be minimal and be offset by the project benefits of maintaining safe navigation and commerce.

Currently, Parrotts Creek is listed as a Shellfish Condemnation Zone by the Virginia Department of Health, meaning that there are no active harvesting permits, as the area has been deemed unsafe for the human consumption of shellfish harvested from the location due to pollution (Figure 10). Only one private oyster lease crosses the channel for Parrotts Creek (Figure 11). Because Parrotts is a federally-authorized channel, this should not impact any potential dredging. No submerged aquatic vegetation (SAV) occurs at the site.

## Channel Design and Disposal Strategy

### Channel Design

The Parrotts Creek channel is 4,800 ft long and 60 ft wide with a turning basin at Millstone Landing. The federally-approved channel depth is -6 ft MLLW. The spit extending from the north side of the creek causes the creek to narrow, possibly restricting tidal flow to some degree. This restriction causes an increase in current velocity which tends to deepen the channel. The federally-defined channel outline was downloaded in GIS format from the U.S. Army Corps of Engineers. Though it comes in close to the spit, it aligns with the channel markers. However, the outbound channel does not align with the natural channel at the curve just outside the creek (Figure 8). This could be the result of the channel shifting naturally and scouring out since it was originally dredged in the 1950s.

Presently, to create a -6 ft MLLW channel and 1 ft of over dredge (total dredge depth -7 ft MLLMLLW), approximately **24,300** cubic yards (cy) (Table 3) of material will be hydraulically dredged and disposed of (Figure 12). Today, the proposed channel maintenance is needed in and along most of the channel, except near the spit. The calculated DEM is represented in various colors to show the amount of dredging necessary. Sections of the channel that require more dredging are shown in red. Sections of the channel where less material needs to be removed are shown in green. Areas deeper than -7 ft MLLW do not have to be dredged and are shown in white.

The nature of channel dredging and maintenance can be seen in the core logs and depositional patterns. Typical channel cross-sections depict the change from existing bottom that will occur due to dredging (Figure 13). They show that the channel has been infilling since it was last dredged. Most of the material would come from Profile A (location shown on Figure 12), which is the innermost section of the channel. Profile C shows that the defined channel does not line up with the existing natural channel. This could either be a GIS data error or the existing channel could have migrated since the 1956 dredging which is most likely. This is not an issue because if the channel is dredged as proposed, it will effectively widen the channel increasing its useful life estimate.

Sediment analysis of cores taken in the channel shows that the material is mostly clay with over 90% fines so it cannot be placed along the shoreline (Figure 14). Core PC-02 is slightly sandy, but it still has over 60% fines. Core PC-06 is located near the spit (Figure 9) and

is sandy; however, the bottom is deep and does not need to be dredged in this section of the channel.

Also modeled was a slightly shallower dredge depth, should the county seek to pursue a less expensive option. A -5 ft MLLW channel with a 1 ft over dredge would require about **12,000** cy (Table 3) of material to be removed. This option reduces both the dredging cost per volume and reduces the footprint needed for a disposal area. However, a channel needs to be at least 6 ft deep so that a buoy-tender can access the site to set and/or maintain aids to navigation (ATONs). Unless disposal of material is an issue, the -6 ft MLLW is still the preferred option. Also calculated was a -7 ft MLLW channel with a 1 ft over dredge. The amount of material that would need to be removed increases to **39,000** cy and because it is all fine material it would need to be disposed of in an upland disposal facility.

Table 3. Summary of proposed channel dredging depths at Parrotts Creek. Note: a -6 ft MLLW depth is needed for ATON maintenance so the * scenario is the preferred option.

| Channel Depth | Overdepth | Total | Volume Fines |
|---|---|---|---|
| (ft MLLW) | (ft) | (ft MLLW) | (cy) |
| Dredging entire federal channel | | | |
| -5 | -1 | -6 | 12,000 |
| -6* | -1 | -7 | 24,300 |
| -7 | -1 | -8 | 39,000 |

## Disposal Strategy

Because most of the material to be dredged is fine sediment, it cannot be placed along the shoreline, but rather requires a confined upland disposal site. Containment dykes are used to retain water borne sediments, hydraulic fills, and other fills. To provide a storage facility for soil or other soil materials, it is common practice to first construct a containment dyke around the extremity of the area to be filled. The function of the containment dyke is to prevent loss of the fill into the surrounding environment. Rather than dig into the ground to construct a dyke with existing material on site, Geotube® units may be utilized to construct the dyke using locally available dredge material as the dyke fill. This reduces the amount of material that needs to be stored inside the dyke thereby reducing the overall footprint. Geotube® is a registered trademark of TenCate Geosynthetics. The tubes come in various sizes, weights, and filtering ability and can be placed into a wide variety of configurations. Typically, they are filled with dredge material to create the dyke on the outside of the disposal area, and additional material can be placed inside the dyke. They also can be used as dewatering tubes that hold the dredge material until it dries (Figure 15).

The Upper Middlesex Volunteer Fire Department (UMV-FD) owns property near Parrotts Creek (Figure 16). Their property would be suitable for the creation of a confined upland disposal site for the Parrotts Creek dredge material. It is anticipated that a dredge pipe could be

laid to the site so that the Parrotts Creek material could be hydraulically-dredged and pumped. The best path for the pipe would be for it to be laid cross through the finger creek adjacent to Millstone Landing, cross through the woods, and along the edge of the fields. Along this route, no roads have to be crossed and only one property owner would have to give permission for the route. The placement area does not have to be placed exactly where shown on the map. It can be moved to accommodate the UMV-FD use of the site or replicated on a different parcel altogether. As shown, it has a perimeter of about 2,160 ft and covers 5.7 acres. Because the amount of material is relatively small, rather than build a dyke out of Geotubes®, one layer of dewatering tubes can be used for the Parrotts Creek dredge material. The proposed configuration is shown in Figure 17. Seven tubes that are about 37 ft wide and 6.5 ft tall would be placed at the site and filled with dredge material. Once the tubes dewater, they can either be left in place, the bags cut and the material either reused for beneficial use or hauled to the landfill. The water coming out of the Geotubes® would be filtered and should meet water quality standards for return to the creek.

Mechanical dredging of the creek also is possible, but generally, it only is viable for small amounts of dredge material. The material would be dug out of the channel, placed on a barge and taken to a site adjacent to the channel that dump trucks can access. The dump trucks would be lined to hold the material inside the bed. The material would be placed in the trucks and hauled off to the landfill or other available site. In general, the standard tandem dump truck will hold 10 cy of material. However, with the Parrotts Creek material being about 90% clay, a more conservative estimate is 8 cy per truck load is probably more realistic. For the -6 ft MLLW (-5 ft MLLW + 1 ft) scenario, that would result in 1,500 truckloads.

The -6 ft MLLW with 1 ft over depth (total dredge depth -7 ft MLLW) is the preferred dredging option. Creating a deeper channel will increase the amount of material that has to be disposed of in an upland containment facility. The shallower option is not preferred because the -6 ft depth is needed if ATONs will be maintained by the US Coast Guard in the channel. The -6 ft MLLW alternative is laid out in the Joint Permit Application (Appendix E).

Because the upland disposal site is located on the UMV-FD property, Middlesex County will have to work with the Fire Department to determine maintenance issues at the site. Maintenance could include installing access pathways and mowing of vegetation on the site. Once the material inside the confinement area dries, it can be dug up and removed to a landfill or used as upland fill elsewhere. In addition, the Geotubes® themselves can be chopped up and removed to the landfill, if desired. YouTube videos showing typical operations for dewatering tubes are https://www.youtube.com/watch?v=UN7SdfiFHeE and https://www.youtube.com/watch?v=2PHljg-HR98.

### Costs

Estimated costs were provided by Waterway Surveys & Engineering and TenCate Geosynthetics Americas. The project cost has $700,000 included for mobilization/demobilization so there would be significant savings if the other shallow water draft channels on the Rappahannock River were combined with the Parrotts dredging project (Table 4). Because

equipment and pipe must be moved from channel to channel, combining projects will not result in a full price savings of mobilization/demobilization. Dredging a channel to a shallower depth does not necessarily produce a large cost-savings because most of the cost is in mobilization and demobilization. In addition, dredging deeper will increase the useful life of the project, but this has to be balanced with the increase in dredge spoil that would have to be disposed of.

Table 4. Estimated cost for select dredging scenarios at Parrotts Creek.

| Dredge Depth +Overdepth | Volume Fines | Mob/Demob | Dredging | Total Cost |
|---|---|---|---|---|
| (ft MLLW) | (cy) | ($) | ($) | ($) |
| Full Channel Hydraulic Dredging^ | | | | |
| -6 | 12,000 | $700,000 | $120,000 | $820,000 |
| -7 | 24,300 | $700,000 | $218,700 | $918,000 |
| -8 | 39,000 | $700,000 | $312,000 | $1,012,000 |
| Full Channel Mechanical Dredging* | | | | |
| -6 | 12,000 | $50,000 | $480,000 | $530,000 |
| -7 | 24,300 | $50,000 | $972,000 | $1,022,000 |
| -8 | 39,000 | $50,000 | $1,560,000 | $1,610,000 |
| ^Cost assumes placement site is within 1 mile of the channel. | | | | |
| *Cost assumes placement site is within 10-12 miles of the channel. | | | | |

Hydraulic dredging Mobilization includes all costs for operations accomplished prior to commencement of actual dredging operations. This includes as a minimum the following:

- Transfer of dredge and attendant plant, booster pumps, bulldozers and other like equipment and machinery for site work;
- All initial installation of pipe, if required; and
- All costs for any other associated work that is necessary in advance of the actual dredging operations.

Dredging Demobilization includes general preparation for transfer of plant to its home base, removal of pipelines, cleanup of site of work areas, and transfer of plant to its home base.

The cost for mechanical dredging of the channel also are shown in Table 4. Mechanical dredging is more cost-effective for smaller volumes. It would cost less than hydraulic dredging to dredge to the -6 ft MLLW depth (+5 ft MLLW with 1 ft overdepth) level but more for the next deeper scenario. The mob/demob is much less expensive than hydraulic dredging, but it has a higher cost per volume. There also may be a fee associated with dumping the material at the landfill.

The cost for the proposed disposal area created with Geotubes® is approximately $154,000. This includes mobilization/demobilization for the disposal site setup and cost associated with dewatering materials as well as the polymer and Geotube® units. Other costs for any site preparation, maintenance, or disposal is not included in the estimate. The area needed for this disposal area is about 5-6 acres.

## Useful Life Estimate

After dredging, shoaling within the channel is not linear; it starts fairly quickly after dredging but slows over time as the channel reaches equilibrium. During dredging, the cut of the bottom material should be sufficient to allow slope material to slough off (or cave) to the natural underwater shape of the bottom without encroaching the desired channel dimensions. However, some slumping of the dredge channel side slopes may occur over time, causing infilling of the channel. In addition, Parrotts Creek channel also will be affected by the continued disintegration of the spit across the mouth of the creek because it is in such close proximity. The spit is eroding, and the marsh is disintegrating even with the rock sill along the front (Figure 18). The old bulkhead at the tip of the spit and along the back is in complete disrepair. As erosion continues, material will be deposited into the channel, and the hydrodynamics of the system may be affected particularly wave energy inside the creek. Some of the dredge material could be placed on the spit to rebuild it, but though this would help to maintain the spit and its habitats, it has several disadvantages. Most of the material that needs to be dredged contains 90% fines with very little sand; only core 2 has any sandy content and that is only 35% of the amount of material to be dredged. Because the bulkhead is in disrepair, the sediment would move immediately back into the channel and disperse into the creek and river increasing sediment content of adjacent waters. Also, only a small amount of material (approximately <500 cy) would be needed to rebuild the spit which could increase the cost of the project by increasing time on site.

For these reasons, estimating the useful life of the dredge project is difficult for Parrotts Creek. Using $^{210}$Pb radioisotopes found within our core taken inside the creek (Figure 8), it was found that Parrotts Creek has an average sediment accretion rate of 0.43 cm/yr (0.02 ft/yr) (Figure 19). $^{137}$Cs radioisotopes are used to determine the approximate age of the sediments at a particular depth by assuming the peak of $^{137}$Cs is the year 1963. As the $^{137}$Cs peak is located at a shallow depth (approximately 24 to 28 cm), it supports the findings of a relatively low (0.46 cm/yr) accretion rate.

Comparing survey data obtained by the US Army Corps of Engineers in 2016 to the 2020 survey data collected for this report shows that the change is occurring in the channel (Figure 20). Though the 2016 survey did not extend in the creek past the spit, the more energetic outer channel accreted about 1.25 ft over the four years resulting in an annual accretion rate of about 0.3 ft/yr. An analysis of change between a 2019 US Army Corps of Engineers survey and the 2020 survey, the rates of change were both accretion and erosion and were mostly less than 0.3 ft/yr. The no change was used to denote change that was between +0.1 ft/yr and -0.1 ft/yr which is probably within the error rate of the surveys. Though sedimentation may initially increase after dredging, the natural relatively low rates of change indicate a rough estimate of useful life of this project is at least 10-20 years.

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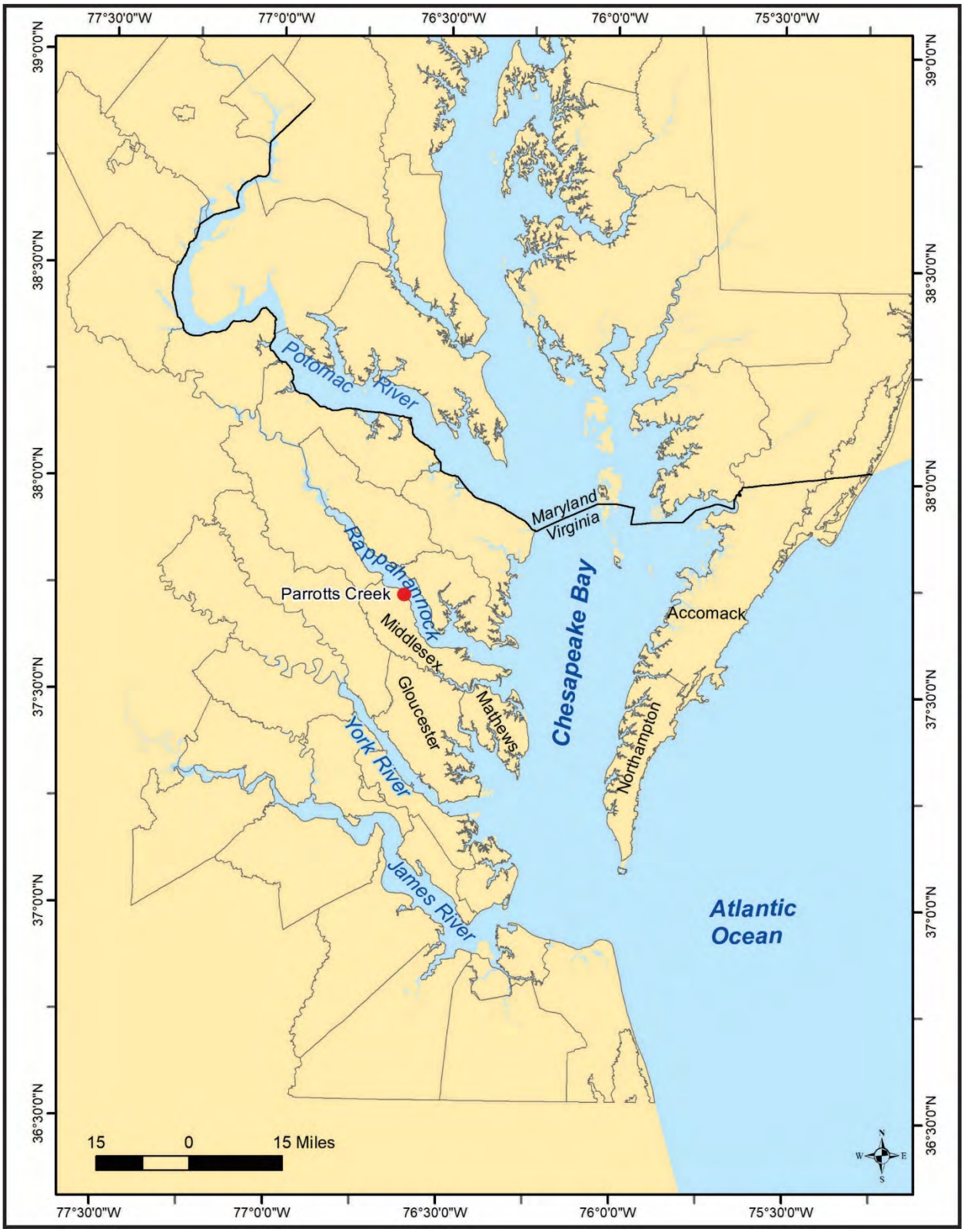



*Figure 1. Location of Parrotts Creek within the Chesapeake Bay estuarine system.*

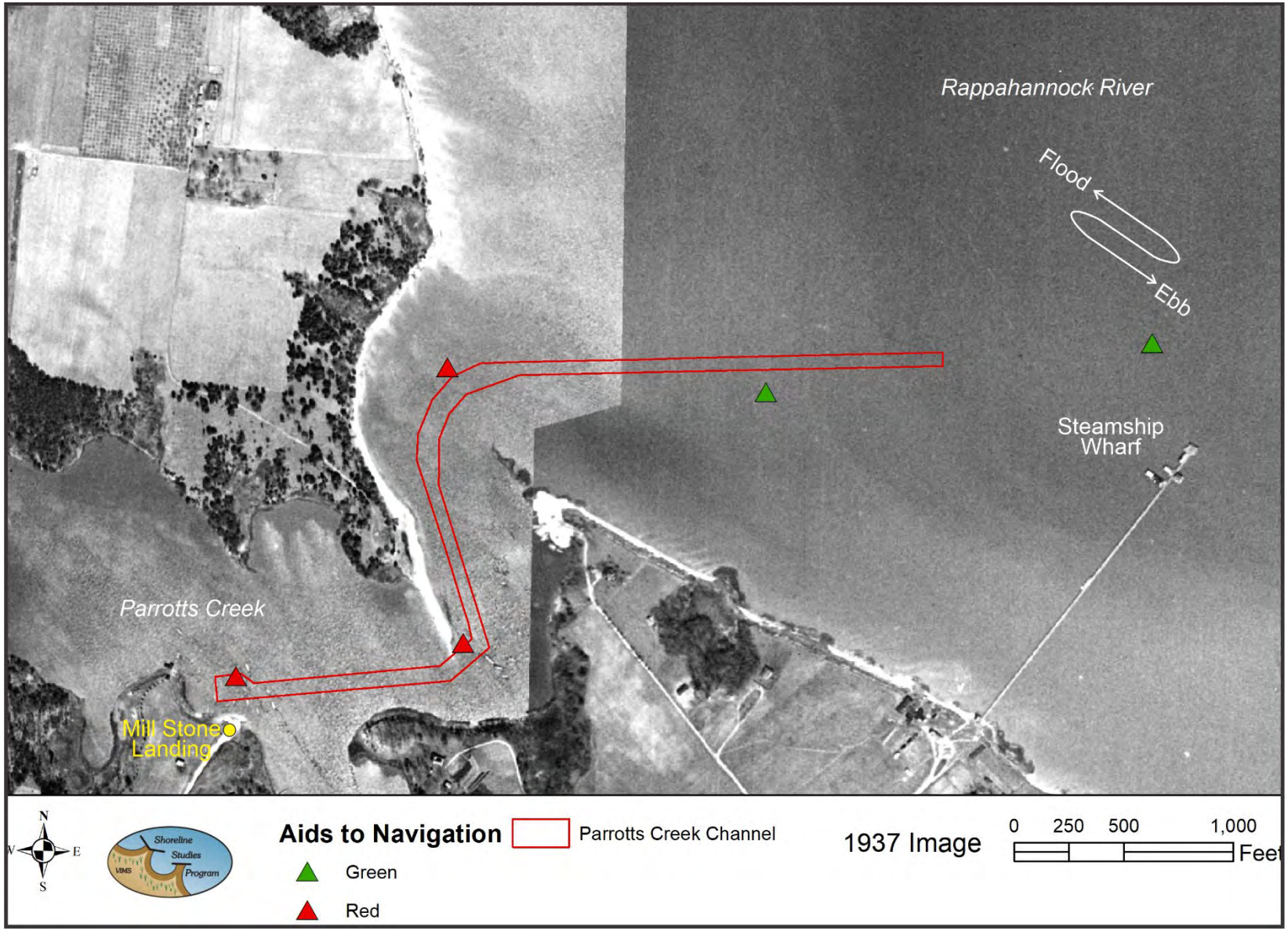



*Figure 2. An orthorectified image showing Parrotts Creek in 1937. From Shoreline Studies Program Shoreline Change Database.*

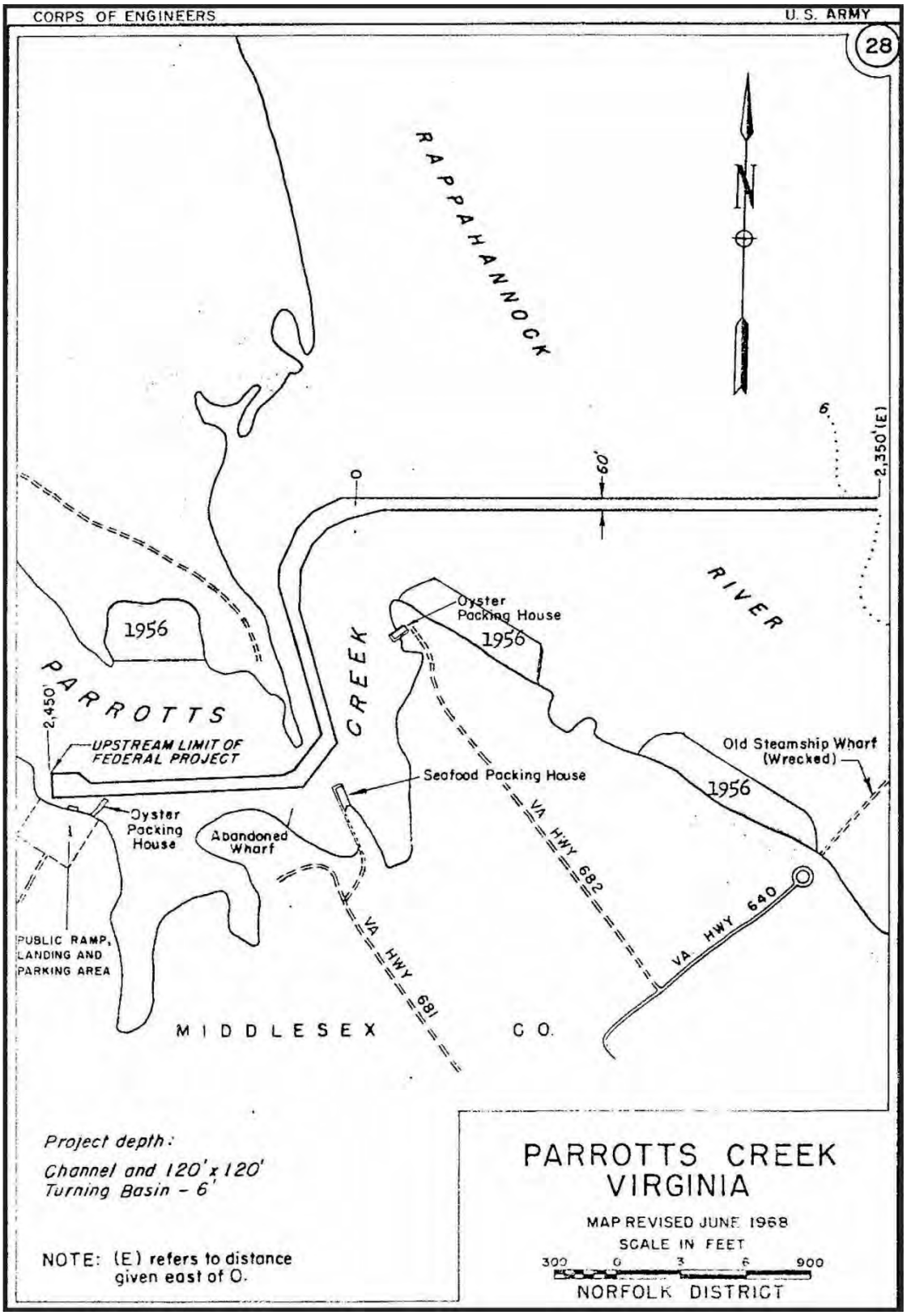



*Figure 3. Federally-defined channel at Parrotts Creek and the location of dredge material placement from the 1956 new dredge work. From USACE.*

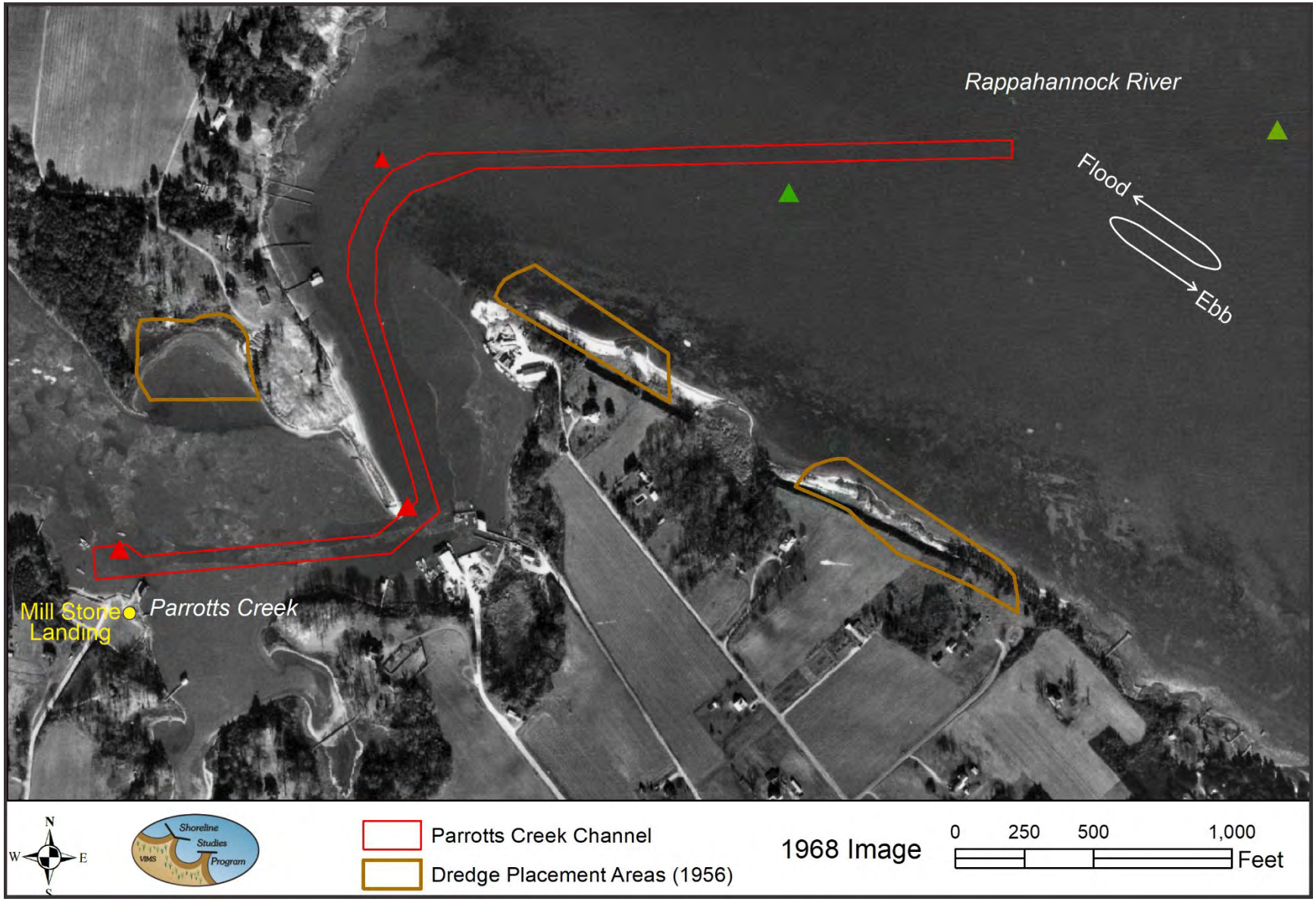



*Figure 4. An orthorectified image showing Parrotts Creek in 1968. From Shoreline Studies Program Shoreline Change Database.*


*Figure 5. An orthorectified VBMP image showing Parrotts Creek in 2017 with disposal areas from 1956.*

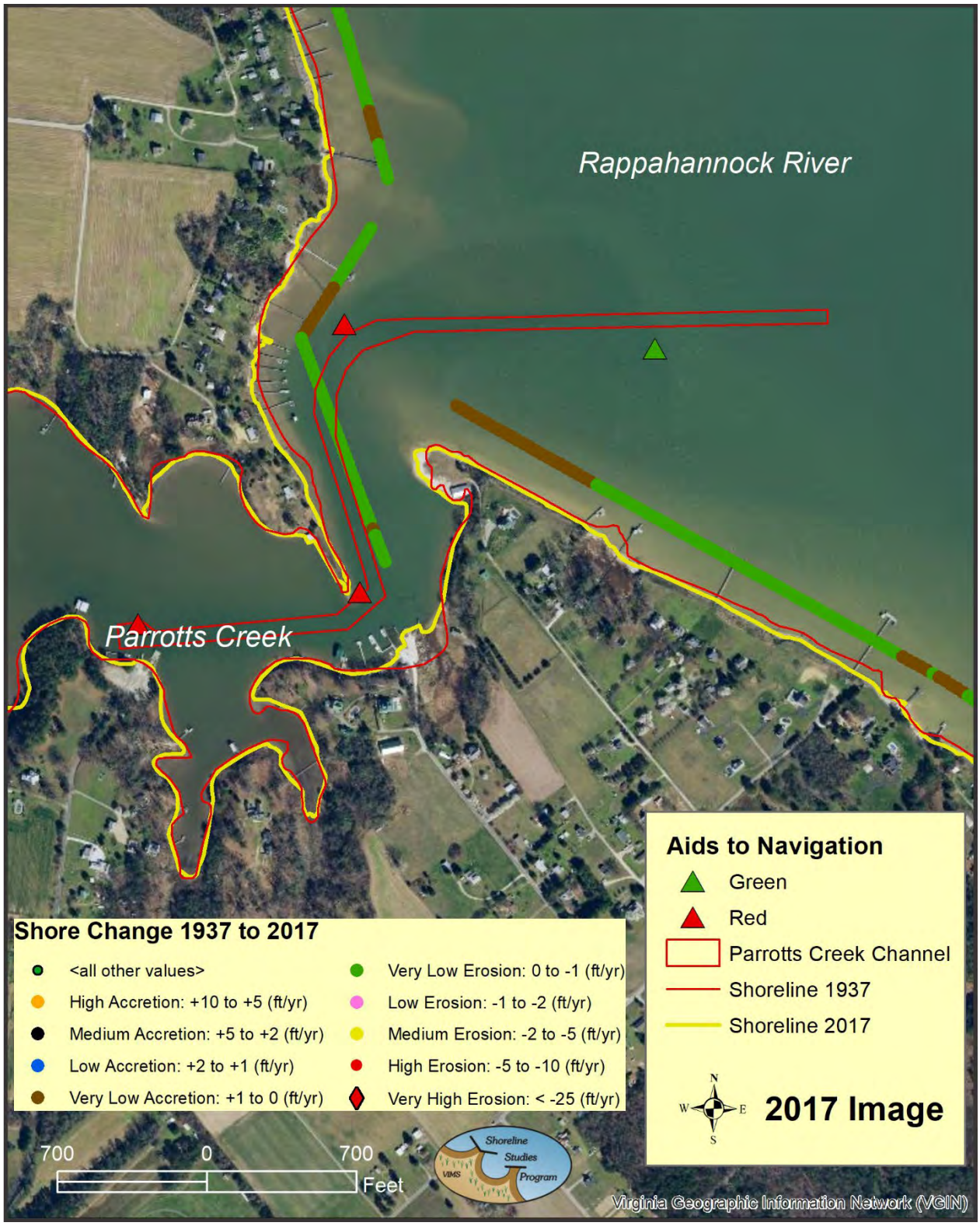



*Figure 6. Parrotts Creek on the 2017 VGIN image showing the 1937 and 2017 shorelines and 1937-2017 end point rate of change categorization. From Shoreline Studies Program Shoreline Change Database.*

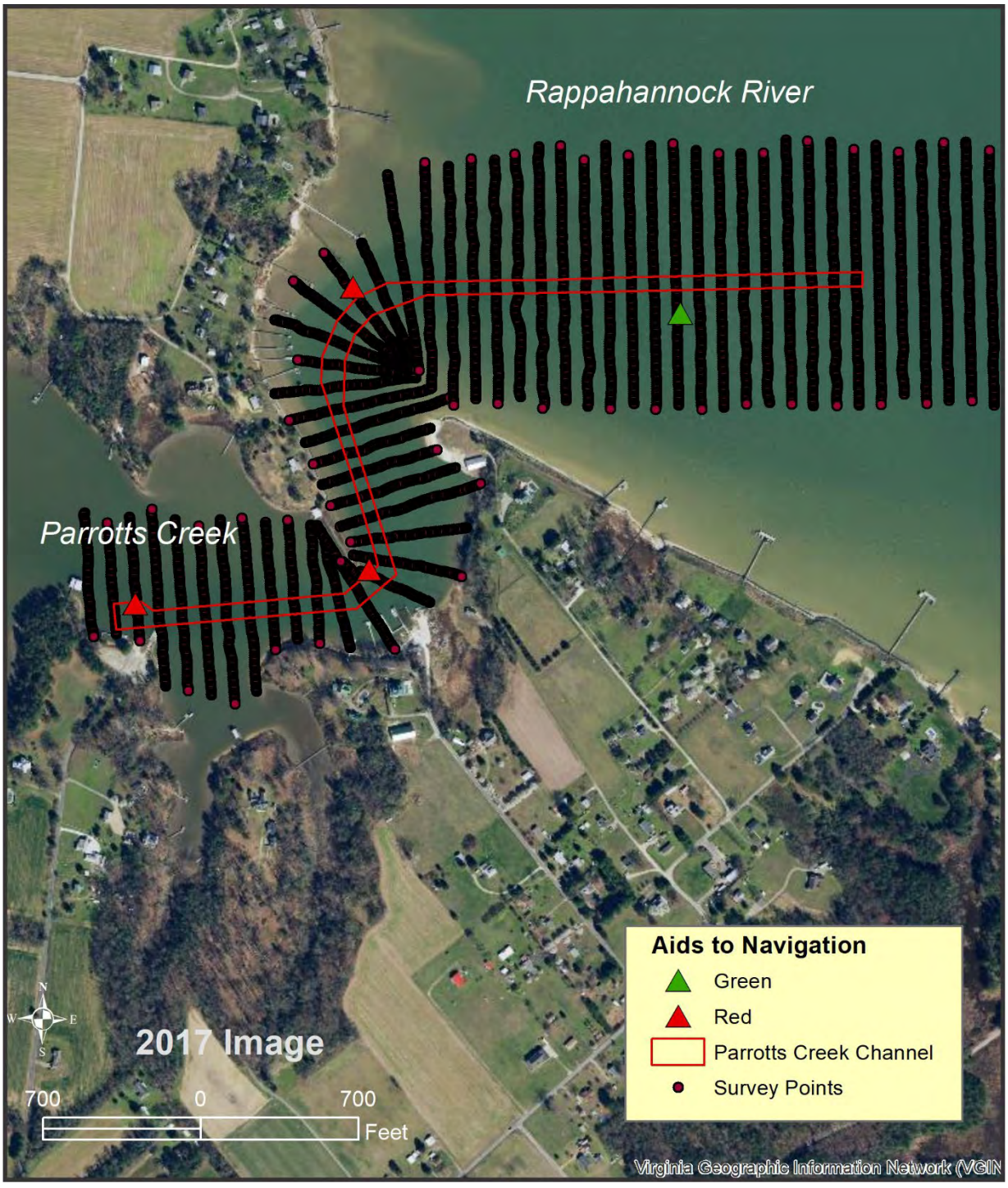



*Figure 7. Survey points taken on November 19, 2020 to determine existing bottom elevations at Parrotts Creek.*

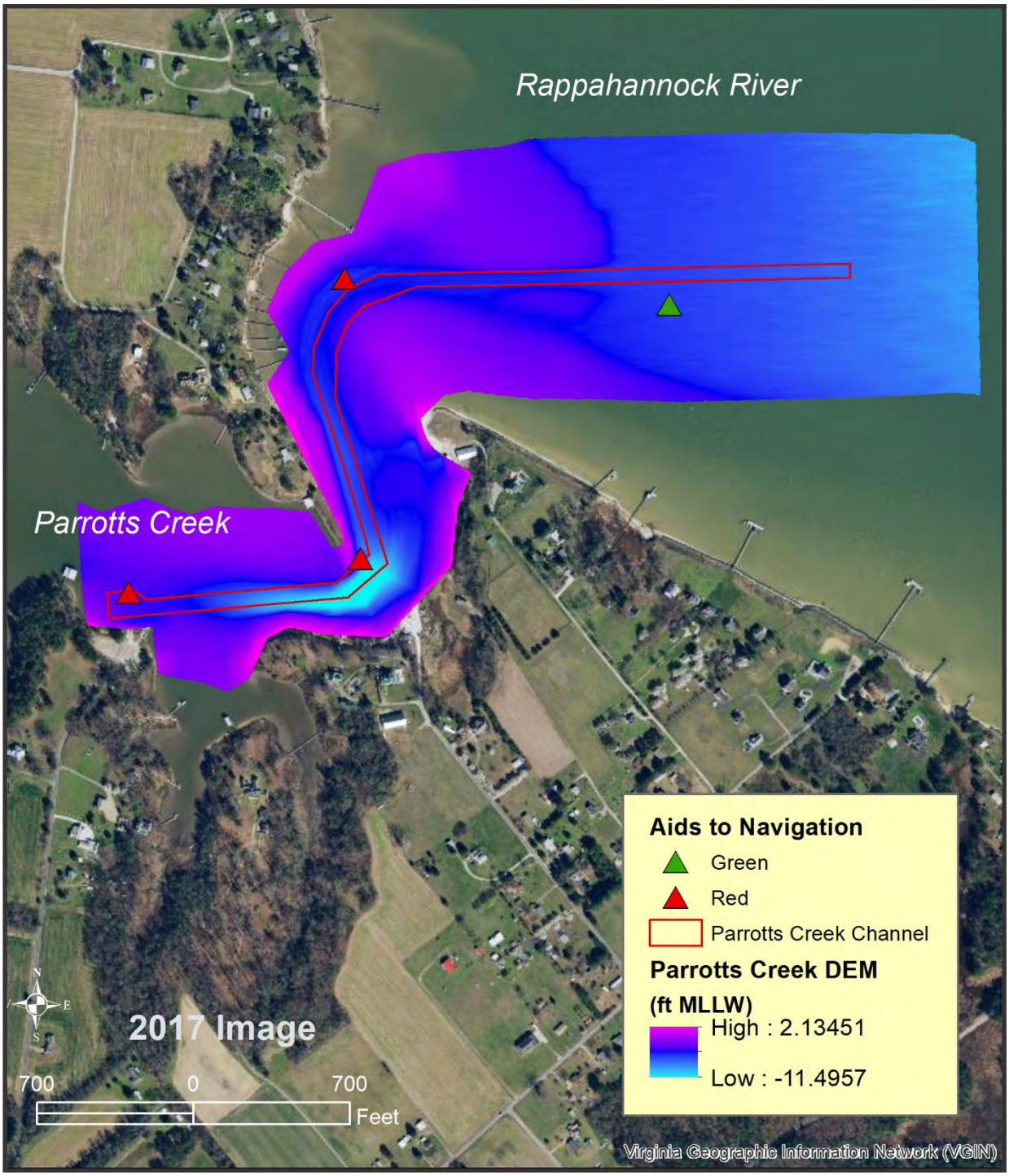



*Figure 8. Digital Elevation Model (DEM) derived from survey points showing existing bathymetry of Parrotts Creek.*

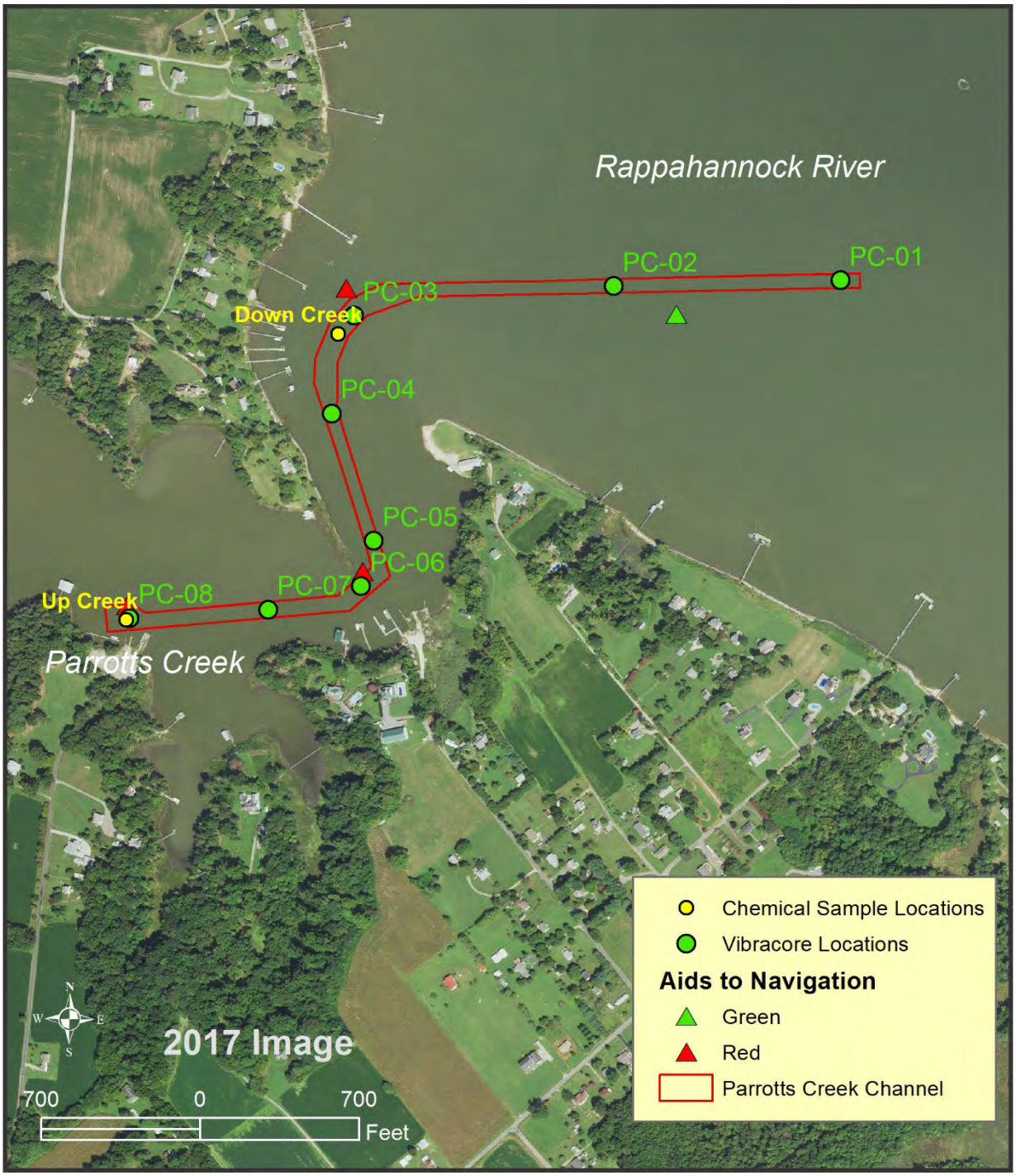



*Figure 9. Location of vibracores and chemical samples taken in Parrotts Creek.*

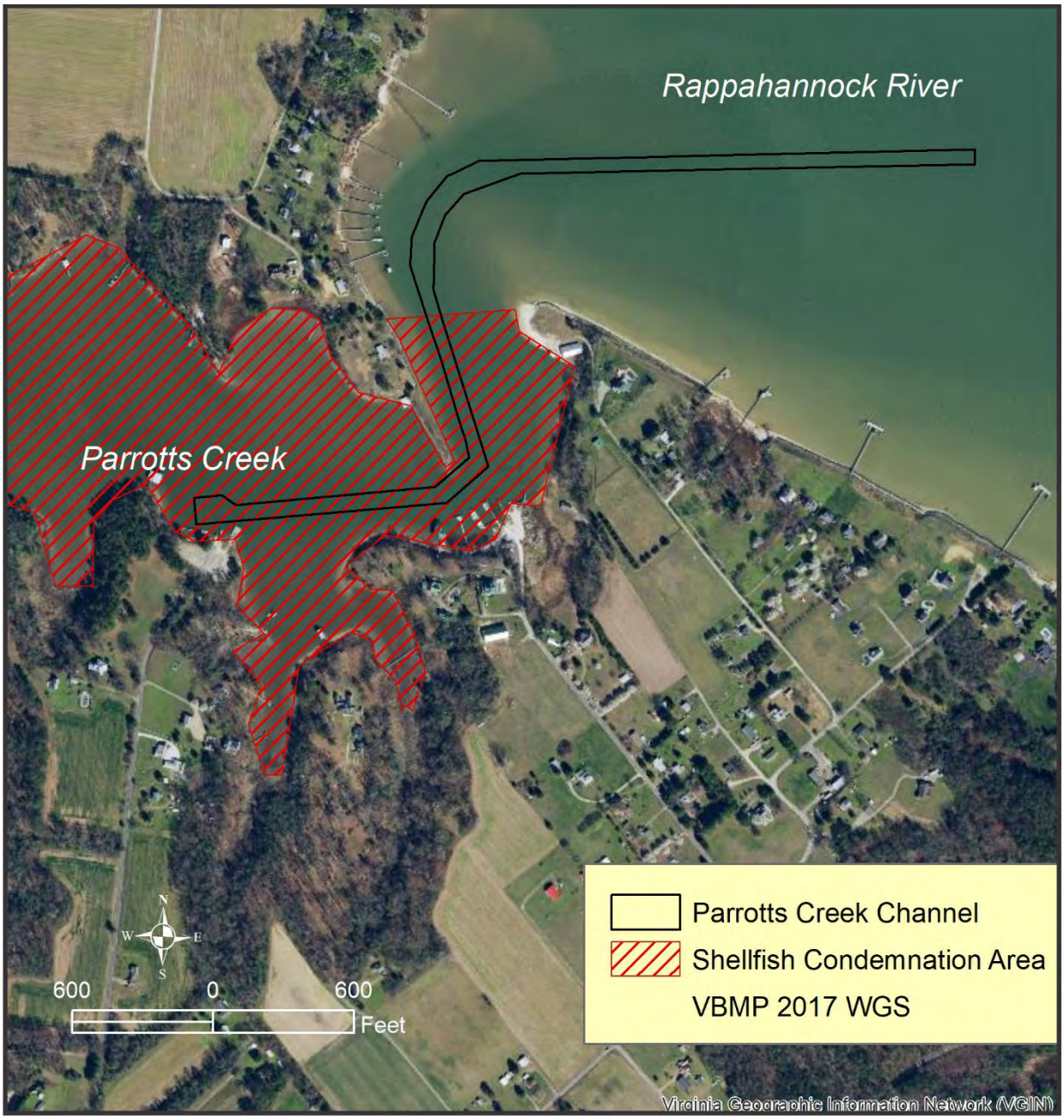



*Figure 10. The areas of Parrotts Creek that have been condemned for shellfish harvesting. From https://webapps.mrc.virginia.gov/public/maps/chesapeakebay_map.php*

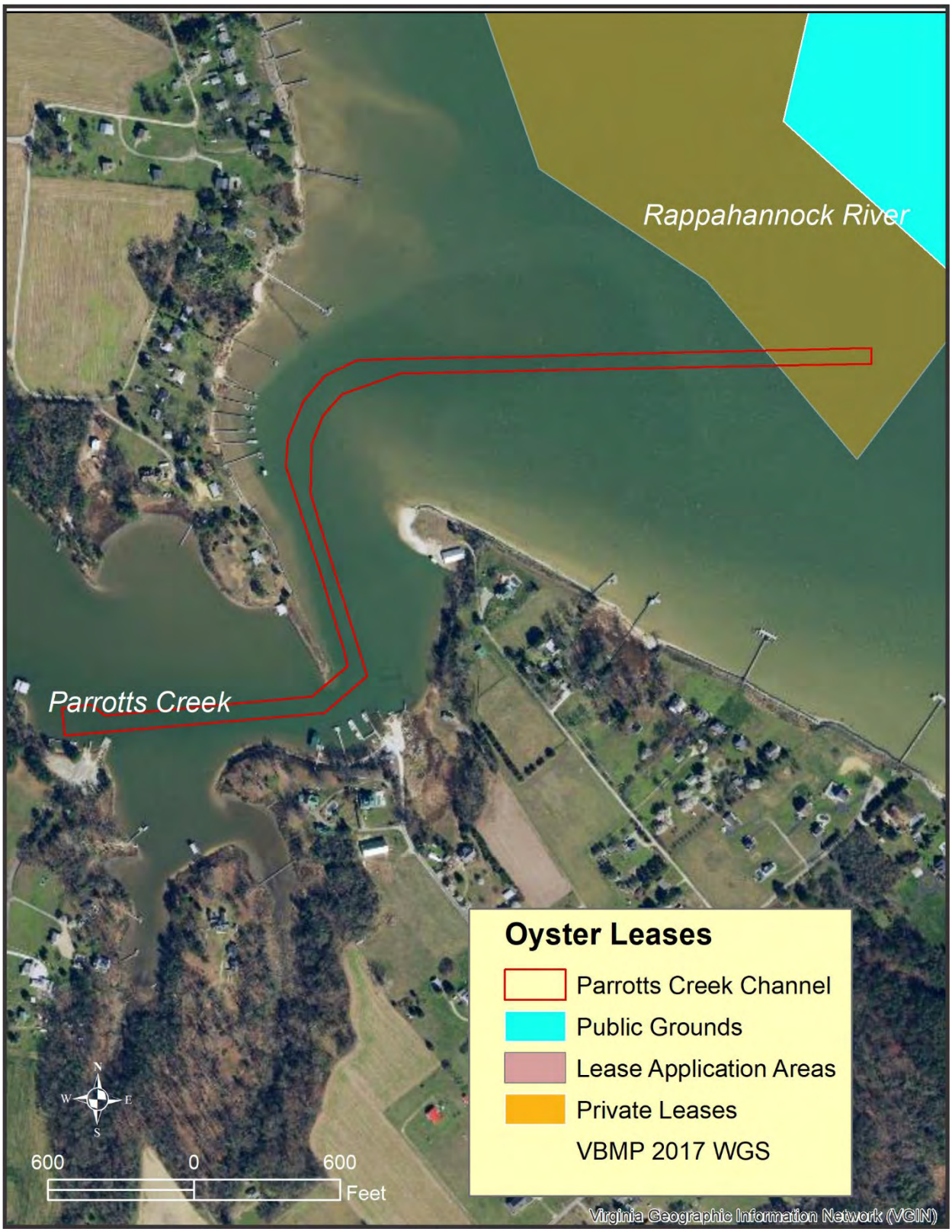



*Figure 11. Private oyster ground leases and public bottom that will be affected by the proposed Parrotts navigation channel. From https://webapps.mrc.virginia.gov/public/maps/chesapeakebay_map.php*

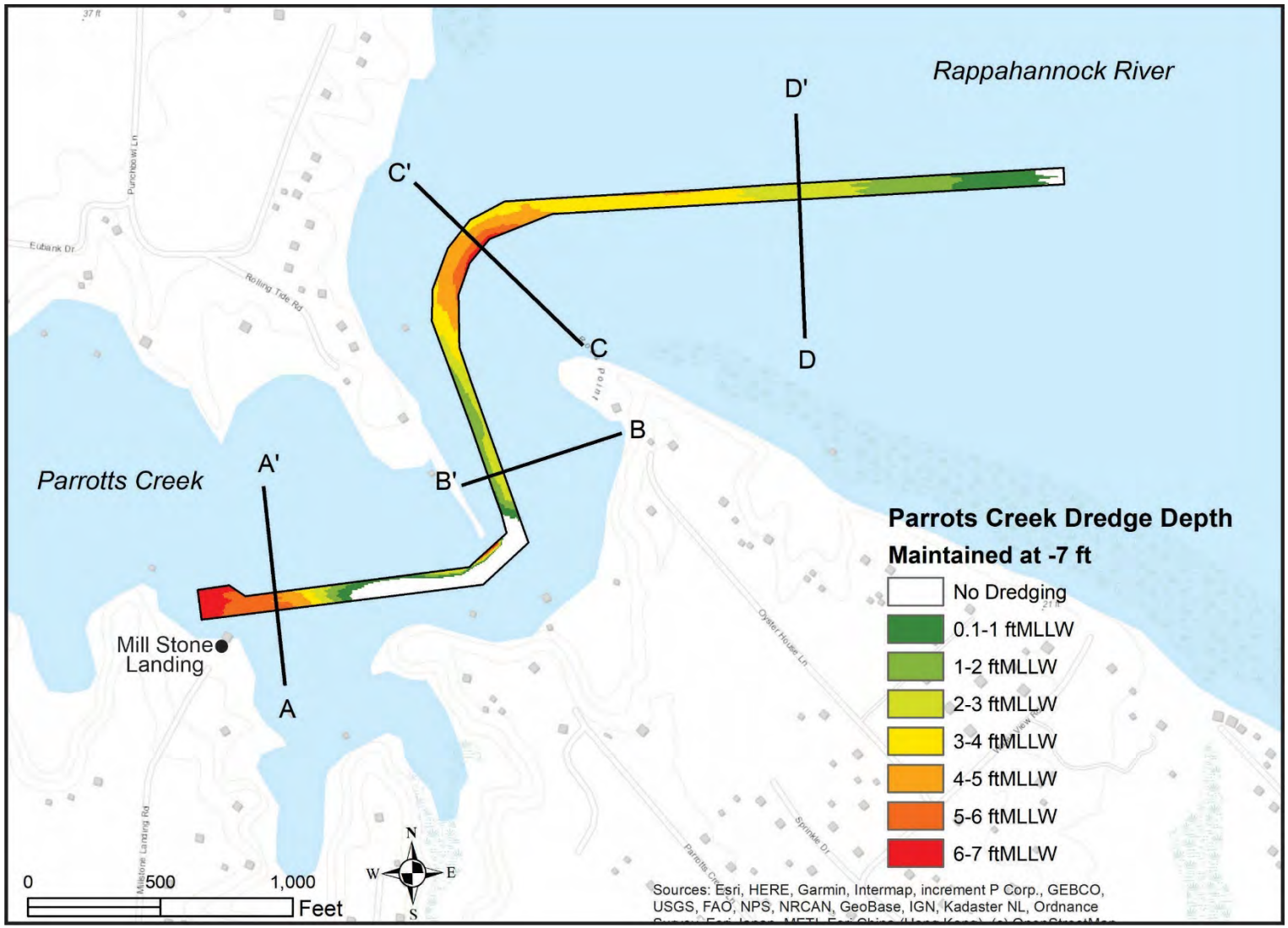



*Figure 12. Digital elevation model (DEM) showing the locations in the channel that are shallower than -7 ft MLLW. Areas that need more material removed are shown in red. Areas that need less material removed are shown in green. Areas deeper than -7 ft MLLW are shown in white because no dredging need occur. Also shown are the locations of typical cross-sections of the channel.*

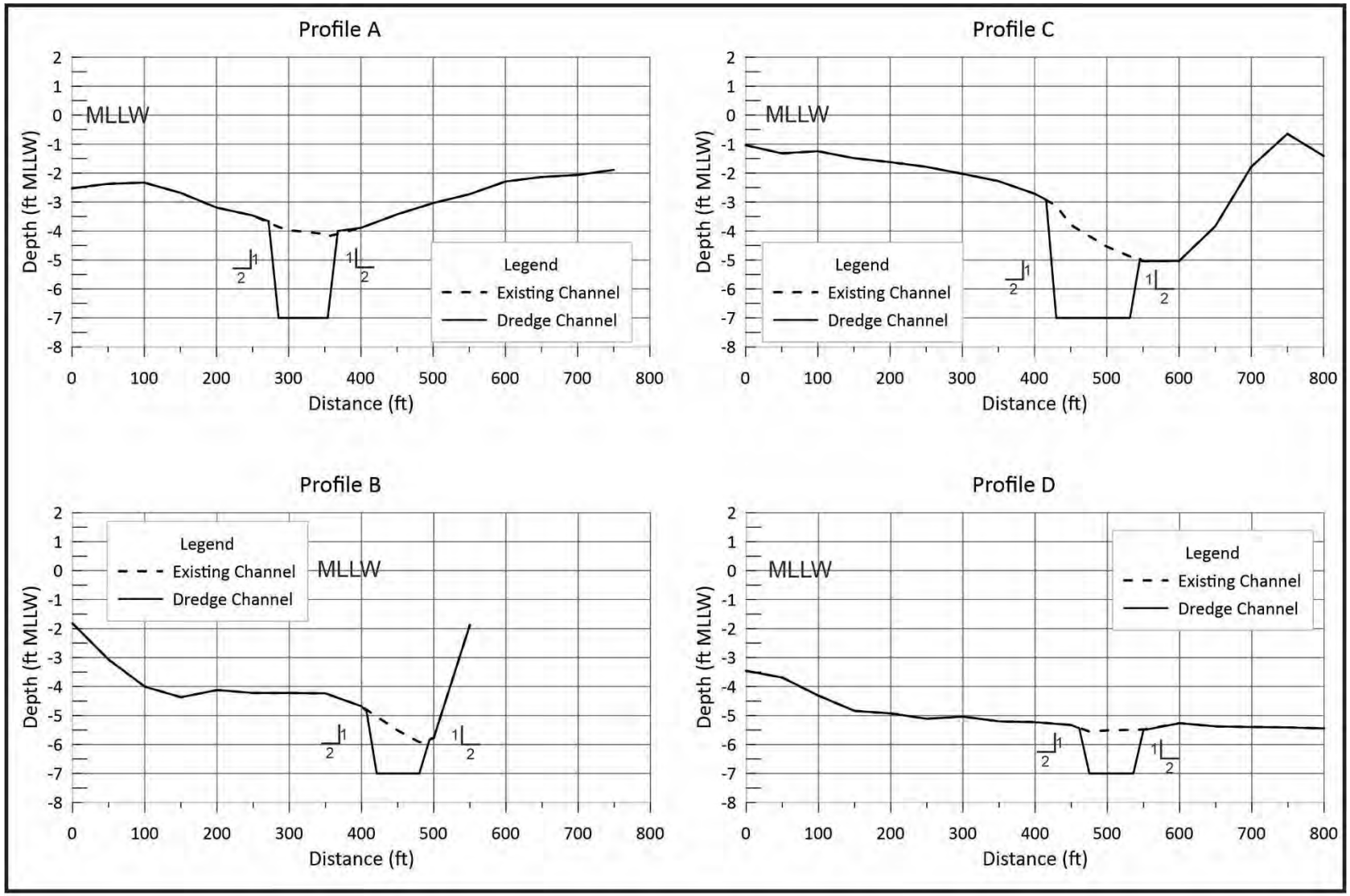



*Figure 13 Typical channel cross-sections looking up-creek at Parrotts. Their location is shown on Figure 12.*

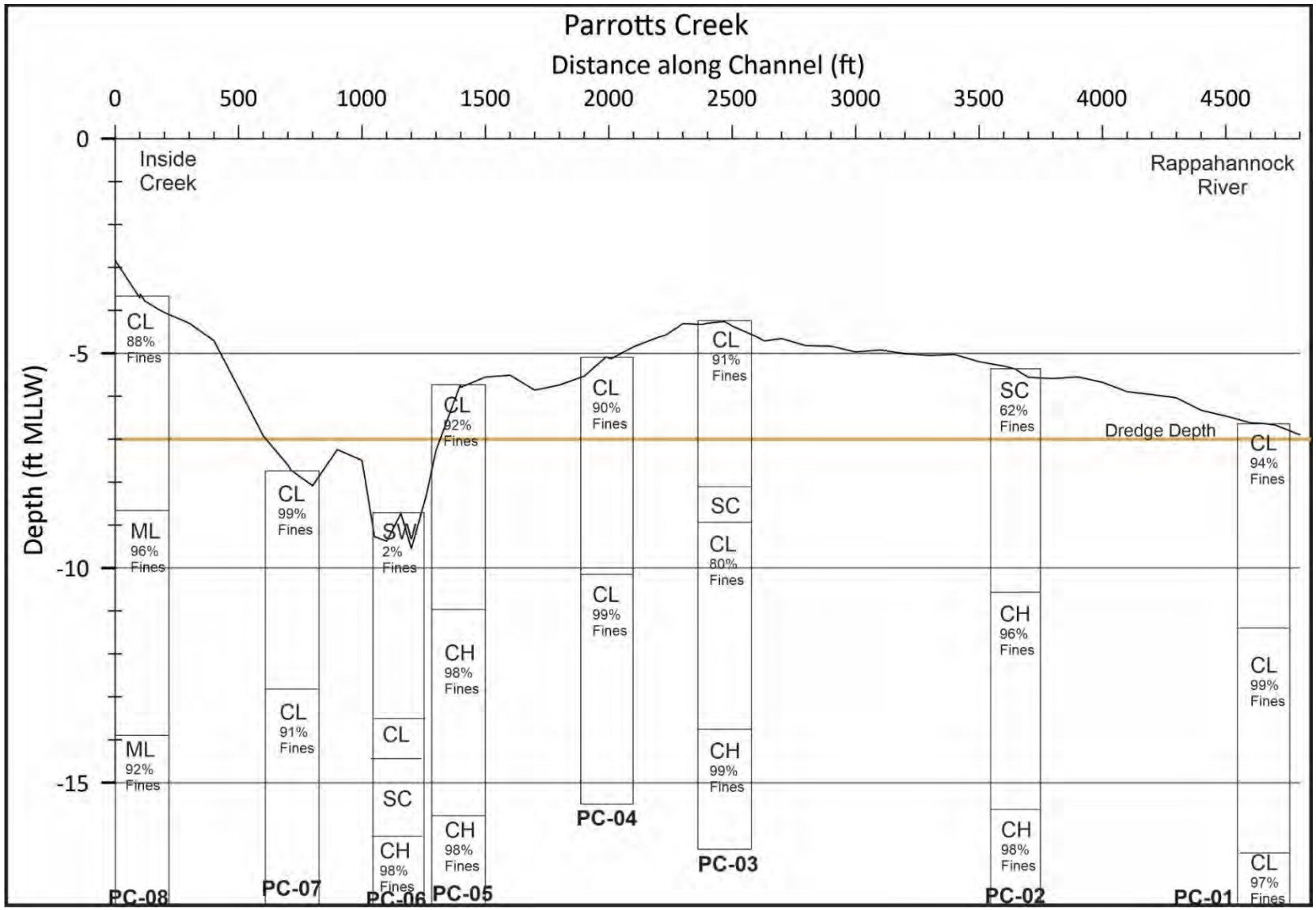



*Figure 14. Along-channel cross-section showing the position of the cores, and the type of material in the core. Core locations are shown on Figure 9. The dredge depth is -7 ft MLLW*


*Figure 15. Example photo of a Geotube® used for dewatering sediment and how it works. Source: acigs.org and TenCate websites.*


*Figure 16. Potential location for Geotube® placement for upland disposal at the Upper Middlesex Volunteer Fire Department property.*

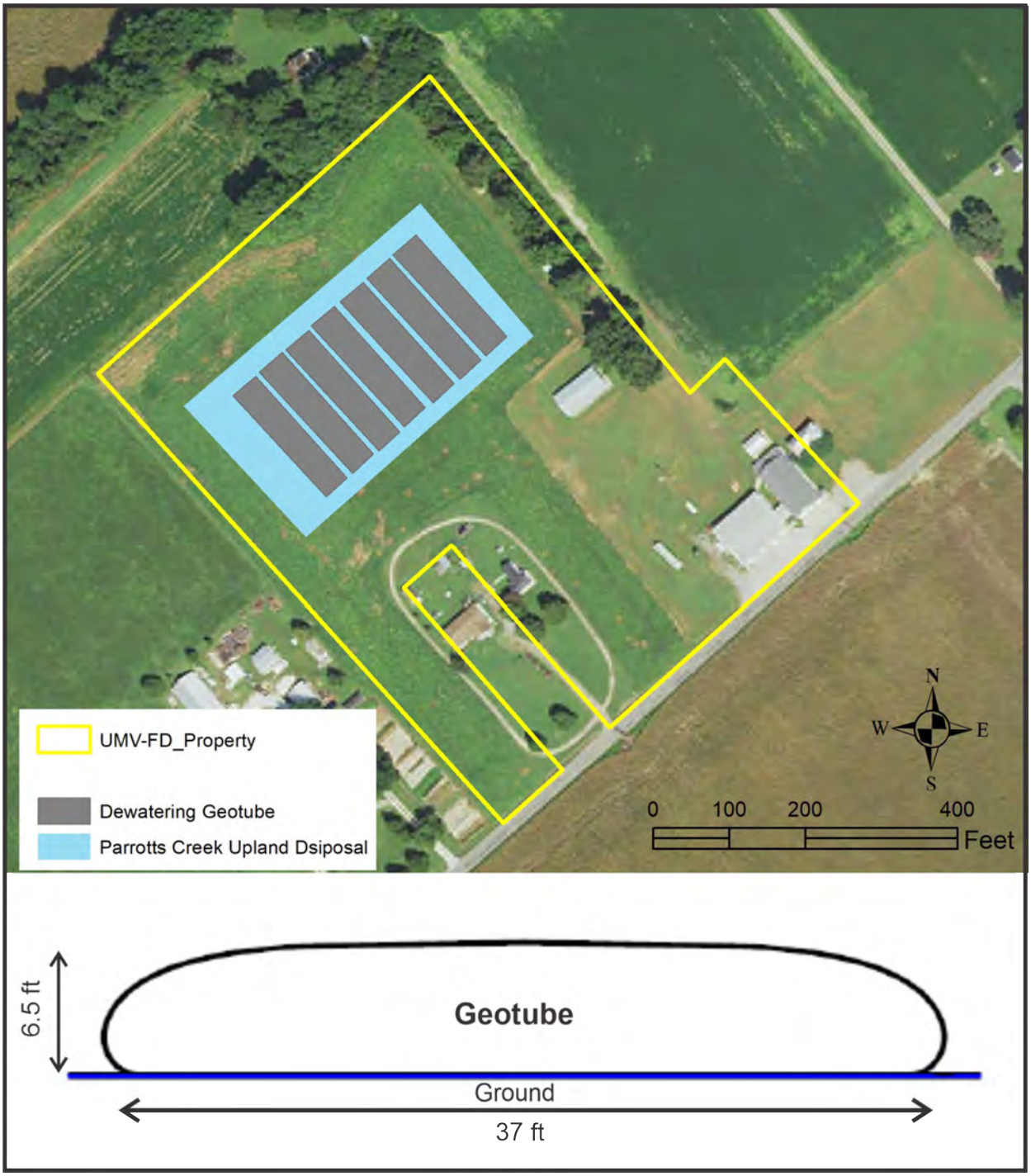



*Figure 17. Configuration of dewatering Geotubes® at the confined upland disposal site.*


*Figure 18. Top: Google Earth image (May 1, 2021) and Bottom: photo taken by VIMS, Shoreline Studies Program personnel (April 5, 2021) of the spit that occurs at the mouth of Parrotts Creek.*

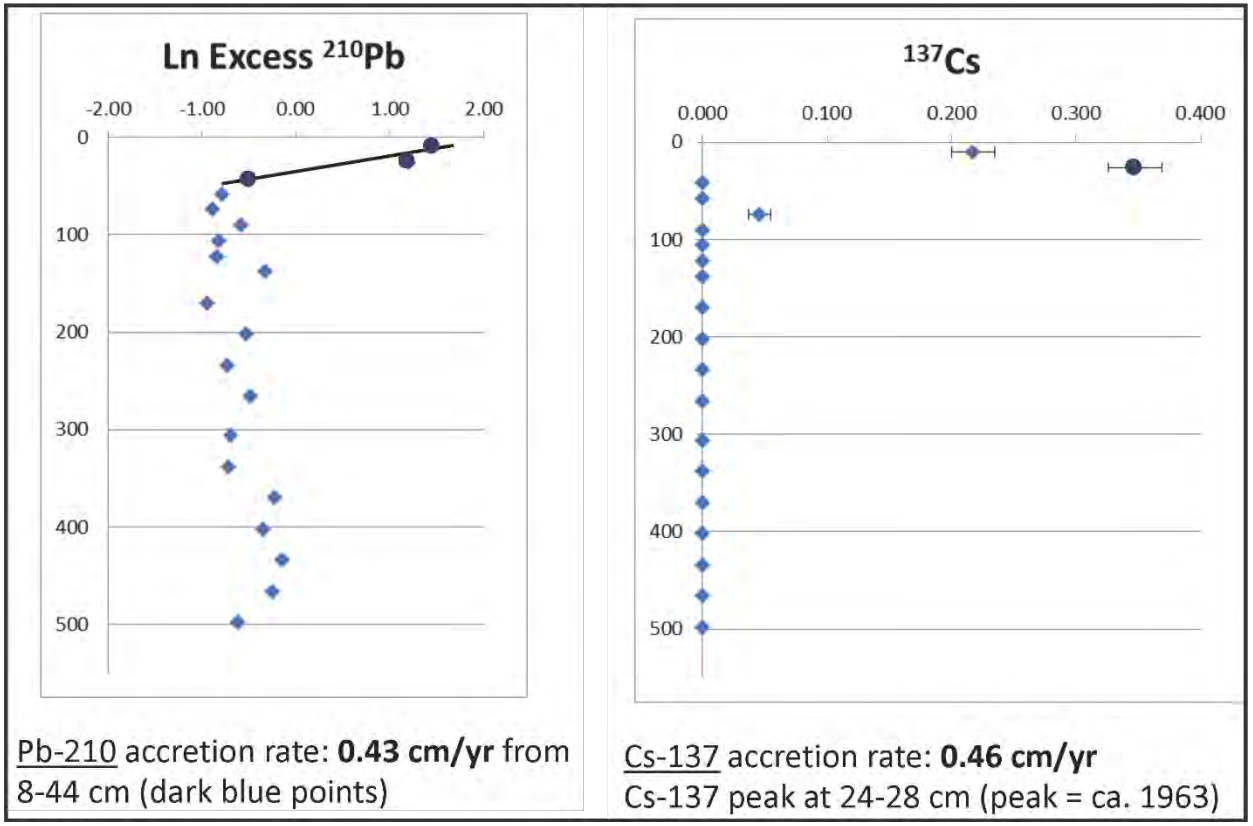



*Figure 19. Result plots from the $^{210}Pb$ and $^{137}Cs$ testing showing the modeled sedimentation rates.*

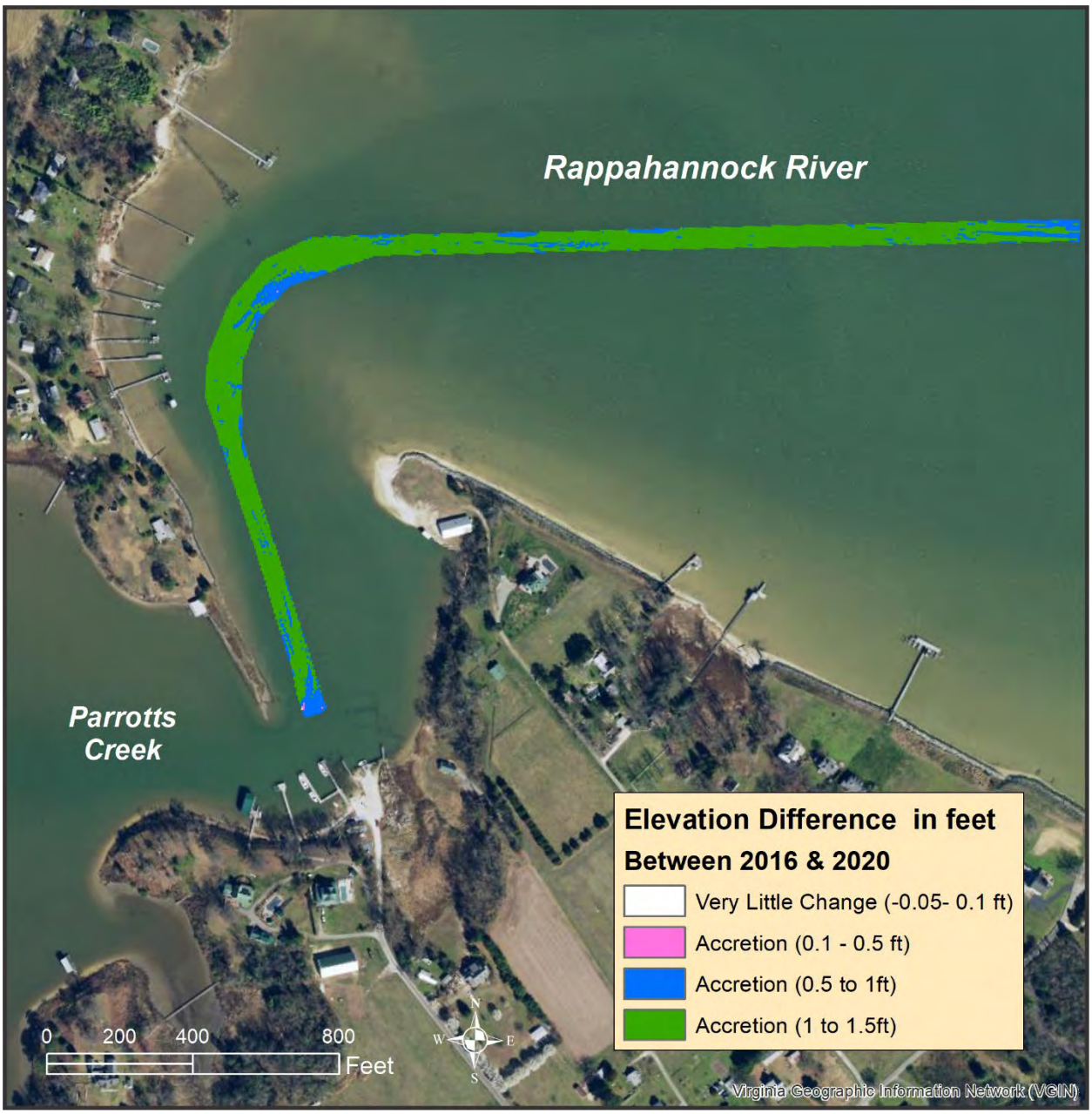
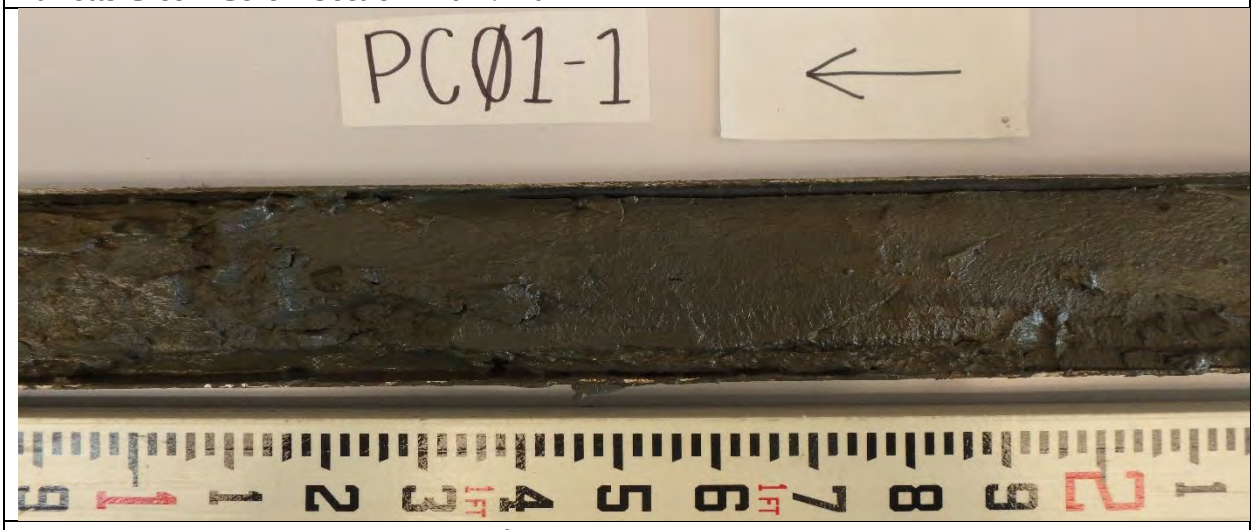



*Figure 20. Elevation change between the 2016 USACE survey and the 2020 survey for this project.*

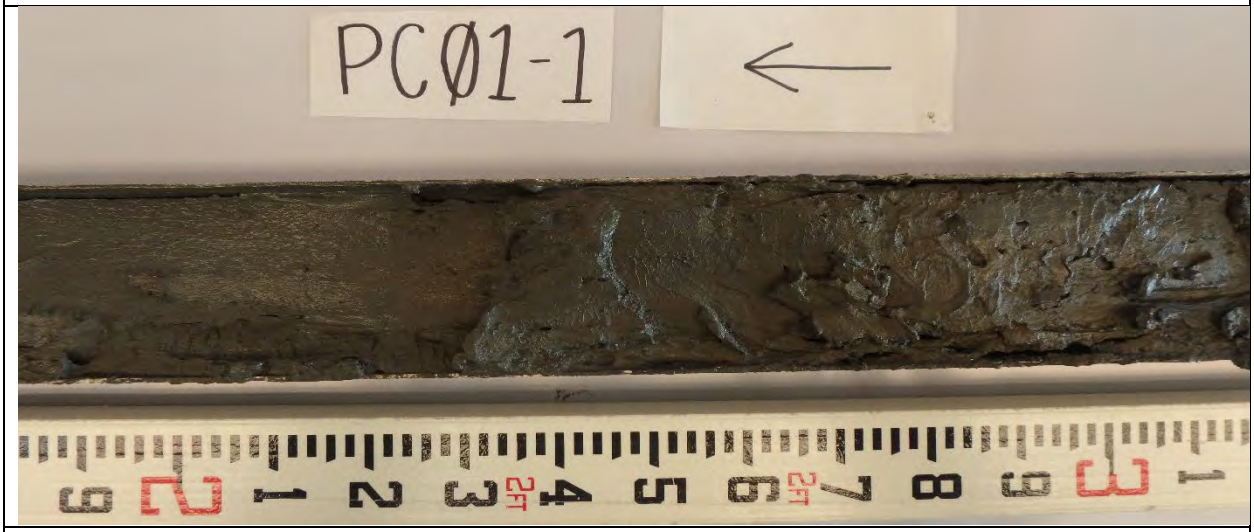
# Appendix A

# Core Photographs

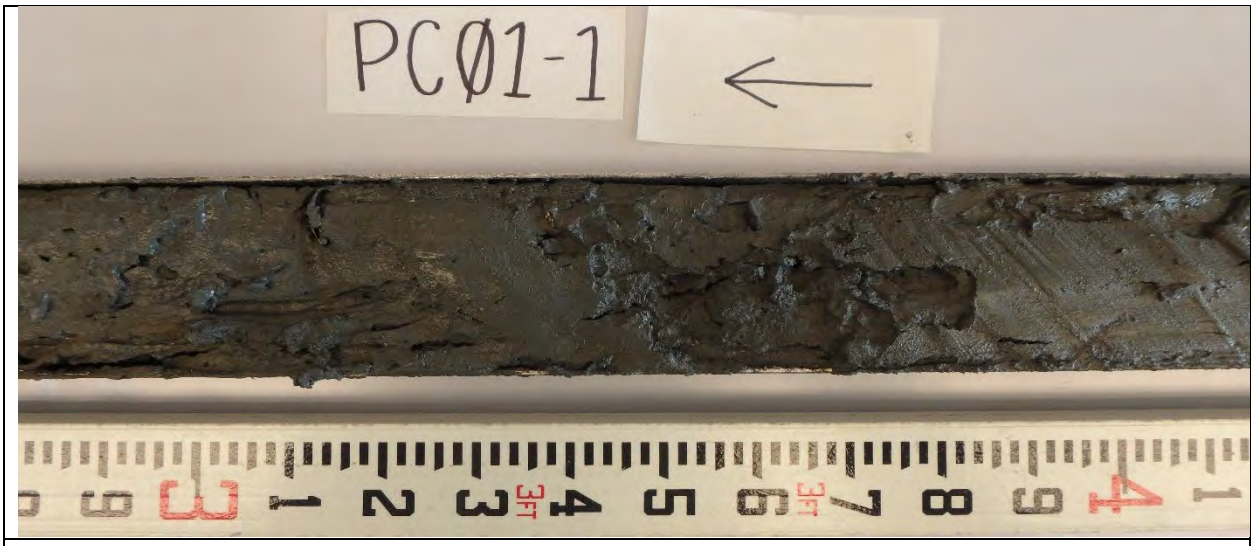

Parrotts Creek Core 1 Section 1 0-1.1 ft



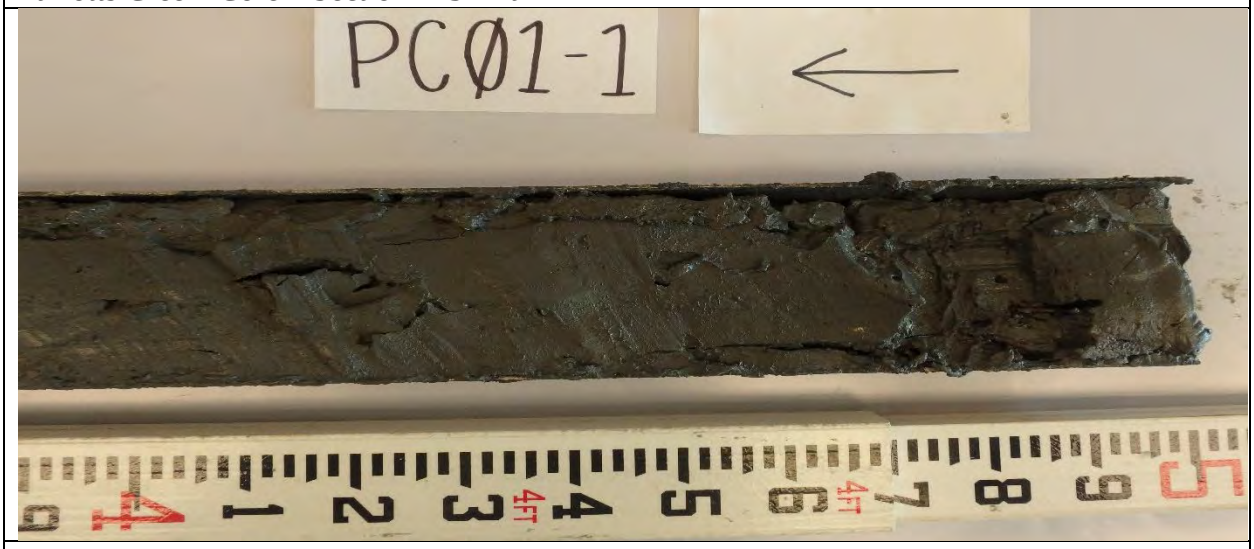

Parrotts Creek Core 1 Section 1 1-2 ft



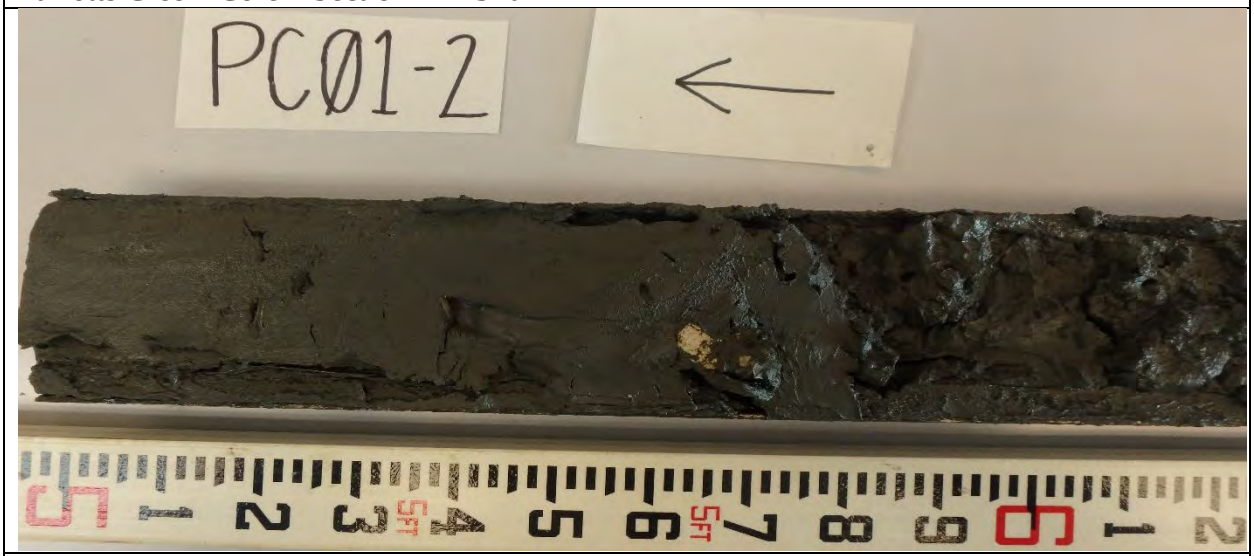

Parrotts Creek Core 1 Section 1 2-3 ft



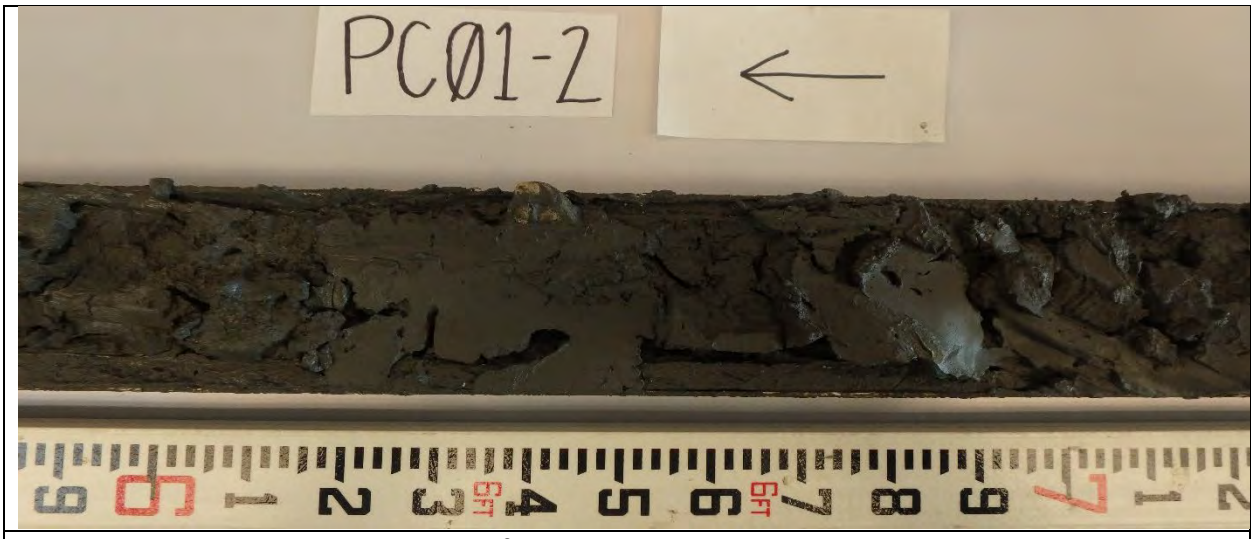

Parrotts Creek Core 1 Section 1 3-4 ft



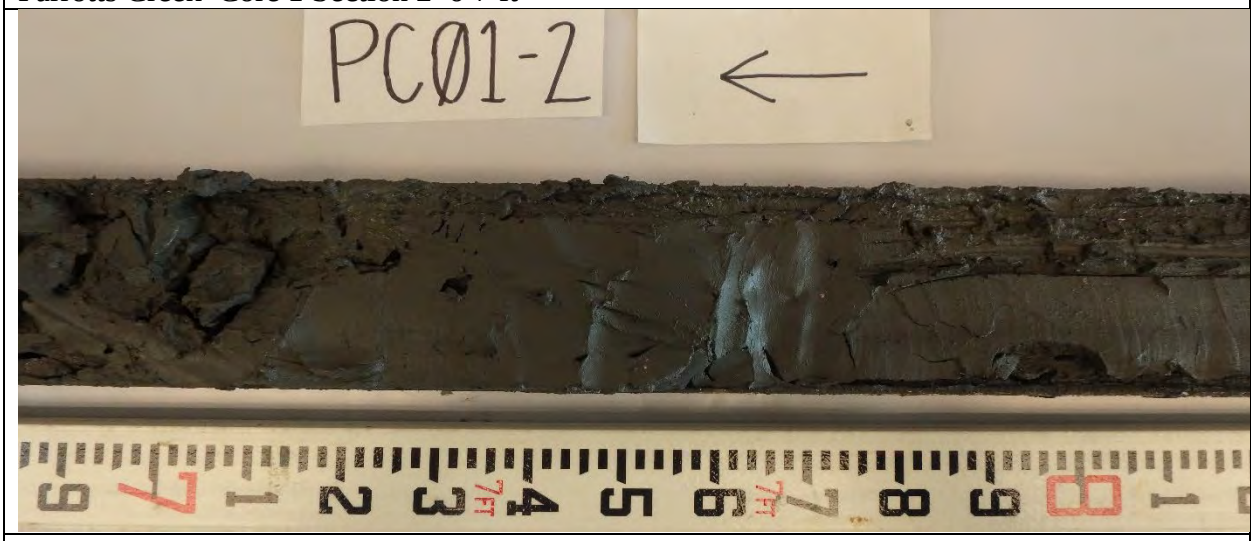

Parrotts Creek Core 1 Section 1 4-5 ft



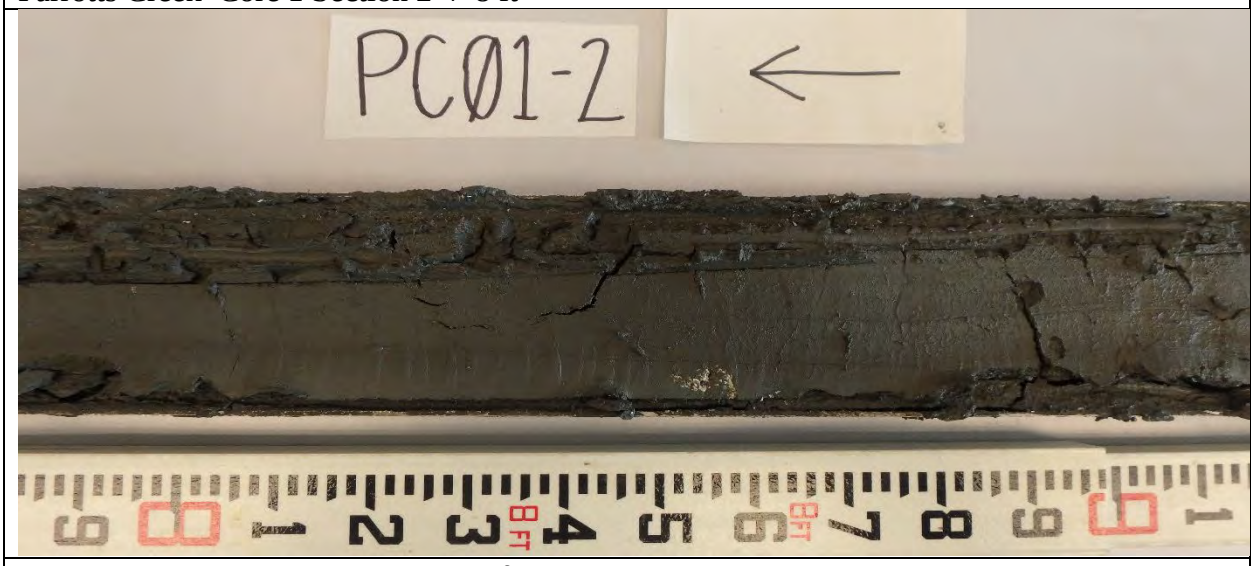

Parrotts Creek Core 1 Section 2 5-6 ft



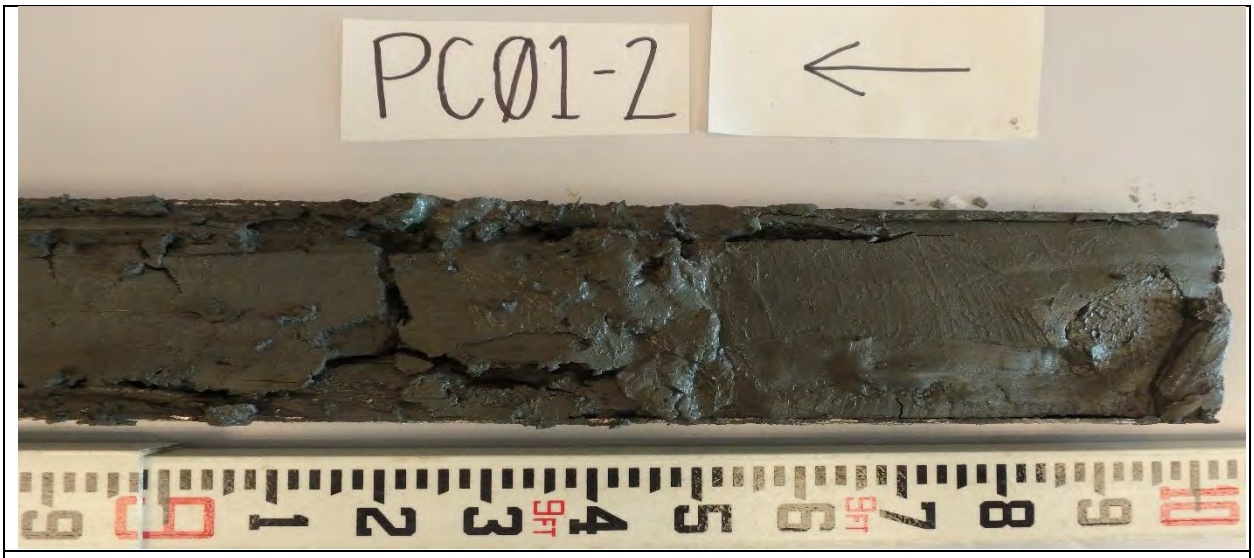

Parrotts Creek Core 1 Section 2 6-7 ft



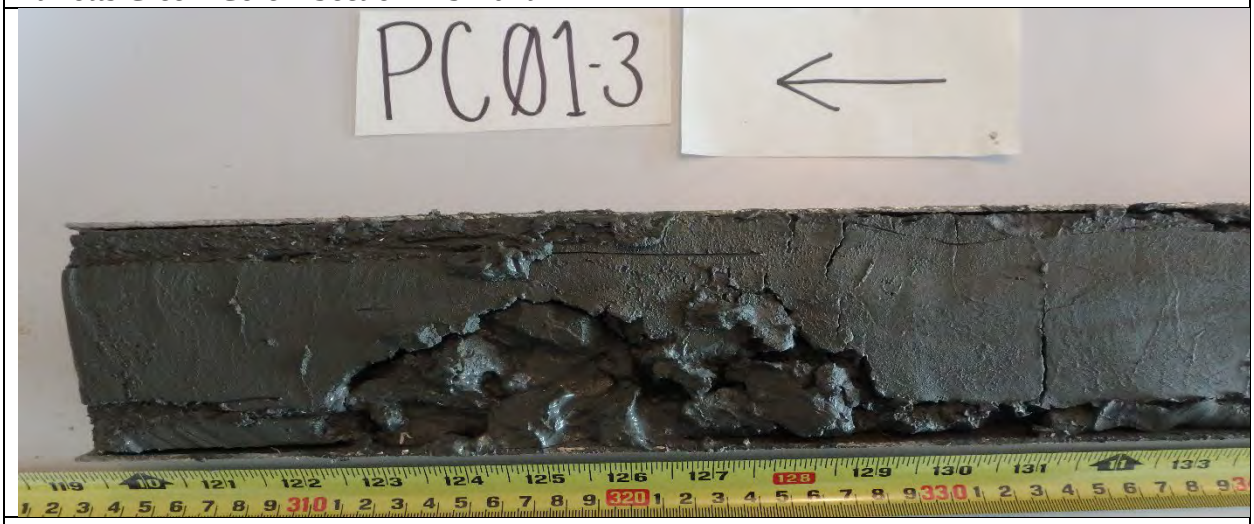

Parrotts Creek Core 1 Section 2 7-8 ft



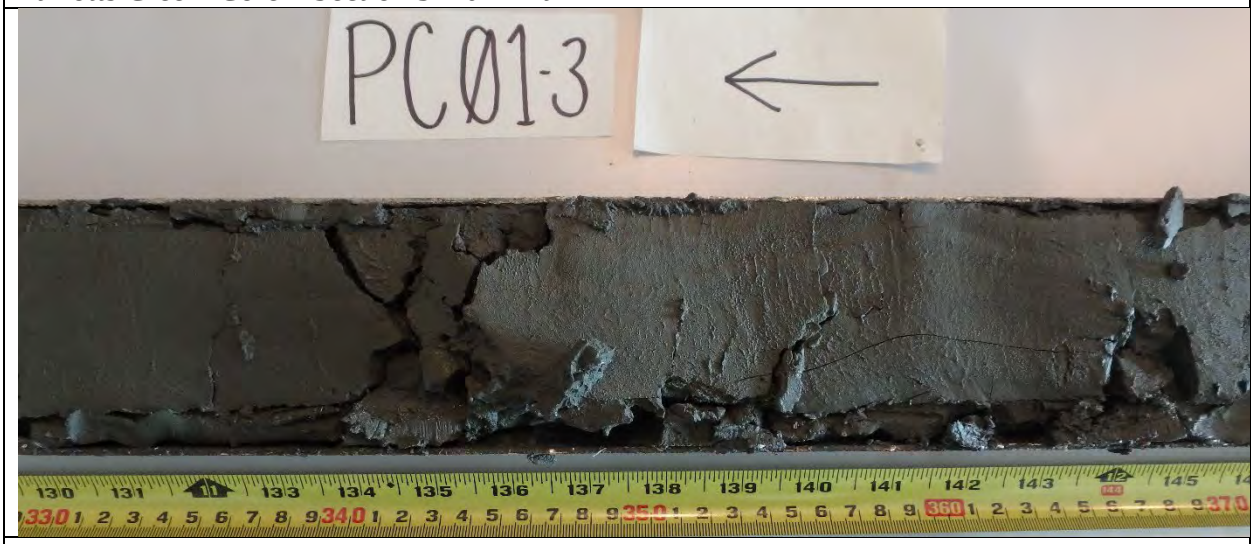

Parrotts Creek Core 1 Section 2 8-9 ft



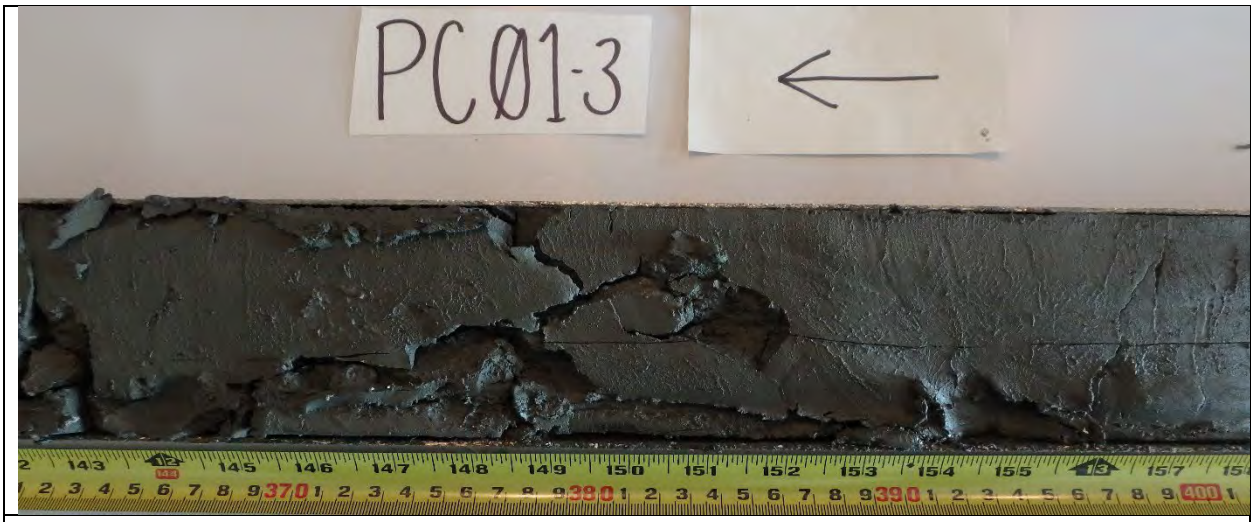

Parrotts Creek Core 1 Section 2 9-10 ft



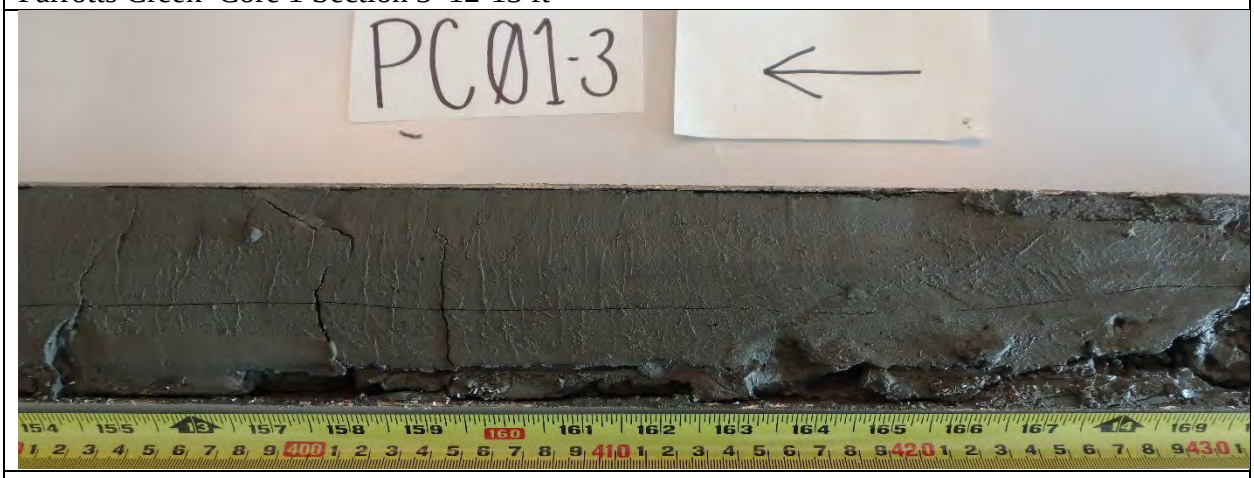

Parrotts Creek Core 1 Section 3 10-11 ft




Parrotts Creek Core 1 Section 3 11-12 ft

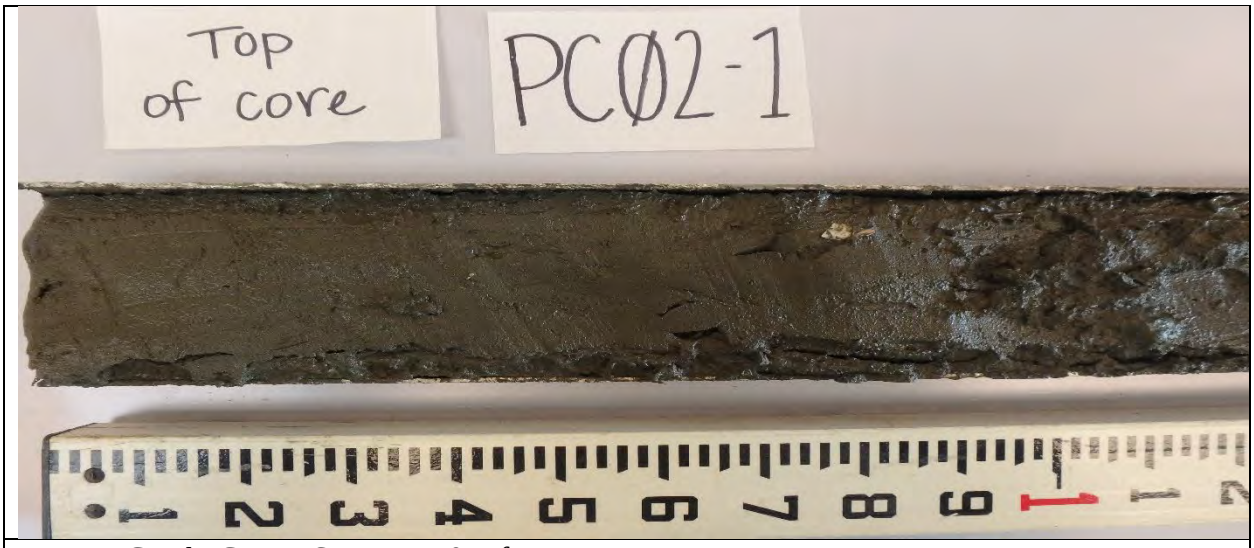



Parrotts Creek Core 1 Section 3 12-13 ft

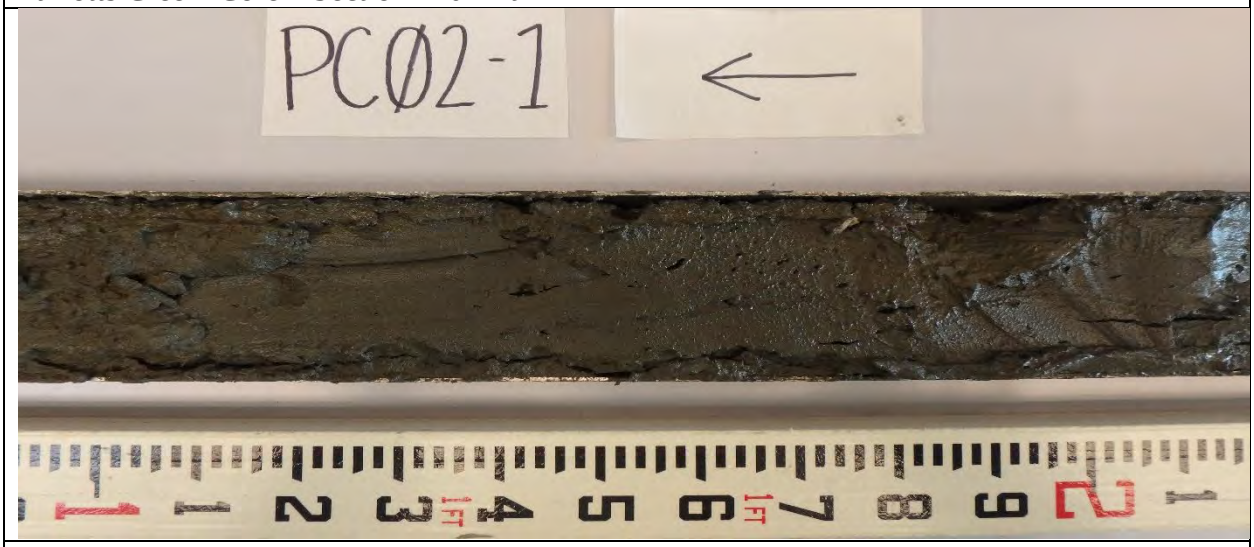



Parrotts Creek Core 1 Section 3 13-14 ft

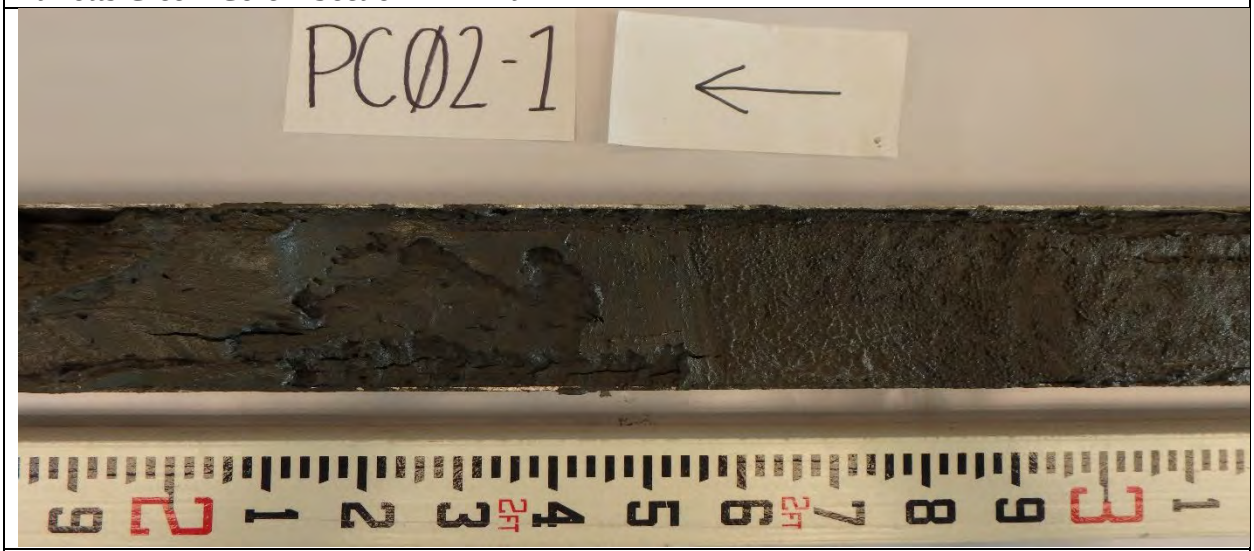

Parrotts Creek Core 1 Section 3 14-14.7 ft



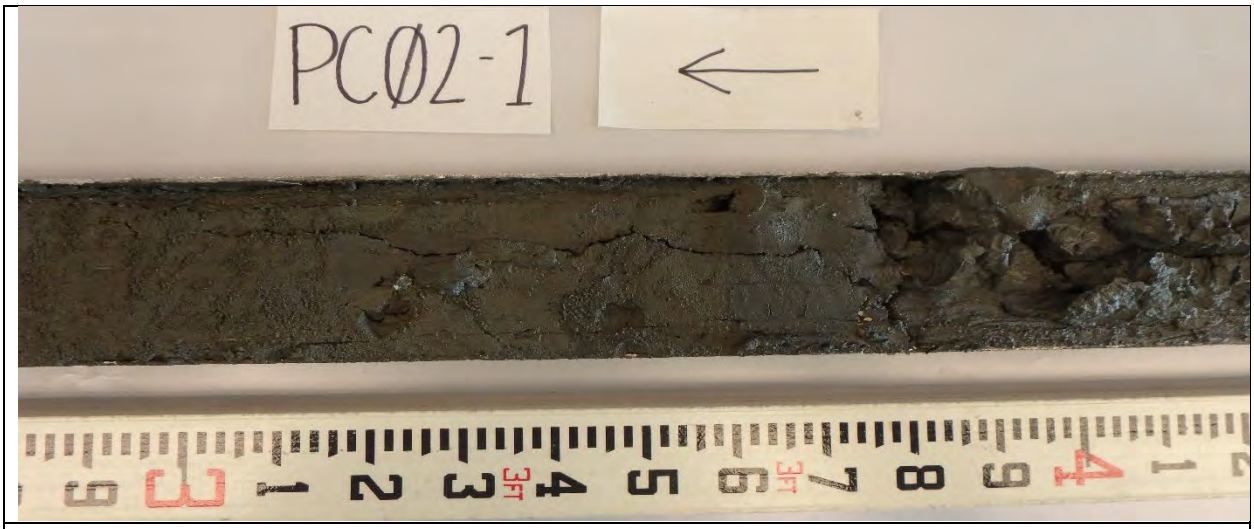

Parrotts Creek Core 2 Section 1 0-1 ft



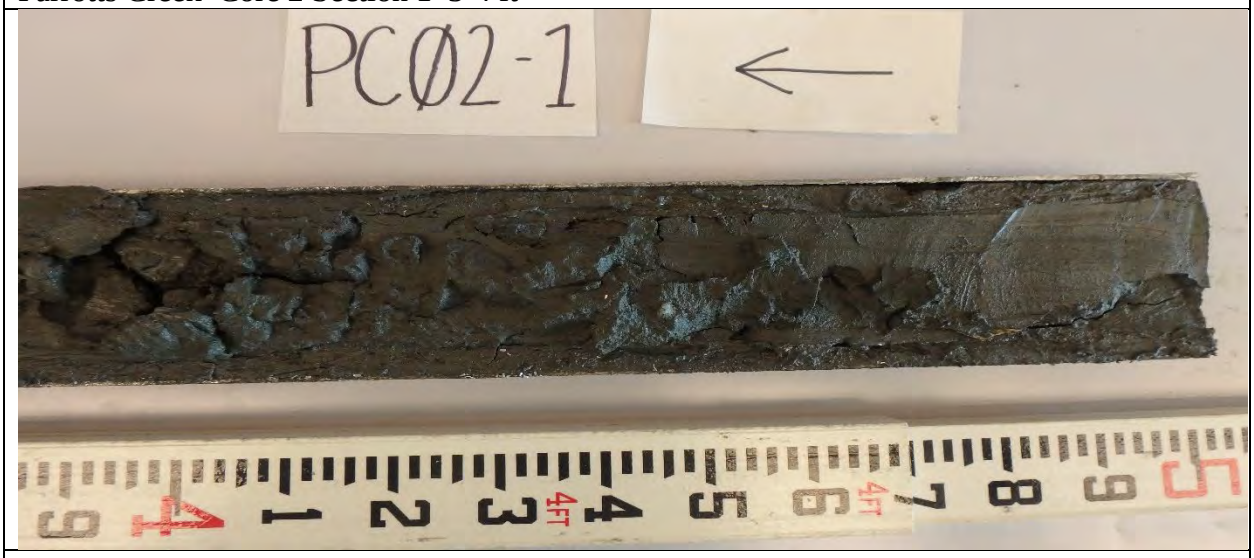

Parrotts Creek Core 2 Section 1 1-2 ft



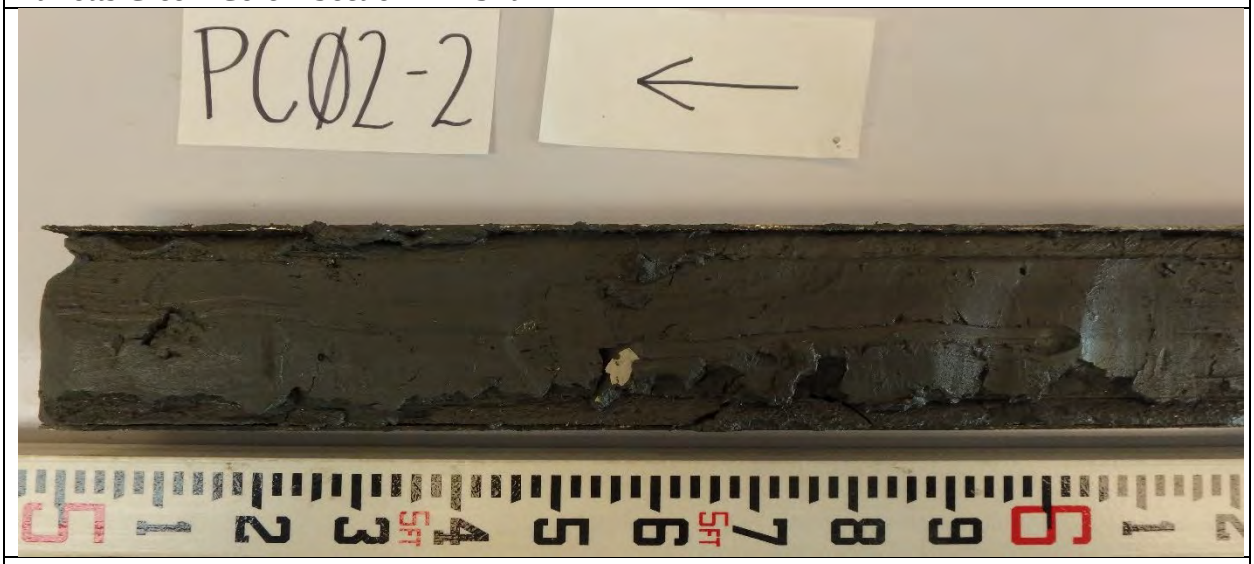

Parrotts Creek Core 2 Section 1 2-3 ft




Parrotts Creek  Core 2 Section 1  3-4 ft

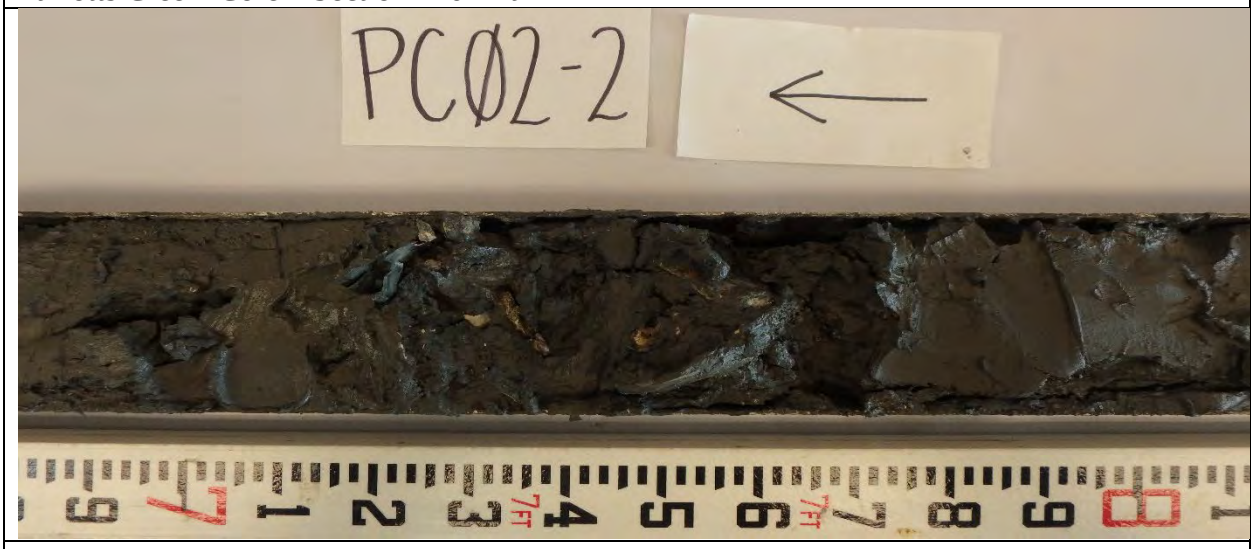



Parrotts Creek  Core 2 Section 1  4-5 ft

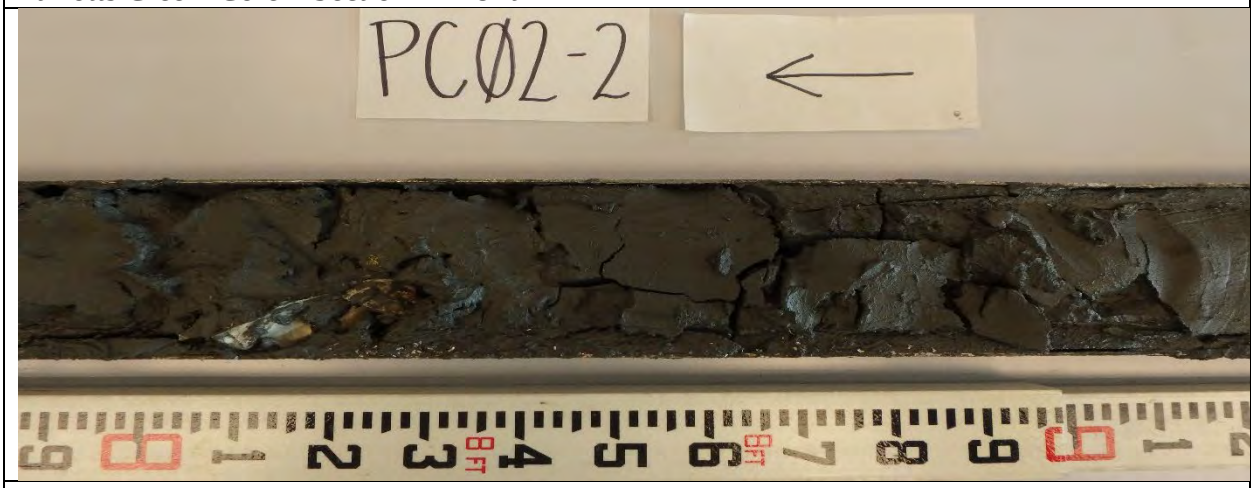



Parrotts Creek  Core 2 Section 2  5-6 ft

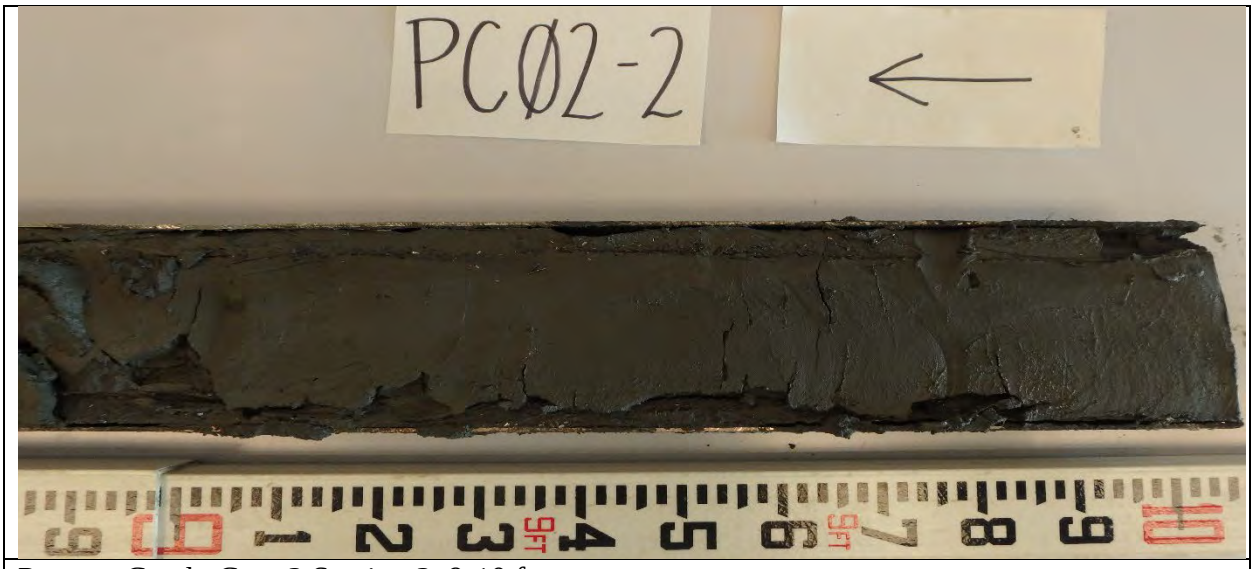

Parrotts Creek Core 2 Section 2 6-7 ft




Parrotts Creek Core 2 Section 2 7-8 ft




Parrotts Creek Core 2 Section 2 8-9 ft

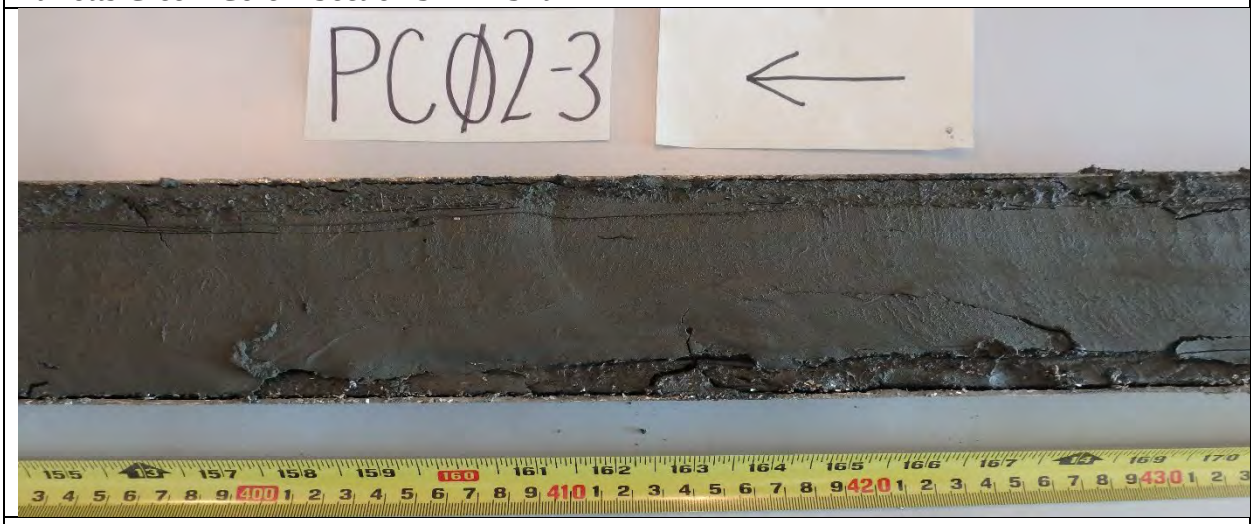



Parrotts Creek Core 2 Section 2 9-10 ft


Parrotts Creek Core 2 Section 3 10-11 ft

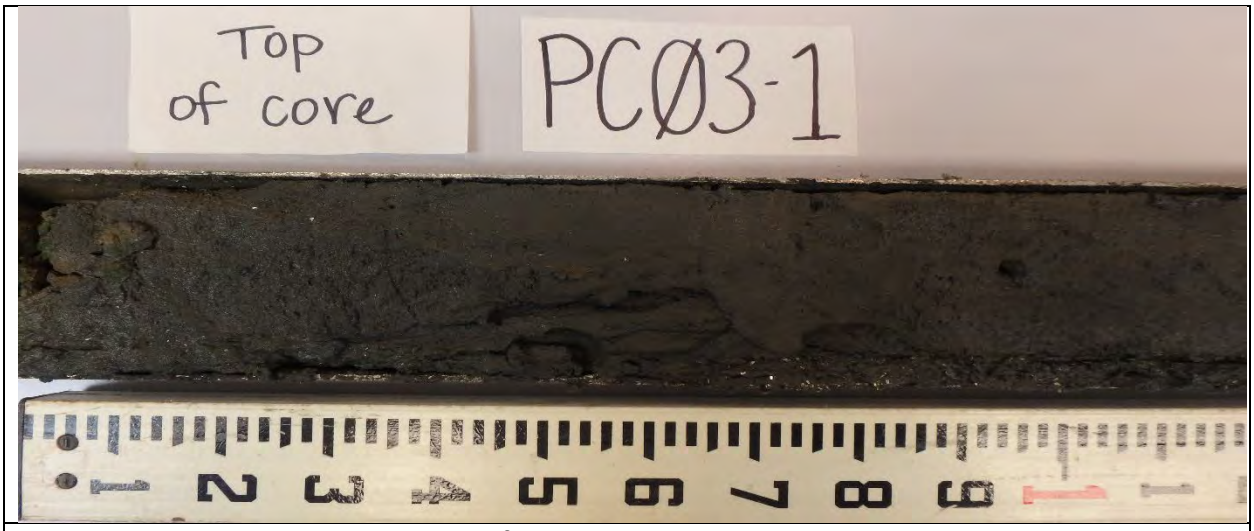

Parrotts Creek Core 2 Section 3 11-12 ft


Parrotts Creek  Core 2 Section 3  12-13 ft

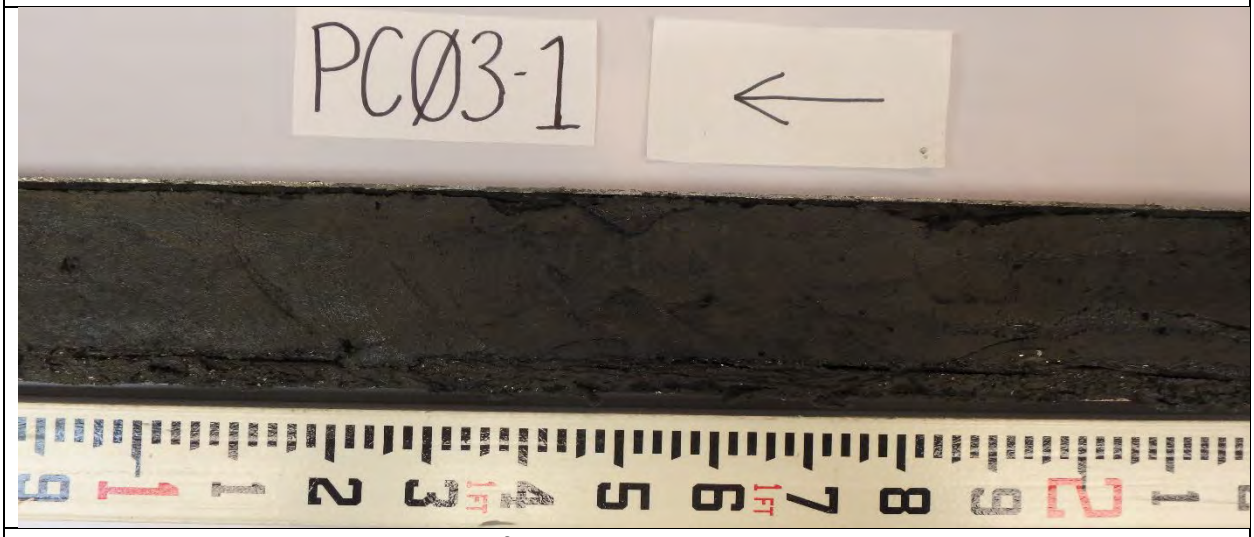



Parrotts Creek  Core 2 Section 3  13-14 ft

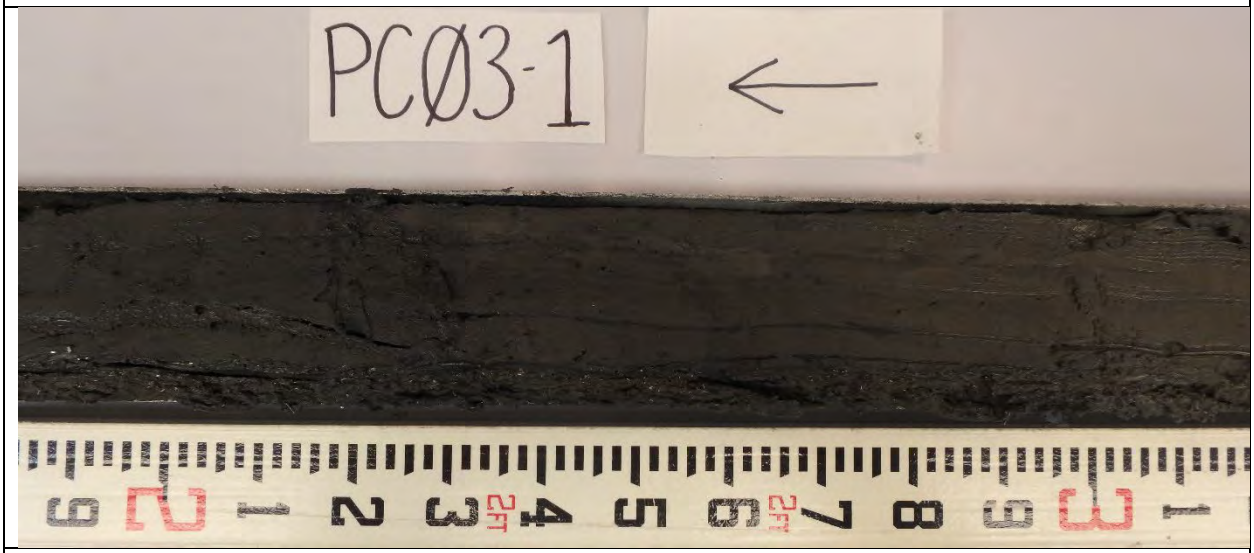

Parrotts Creek  Core 2 Section 3  14-14.6 ft



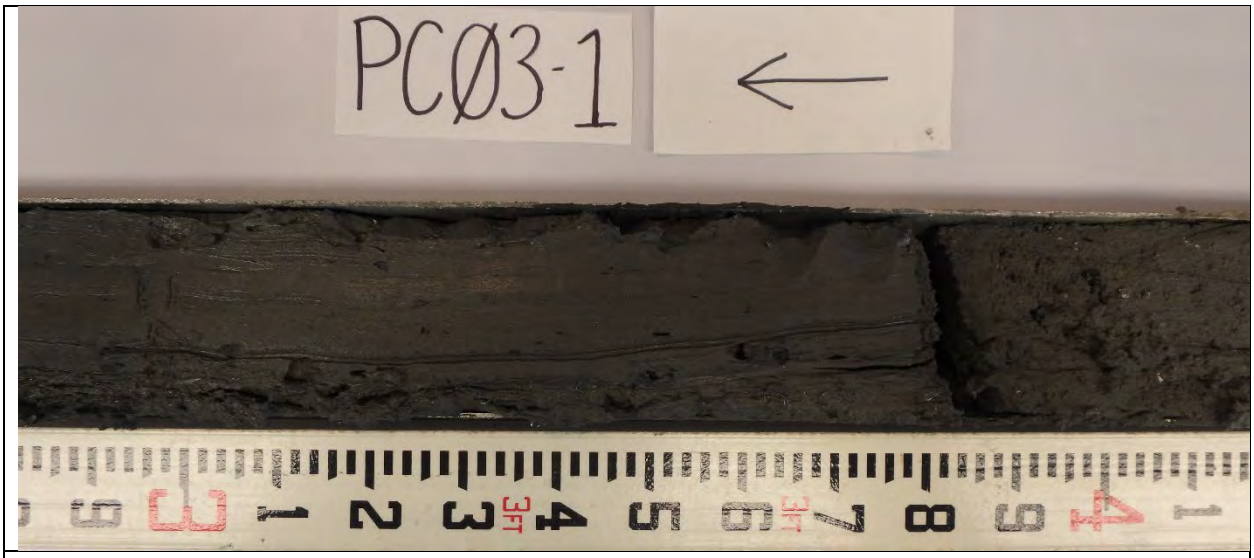

Parrotts Creek Core 3 Section 1 0-1 ft



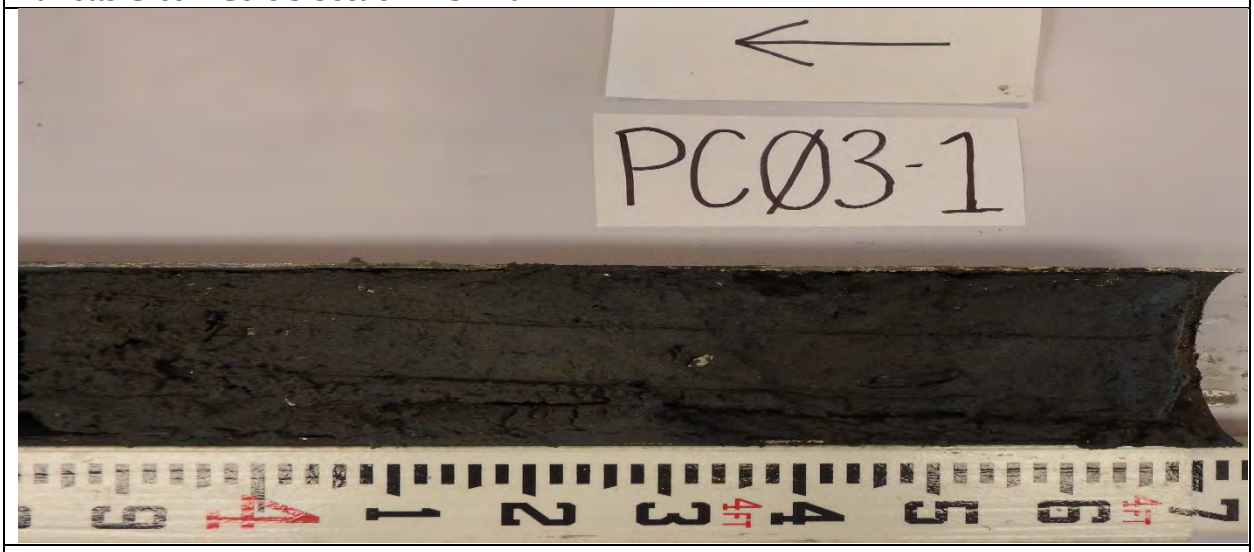

Parrotts Creek Core 3 Section 1 1-2 ft



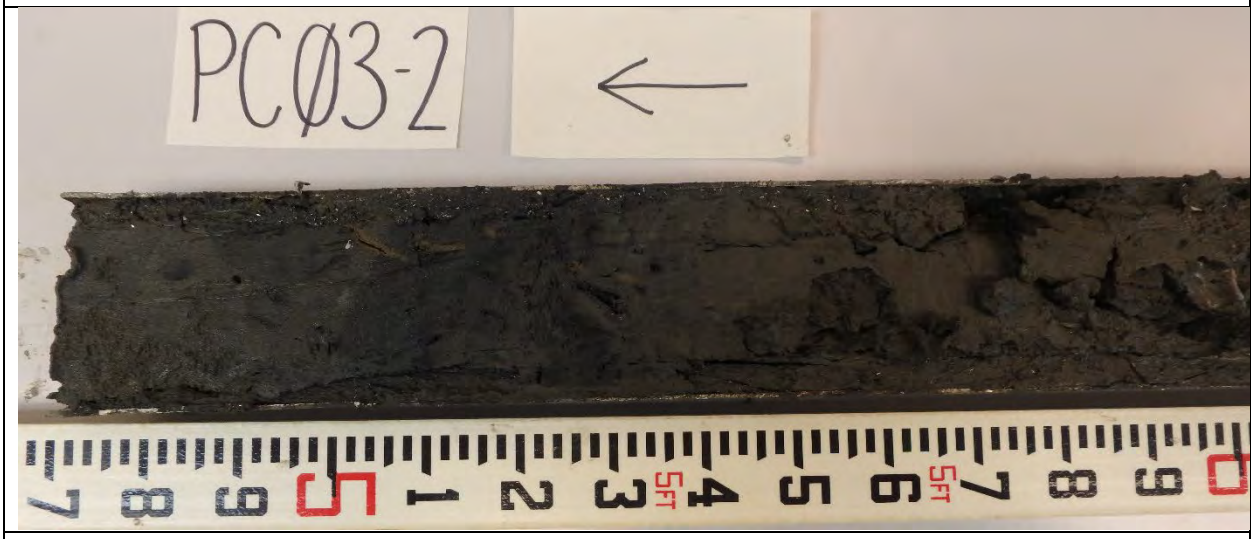

Parrotts Creek Core 3 Section 1 2-3 ft



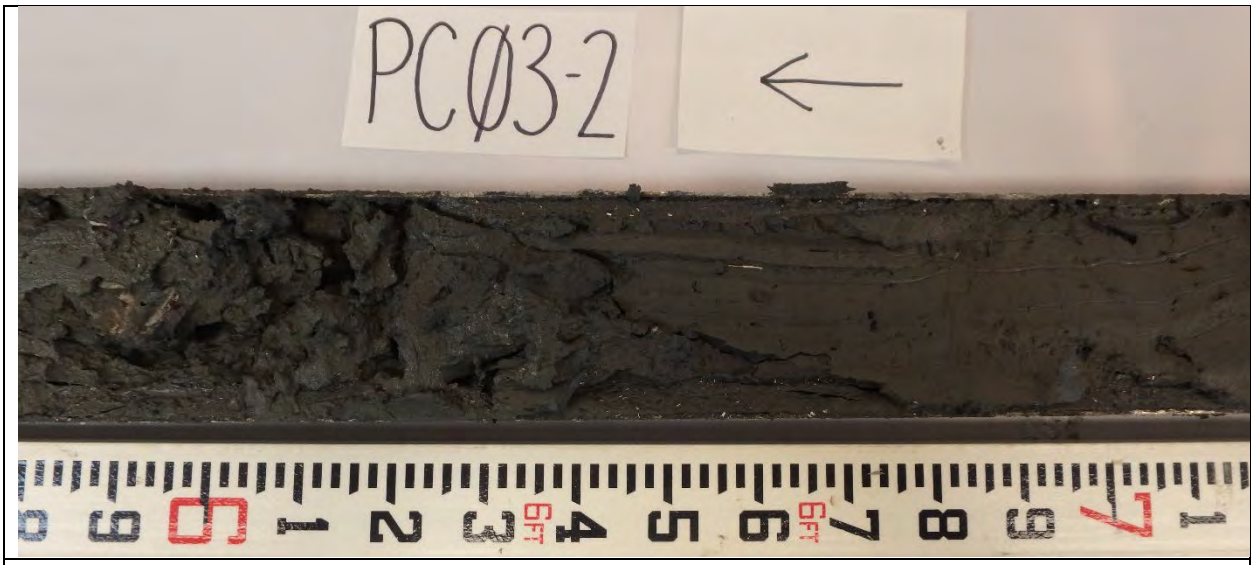

Parrotts Creek  Core 3 Section 1  3-4 ft



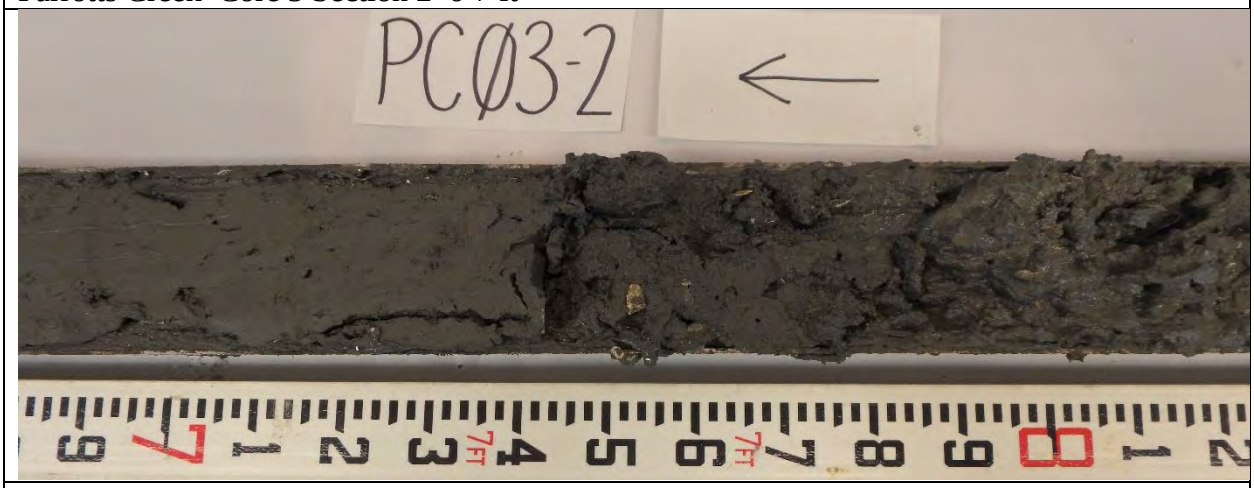

Parrotts Creek  Core 3 Section 1  4-4.7 ft



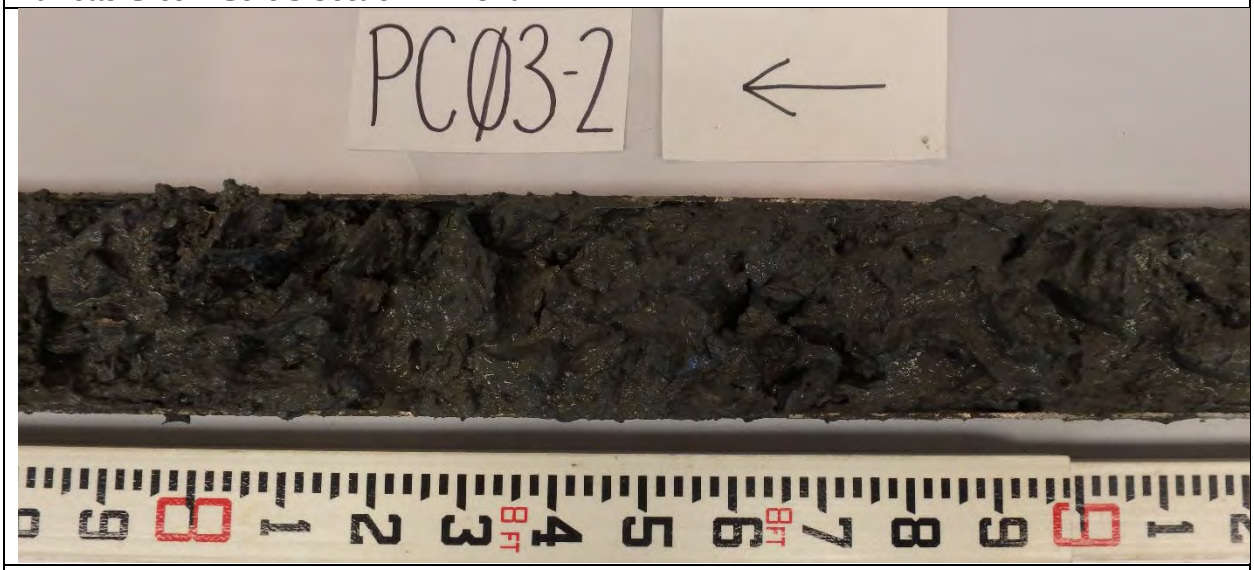

Parrotts Creek  Core 3 Section 2  4.7-6 ft




Parrotts Creek Core 3 Section 2 6-7 ft

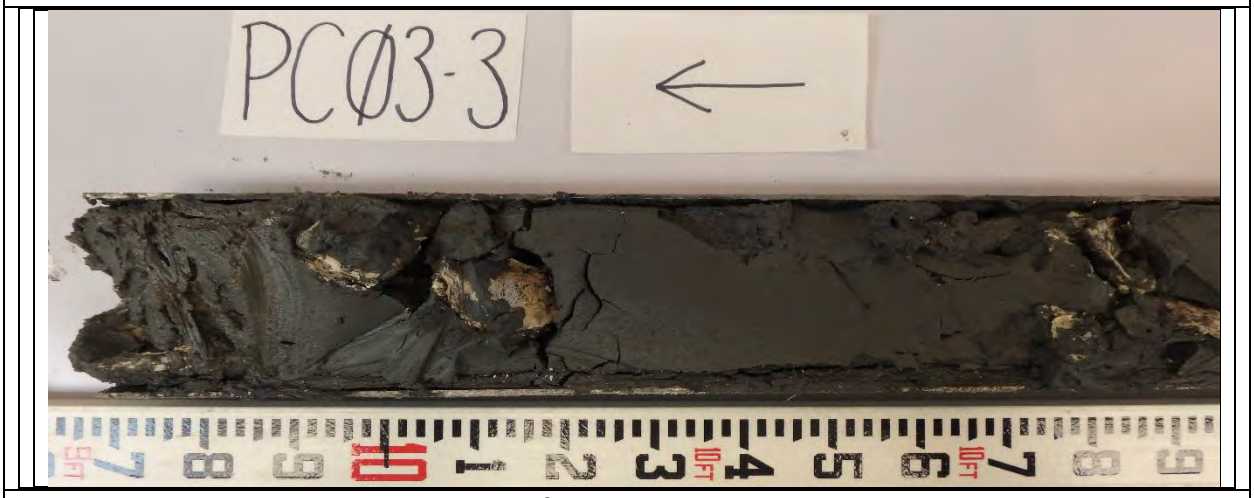



Parrotts Creek Core 3 Section 2 7-8 ft

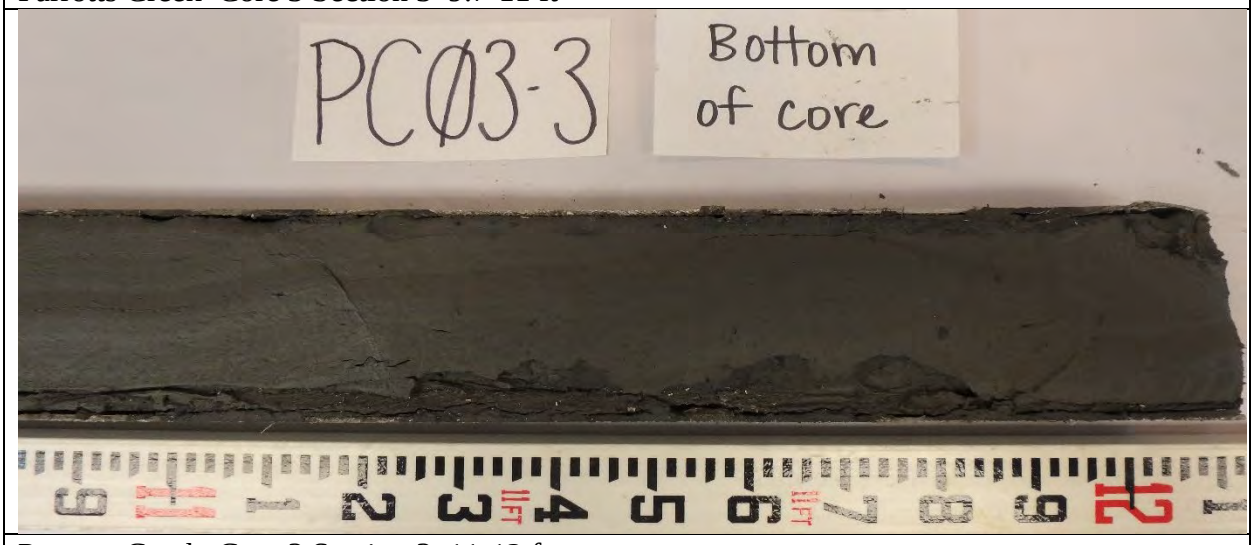



Parrotts Creek Core 3 Section 2 8-9 ft


Parrotts Creek  Core 3 Section 2  9-9.7 ft

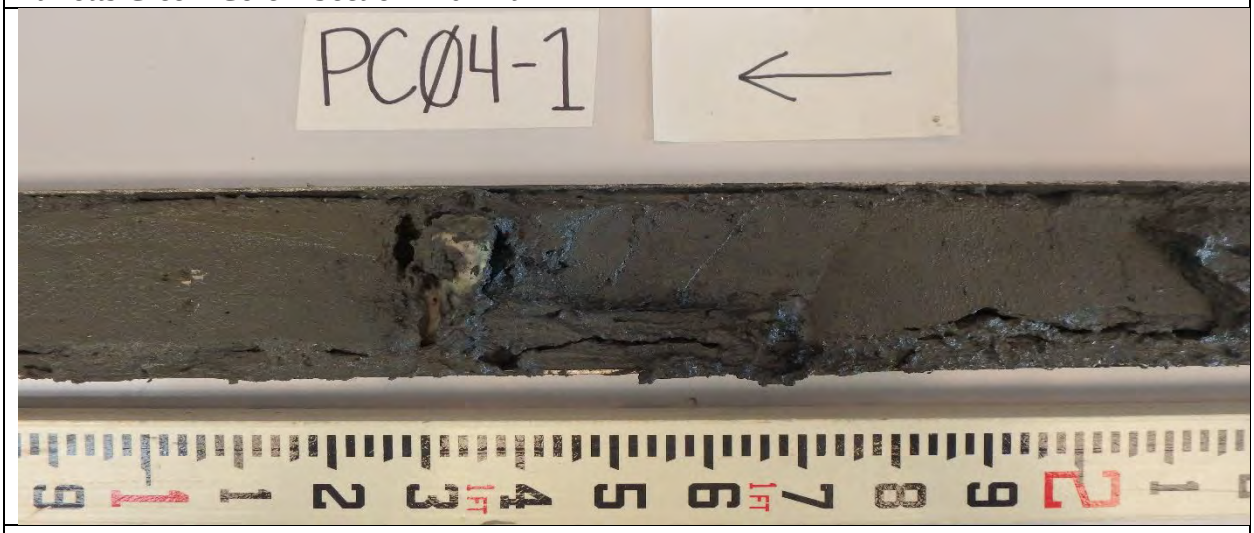



Parrotts Creek  Core 3 Section 3  9.7-11 ft

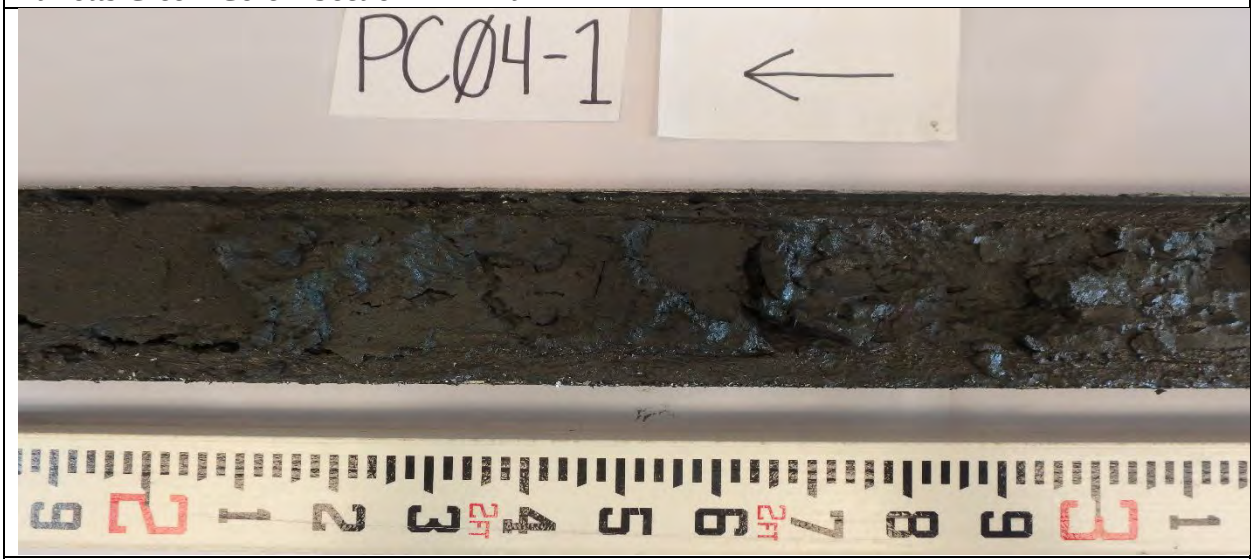



Parrotts Creek  Core 3 Section 3  11-12 ft

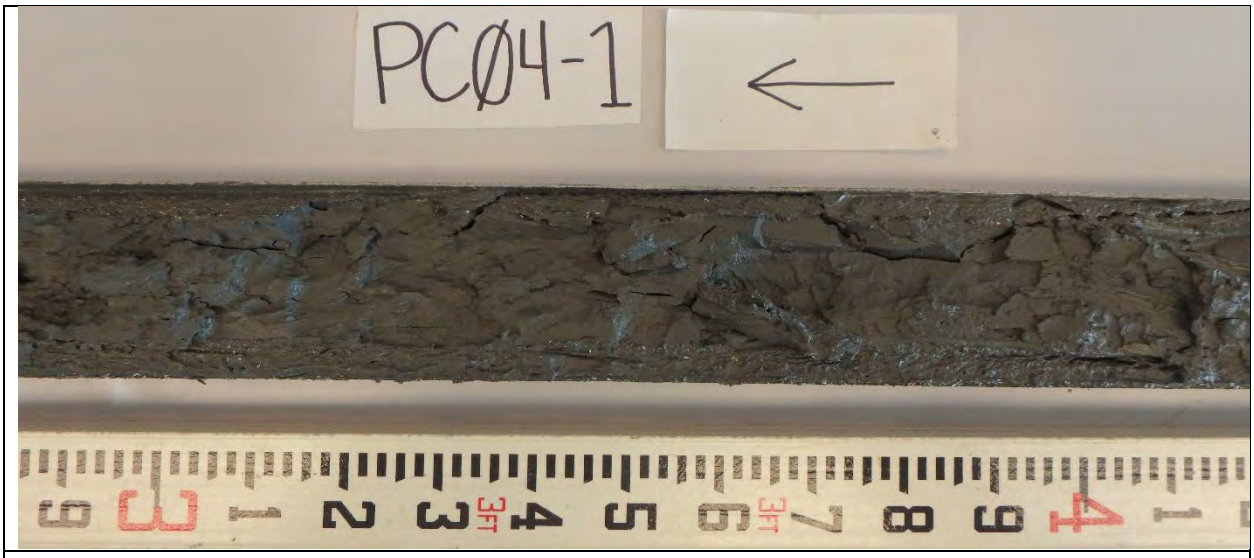

Parrotts Creek Core 4 Section 1 0-1 ft



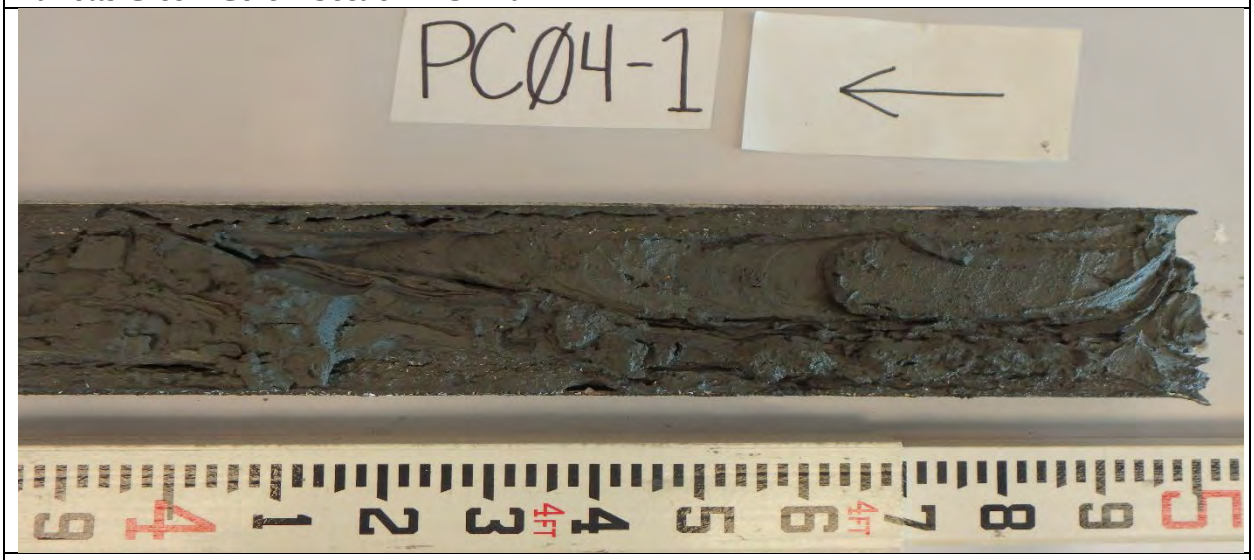

Parrotts Creek Core 4 Section 1 1-2 ft



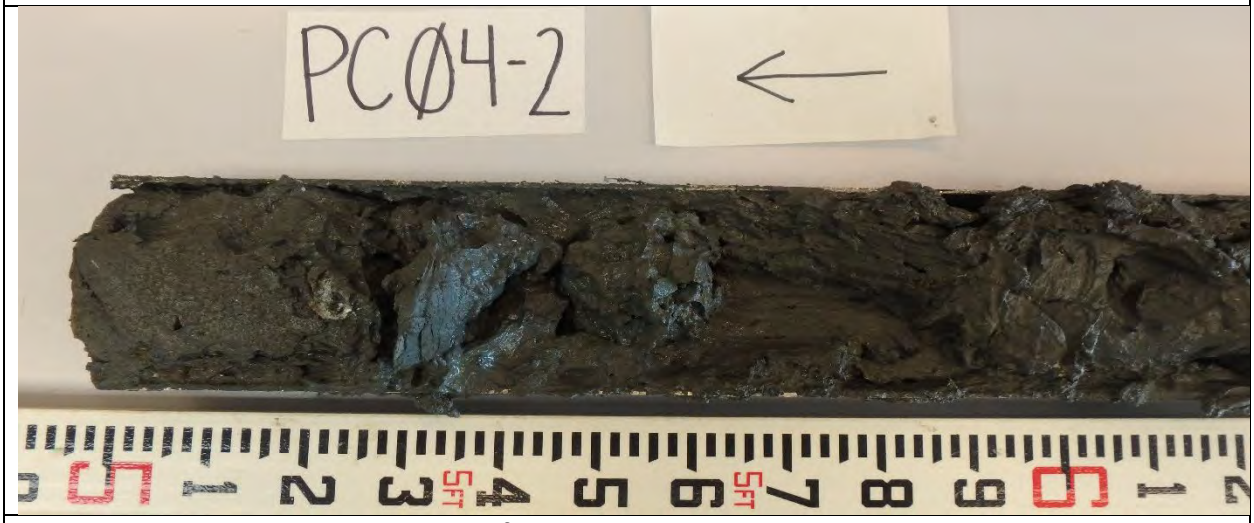

Parrotts Creek Core 4 Section 1 2-3 ft



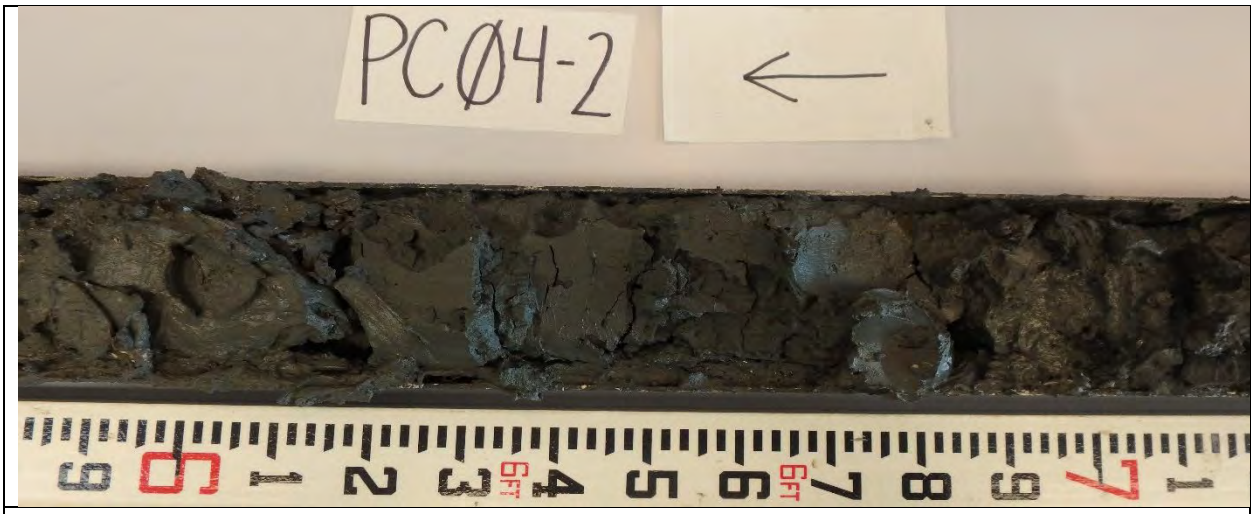

Parrotts Creek Core 4 Section 1 3-4 ft



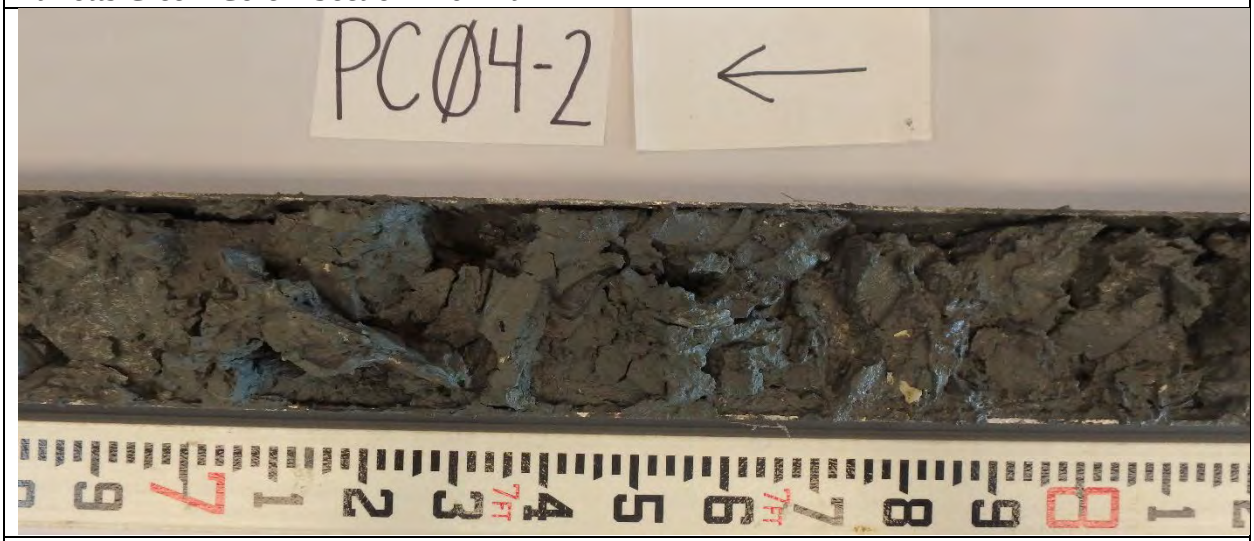

Parrotts Creek Core 4 Section 1 4-5 ft



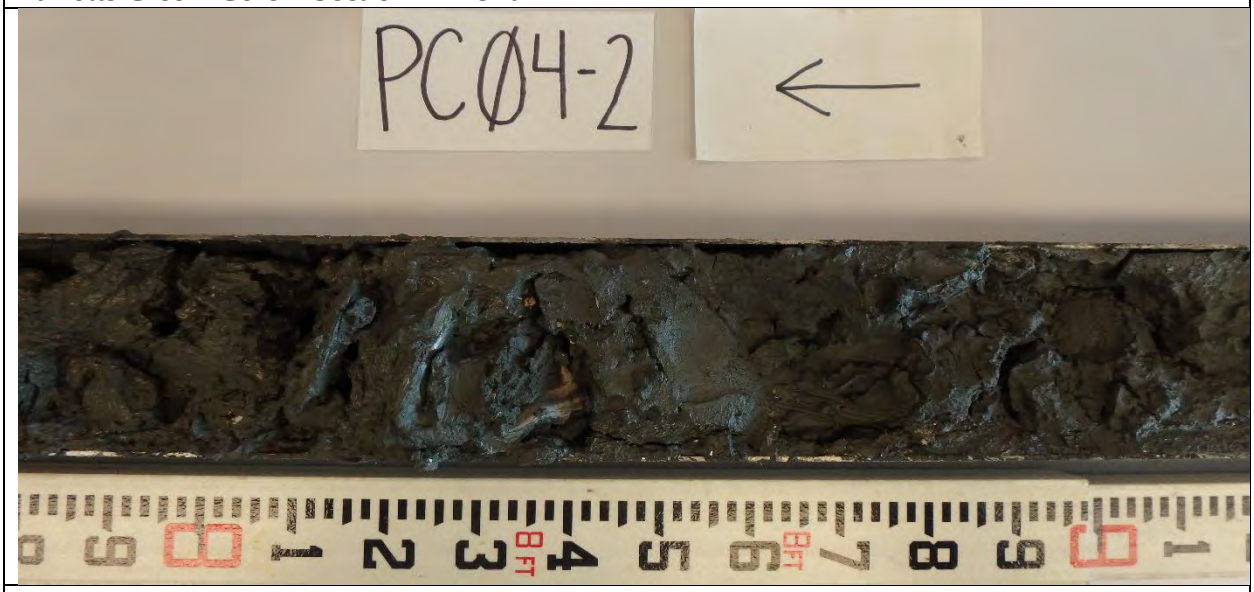

Parrotts Creek Core 4 Section 2 5-6 ft




Parrotts Creek  Core 4 Section 2  6-7 ft



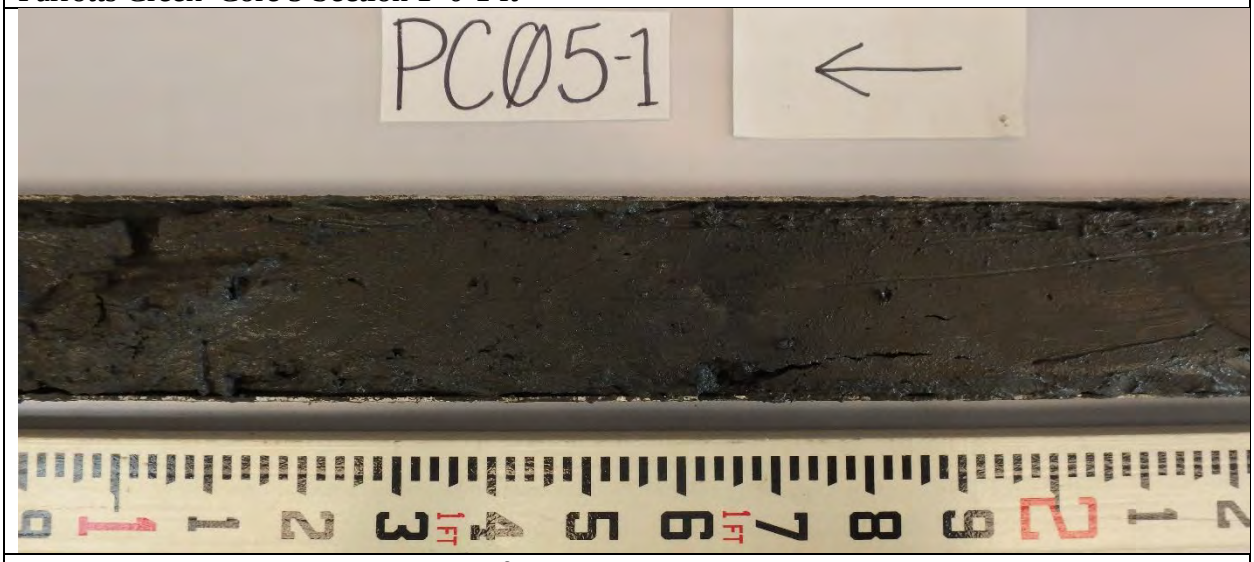

Parrotts Creek  Core 4 Section 2  7-8 ft



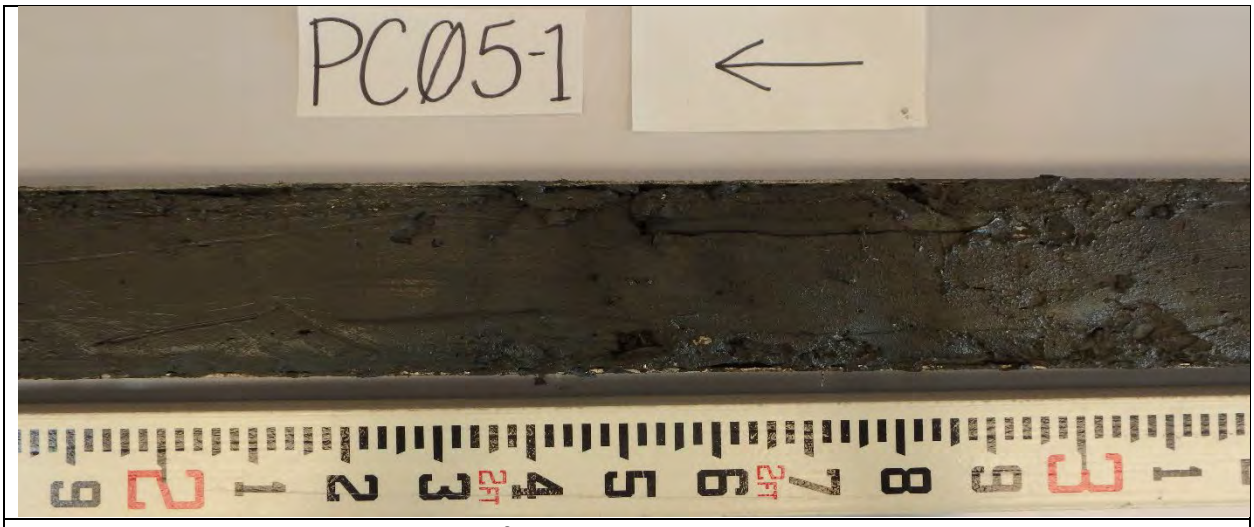

Parrotts Creek  Core 4 Section 2  8-9 ft


Parrotts Creek Core 4 Section 2 9-10 ft

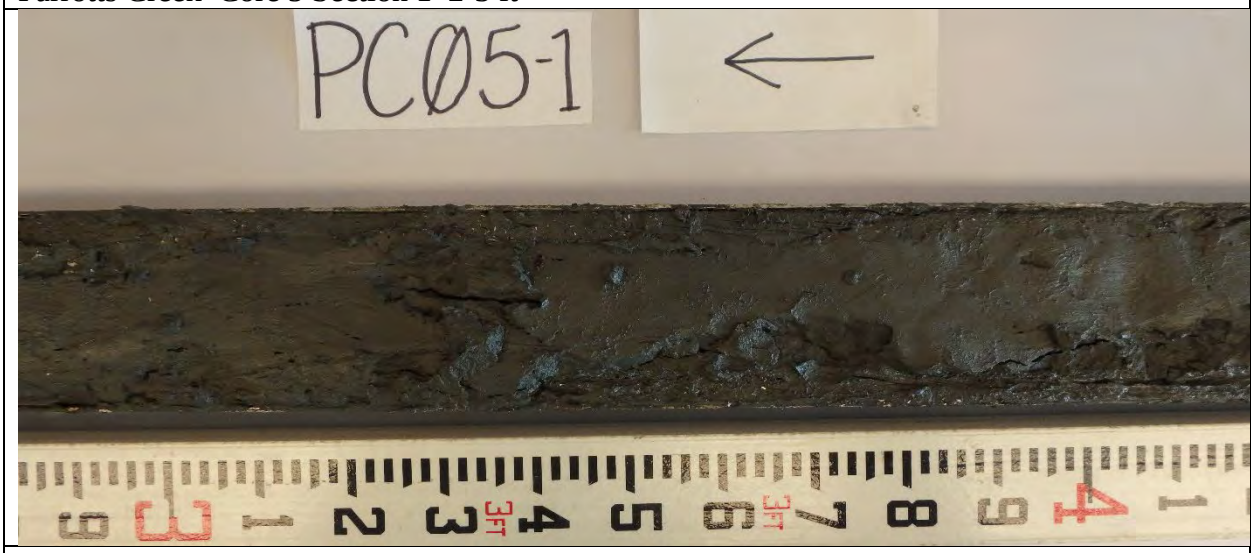

Parrotts Creek Core 5 Section 1 0-1 ft



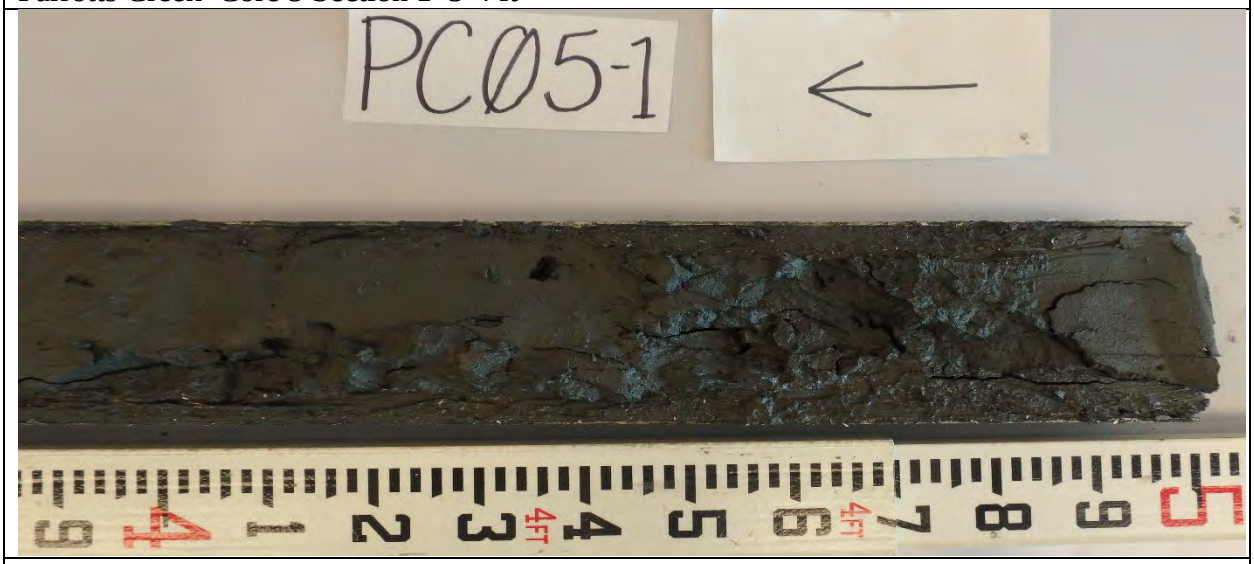

Parrotts Creek Core 5 Section 1 1-2 ft



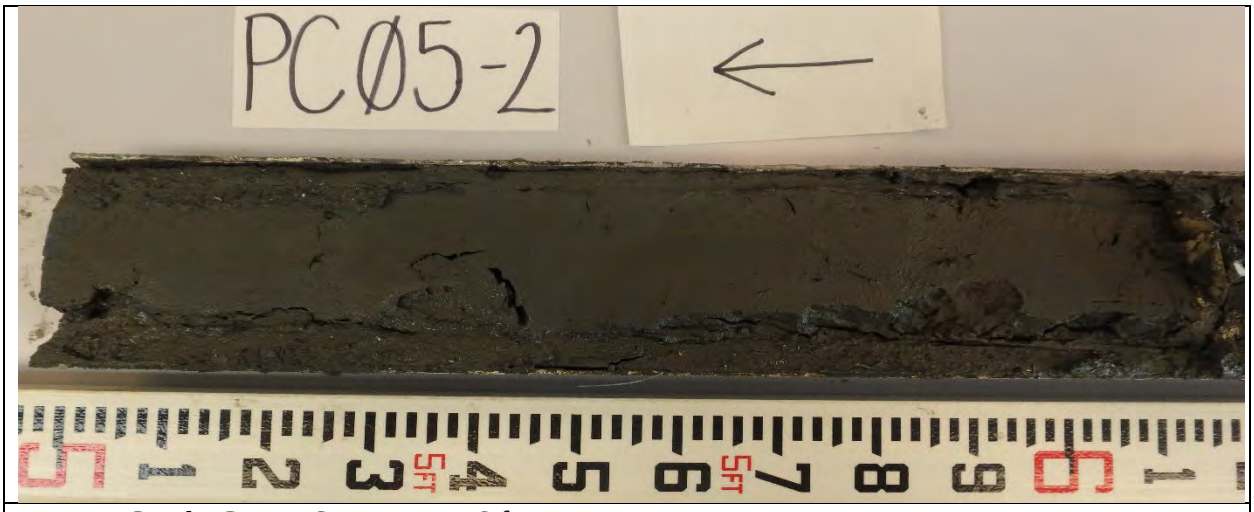

Parrotts Creek Core 5 Section 1 2-3 ft



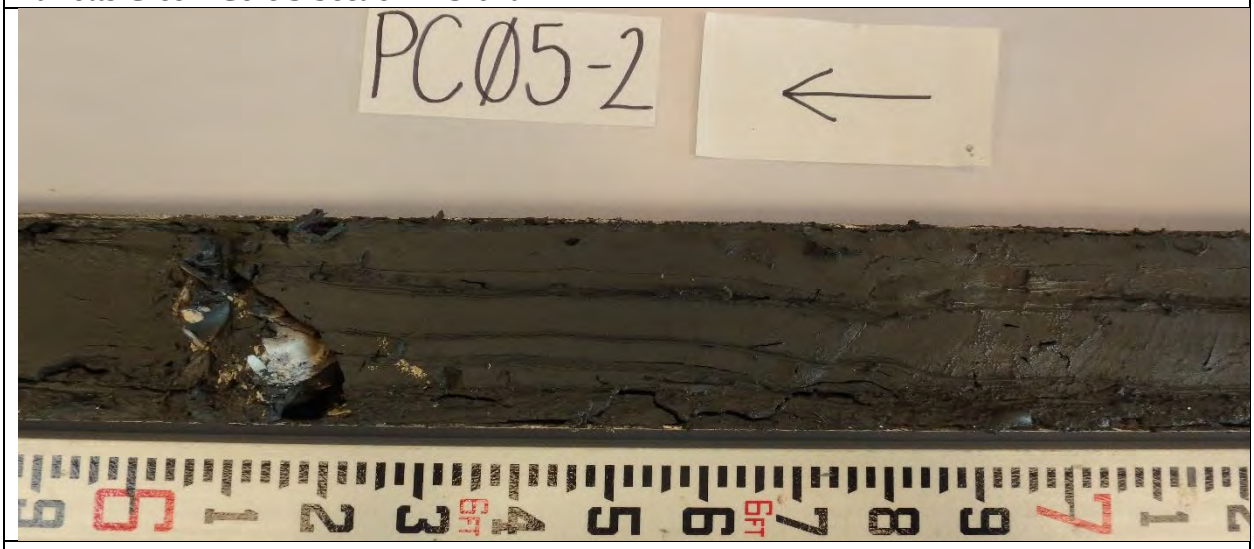

Parrotts Creek Core 5 Section 1 3-4 ft



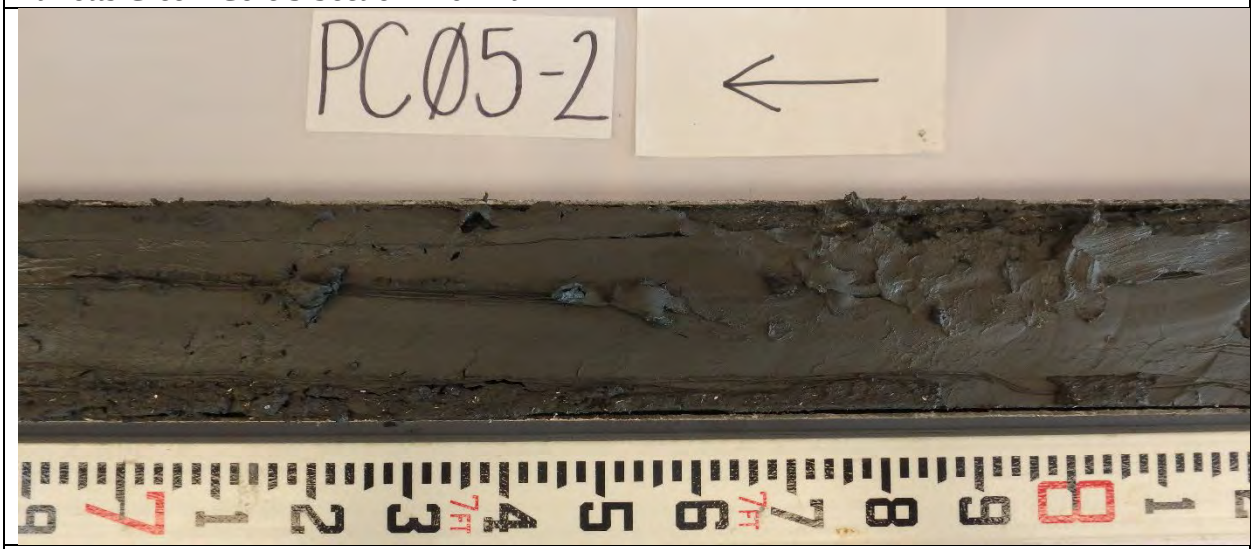

Parrotts Creek Core 5 Section 1 4-5 ft




Parrotts Creek  Core 5 Section 2  5-6 ft

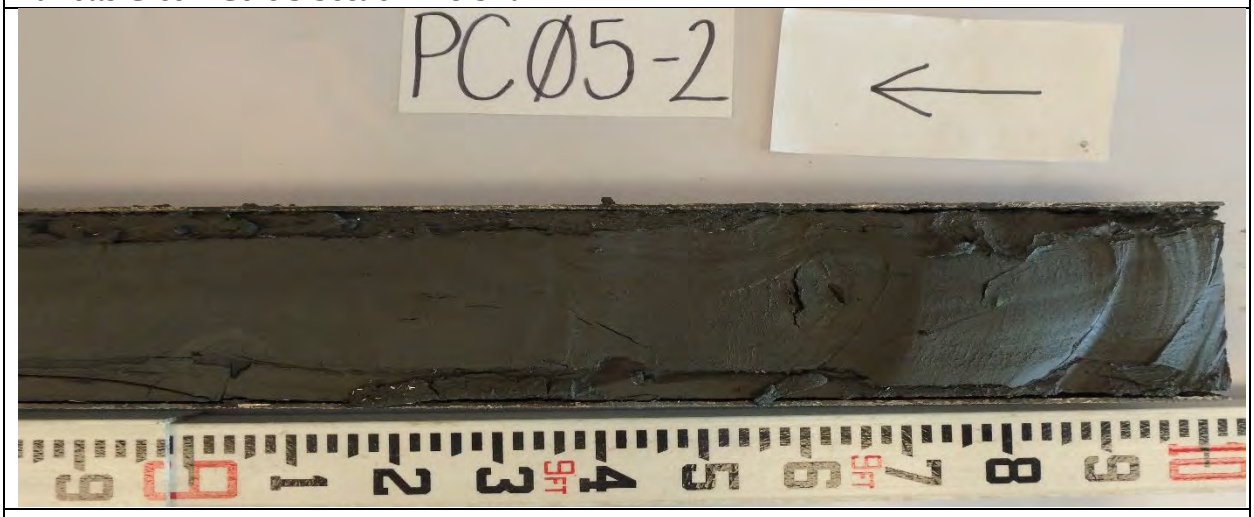



Parrotts Creek  Core 5 Section 2  6-7 ft

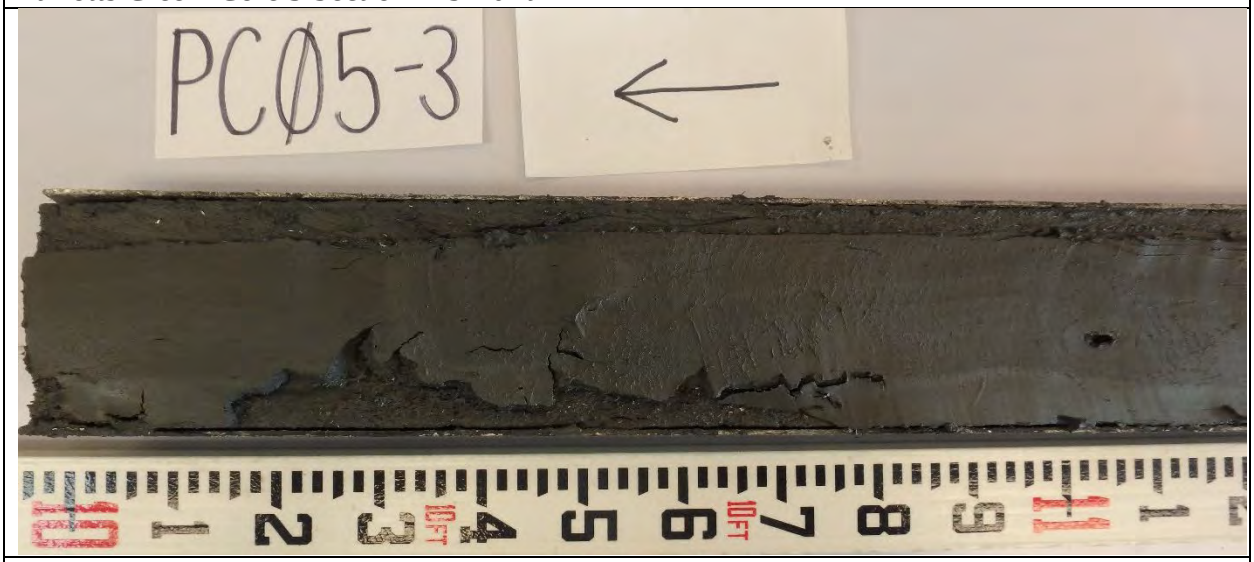



Parrotts Creek  Core 5 Section 2  7-8 ft

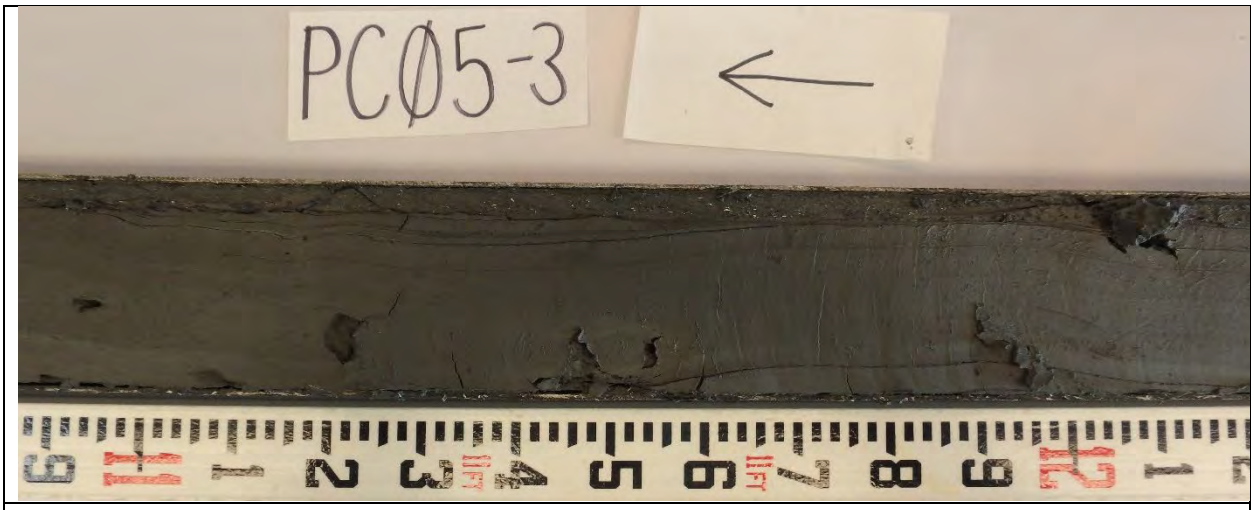

Parrotts Creek  Core 5 Section 2  8-9 ft



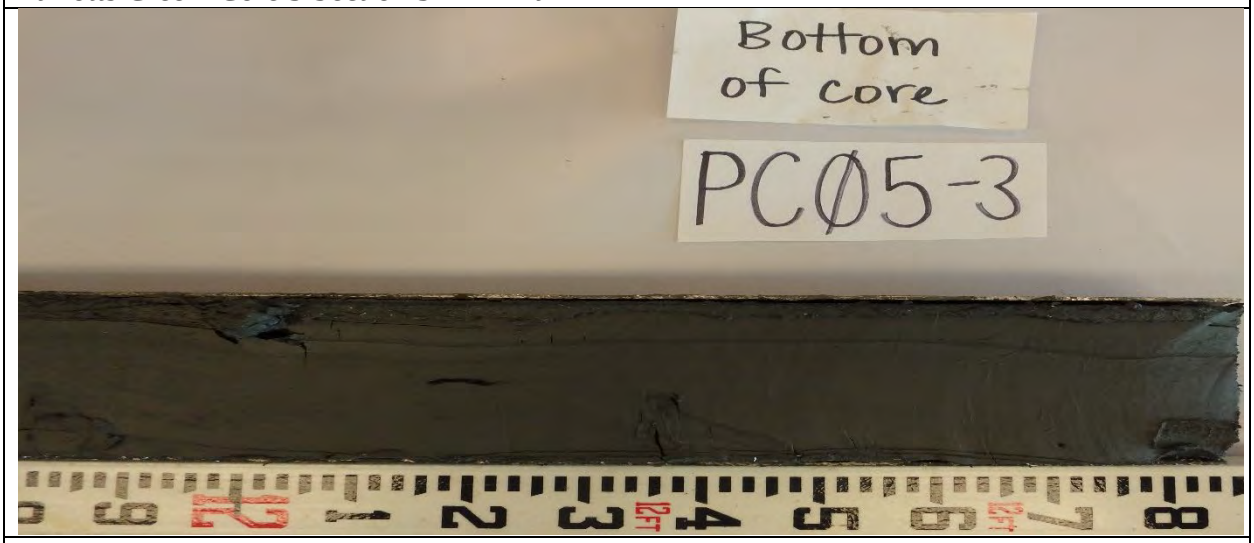

Parrotts Creek  Core 5 Section 2  9-10 ft



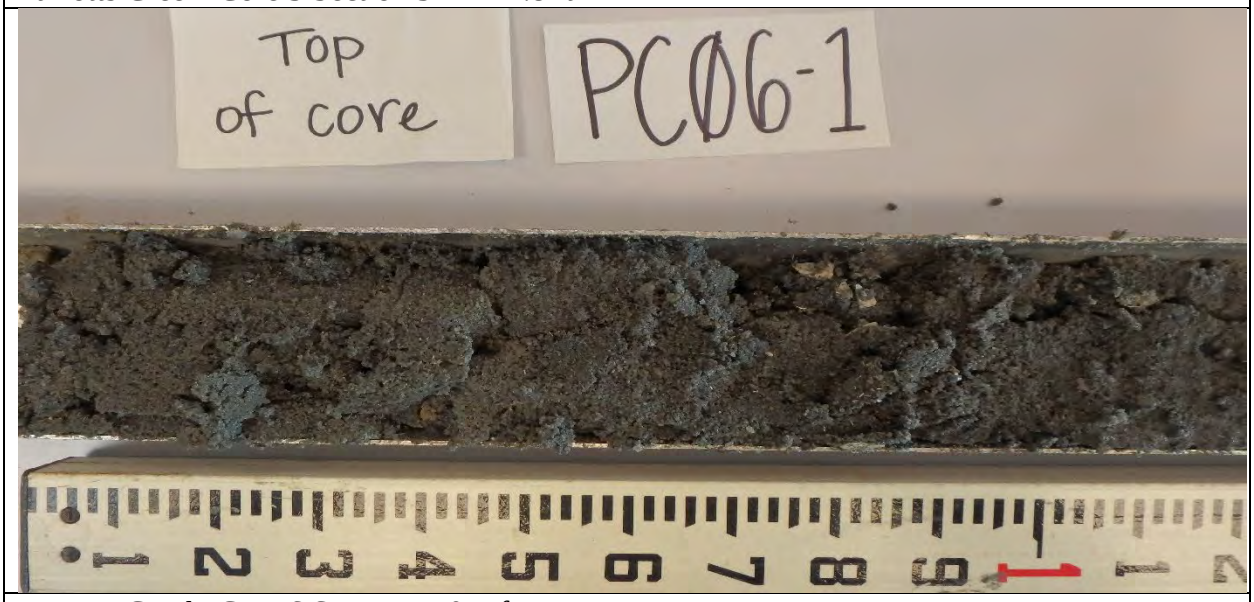

Parrotts Creek  Core 5 Section 3  10-11 ft



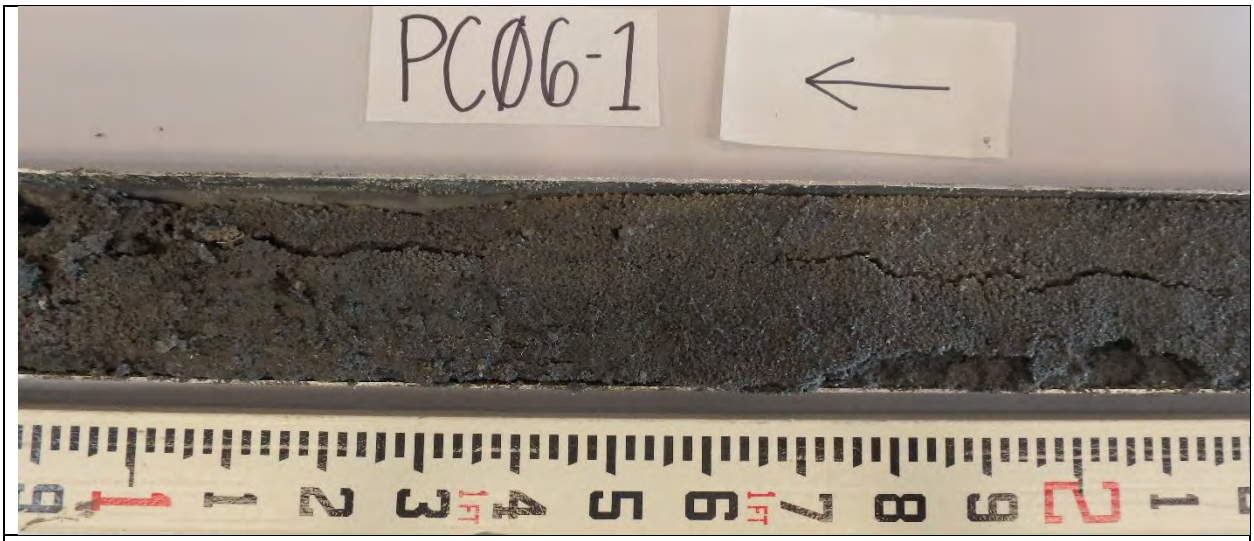

Parrotts Creek Core 5 Section 3 11-12ft



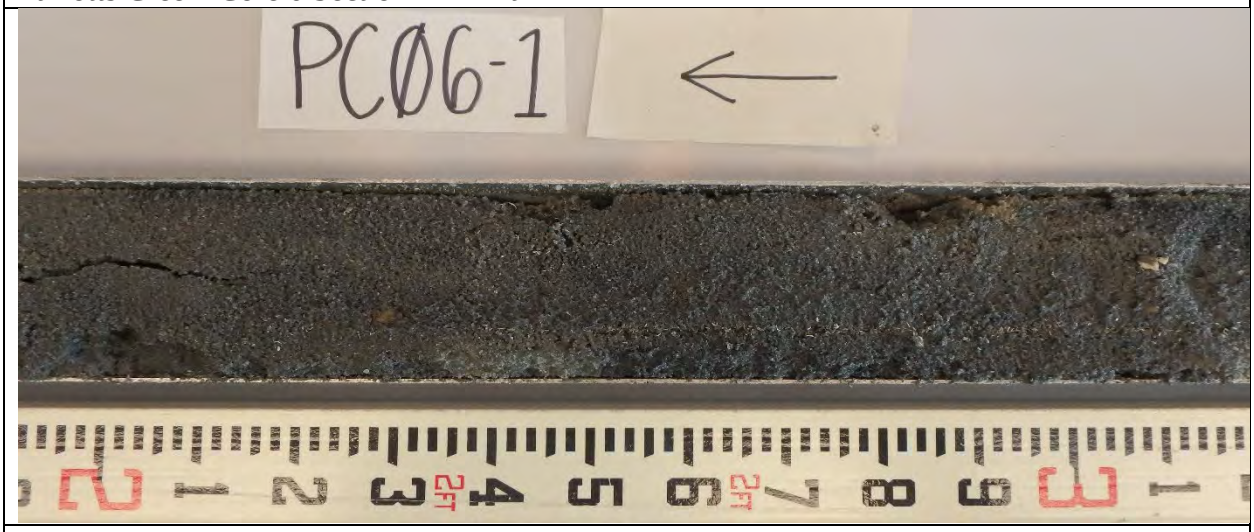

Parrotts Creek Core 5 Section 3 12-12.8 ft



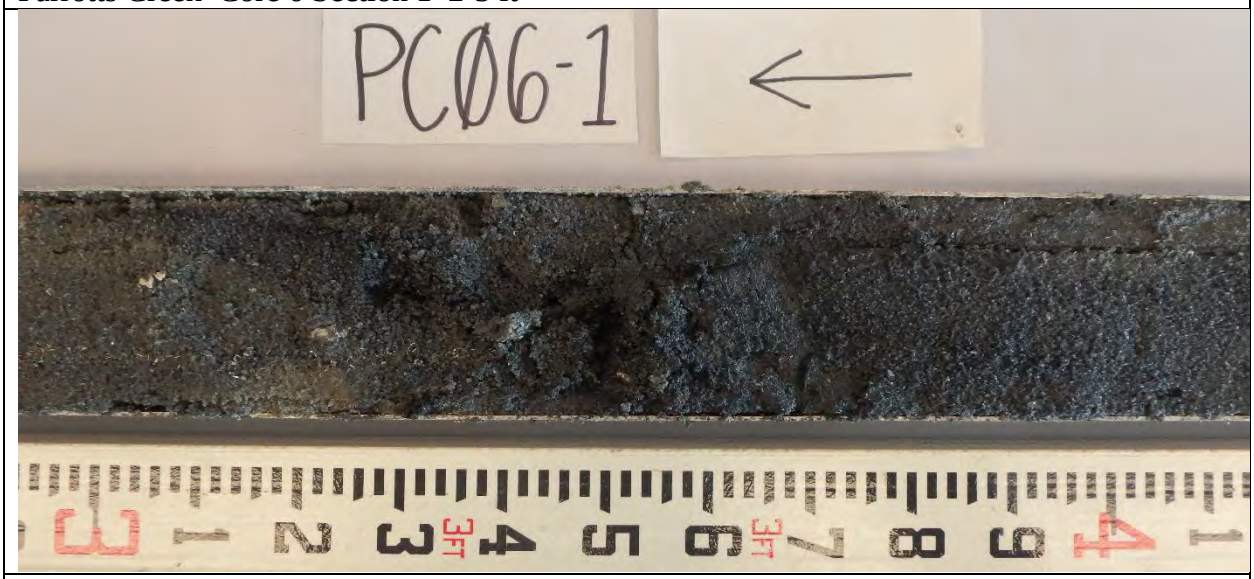

Parrotts Creek Core 6 Section 1 0-1 ft



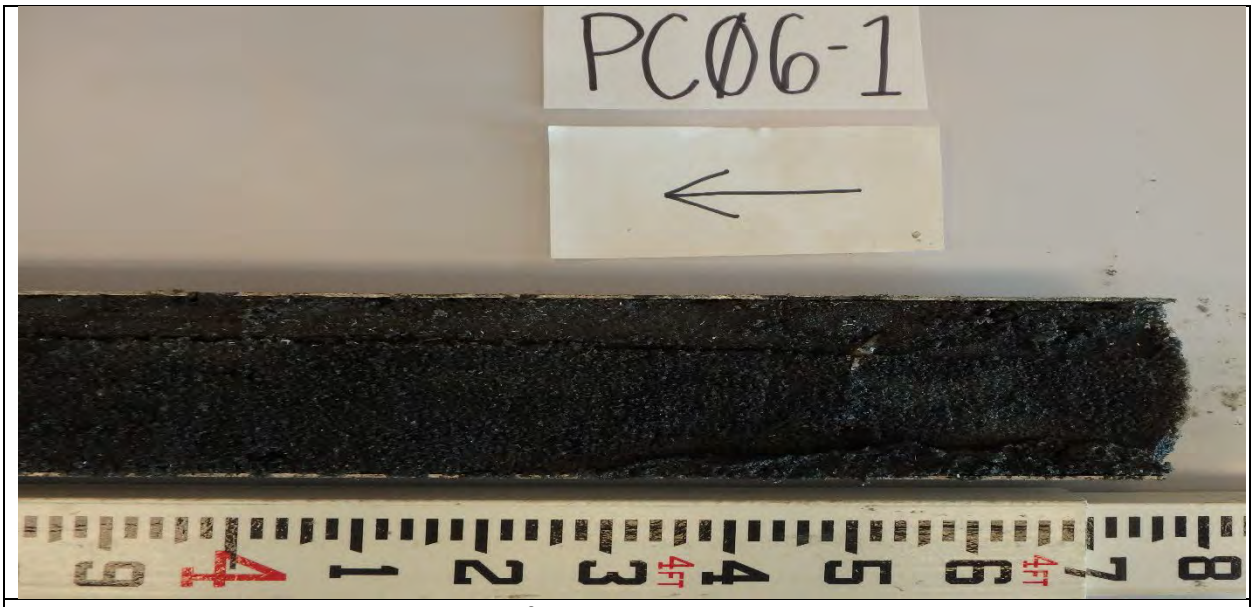

Parrotts Creek Core 6 Section 1 1-2 ft



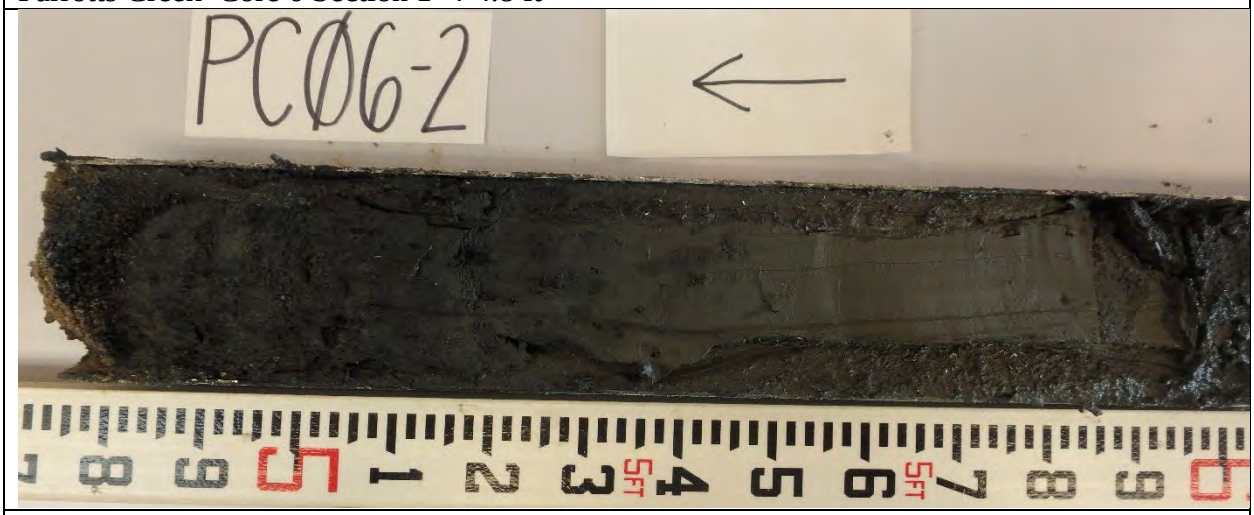

Parrotts Creek Core 6 Section 1 2-3 ft



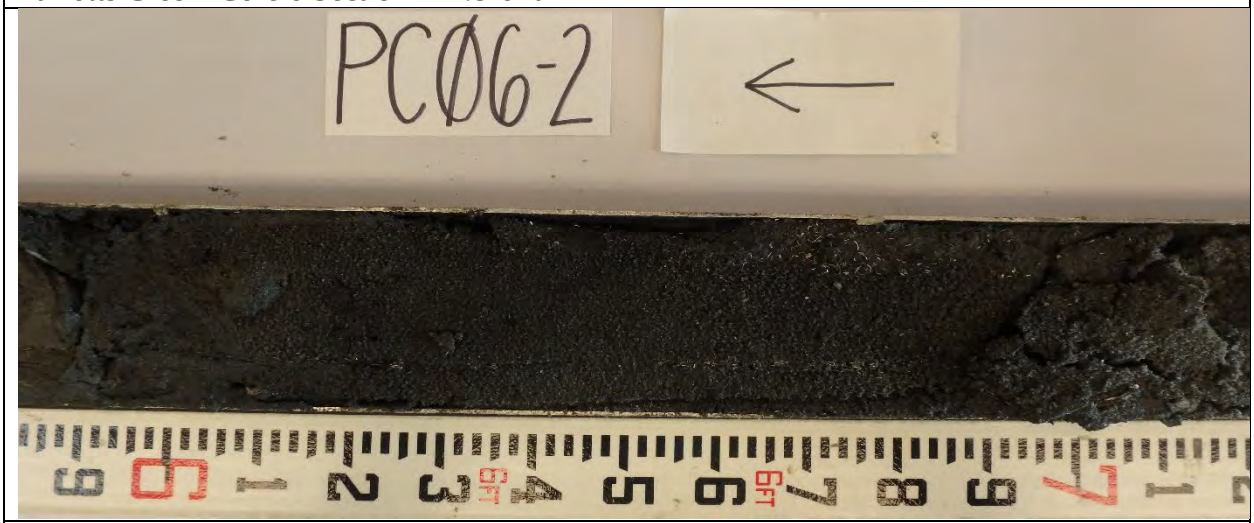

Parrotts Creek Core 6 Section 1 3-4 ft



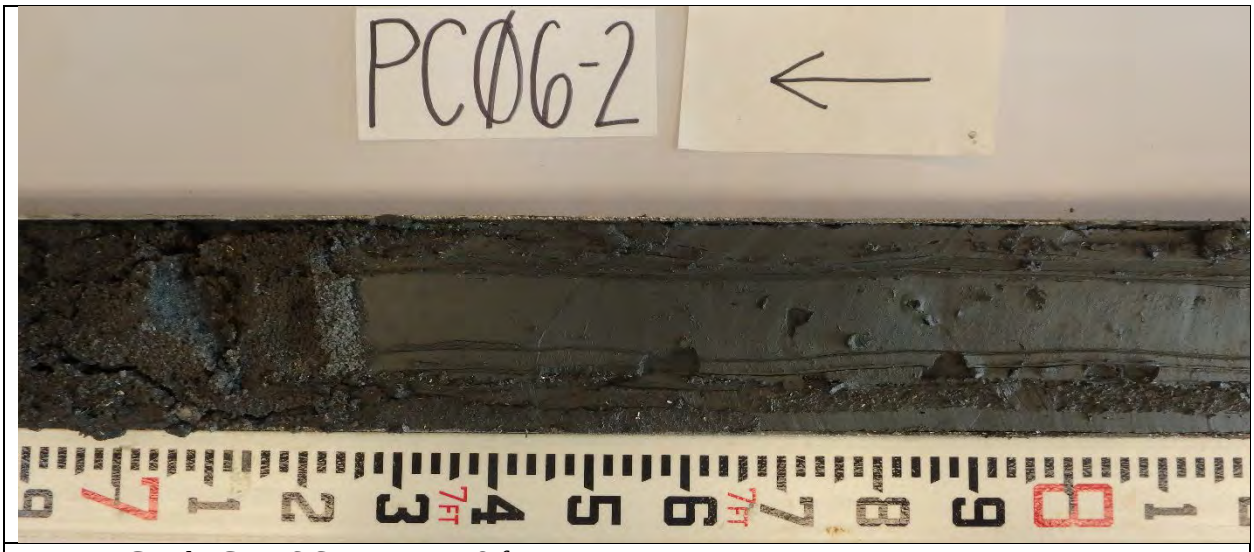

Parrotts Creek Core 6 Section 1 4-4.8 ft




Parrotts Creek Core 6 Section 2 4.8-6 ft

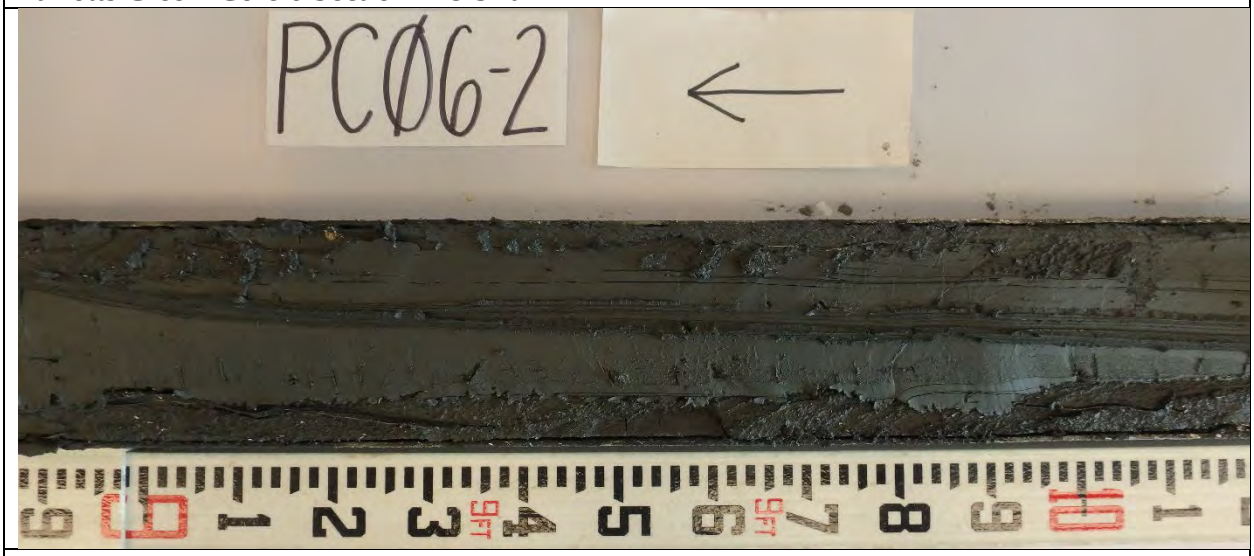



Parrotts Creek Core 6 Section 2 6-7 ft

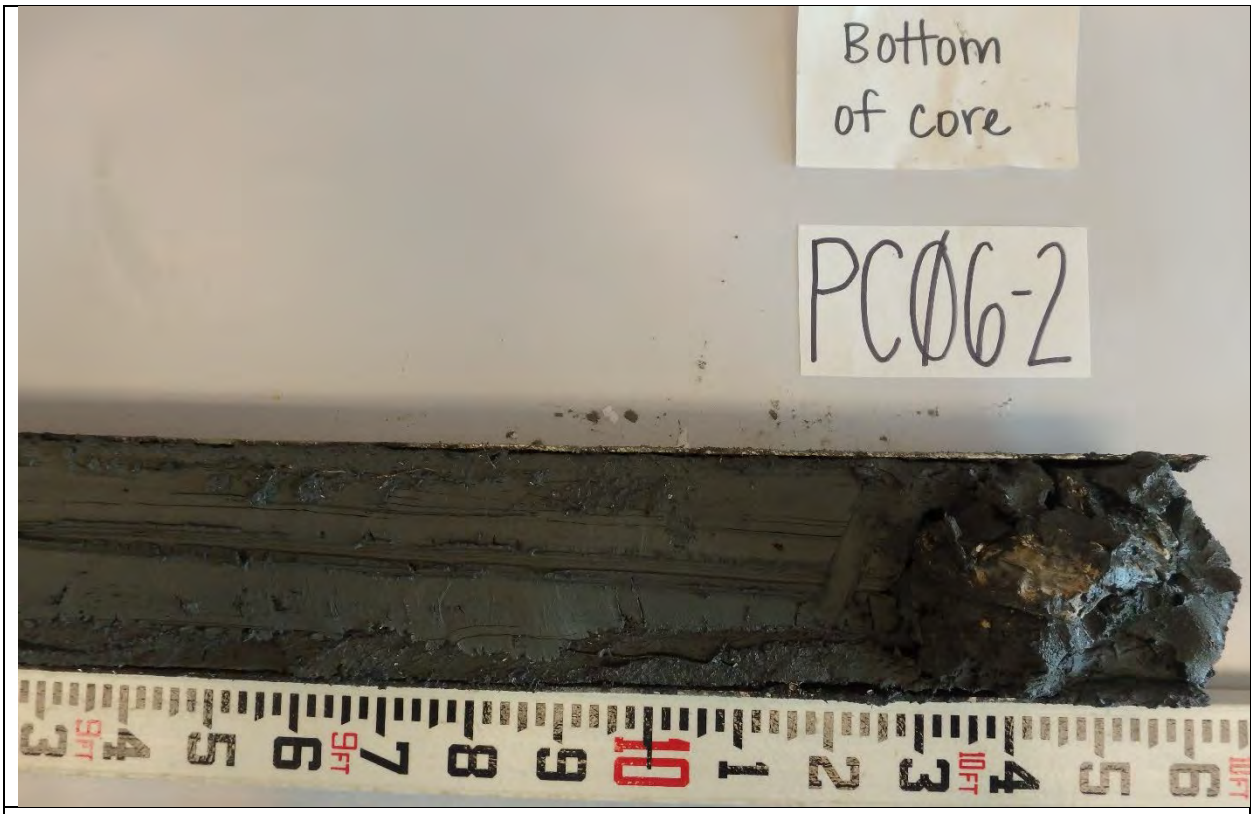



Parrotts Creek Core 6 Section 2 7-8 ft

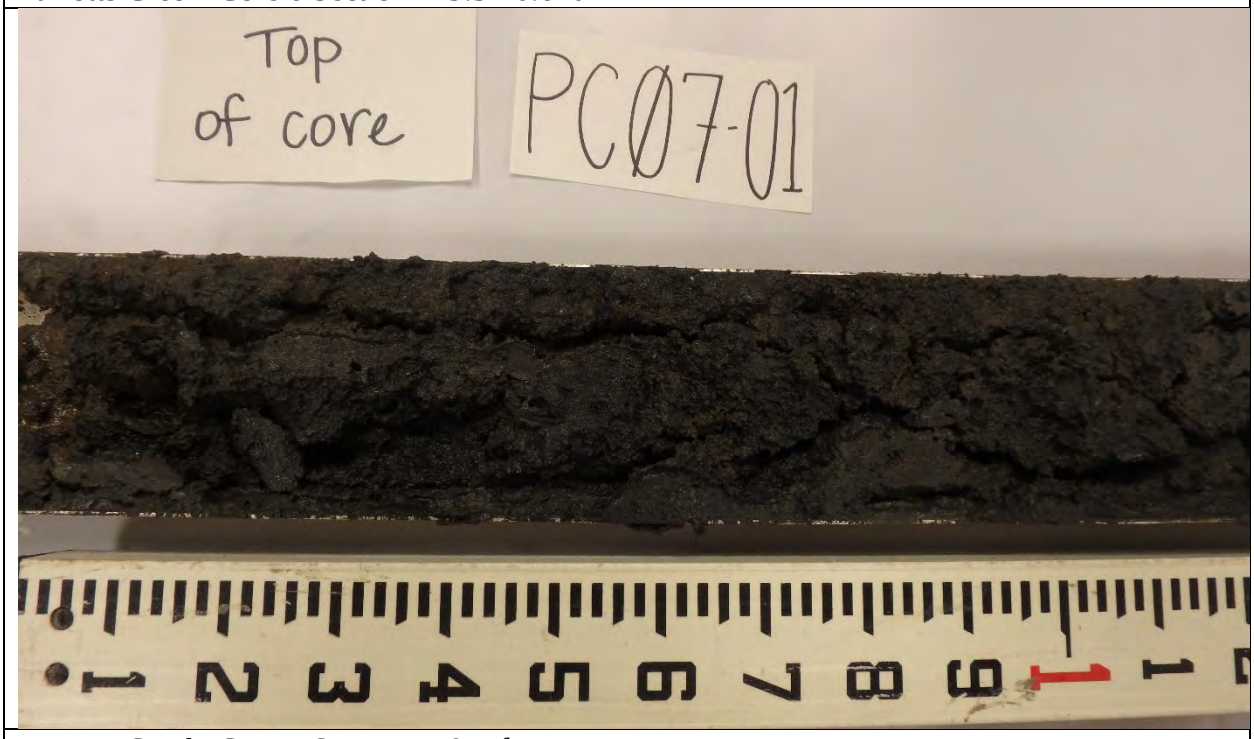

Parrotts Creek Core 6 Section 2 8-9 ft




Parrotts Creek Core 6 Section 2 9-10 ft

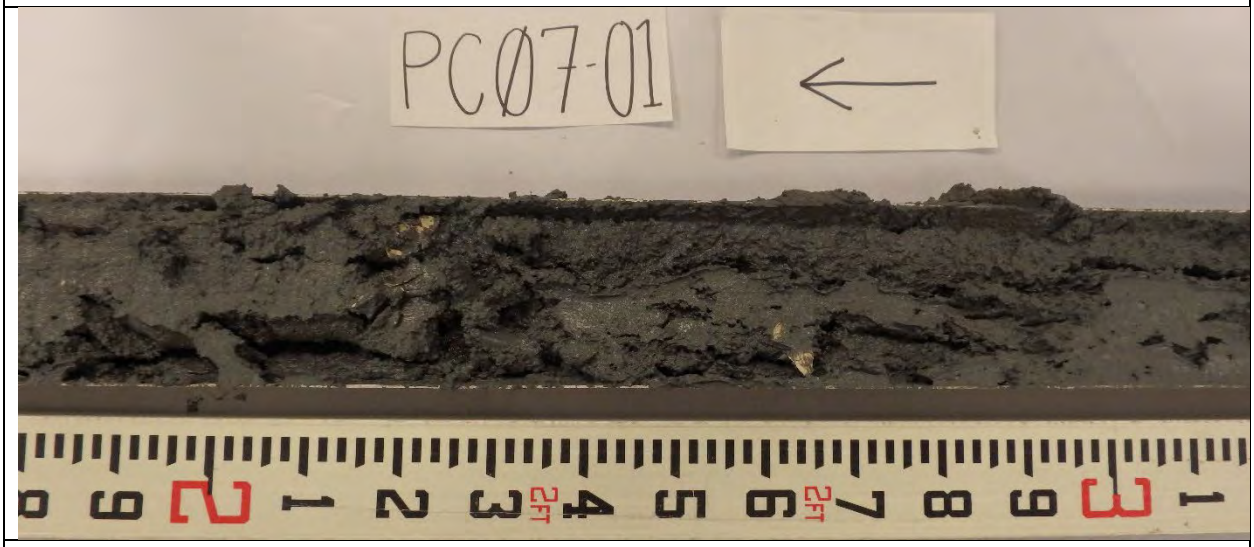



Parrotts Creek Core 6 Section 2 9.3-10.6 ft

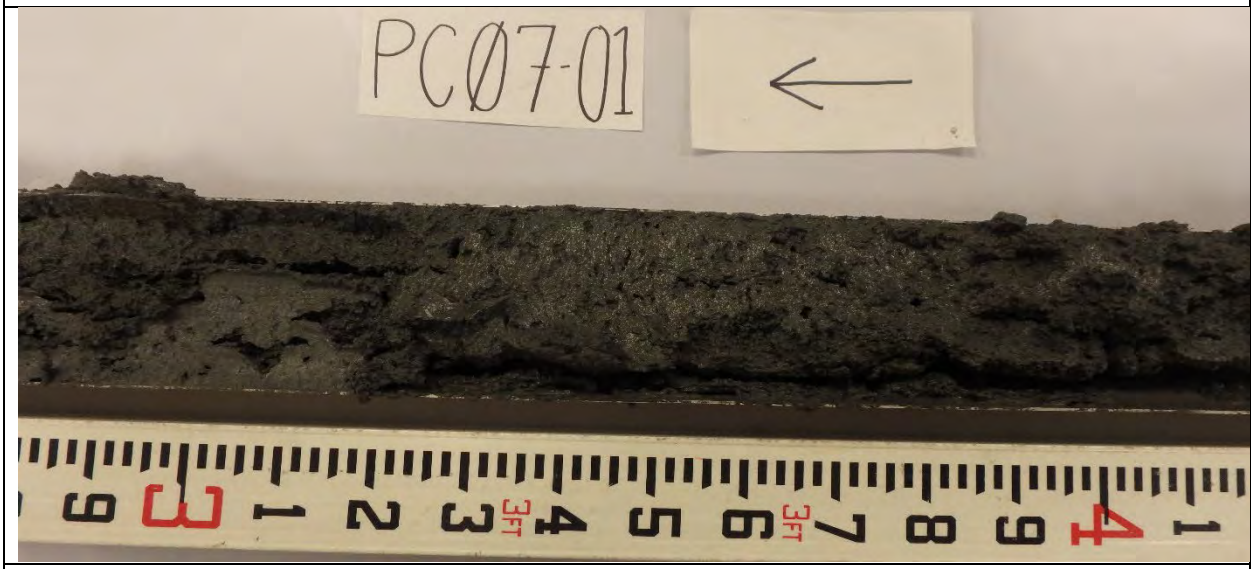



Parrotts Creek Core 7 Section 1 0-1 ft


Parrotts Creek Core 7 Section 1 1-2 ft

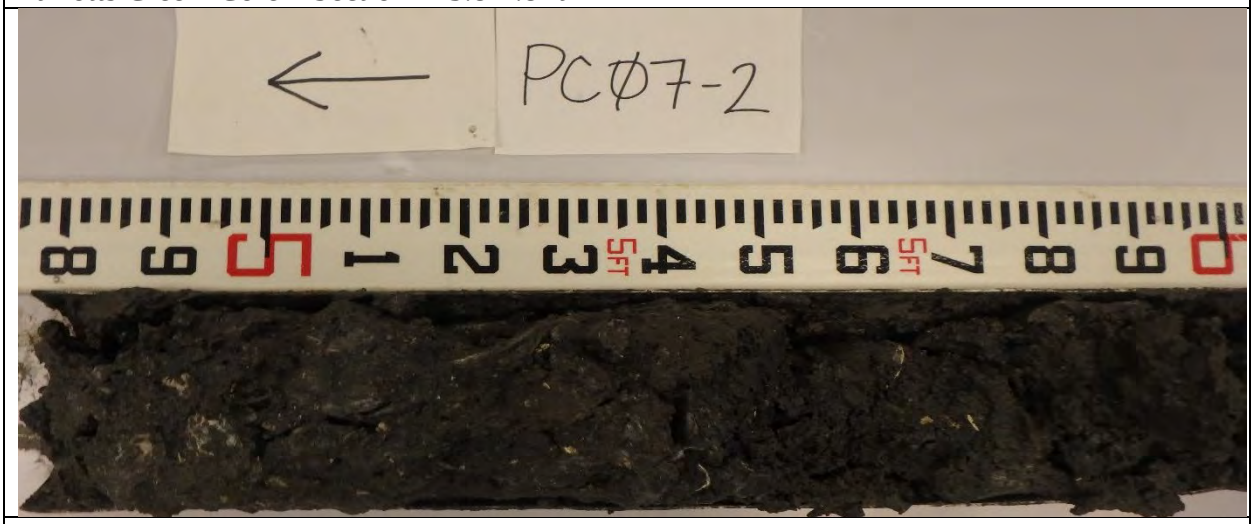



Parrotts Creek Core 7 Section 1 2-3 ft



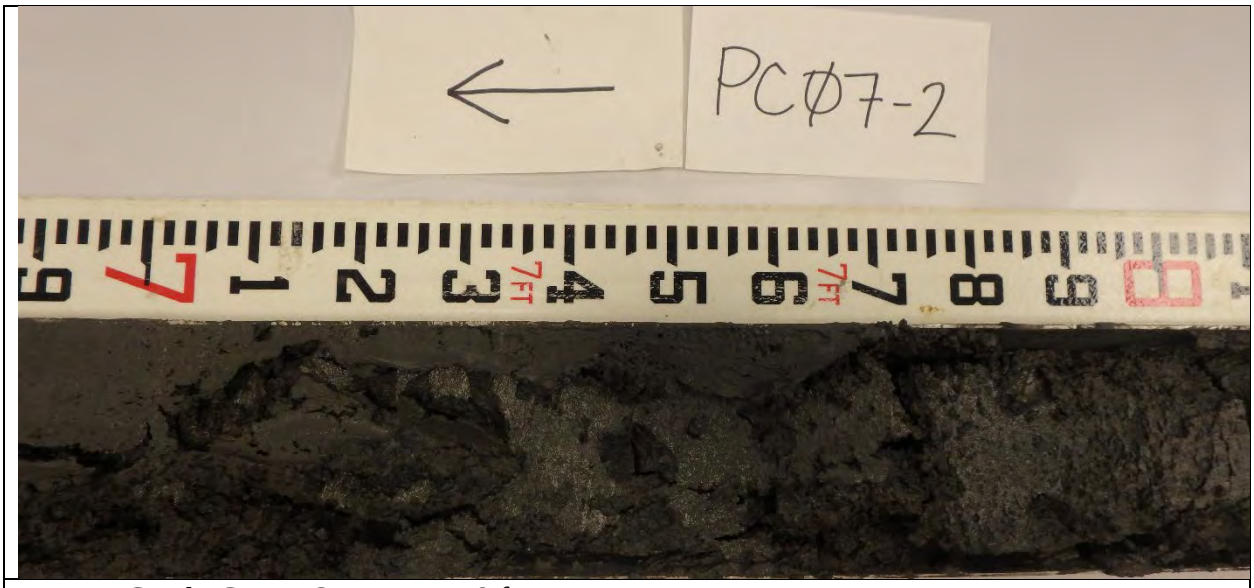

Parrotts Creek Core 7 Section 1 3-4 ft


Parrotts Creek Core 7 Section 1 3.8-4.8 ft

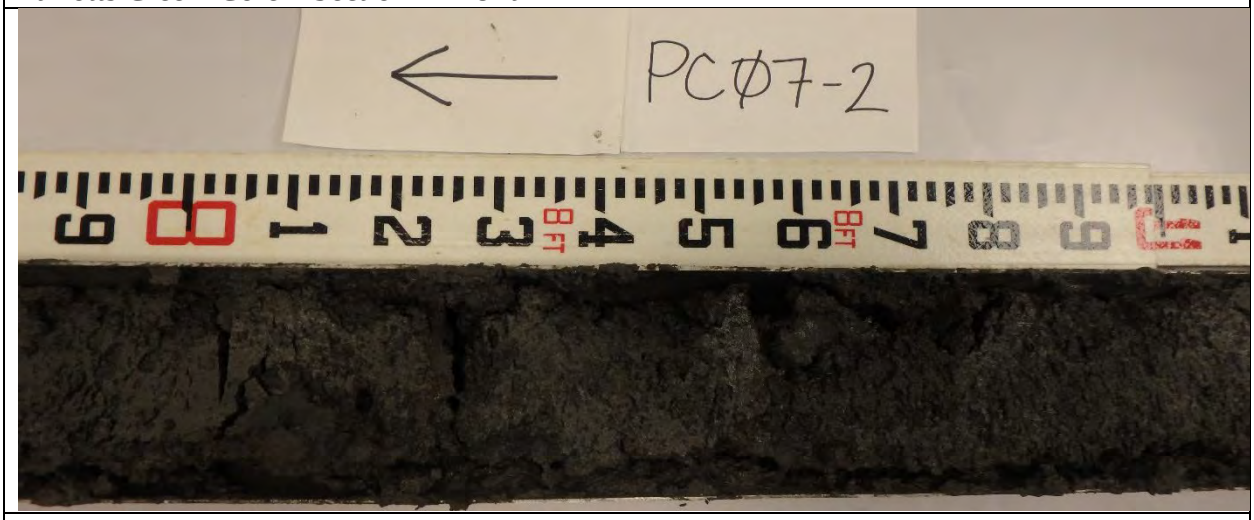



Parrotts Creek Core 7 Section 2 4.8-6 ft

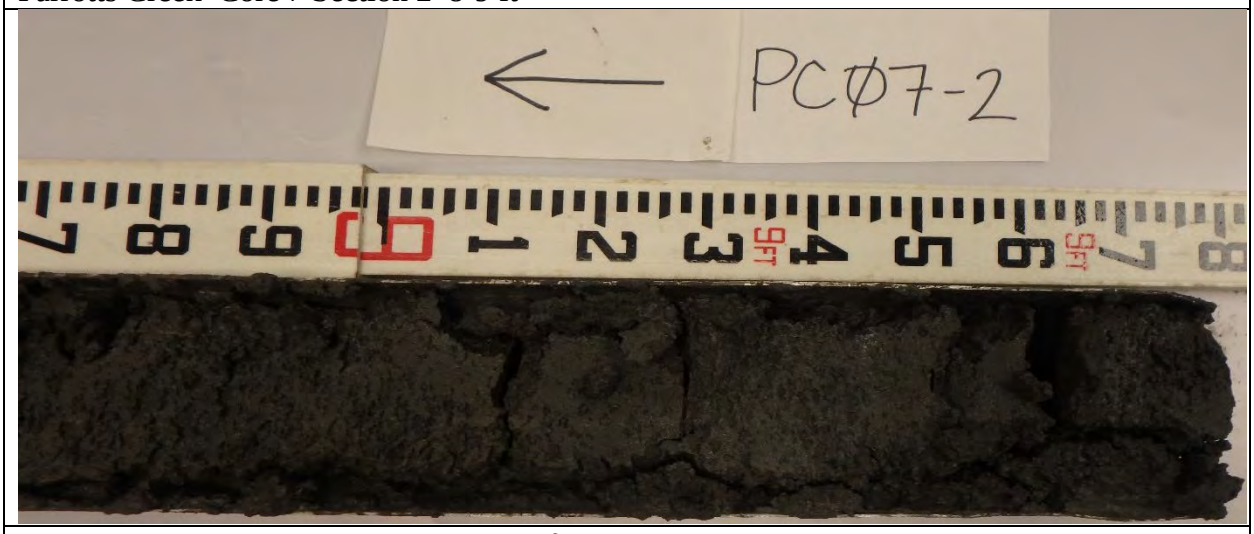

Parrotts Creek Core 7 Section 2 5.8-7 ft



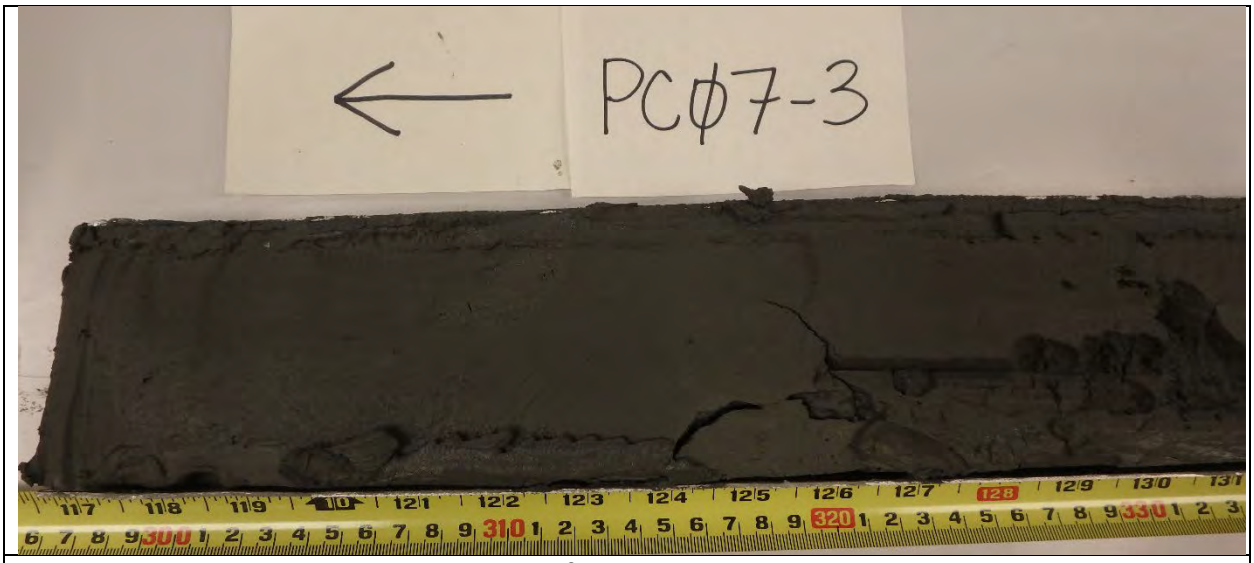

Parrotts Creek Core 7 Section 2 7-8 ft



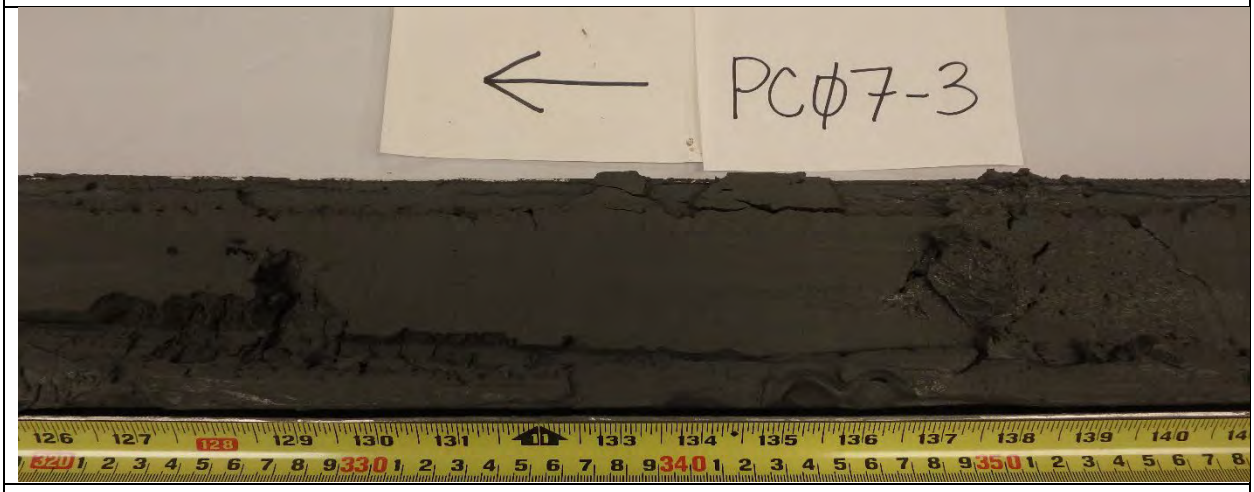

Parrotts Creek Core 7 Section 2 8-9 ft



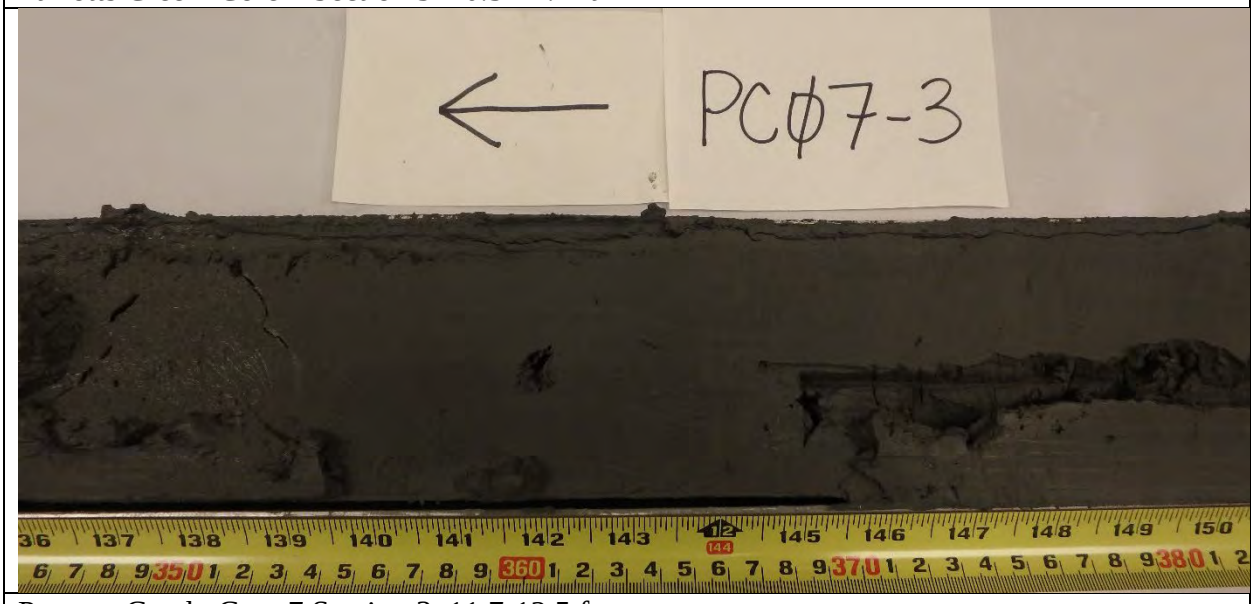

Parrotts Creek Core 7 Section 2 8.7-9.8 ft



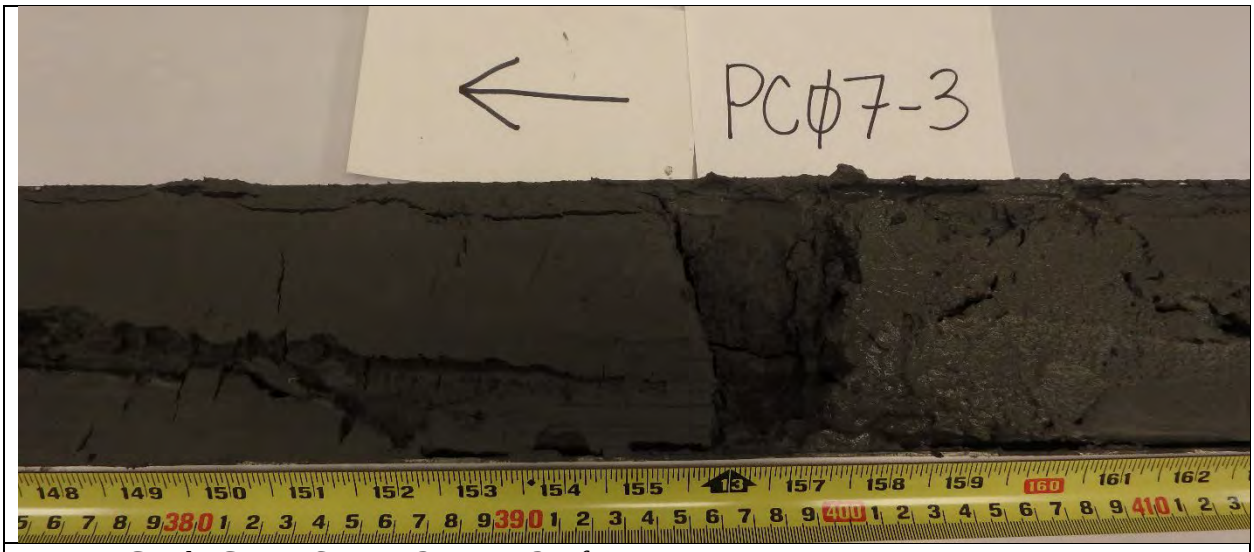

Parrotts Creek  Core 7 Section 3  9.8-10.9 ft



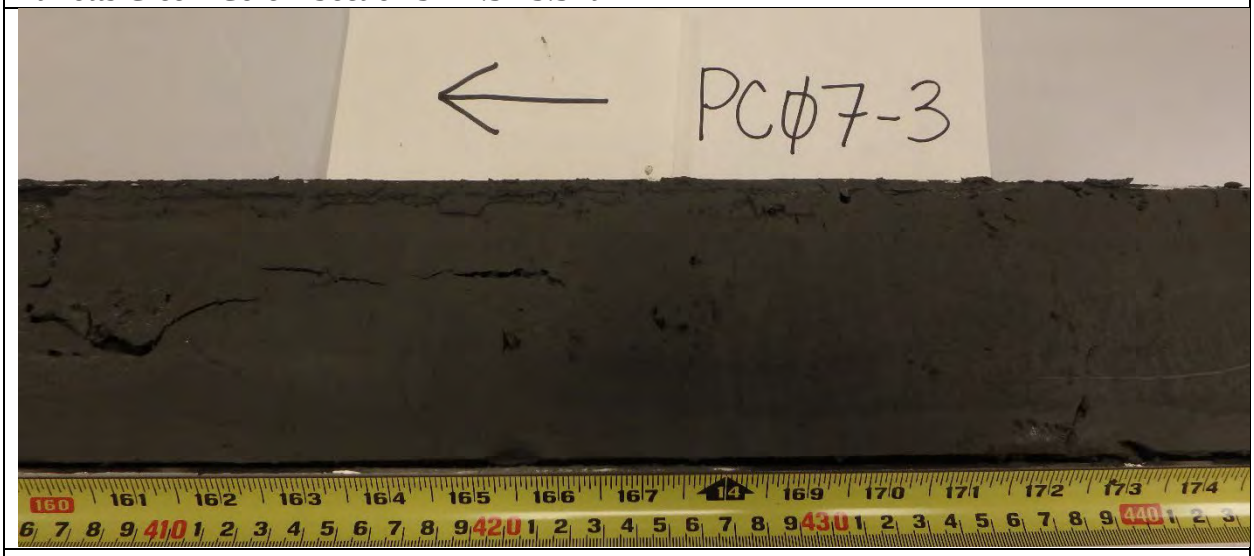

Parrotts Creek  Core 7 Section 3  10.5-11.7 ft




Parrotts Creek  Core 7 Section 3  11.7-12.5 ft

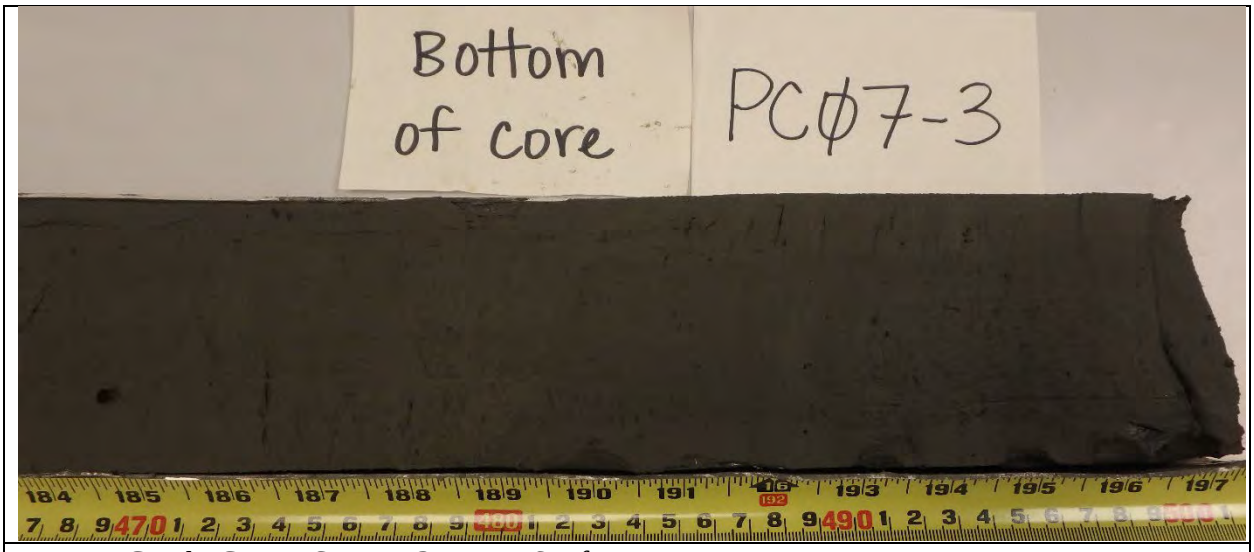



Parrotts Creek Core 7 Section 3 12.5-13.5 ft

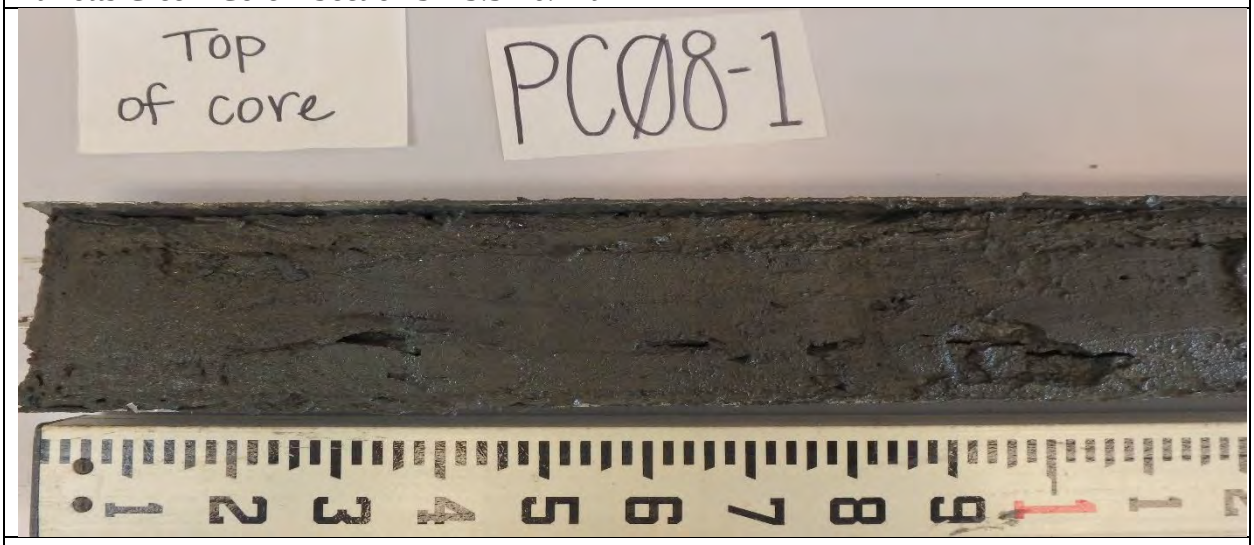



Parrotts Creek Core 7 Section 3 13.5-14.5 ft

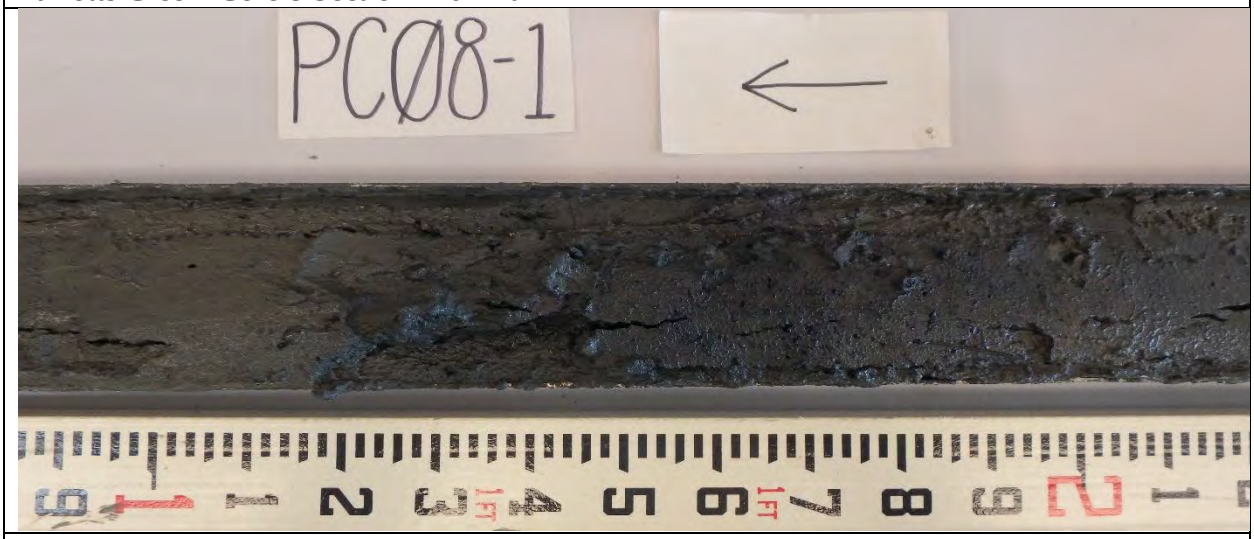

Parrotts Creek Core 7 Section 3 14.5-15.5 ft



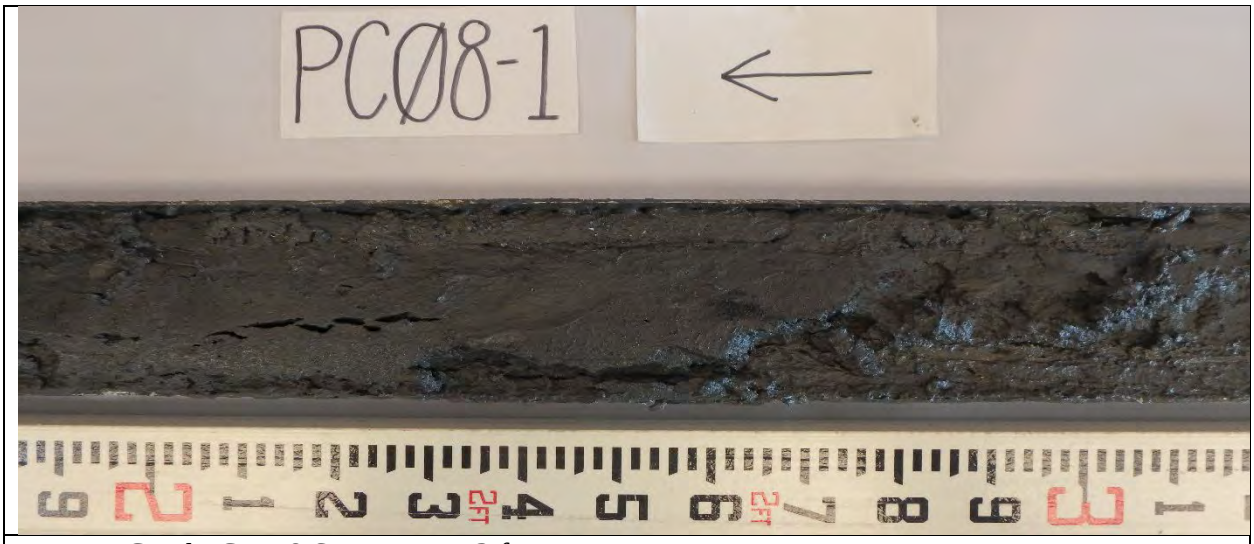

Parrotts Creek Core 7 Section 3 15.5-16.4 ft



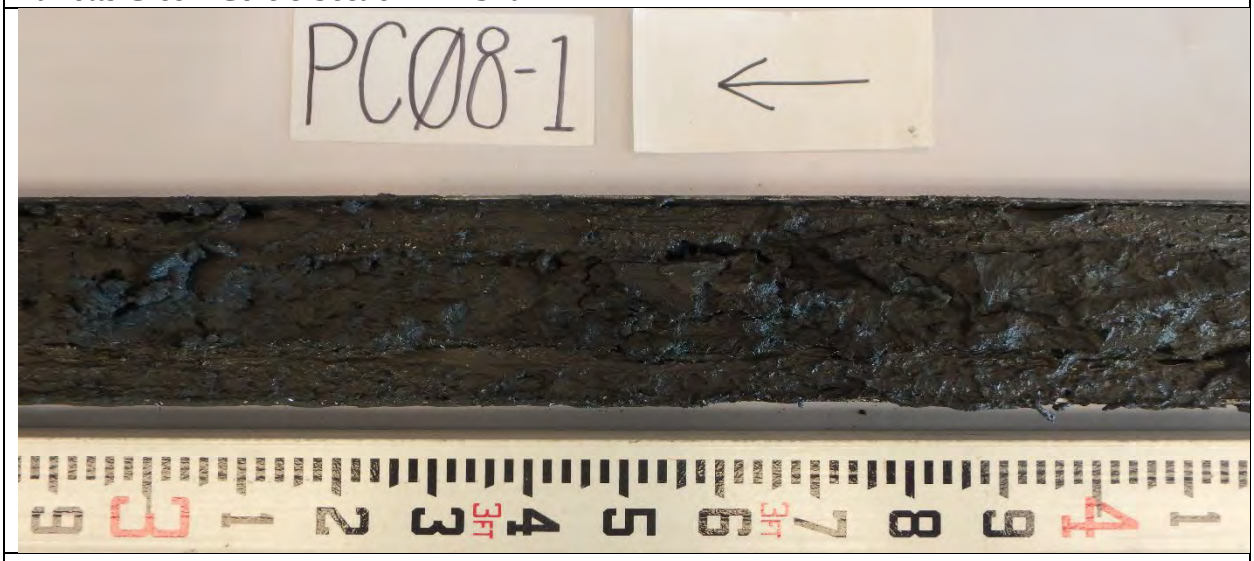

Parrotts Creek Core 8 Section 1 0-1 ft



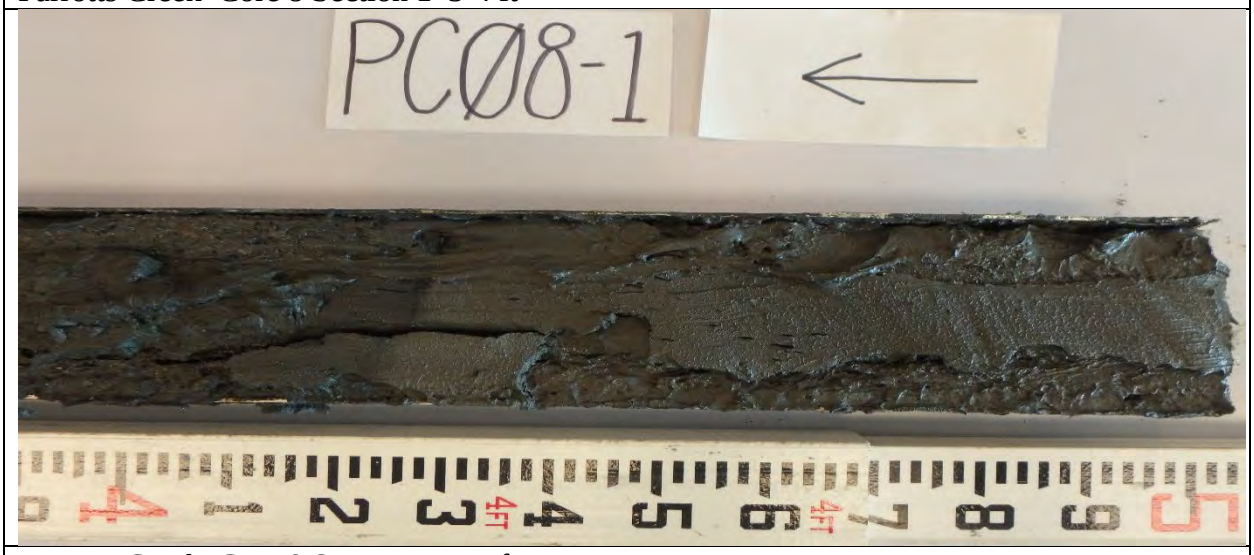

Parrotts Creek Core 8 Section 1 1-2 ft



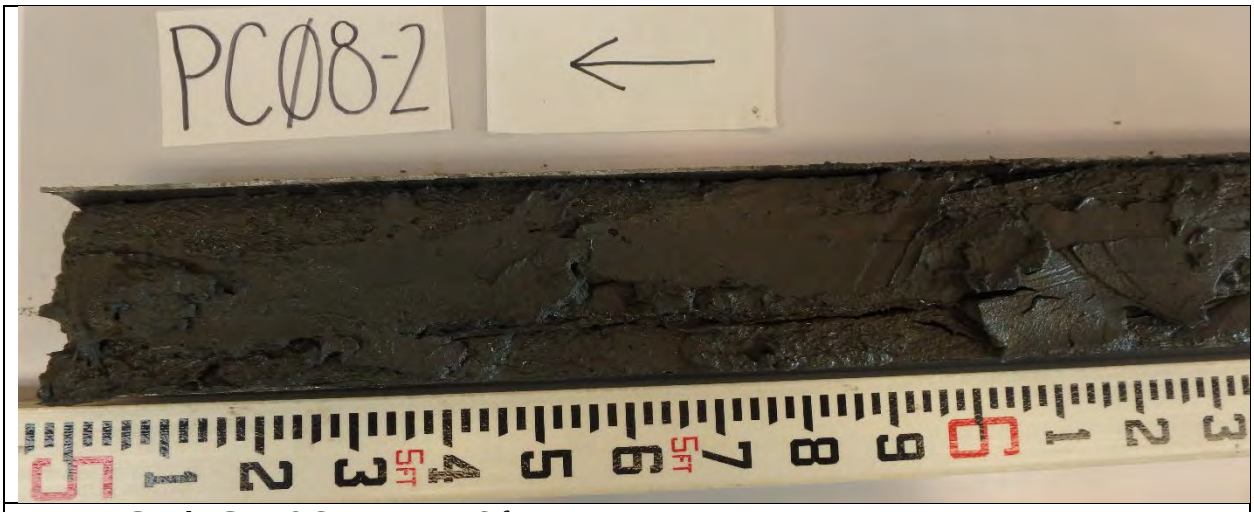

Parrotts Creek  Core 8 Section 1  2-3 ft



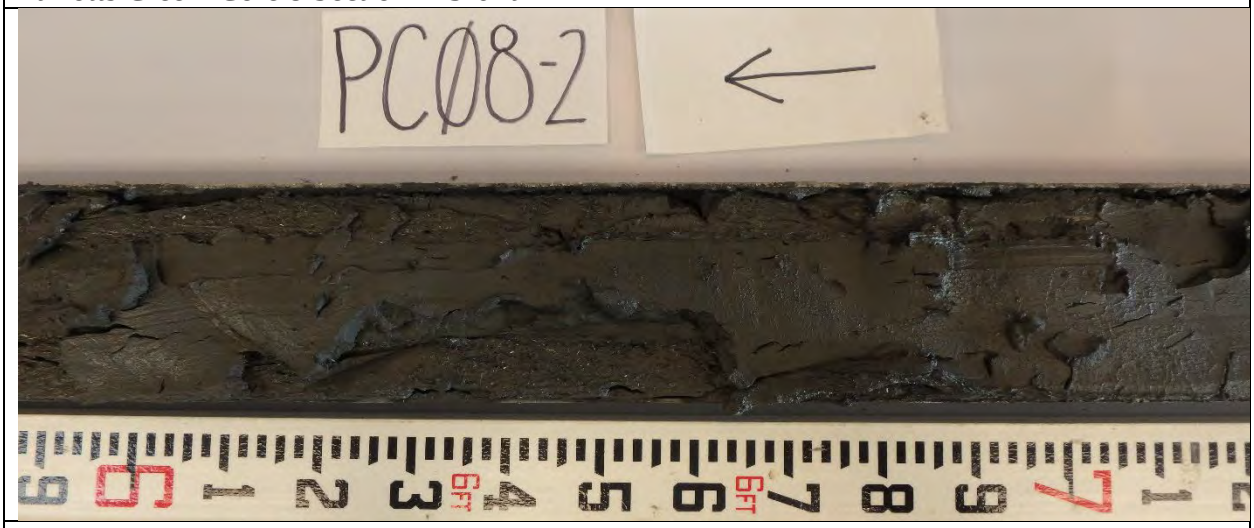

Parrotts Creek  Core 8 Section 1  3-4 ft



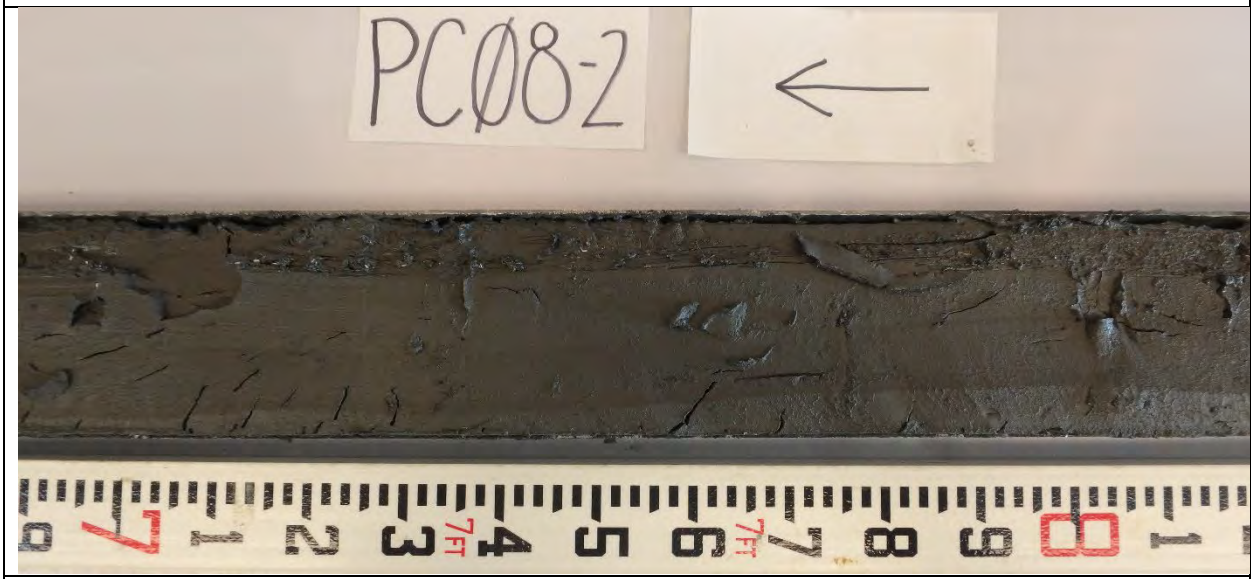

Parrotts Creek  Core 8 Section 1  4-5 ft



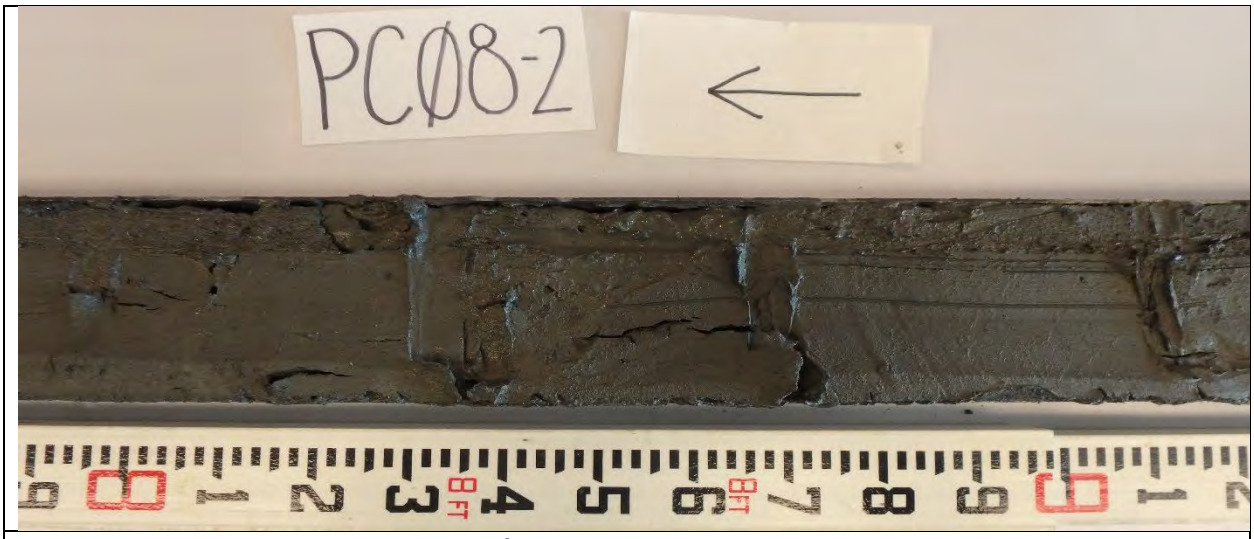

Parrotts Creek Core 8 Section 2 5-6 ft



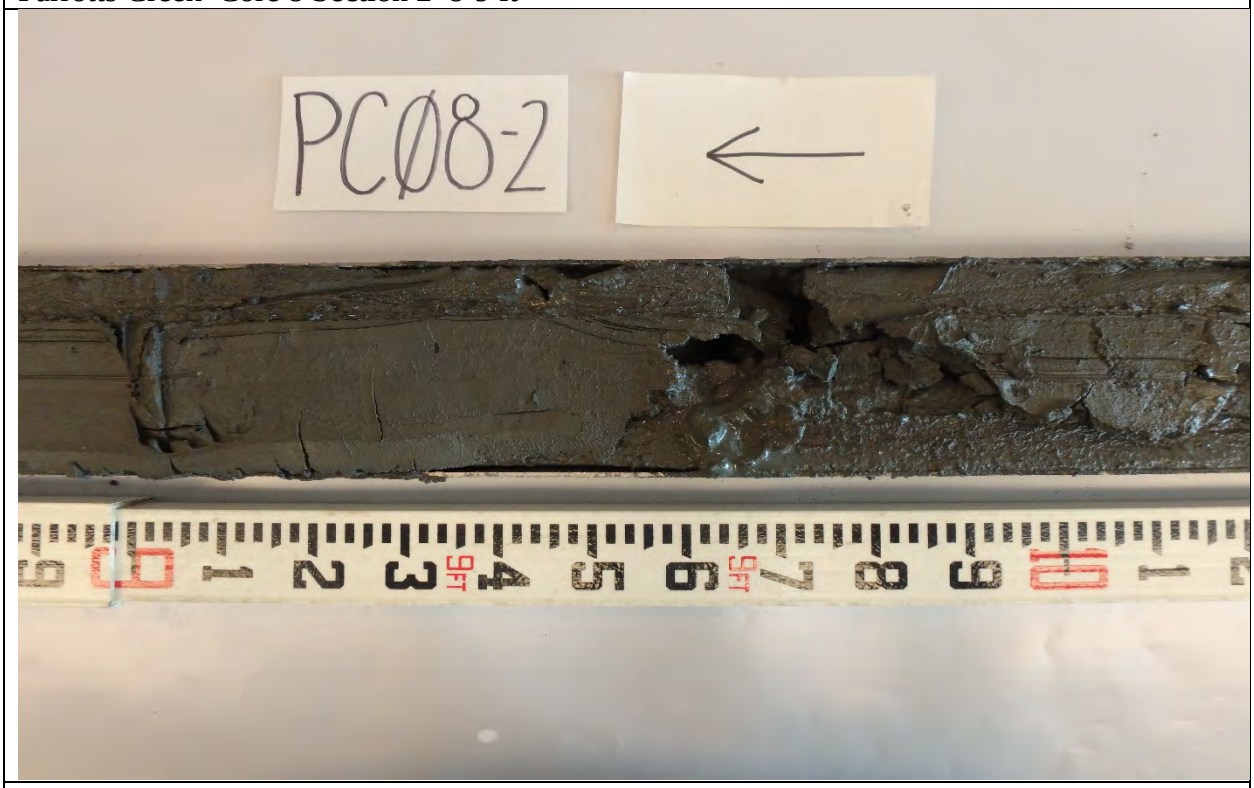

Parrotts Creek Core 8 Section 2 6-7 ft




Parrotts Creek Core 8 Section 2 7-8 ft




Parrotts Creek  Core 8 Section 2  8-9 ft



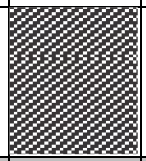
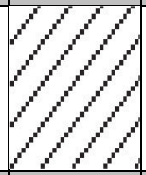
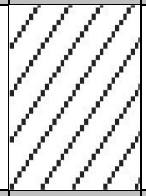

Parrotts Creek  Core 8 Section 2  9-10 ft


Parrotts Creek  Core 8 Section 2  9.4-10.6 ft

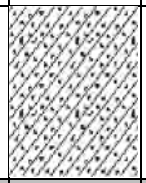
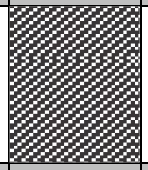
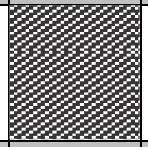
# Appendix B

# Core Logs

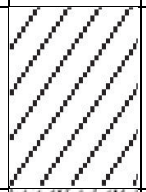
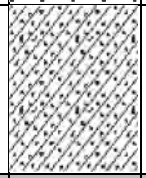
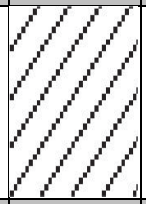
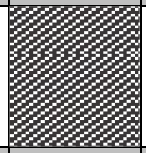
Parrotts Creek Core 1 Latitude: 37.7311 Longitude: -76.6113 Date: 10/07/2020

| Section | Depth (ft) | Depth Below Sediment Surface MLLW (ft) | Graphic | USCS Soil Type | Description | Color | Grain Size %G/SD/S/C %Fines/$D_{50}$ (mm) %Moisture |
|---|---|---|---|---|---|---|---|
| 1 | 0-5 | -6.5 to -11.5 |  | **CH** | Clay with trace fine sand, clay is soft (low plasticity), micaceous, with trace organic and shell fragments. | Olive gray | 0/5.9/50.3/43.8<br>94.1/0<br>50.8 |
| 1 | 5 | | | | **End of Section 1** | | |
| 2 | 5-10 | -11.5 to -16.5 |  | **CL** | Clay with trace fine sand, clay is medium stiff to stiff (medium plasticity), pockets (~5-15 cm) at 5.76 and 9.32 ft are soft clay, micaceous, with trace shell fragments. | Olive gray | 0/1.5/52.5/46.0<br>98.5<br>47.8 |
| 2 | 10 | | | | **End of Section 2** | | |
| 3 | 10-14.6 | -16.5 to -21.1 |  | **CL** | Clay with trace fine sand, clay is medium stiff to stiff (medium plasticity), pockets (~5-15 cm) at 10.28 and 13.96 ft of soft clay, sand appears in intermittent bands (1-3 mm) with trace shell fragments. | Olive gray | 0/3.5/50.8/45.7<br>96.5<br>45.4 |
| 3 | 14.6 | | | | **End of Section 3** | | |
| Core | 14.6 | | | | **End of Core** | | |

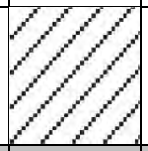
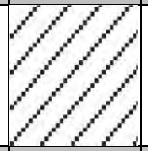
Parrotts Creek Core 2 Latitude: 37.7309 Longitude: -76.6147 Date: 10/07/2020

| Section | Depth (ft) | Depth Below Sediment Surface MLLW (ft) | Graphic | USCS Soil Type | Description | Color | Grain Size %G/SD/S/C %Fines/$D_{50}$ (mm) %Moisture |
|---|---|---|---|---|---|---|---|
| 1 | 0-5 | -5.3 to -10.3 |  | **SC** | Clayey with some fine sand, clay is soft transitioning to medium stiff at 4.46 ft, one band of clayey fine to medium sand at 2.52-3.3 ft, subrounded, micaceous, poorly sorted, heavy minerals. | Dark gray | 0/38.5/25.1/36.4<br>61.5/0<br>44.4 |
| 1 | 5 | | | | **End of Section 1** | | |
| 2 | 5-10 | -10.3 to -15.3 |  | **CH** | Clay with trace fine sand, clay is medium stiff, micaceous, with some shell fragments (1-80 mm) between 6.14 and 7.72 ft and clay is soft in same section. | Dark gray | 0/4.1/50.3/45.6<br>95.9<br>44.6 |
| 2 | 10 | | | | **End of Section 2** | | |
| 3 | 10-14.5 | -15.3 to -19.8 |  | **CH** | Clay, medium stiff to stiff, micaceous, with trace shell fragments and organic fragments. | Olive gray | 0/1.9/40.5/57.6<br>98.1<br>45.3 |
| 3 | 14.5 | | | | **End of Section 3** | | |
| Core | 14.5 | | | | **End of Core** | | |

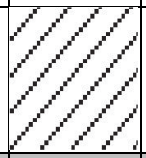
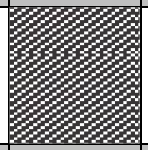
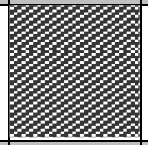
Parrotts Creek Core 3 Latitude: 37.7307 Longitude: -76.6186 Date: 10/07/2020

| Section | Depth (ft) | Depth Below Sediment Surface MLLW (ft) | Graphic | USCS Soil Type | Description | Color | Grain Size %G/SD/S/C %Fines/$D_{50}$ (mm) %Moisture |
|---|---|---|---|---|---|---|---|
| 1 | 0-3.8 | -3.9 to -7.7 |  | **CL** | Clay with some fine to medium sand, clay is soft (medium to low plasticity), sand is present in top 0.72 ft and fines downward, subangular, micaceous, heavy minerals, trace organic fragments. | Dark gray to light gray | 0/9.4/35.4/55.2<br>90.6/0<br>58.4 |
| 1 | 3.8-4.7 | -7.7 to -8.6 |  | **SC** | Fine to medium sand and clayey, clay is medium stiff, grain size fines with depth, sand is micaceous, subrounded, heavy minerals, with trace organic and little shell fragments. | Dark gray | 0/80.8/8.3/10.9<br>19.2/0.2<br>26.3 |
| 1 | 4.7 | | | | **End of Section 1** | | |
| 2 | 4.7-9.7 | -8.6 to -13.6 |  | **CL** | Clay with little fine to medium sand, clay is medium stiff, from 5.88-6.4 ft and 7.44-9.68 ft there is shell hash with fragments (≤ 8 cm), in this section clay is very soft, sand is subrounded, micaceous, heavy minerals. | Dark gray | 0/20.1/34.0/45.9<br>79.9/0<br>43.3 |
| 2 | 9.7 | | | | **End of Section 2** | | |
| 3 | 9.7-12.3 | -13.6 to -16.2 |  | **CH** | Clay, stiff (medium to high plasticity) with shell hash from 9.7-10.9 ft, micaceous. | Dark gray | 0/1.2/48.1/50.7<br>98.8<br>46.3 |
| 3 | 12.3 | | | | **End of Section 3** | | |
| Core | 12.3 | | | | **End of Core** | | |

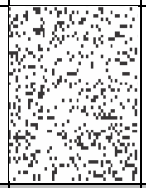
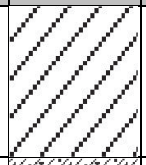
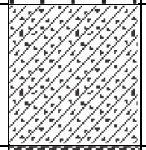
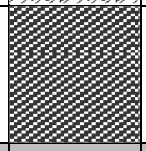
Parrotts Creek Core 4 Latitude: 37.7295 Longitude: -76.6188 Date: 10/07/2020

| Section | Depth (ft) | Depth Below Sediment Surface MLLW (ft) | Graphic | USCS Soil Type | Description | Color | Grain Size %G/SD/S/C %Fines/$D_{50}$ (mm) %Moisture |
|---|---|---|---|---|---|---|---|
| 1 | 0-4.9 | -5.3 to -10.2 |  | **CL** | Clay with little fine sand, clay is soft (low plasticity), micaceous, with little shell fragments. | Dark gray | 0/9.7/40.2/50.1<br>90.3/0<br>58.5 |
| 1 | 4.9 | | | | **End of Section 1** | | |
| 2 | 4.9-10.2 | -10.2 to -15.5 |  | **CL** | Clay with trace fine sand, clay is soft (low plasticity), micaceous, dense shell hash throughout (fragments ≤ 10 cm). | Dark gray | 0/1.2/47.3/51.5<br>98.8<br>49.9 |
| 2 | 10.2 | | | | **End of Section 2** | | |
| Core | 10.2 | | | | **End of Core** | | |

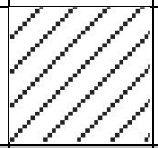
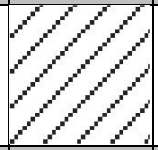
Parrotts Creek Core 5 Latitude: 37.7278 Longitude: -76.6182 Date: 10/07/2020

| Section | Depth (ft) | Depth Below Sediment Surface MLLW (ft) | Graphic | USCS Soil Type | Description | Color | Grain Size %G/SD/S/C %Fines/$D_{50}$ (mm) %Moisture |
|---|---|---|---|---|---|---|---|
| 1 | 0-5 | -5.6 to -10.6 |  | **CL** | Clay with trace fine sand, clay is soft transitioning to stiff (low to high plasticity), micaceous, with little shell and trace organic fragments. | Dark gray | 0/7.9/35.6/56.5<br>92.1<br>52.8 |
| 1 | 5 | | | | **End of Section 1** | | |
| 2 | 5-10 | -10.6 to -15.6 |  | **CH** | Clay, stiff with pockets (2-6 cm) of soft clay, shell fragments present in one layer at 6.06-6.2 ft, micaceous. | Olive gray | 0/1.8/50.3/47.9<br>98.2/0<br>44.7 |
| 2 | 10 | | | | **End of Section 2** | | |
| 3 | 10-12.8 | -15.6 to -18.4 |  | **CH** | Clay, clay is stiff, micaceous, with trace organic and shell fragments. | Olive gray | 0/1.9/48.6/49.5<br>98.1<br>41.8 |
| 3 | 12.8 | | | | **End of Section 3** | | |
| Core | 12.8 | | | | **End of Core** | | |

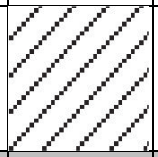
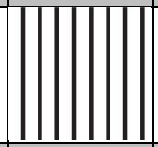
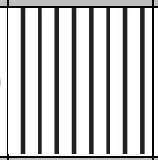
Parrotts Creek Core 6 Latitude: 37.7273 Longitude: -76.6185 Date: 10/07/2020

| Section | Depth (ft) | Depth Below Sediment Surface MLLW (ft) | Graphic | USCS Soil Type | Description | Color | Grain Size %G/SD/S/C %Fines/$D_{50}$ (mm) %Moisture |
|---|---|---|---|---|---|---|---|
| 1 | 0-4.7 | -8.7 to -13.4 |  | **SW** | Fine to coarse sand with little granules and pebbles (≤ 20 mm) with trace clay, poorly sorted, subangular, heavy minerals, micaceous, with trace shell fragments throughout. | Olive gray to dark gray | 0.6/97.7/0.5/1.2<br>1.7/0.3<br>14.7 |
| 1 | 4.7 | | | | **End of Section 1** | | |
| 2 | 4.7-5.8 | -13.4 to -14.5 |  | **CL** | Clay with little fine to medium sand, clay is medium stiff, micaceous, sand is present in 1-10 mm bands in top 0.32 ft, subangular, heavy minerals. | Dark gray | 0/35.6/30.3/34.1<br>64.4/0<br>36.4 |
| 2 | 5.8-7.3 | -14.5 to -16.0 |  | **SC** | Fine to medium sand and clay with trace granules, poorly sorted, micaceous, heavy minerals, with trace shell fragments. | Dark gray | 0/84.1/7.7/8.2<br>15.9/0.3<br>17.7 |
| 2 | 7.3-10.6 | -16.0 to -19.3 |  | **CH** | Clay, stiff (high plasticity), trace organic and shell fragments with one large shell 12 cm long at 10.58 ft. | Olive gray | 0/1.8/49.2/49.0<br>98.2<br>40.8 |
| 2 | 10.6 | | | | **End of Section 2** | | |
| Core | 10.6 | | | | **End of Core** | | |

Parrotts Creek Core 7 Latitude: 37.7270 Longitude: -76.6200 Date: 10/07/2020

| Section | Depth (ft) | Depth Below Sediment Surface MLLW (ft) | Graphic | USCS Soil Type | Description | Color | Grain Size %G/SD/S/C %Fines/$D_{50}$ (mm) %Moisture |
|---|---|---|---|---|---|---|---|
| 1 | 0-5 | -7.7 to -12.7 |  | **CL** | Clay with trace fine sand, clay is soft (low plasticity), micaceous, with shell and organic fragments. | Mottled dark and olive gray | 0/1.5/35.3/63.2<br>98.5<br>60.2 |
| 1 | 5 | | | | **End of Section 1** | | |
| 2 | 5-10.5 | -12.7 to -18.2 |  | **CL** | Clay with little fine sand, clay is medium stiff (low to medium plasticity), micaceous, with shell and organic fragments. | Olive gray | 0/9.4/41.3/49.3<br>90.6/0<br>44.5 |
| 2 | 10.5 | | | | **End of Section 2** | | |
| Core | | | | | **End of Core** | | |

Parrotts Creek Core 8 Latitude: 37.7269 Longitude: -76.6220 Date: 10/07/2020

| Section | Depth (ft) | Depth Below Sediment Surface MLLW (ft) | Graphic | USCS Soil Type | Description | Color | Grain Size %G/SD/S/C %Fines/$D_{50}$ (mm) %Moisture |
|---|---|---|---|---|---|---|---|
| 1 | 0-4.8 | -3.6 to -8.4 |  | **CL** | clay with little fine sand, clay is soft and stiffens down core, micaceous, sand present in top 2.4 ft, fining downwards, shell hash throughout | Dark gray | 0/12.3/34.4/53.3<br>87.7/0<br>45.9 |
| 1 | 4.8 | | | | **End of Section 1** | | |
| 2 | 4.8-9.8 | -8.4 to -13.4 |  | **ML** | clayey silt, micaceous, abundant shells and shell hash at 4.78-6 ft | Dark gray | 0/3.9/44.0/52.1<br>96.1/0<br>43.4 |
| 2 | 9.8 | | | | **End of End of Section 2** | | |
| 3 | 9.8-16.4 | -13.4 to -20.0 |  | **ML** | clayey silt, slight plasticity, micaceous, occasional woody fragments throughout, areas of unconsolidated silt at 346-354cm and 398-408cm | Olive gray | 0/7.9/44.6/47.5<br>92.1/0<br>45.6 |
| 3 | 16.4 | | | | **End of Section 3** | | |
| Core | 16.4 | | | | **End of Core** | | |

# Appendix C

# Sediment Data

| Name | Location | Core-Section | SampleID | % Moisture Units: % MDL: 0.1 |
|---|---|---|---|---|
| PC01 | Parrotts Creek | 1-1 | 1-1 (0-5 ft) | 50.8 |
| PC02 | Parrotts Creek | 1-2 | 1-2 (5-10 ft) | 47.8 |
| PC03 | Parrotts Creek | 1-3 | 1-3 (10-14.58 ft) | 45.4 |
| PC04 | Parrotts Creek | 2-1 | 2-1 (0-5 ft) | 44.4 |
| PC05 | Parrotts Creek | 2-2 | 2-2 (5-10 ft) | 44.6 |
| PC06 | Parrotts Creek | 2-3 | 2-3 (10-14.48 ft) | 45.3 |
| PC07 | Parrotts Creek | 3-1 | 3-1 (0-3.78 ft) | 58.4 |
| PC08 | Parrotts Creek | 3-1 | 3-1 (3.78-4.72 ft) | 26.3 |
| PC09 | Parrotts Creek | 3-2 | 3-2 (4.72-9.70) | 43.3 |
| PC10 | Parrotts Creek | 3-3 | 3-3 (9.70-12.26 ft) | 46.3 |
| PC11 | Parrotts Creek | 4-1 | 4-1 (0-5 ft) | 58.5 |
| PC12 | Parrotts Creek | 4-2 | 4-2 (5-10.2 ft) | 49.9 |
| PC13 | Parrotts Creek | 5-1 | 5-1 (0-5 ft) | 52.8 |
| PC14 | Parrotts Creek | 5-2 | 5-2 (5-10 ft) | 44.7 |
| PC15 | Parrotts Creek | 5-3 | 5-3 (10-12.84 ft) | 41.8 |
| PC16 | Parrotts Creek | 6-1 | 6-1 (0-4.76 ft) | 14.7 |
| PC17 | Parrotts Creek | 6-2 | 6-2 (4.76-5.84 ft) | 36.4 |
| PC18 | Parrotts Creek | 6-2 | 6-2 (5.84-7.26 ft) | 17.7 |
| PC19 | Parrotts Creek | 6-2 | 6-2 (7.26-10.58 ft) | 40.8 |
| PC20 | Parrotts Creek | 7-1 | 7-1 (0-4.78 ft) | 60.2 |
| PC21 | Parrotts Creek | 7-2 | 7-2 (4.78-9.78 ft) | 44.5 |
| PC22 | Parrotts Creek | 8-1 | 8-1 (0-5 ft) | 45.9 |
| PC23 | Parrotts Creek | 8-2 | 8-2 (5-10.54 ft) | 43.4 |
| PC24 | Parrotts Creek | 8-3 | 8-3 (9.78-16.38 ft) | 45.6 |

| Name | SampleID | % Gravel Units: % MDL: 0.1 | % Sand Units: % MDL: 0.1 | % Silt Units: % MDL: 0.1 | % Clay Units: % MDL: 0.1 | % Fines Units: % |
|---|---|---|---|---|---|---|
| PC01 | 1-1 (0-5 ft) | 0.0 | 5.9 | 50.3 | 43.8 | 94.1 |
| PC02 | 1-2 (5-10 ft) | 0.0 | 1.5 | 52.5 | 46 | 98.5 |
| PC03 | 1-3 (10-14.58 ft) | 0.0 | 3.5 | 50.8 | 45.7 | 96.5 |
| PC04 | 2-1 (0-5 ft) | 0.0 | 38.5 | 25.1 | 36.4 | 61.5 |
| PC05 | 2-2 (5-10 ft) | 0.0 | 4.1 | 50.3 | 45.6 | 95.9 |
| PC06 | 2-3 (10-14.48 ft) | 0.0 | 1.9 | 40.5 | 57.6 | 98.1 |
| PC07 | 3-1 (0-3.78 ft) | 0.0 | 9.4 | 35.4 | 55.2 | 90.6 |
| PC08 | 3-1 (3.78-4.72 ft) | 0.0 | 80.8 | 8.3 | 10.9 | 19.2 |
| PC09 | 3-2 (4.72-9.70) | 0.0 | 20.1 | 34 | 45.9 | 79.9 |
| PC10 | 3-3 (9.70-12.26 ft) | 0.0 | 1.2 | 48.1 | 50.7 | 98.8 |
| PC11 | 4-1 (0-5 ft) | 0.0 | 9.7 | 40.2 | 50.1 | 90.3 |
| PC12 | 4-2 (5-10.2 ft) | 0.0 | 1.2 | 47.3 | 51.5 | 98.8 |
| PC13 | 5-1 (0-5 ft) | 0.0 | 7.9 | 35.6 | 56.5 | 92.1 |
| PC14 | 5-2 (5-10 ft) | 0.0 | 1.8 | 50.3 | 47.9 | 98.2 |
| PC15 | 5-3 (10-12.84 ft) | 0.0 | 1.9 | 48.6 | 49.5 | 98.1 |
| PC16 | 6-1 (0-4.76 ft) | 0.6 | 97.7 | 0.5 | 1.2 | 1.7 |
| PC17 | 6-2 (4.76-5.84 ft) | 0.0 | 35.6 | 30.3 | 34.1 | 64.4 |
| PC18 | 6-2 (5.84-7.26 ft) | 0.0 | 84.1 | 7.7 | 8.2 | 15.9 |
| PC19 | 6-2 (7.26-10.58 ft) | 0.0 | 1.8 | 49.2 | 49 | 98.2 |
| PC20 | 7-1 (0-4.78 ft) | 0.0 | 1.5 | 35.3 | 63.2 | 98.5 |
| PC21 | 7-2 (4.78-9.78 ft) | 0.0 | 9.4 | 41.3 | 49.3 | 90.6 |
| PC22 | 8-1 (0-5 ft) | 0.0 | 12.3 | 34.4 | 53.3 | 87.7 |
| PC23 | 8-2 (5-10.54 ft) | 0.0 | 3.9 | 44 | 52.1 | 96.1 |
| PC24 | 8-3 (9.78-16.38 ft) | 0.0 | 7.9 | 44.6 | 47.5 | 92.1 |

| Name | SampleID | Total Sample Mean (mm) | Total Sample Median (mm) | Total Sample Stnd Dev (mm) | Total Sample Skewness (mm) | Total Sample Kurtosis (mm) |
|---|---|---|---|---|---|---|
| PC01 | 1-1 (0-5 ft) | 0.03 | 0.03 | 0.05 | 12.84 | 285.05 |
| PC02 | 1-2 (5-10 ft) | | | | | |
| PC03 | 1-3 (10-14.58 ft) | | | | | |
| PC04 | 2-1 (0-5 ft) | 0.10 | 0.03 | 0.11 | 0.77 | 2.18 |
| PC05 | 2-2 (5-10 ft) | | | | | |
| PC06 | 2-3 (10-14.48 ft) | | | | | |
| PC07 | 3-1 (0-3.78 ft) | 0.03 | 0.00 | 0.05 | 16.40 | 539.66 |
| PC08 | 3-1 (3.78-4.72 ft) | 0.16 | 0.16 | 0.15 | 6.88 | 71.30 |
| PC09 | 3-2 (4.72-9.70) | 0.06 | 0.03 | 0.13 | 5.01 | 35.83 |
| PC10 | 3-3 (9.70-12.26 ft) | | | | | |
| PC11 | 4-1 (0-5 ft) | 0.03 | 0.00 | 0.06 | 21.30 | 633.16 |
| PC12 | 4-2 (5-10.2 ft) | | | | | |
| PC13 | 5-1 (0-5 ft) | | | | | |
| PC14 | 5-2 (5-10 ft) | 0.02 | 0.03 | 0.04 | 30.53 | 1251.69 |
| PC15 | 5-3 (10-12.84 ft) | | | | | |
| PC16 | 6-1 (0-4.76 ft) | 0.39 | 0.31 | 0.41 | 8.11 | 81.81 |
| PC17 | 6-2 (4.76-5.84 ft) | 0.12 | 0.03 | 0.15 | 1.27 | 3.51 |
| PC18 | 6-2 (5.84-7.26 ft) | 0.27 | 0.28 | 0.17 | 0.84 | 7.73 |
| PC19 | 6-2 (7.26-10.58 ft) | | | | | |
| PC20 | 7-1 (0-4.78 ft) | | | | | |
| PC21 | 7-2 (4.78-9.78 ft) | 0.03 | 0.03 | 0.06 | 4.46 | 30.36 |
| PC22 | 8-1 (0-5 ft) | 0.03 | 0.00 | 0.05 | 3.16 | 19.91 |
| PC23 | 8-2 (5-10.54 ft) | 0.02 | 0.00 | 0.04 | 30.57 | 1406.29 |
| PC24 | 8-3 (9.78-16.38 ft) | 0.03 | 0.03 | 0.03 | 2.88 | 16.32 |

# Appendix D

# Chemical Sediment Analysis Results

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# Certificate of Analysis

***Final Report***

**Laboratory Order ID 21D0213**

| | | | |
|---|---|---|---|
| Client Name: | Virginia Institute of Marine Science<br>1370 Greate Road<br><br>Gloucester, VA 23062-1346 | Date Received: | April 6, 2021 13:41 |
| | | Date Issued: | April 13, 2021 17:15 |
| | | Project Number: | [none] |
| Submitted To: | Donna Milligan | Purchase Order: | PC02658723 |
| Client Site I.D.: | Shallow Water Dredging | | |

Enclosed are the results of analyses for samples received by the laboratory on 04/06/2021 13:41. If you have any questions concerning this report, please feel free to contact the laboratory.

Sincerely,

Ted Soyars

Technical Director

**End Notes**:

The test results listed in this report relate only to the samples submitted to the laboratory and as received by the Laboratory.

Unless otherwise noted, the test results for solid materials are calculated on a wet weight basis. Analyses for pH, dissolved oxygen, temperature, residual chlorine and sulfite that are performed in the laboratory do not meet NELAC requirements due to extremely short holding times. These analyses should be performed in the field. The results of field analyses performed by the Sampler included in the Certificate of Analysis are done so at the client's request and are not included in the laboratory's fields of certification nor have they been audited for adherence to a reference method or procedure.

The signature on the final report certifies that these results conform to all applicable NELAC standards unless otherwise specified. For a complete list of the Laboratory's NELAC certified parameters please contact customer service.

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# Certificate of Analysis

***Final Report***

| | | | |
|---|---|---|---|
| Client Name: | Virginia Institute of Marine Science<br>1370 Greate Road<br><br>Gloucester VA, 23062-1346 | Date Issued: | April 13, 2021 17:15 |
| | | Project Number: | [none] |
| | | Purchase Order: | PC02658723 |
| Submitted To: | Donna Milligan | | |
| Client Site I.D.: | Shallow Water Dredging | | |

**ANALYTICAL REPORT FOR SAMPLES**

**Laboratory Order ID 21D0213**

| Sample ID | Laboratory ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| Parrotts Up Creek | 21D0213-01 | Solids | 04/05/2021 11:52 | 04/06/2021 13:41 |
| Parrotts Down Creek | 21D0213-02 | Solids | 04/05/2021 13:27 | 04/06/2021 13:41 |

PCB results have been calculated based on dry weight.

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# Certificate of Analysis

***Final Report***

| | | | |
|---|---|---|---|
| Client Name: | Virginia Institute of Marine Science<br>1370 Greate Road<br><br>Gloucester VA, 23062-1346 | Date Issued:<br>Project Number:<br>Purchase Order: | April 13, 2021 17:15<br>[none]<br>PC02658723 |
| Submitted To: | Donna Milligan | | |
| Client Site I.D.: | Shallow Water Dredging | | |

**Laboratory Order ID: 21D0213**

**Analytical Results**

**Sample I.D.** Parrotts Up Creek **Laboratory Sample ID:** 21D0213-01

**Grab Date/Time:** 04/05/2021 11:52

**Field Residual Cl:** **Field pH:**

| Parameter | Samp ID | Method | Result | Qual | Reporting Limit | D.F. | Sample Prep Date/Time | Analysis Date/Time | Analyst |
|---|---|---|---|---|---|---|---|---|---|
| **TCLP Metals by 6000/7000 Series Methods** | | | | | | | | | |
| TCLP Silver | 01 | SW6010D | <0.100 mg/L | | 0.100 | 1 | 04/08/21 10:00 | 04/08/21 15:14 | BG |
| TCLP Arsenic | 01 | SW6010D | <0.100 mg/L | | 0.100 | 1 | 04/08/21 10:00 | 04/08/21 15:14 | BG |
| TCLP Barium | 01 | SW6010D | <5.00 mg/L | | 5.00 | 1 | 04/08/21 10:00 | 04/08/21 15:14 | BG |
| TCLP Cadmium | 01 | SW6010D | <0.0400 mg/L | | 0.0400 | 1 | 04/08/21 10:00 | 04/08/21 15:14 | BG |
| TCLP Chromium | 01 | SW6010D | <0.100 mg/L | | 0.100 | 1 | 04/08/21 10:00 | 04/08/21 15:14 | BG |
| TCLP Mercury | 01 | SW7470A | <0.008 mg/L | | 0.008 | 1 | 04/08/21 09:57 | 04/08/21 13:36 | MWL |
| TCLP Lead | 01 | SW6010D | <0.100 mg/L | | 0.100 | 1 | 04/08/21 10:00 | 04/08/21 15:14 | BG |
| TCLP Selenium | 01 | SW6010D | <0.250 mg/L | | 0.250 | 1 | 04/08/21 10:00 | 04/08/21 15:14 | BG |
| **TCLP Extraction Fluid, Metals** | 01 | SW1311 | **1 #** | | -- | 1 | 04/07/21 15:00 | 04/07/21 15:00 | ESW |
| **Volatile Organic Compounds by GC** | | | | | | | | | |
| Methyl-t-butyl ether (MTBE) | 01 | SW8021B | <24.8 ug/kg | | 24.8 | 1 | 04/07/21 13:23 | 04/07/21 13:23 | MAK |
| Benzene | 01 | SW8021B | <24.8 ug/kg | | 24.8 | 1 | 04/07/21 13:23 | 04/07/21 13:23 | MAK |
| Toluene | 01 | SW8021B | <24.8 ug/kg | | 24.8 | 1 | 04/07/21 13:23 | 04/07/21 13:23 | MAK |
| Ethylbenzene | 01 | SW8021B | <24.8 ug/kg | | 24.8 | 1 | 04/07/21 13:23 | 04/07/21 13:23 | MAK |
| m+p-Xylenes | 01 | SW8021B | <49.5 ug/kg | | 49.5 | 1 | 04/07/21 13:23 | 04/07/21 13:23 | MAK |
| o-Xylene | 01 | SW8021B | <24.8 ug/kg | | 24.8 | 1 | 04/07/21 13:23 | 04/07/21 13:23 | MAK |
| Xylenes, Total | 01 | SW8021B | <74.3 ug/kg | | 74.3 | 1 | 04/07/21 13:23 | 04/07/21 13:23 | MAK |
| *Surr: 2,5-Dibromotoluene (Surr PID)* | *01* | *SW8021B* | *79.5 %* | *S* | *80-120* | | *04/07/21 13:23* | *04/07/21 13:23* | *MAK* |
| **Semivolatile Hydrocarbons by GC** | | | | | | | | | |
| TPH-Semi-Volatiles (DRO) | 01 | SW8015C | <10.0 mg/kg | | 10.0 | 1 | 04/07/21 17:00 | 04/08/21 18:16 | LBH2 |
| *Surr: Pentacosane (Surr)* | *01* | *SW8015C* | *51.8 %* | | *45-160* | | *04/07/21 17:00* | *04/08/21 18:16* | *LBH2* |
| **TCLP Semivolatile Organic Compounds** | | | | | | | | | |

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# Certificate of Analysis

***Final Report***

| | | | |
|---|---|---|---|
| Client Name: | Virginia Institute of Marine Science<br>1370 Greate Road<br><br>Gloucester VA, 23062-1346 | Date Issued:<br>Project Number:<br>Purchase Order: | April 13, 2021 17:15<br>[none]<br>PC02658723 |
| Submitted To: | Donna Milligan | | |
| Client Site I.D.: | Shallow Water Dredging | | |

**Laboratory Order ID: 21D0213**

**Analytical Results**

**Sample I.D.** Parrotts Up Creek **Laboratory Sample ID:** 21D0213-01

**Grab Date/Time:** 04/05/2021 11:52

**Field Residual Cl:** **Field pH:**

| Parameter | Samp ID | Method | Result | Qual | Reporting Limit | D.F. | Sample Prep Date/Time | Analysis Date/Time | Analyst |
|---|---|---|---|---|---|---|---|---|---|
| **TCLP Semivolatile Organic Compounds** | | | | | | | | | |
| **TCLP Extraction Fluid, SV Organics** | 01 | SW1311 | **1 #** | | -- | 1 | 04/09/21 15:00 | 04/10/21 09:30 | SMM |
| **Organochlorine Pesticides and PCBs by GC/ECD** | | | | | | | | | |
| PCB as Aroclor 1016 | 01 | SW8082A | <0.269 mg/kg dry | | 0.269 | 1 | 04/08/21 13:50 | 04/09/21 08:41 | LBH2 |
| PCB as Aroclor 1221 | 01 | SW8082A | <0.269 mg/kg dry | | 0.269 | 1 | 04/08/21 13:50 | 04/09/21 08:41 | LBH2 |
| PCB as Aroclor 1232 | 01 | SW8082A | <0.269 mg/kg dry | | 0.269 | 1 | 04/08/21 13:50 | 04/09/21 08:41 | LBH2 |
| PCB as Aroclor 1242 | 01 | SW8082A | <0.269 mg/kg dry | | 0.269 | 1 | 04/08/21 13:50 | 04/09/21 08:41 | LBH2 |
| PCB as Aroclor 1248 | 01 | SW8082A | <0.269 mg/kg dry | | 0.269 | 1 | 04/08/21 13:50 | 04/09/21 08:41 | LBH2 |
| PCB as Aroclor 1254 | 01 | SW8082A | <0.269 mg/kg dry | | 0.269 | 1 | 04/08/21 13:50 | 04/09/21 08:41 | LBH2 |
| PCB as Aroclor 1260 | 01 | SW8082A | <0.269 mg/kg dry | | 0.269 | 1 | 04/08/21 13:50 | 04/09/21 08:41 | LBH2 |
| *Surr: DCB* | *01* | *SW8082A* | *81.2 %* | | *30-105* | | *04/08/21 13:50* | *04/09/21 08:41* | *LBH2* |
| *Surr: TCMX* | *01* | *SW8082A* | *119 %* | *S* | *30-105* | | *04/08/21 13:50* | *04/09/21 08:41* | *LBH2* |
| **TCLP Organochlorine Herbicides by GC/ECD** | | | | | | | | | |
| TCLP 2,4,5-TP (Silvex) | 01 | SW8151A | <0.0005 mg/L | | 0.0005 | 1 | 04/12/21 10:00 | 04/12/21 19:21 | LBH2 |
| TCLP 2,4-D | 01 | SW8151A | <0.001 mg/L | | 0.001 | 1 | 04/12/21 10:00 | 04/12/21 19:21 | LBH2 |
| *Surr: DCAA (Surr)* | *01* | *SW8151A* | *93.5 %* | | *60-112* | | *04/12/21 10:00* | *04/12/21 19:21* | *LBH2* |
| **TCLP Organochlorine Pesticides and PCBs by GC/ECD** | | | | | | | | | |
| TCLP Chlordane | 01 | SW8081B | <0.030 mg/L | | 0.030 | 1 | 04/12/21 14:25 | 04/13/21 11:43 | LBH2 |
| TCLP Endrin | 01 | SW8081B | <0.005 mg/L | | 0.005 | 1 | 04/12/21 14:25 | 04/13/21 11:43 | LBH2 |
| TCLP gamma-BHC (Lindane) | 01 | SW8081B | <0.005 mg/L | | 0.005 | 1 | 04/12/21 14:25 | 04/13/21 11:43 | LBH2 |
| TCLP Heptachlor | 01 | SW8081B | <0.005 mg/L | | 0.005 | 1 | 04/12/21 14:25 | 04/13/21 11:43 | LBH2 |
| TCLP Heptachlor Epoxide | 01 | SW8081B | <0.005 mg/L | | 0.005 | 1 | 04/12/21 14:25 | 04/13/21 11:43 | LBH2 |
| TCLP Methoxychlor | 01 | SW8081B | <0.005 mg/L | | 0.005 | 1 | 04/12/21 14:25 | 04/13/21 11:43 | LBH2 |
| TCLP Toxaphene | 01 | SW8081B | <0.500 mg/L | | 0.500 | 1 | 04/12/21 14:25 | 04/13/21 11:43 | LBH2 |
| *Surr: TCMX* | *01* | *SW8081B* | *73.0 %* | | *18-112* | | *04/12/21 14:25* | *04/13/21 11:43* | *LBH2* |

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# Certificate of Analysis

***Final Report***

| | | | |
|---|---|---|---|
| Client Name: | Virginia Institute of Marine Science<br>1370 Greate Road<br><br>Gloucester VA, 23062-1346 | Date Issued: | April 13, 2021 17:15 |
| | | Project Number: | [none] |
| | | Purchase Order: | PC02658723 |
| Submitted To: | Donna Milligan | | |
| Client Site I.D.: | Shallow Water Dredging | | |

**Laboratory Order ID: 21D0213**

**Analytical Results**

**Sample I.D.** Parrotts Up Creek **Laboratory Sample ID:** 21D0213-01

**Grab Date/Time:** 04/05/2021 11:52

**Field Residual Cl:** **Field pH:**

| Parameter | Samp ID | Method | Result | Qual | Reporting Limit | D.F. | Sample Prep Date/Time | Analysis Date/Time | Analyst |
|---|---|---|---|---|---|---|---|---|---|
| **TCLP Organochlorine Pesticides and PCBs by GC/ECD** | | | | | | | | | |
| *Surr: DCB* | *01* | *SW8081B* | *69.5 %* | | *27-131* | | *04/12/21 14:25* | *04/13/21 11:43* | *LBH2* |
| **Wet Chemistry Analysis** | | | | | | | | | |
| **Percent Solids** | 01 | SM22 2540G-2011 | **37.2 %** | | 0.10 | 1 | 04/08/21 14:20 | 04/08/21 14:20 | PHM |

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# Certificate of Analysis

***Final Report***

| | | | |
|---|---|---|---|
| Client Name: | Virginia Institute of Marine Science<br>1370 Greate Road<br><br>Gloucester VA, 23062-1346 | Date Issued:<br>Project Number:<br>Purchase Order: | April 13, 2021 17:15<br>[none]<br>PC02658723 |
| Submitted To: | Donna Milligan | | |
| Client Site I.D.: | Shallow Water Dredging | | |

**Laboratory Order ID: 21D0213**

**Analytical Results**

**Sample I.D.** Parrotts Down Creek **Laboratory Sample ID:** 21D0213-02

**Grab Date/Time:** 04/05/2021 13:27

**Field Residual Cl:** **Field pH:**

| Parameter | Samp ID | Method | Result | Qual | Reporting Limit | D.F. | Sample Prep Date/Time | Analysis Date/Time | Analyst |
|---|---|---|---|---|---|---|---|---|---|
| **TCLP Metals by 6000/7000 Series Methods** | | | | | | | | | |
| TCLP Silver | 02 | SW6010D | <0.100 mg/L | | 0.100 | 1 | 04/08/21 10:00 | 04/08/21 15:22 | BG |
| TCLP Arsenic | 02 | SW6010D | <0.100 mg/L | | 0.100 | 1 | 04/08/21 10:00 | 04/08/21 15:22 | BG |
| TCLP Barium | 02 | SW6010D | <5.00 mg/L | | 5.00 | 1 | 04/08/21 10:00 | 04/08/21 15:22 | BG |
| TCLP Cadmium | 02 | SW6010D | <0.0400 mg/L | | 0.0400 | 1 | 04/08/21 10:00 | 04/08/21 15:22 | BG |
| TCLP Chromium | 02 | SW6010D | <0.100 mg/L | | 0.100 | 1 | 04/08/21 10:00 | 04/08/21 15:22 | BG |
| TCLP Mercury | 02 | SW7470A | <0.008 mg/L | | 0.008 | 1 | 04/08/21 09:57 | 04/08/21 13:44 | MWL |
| TCLP Lead | 02 | SW6010D | <0.100 mg/L | | 0.100 | 1 | 04/08/21 10:00 | 04/08/21 15:22 | BG |
| TCLP Selenium | 02 | SW6010D | <0.250 mg/L | | 0.250 | 1 | 04/08/21 10:00 | 04/08/21 15:22 | BG |
| **TCLP Extraction Fluid, Metals** | 02 | SW1311 | **1 #** | | -- | 1 | 04/07/21 15:00 | 04/07/21 15:00 | ESW |
| **Volatile Organic Compounds by GC** | | | | | | | | | |
| Methyl-t-butyl ether (MTBE) | 02 | SW8021B | <5.00 ug/kg | | 5.00 | 1 | 04/07/21 13:00 | 04/07/21 13:00 | MAK |
| Benzene | 02 | SW8021B | <5.00 ug/kg | | 5.00 | 1 | 04/07/21 13:00 | 04/07/21 13:00 | MAK |
| Toluene | 02 | SW8021B | <5.00 ug/kg | | 5.00 | 1 | 04/07/21 13:00 | 04/07/21 13:00 | MAK |
| Ethylbenzene | 02 | SW8021B | <5.00 ug/kg | | 5.00 | 1 | 04/07/21 13:00 | 04/07/21 13:00 | MAK |
| m+p-Xylenes | 02 | SW8021B | <10.0 ug/kg | | 10.0 | 1 | 04/07/21 13:00 | 04/07/21 13:00 | MAK |
| o-Xylene | 02 | SW8021B | <5.00 ug/kg | | 5.00 | 1 | 04/07/21 13:00 | 04/07/21 13:00 | MAK |
| Xylenes, Total | 02 | SW8021B | <15.0 ug/kg | | 15.0 | 1 | 04/07/21 13:00 | 04/07/21 13:00 | MAK |
| *Surr: 2,5-Dibromotoluene (Surr PID)* | *02* | *SW8021B* | *79.9 %* | *S* | *80-120* | | *04/07/21 13:00* | *04/07/21 13:00* | *MAK* |
| **Semivolatile Hydrocarbons by GC** | | | | | | | | | |
| TPH-Semi-Volatiles (DRO) | 02 | SW8015C | <10.0 mg/kg | | 10.0 | 1 | 04/07/21 17:00 | 04/08/21 18:43 | LBH2 |
| *Surr: Pentacosane (Surr)* | *02* | *SW8015C* | *60.1 %* | | *45-160* | | *04/07/21 17:00* | *04/08/21 18:43* | *LBH2* |
| **TCLP Semivolatile Organic Compounds** | | | | | | | | | |

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***Final Report***

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|---|---|---|---|
| Client Name: | Virginia Institute of Marine Science<br>1370 Greate Road<br><br>Gloucester VA, 23062-1346 | Date Issued:<br>Project Number:<br>Purchase Order: | April 13, 2021 17:15<br>[none]<br>PC02658723 |
| Submitted To: | Donna Milligan | | |
| Client Site I.D.: | Shallow Water Dredging | | |

**Laboratory Order ID: 21D0213**

**Analytical Results**

**Sample I.D.** Parrotts Down Creek **Laboratory Sample ID:** 21D0213-02

**Grab Date/Time:** 04/05/2021 13:27

**Field Residual Cl:** **Field pH:**

| Parameter | Samp ID | Method | Result | Qual | Reporting Limit | D.F. | Sample Prep Date/Time | Analysis Date/Time | Analyst |
|---|---|---|---|---|---|---|---|---|---|
| **TCLP Semivolatile Organic Compounds** | | | | | | | | | |
| **TCLP Extraction Fluid, SV Organics** | 02 | SW1311 | **1 #** | | -- | 1 | 04/09/21 15:00 | 04/10/21 09:30 | SMM |
| **Organochlorine Pesticides and PCBs by GC/ECD** | | | | | | | | | |
| PCB as Aroclor 1016 | 02 | SW8082A | <0.198 mg/kg dry | | 0.198 | 1 | 04/08/21 13:50 | 04/09/21 09:00 | LBH2 |
| PCB as Aroclor 1221 | 02 | SW8082A | <0.198 mg/kg dry | | 0.198 | 1 | 04/08/21 13:50 | 04/09/21 09:00 | LBH2 |
| PCB as Aroclor 1232 | 02 | SW8082A | <0.198 mg/kg dry | | 0.198 | 1 | 04/08/21 13:50 | 04/09/21 09:00 | LBH2 |
| PCB as Aroclor 1242 | 02 | SW8082A | <0.198 mg/kg dry | | 0.198 | 1 | 04/08/21 13:50 | 04/09/21 09:00 | LBH2 |
| PCB as Aroclor 1248 | 02 | SW8082A | <0.198 mg/kg dry | | 0.198 | 1 | 04/08/21 13:50 | 04/09/21 09:00 | LBH2 |
| PCB as Aroclor 1254 | 02 | SW8082A | <0.198 mg/kg dry | | 0.198 | 1 | 04/08/21 13:50 | 04/09/21 09:00 | LBH2 |
| PCB as Aroclor 1260 | 02 | SW8082A | <0.198 mg/kg dry | | 0.198 | 1 | 04/08/21 13:50 | 04/09/21 09:00 | LBH2 |
| *Surr: DCB* | *02* | *SW8082A* | *82.4 %* | | *30-105* | | *04/08/21 13:50* | *04/09/21 09:00* | *LBH2* |
| *Surr: TCMX* | *02* | *SW8082A* | *154 %* | *S* | *30-105* | | *04/08/21 13:50* | *04/09/21 09:00* | *LBH2* |
| **TCLP Organochlorine Herbicides by GC/ECD** | | | | | | | | | |
| TCLP 2,4,5-TP (Silvex) | 02 | SW8151A | <0.0005 mg/L | | 0.0005 | 1 | 04/12/21 10:00 | 04/12/21 19:47 | LBH2 |
| TCLP 2,4-D | 02 | SW8151A | <0.001 mg/L | | 0.001 | 1 | 04/12/21 10:00 | 04/12/21 19:47 | LBH2 |
| *Surr: DCAA (Surr)* | *02* | *SW8151A* | *80.3 %* | | *60-112* | | *04/12/21 10:00* | *04/12/21 19:47* | *LBH2* |
| **TCLP Organochlorine Pesticides and PCBs by GC/ECD** | | | | | | | | | |
| TCLP Chlordane | 02 | SW8081B | <0.030 mg/L | | 0.030 | 1 | 04/12/21 14:25 | 04/13/21 12:02 | LBH2 |
| TCLP Endrin | 02 | SW8081B | <0.005 mg/L | | 0.005 | 1 | 04/12/21 14:25 | 04/13/21 12:02 | LBH2 |
| TCLP gamma-BHC (Lindane) | 02 | SW8081B | <0.005 mg/L | | 0.005 | 1 | 04/12/21 14:25 | 04/13/21 12:02 | LBH2 |
| TCLP Heptachlor | 02 | SW8081B | <0.005 mg/L | | 0.005 | 1 | 04/12/21 14:25 | 04/13/21 12:02 | LBH2 |
| TCLP Heptachlor Epoxide | 02 | SW8081B | <0.005 mg/L | | 0.005 | 1 | 04/12/21 14:25 | 04/13/21 12:02 | LBH2 |
| TCLP Methoxychlor | 02 | SW8081B | <0.005 mg/L | | 0.005 | 1 | 04/12/21 14:25 | 04/13/21 12:02 | LBH2 |
| TCLP Toxaphene | 02 | SW8081B | <0.500 mg/L | | 0.500 | 1 | 04/12/21 14:25 | 04/13/21 12:02 | LBH2 |
| *Surr: TCMX* | *02* | *SW8081B* | *83.0 %* | | *18-112* | | *04/12/21 14:25* | *04/13/21 12:02* | *LBH2* |

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***Final Report***

| | | | |
|---|---|---|---|
| Client Name: | Virginia Institute of Marine Science<br>1370 Greate Road<br><br>Gloucester VA, 23062-1346 | Date Issued: | April 13, 2021 17:15 |
| | | Project Number: | [none] |
| | | Purchase Order: | PC02658723 |
| Submitted To: | Donna Milligan | | |
| Client Site I.D.: | Shallow Water Dredging | | |

**Laboratory Order ID: 21D0213**

**Analytical Results**

**Sample I.D.** Parrotts Down Creek **Laboratory Sample ID:** 21D0213-02

**Grab Date/Time:** 04/05/2021 13:27

**Field Residual Cl:** **Field pH:**

| Parameter | Samp ID | Method | Result | Qual | Reporting Limit | D.F. | Sample Prep Date/Time | Analysis Date/Time | Analyst |
|---|---|---|---|---|---|---|---|---|---|
| **TCLP Organochlorine Pesticides and PCBs by GC/ECD** | | | | | | | | | |
| *Surr: DCB* | *02* | *SW8081B* | *55.5 %* | | *27-131* | | *04/12/21 14:25* | *04/13/21 12:02* | *LBH2* |
| **Wet Chemistry Analysis** | | | | | | | | | |
| **Percent Solids** | 02 | SM22 2540G-2011 | **50.6 %** | | 0.10 | 1 | 04/08/21 14:20 | 04/08/21 14:20 | PHM |

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|---|---|---|---|
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| | | Project Number: | [none] |
| | | Purchase Order: | PC02658723 |
| Submitted To: | Donna Milligan | | |
| Client Site I.D.: | Shallow Water Dredging | | |

## Analytical Summary

**Preparation Method:**

| Sample ID | Preparation Factors Initial / Final | Method | Batch ID | Sequence ID | Calibration ID |
|---|---|---|---|---|---|
| **Wet Chemistry Analysis** | | **Preparation Method:** | **No Prep Wet Chem** | | |
| 21D0213-01 | 10.0 g / 10.0 mL | SM22 2540G-2011 | BED0259 | SED0246 | |
| 21D0213-02 | 10.0 g / 10.0 mL | SM22 2540G-2011 | BED0259 | SED0246 | |

| Sample ID | Preparation Factors Initial / Final | Method | Batch ID | Sequence ID | Calibration ID |
|---|---|---|---|---|---|
| **TCLP Metals by 6000/7000 Series Methods** | | **Preparation Method:** | **SW1311 Metals** | | |
| 21D0213-01 | 100 g / 2000 mL | SW1311 | BED0227 | SED0210 | |
| 21D0213-02 | 100 g / 2000 mL | SW1311 | BED0227 | SED0210 | |

| Sample ID | Preparation Factors Initial / Final | Method | Batch ID | Sequence ID | Calibration ID |
|---|---|---|---|---|---|
| **TCLP Metals by 6000/7000 Series Methods** | | **Preparation Method:** | **SW3010A** | | |
| 21D0213-01 | 10.0 mL / 50.0 mL | SW6010D | BED0245 | SED0251 | AD10031 |
| 21D0213-02 | 10.0 mL / 50.0 mL | SW6010D | BED0245 | SED0251 | AD10031 |

| Sample ID | Preparation Factors Initial / Final | Method | Batch ID | Sequence ID | Calibration ID |
|---|---|---|---|---|---|
| **Semivolatile Hydrocarbons by GC** | | **Preparation Method:** | **SW3510C** | | |
| 21D0213-01 | 50.8 g / 1.00 mL | SW8015C | BED0223 | SED0252 | AA10005 |
| 21D0213-02 | 51.0 g / 1.00 mL | SW8015C | BED0223 | SED0252 | AA10005 |
| **TCLP Semivolatile Organic Compounds** | | **Preparation Method:** | **SW3510C** | | |
| 21D0213-01 | 100 g / 2000 mL | SW1311 | BED0365 | SED0340 | AC10032 |
| 21D0213-02 | 100 g / 2000 mL | SW1311 | BED0365 | SED0340 | AC10032 |
| **TCLP Organochlorine Herbicides by GC/ECD** | | **Preparation Method:** | **SW3510C** | | |
| 21D0213-01 | 100 mL / 5.00 mL | SW8151A | BED0366 | SED0381 | AC10103 |
| 21D0213-02 | 100 mL / 5.00 mL | SW8151A | BED0366 | SED0381 | AC10103 |
| **TCLP Organochlorine Pesticides and PCBs by GC/ECD** | | **Preparation Method:** | **SW3510C** | | |
| 21D0213-01 | 100 mL / 1.00 mL | SW8081B | BED0380 | SED0397 | AC10008 |
| 21D0213-02 | 100 mL / 1.00 mL | SW8081B | BED0380 | SED0397 | AC10008 |

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| | | | |
|---|---|---|---|
| Client Name: | Virginia Institute of Marine Science<br>1370 Greate Road<br><br>Gloucester VA, 23062-1346 | Date Issued: | April 13, 2021 17:15 |
| | | Project Number: | [none] |
| | | Purchase Order: | PC02658723 |
| Submitted To: | Donna Milligan | | |
| Client Site I.D.: | Shallow Water Dredging | | |

| Sample ID | Preparation Factors Initial / Final | Method | Batch ID | Sequence ID | Calibration ID |
|---|---|---|---|---|---|
| **Organochlorine Pesticides and PCBs by GC/ECD** | | **Preparation Method:** | **SW3550B** | | |
| 21D0213-01 | 30.0 g / 5.00 mL | SW8082A | BED0267 | SED0282 | AD10013 |
| 21D0213-02 | 30.0 g / 5.00 mL | SW8082A | BED0267 | SED0282 | AD10013 |

| Sample ID | Preparation Factors Initial / Final | Method | Batch ID | Sequence ID | Calibration ID |
|---|---|---|---|---|---|
| **Volatile Organic Compounds by GC** | | **Preparation Method:** | **SW5030B** | | |
| 21D0213-01 | 1.01 g / 5.00 mL | SW8021B | BED0204 | SED0219 | AC10093 |
| 21D0213-02 | 5.00 g / 5.00 mL | SW8021B | BED0204 | SED0219 | AC10093 |

| Sample ID | Preparation Factors Initial / Final | Method | Batch ID | Sequence ID | Calibration ID |
|---|---|---|---|---|---|
| **TCLP Metals by 6000/7000 Series Methods** | | **Preparation Method:** | **SW7470A** | | |
| 21D0213-01 | 1.00 mL / 20.0 mL | SW7470A | BED0247 | SED0242 | AD10033 |
| 21D0213-02 | 1.00 mL / 20.0 mL | SW7470A | BED0247 | SED0242 | AD10033 |

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|---|---|---|---|
| Client Name: | Virginia Institute of Marine Science<br>1370 Greate Road<br><br>Gloucester VA, 23062-1346 | Date Issued: | April 13, 2021 17:15 |
| | | Project Number: | [none] |
| | | Purchase Order: | PC02658723 |
| Submitted To: | Donna Milligan | | |
| Client Site I.D.: | Shallow Water Dredging | | |

## TCLP Metals by 6000/7000 Series Methods - Quality Control

## Air Water & Soil Laboratories, Inc.

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch BED0227 - SW1311 Metals** | | | | | | | | | | |
| **Blank (BED0227-BLK1)** | | | | Prepared & Analyzed: 04/07/2021 | | | | | | |
| Extraction Fluid, Metals | 1 # | 0 | # | | | | | | | |
| **Batch BED0245 - SW3010A** | | | | | | | | | | |
| **Blank (BED0245-BLK1)** | | | | Prepared & Analyzed: 04/08/2021 | | | | | | |
| Arsenic | <0.100 mg/L | 0.100 | mg/L | | | | | | | |
| Barium | <5.00 mg/L | 5.00 | mg/L | | | | | | | |
| Cadmium | <0.0400 mg/L | 0.0400 | mg/L | | | | | | | |
| Chromium | <0.100 mg/L | 0.100 | mg/L | | | | | | | |
| Lead | <0.100 mg/L | 0.100 | mg/L | | | | | | | |
| Selenium | <0.250 mg/L | 0.250 | mg/L | | | | | | | |
| Silver | <0.100 mg/L | 0.100 | mg/L | | | | | | | |
| **LCS (BED0245-BS1)** | | | | Prepared & Analyzed: 04/08/2021 | | | | | | |
| Arsenic | 2.38 mg/L | 0.100 | mg/L | 2.50 | mg/L | 95.4 | 80-120 | | | |
| Barium | <5.00 mg/L | 5.00 | mg/L | 2.50 | mg/L | 98.2 | 80-120 | | | |
| Cadmium | 2.39 mg/L | 0.0400 | mg/L | 2.50 | mg/L | 95.6 | 80-120 | | | |
| Chromium | 2.33 mg/L | 0.100 | mg/L | 2.50 | mg/L | 93.0 | 80-120 | | | |
| Lead | 2.30 mg/L | 0.100 | mg/L | 2.50 | mg/L | 92.0 | 80-120 | | | |
| Selenium | 2.27 mg/L | 0.250 | mg/L | 2.50 | mg/L | 90.9 | 80-120 | | | |
| Silver | 0.484 mg/L | 0.100 | mg/L | 0.500 | mg/L | 96.9 | 80-120 | | | |
| **LCS Dup (BED0245-BSD1)** | | | | Prepared & Analyzed: 04/08/2021 | | | | | | |
| Arsenic | 2.49 mg/L | 0.100 | mg/L | 2.50 | mg/L | 99.7 | 80-120 | 4.43 | 20 | |
| Barium | <5.00 mg/L | 5.00 | mg/L | 2.50 | mg/L | 98.3 | 80-120 | 0.0851 | 20 | |
| Cadmium | 2.47 mg/L | 0.0400 | mg/L | 2.50 | mg/L | 98.9 | 80-120 | 3.39 | 20 | |
| Chromium | 2.41 mg/L | 0.100 | mg/L | 2.50 | mg/L | 96.3 | 80-120 | 3.43 | 20 | |
| Lead | 2.36 mg/L | 0.100 | mg/L | 2.50 | mg/L | 94.4 | 80-120 | 2.50 | 20 | |
| Selenium | 2.32 mg/L | 0.250 | mg/L | 2.50 | mg/L | 92.6 | 80-120 | 1.90 | 20 | |
| Silver | 0.491 mg/L | 0.100 | mg/L | 0.500 | mg/L | 98.2 | 80-120 | 1.36 | 20 | |

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| Submitted To: | Donna Milligan | | |
| Client Site I.D.: | Shallow Water Dredging | | |

## TCLP Metals by 6000/7000 Series Methods - Quality Control

## Air Water & Soil Laboratories, Inc.

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch BED0245 - SW3010A** | | | | | | | | | | |
| **Matrix Spike (BED0245-MS1)** | **Source: 21D0213-01** | | | Prepared & Analyzed: 04/08/2021 | | | | | | |
| Arsenic | 2.21 mg/L | 0.100 | mg/L | 2.50 | <0.100 mg/L | 88.5 | 75-125 | | | |
| Barium | <5.00 mg/L | 5.00 | mg/L | 2.50 | <5.00 mg/L | 95.8 | 75-125 | | | |
| Cadmium | 2.19 mg/L | 0.0400 | mg/L | 2.50 | <0.0400 mg/L | 87.8 | 75-125 | | | |
| Chromium | 2.12 mg/L | 0.100 | mg/L | 2.50 | <0.100 mg/L | 84.9 | 75-125 | | | |
| Lead | 2.11 mg/L | 0.100 | mg/L | 2.50 | <0.100 mg/L | 84.5 | 75-125 | | | |
| Selenium | 2.05 mg/L | 0.250 | mg/L | 2.50 | <0.250 mg/L | 82.2 | 75-125 | | | |
| Silver | 0.473 mg/L | 0.100 | mg/L | 0.500 | <0.100 mg/L | 94.7 | 75-125 | | | |
| **Matrix Spike Dup (BED0245-MSD1)** | **Source: 21D0213-01** | | | Prepared & Analyzed: 04/08/2021 | | | | | | |
| Arsenic | 2.41 mg/L | 0.100 | mg/L | 2.50 | <0.100 mg/L | 96.3 | 75-125 | 8.36 | 20 | |
| Barium | <5.00 mg/L | 5.00 | mg/L | 2.50 | <5.00 mg/L | 93.6 | 75-125 | 2.32 | 20 | |
| Cadmium | 2.41 mg/L | 0.0400 | mg/L | 2.50 | <0.0400 mg/L | 96.2 | 75-125 | 9.20 | 20 | |
| Chromium | 2.34 mg/L | 0.100 | mg/L | 2.50 | <0.100 mg/L | 93.6 | 75-125 | 9.77 | 20 | |
| Lead | 2.29 mg/L | 0.100 | mg/L | 2.50 | <0.100 mg/L | 91.8 | 75-125 | 8.26 | 20 | |
| Selenium | 2.24 mg/L | 0.250 | mg/L | 2.50 | <0.250 mg/L | 89.7 | 75-125 | 8.78 | 20 | |
| Silver | 0.483 mg/L | 0.100 | mg/L | 0.500 | <0.100 mg/L | 96.5 | 75-125 | 1.95 | 20 | |
| **Batch BED0247 - SW7470A** | | | | | | | | | | |
| **Blank (BED0247-BLK1)** | | | | Prepared & Analyzed: 04/08/2021 | | | | | | |
| Mercury | <0.008 mg/L | 0.008 | mg/L | | | | | | | |
| **LCS (BED0247-BS1)** | | | | Prepared & Analyzed: 04/08/2021 | | | | | | |
| Mercury | 0.046 mg/L | 0.008 | mg/L | 0.0500 | mg/L | 92.7 | 80-120 | | | |
| **LCS Dup (BED0247-BSD1)** | | | | Prepared & Analyzed: 04/08/2021 | | | | | | |
| Mercury | 0.051 mg/L | 0.008 | mg/L | 0.0500 | mg/L | 102 | 80-120 | 9.92 | 20 | |

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# Certificate of Analysis

***Final Report***

| | | | |
|---|---|---|---|
| Client Name: | Virginia Institute of Marine Science<br>1370 Greate Road<br><br>Gloucester VA, 23062-1346 | Date Issued: | April 13, 2021 17:15 |
| | | Project Number: | [none] |
| | | Purchase Order: | PC02658723 |
| Submitted To: | Donna Milligan | | |
| Client Site I.D.: | Shallow Water Dredging | | |

## TCLP Metals by 6000/7000 Series Methods - Quality Control

## Air Water & Soil Laboratories, Inc.

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch BED0247 - SW7470A** | | | | | | | | | | |
| **Matrix Spike (BED0247-MS1)** | **Source: 21D0213-01** | | | Prepared & Analyzed: 04/08/2021 | | | | | | |
| Mercury | 0.049 mg/L | 0.008 | mg/L | 0.0500 | <0.008 mg/L | 98.8 | 80-120 | | | |
| **Matrix Spike Dup (BED0247-MSD1)** | **Source: 21D0213-01** | | | Prepared & Analyzed: 04/08/2021 | | | | | | |
| Mercury | 0.048 mg/L | 0.008 | mg/L | 0.0500 | <0.008 mg/L | 96.9 | 80-120 | 1.93 | 20 | |

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| | | Project Number: | [none] |
| | | Purchase Order: | PC02658723 |
| Submitted To: | Donna Milligan | | |
| Client Site I.D.: | Shallow Water Dredging | | |

## Volatile Organic Compounds by GC - Quality Control

## Air Water & Soil Laboratories, Inc.

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch BED0204 - SW5030B** | | | | | | | | | | |
| **Blank (BED0204-BLK1)** | | | | Prepared & Analyzed: 04/07/2021 | | | | | | |
| Methyl-t-butyl ether (MTBE) | <5.00 ug/kg | 5.00 | ug/kg | | | | | | | |
| Benzene | <5.00 ug/kg | 5.00 | ug/kg | | | | | | | |
| Toluene | <5.00 ug/kg | 5.00 | ug/kg | | | | | | | |
| Ethylbenzene | <5.00 ug/kg | 5.00 | ug/kg | | | | | | | |
| m+p-Xylenes | <10.0 ug/kg | 10.0 | ug/kg | | | | | | | |
| o-Xylene | <5.00 ug/kg | 5.00 | ug/kg | | | | | | | |
| Xylenes, Total | <15.0 ug/kg | 15.0 | ug/kg | | | | | | | |
| *Surr: 2,5-Dibromotoluene (Surr PID)* | 85.3 | | ug/L | 100 | | 85.3 | 80-120 | | | |
| **LCS (BED0204-BS1)** | | | | Prepared & Analyzed: 04/07/2021 | | | | | | |
| Methyl-t-butyl ether (MTBE) | 98.6 ug/kg | 5.00 | ug/kg | 100 | ug/kg | 98.6 | 70-130 | | | |
| Benzene | 109 ug/kg | 5.00 | ug/kg | 100 | ug/kg | 109 | 70-130 | | | |
| Toluene | 112 ug/kg | 5.00 | ug/kg | 100 | ug/kg | 112 | 70-130 | | | |
| Ethylbenzene | 110 ug/kg | 5.00 | ug/kg | 100 | ug/kg | 110 | 70-130 | | | |
| m+p-Xylenes | 222 ug/kg | 10.0 | ug/kg | 200 | ug/kg | 111 | 70-130 | | | |
| o-Xylene | 107 ug/kg | 5.00 | ug/kg | 100 | ug/kg | 107 | 70-130 | | | |
| *Surr: 2,5-Dibromotoluene (Surr PID)* | 96.1 | | ug/L | 100 | ug/L | 96.1 | 80-120 | | | |
| **Matrix Spike (BED0204-MS1)** | **Source: 21D0149-01** | | | Prepared & Analyzed: 04/07/2021 | | | | | | |
| Methyl-t-butyl ether (MTBE) | 84.8 ug/kg | 5.00 | ug/kg | 99.0 | <5.00 ug/kg | 85.6 | 70-130 | | | |
| Benzene | 93.1 ug/kg | 5.00 | ug/kg | 99.0 | <5.00 ug/kg | 94.0 | 70-130 | | | |
| Toluene | 95.0 ug/kg | 5.00 | ug/kg | 99.0 | <5.00 ug/kg | 95.9 | 70-130 | | | |
| Ethylbenzene | 92.9 ug/kg | 5.00 | ug/kg | 99.0 | <5.00 ug/kg | 93.8 | 70-130 | | | |
| m+p-Xylenes | 190 ug/kg | 10.0 | ug/kg | 198 | <10.0 ug/kg | 95.8 | 70-130 | | | |
| o-Xylene | 92.1 ug/kg | 5.00 | ug/kg | 99.0 | <5.00 ug/kg | 93.0 | 70-130 | | | |
| *Surr: 2,5-Dibromotoluene (Surr PID)* | 97.6 | | ug/L | 100 | ug/L | 97.6 | 80-120 | | | |
| **Matrix Spike Dup (BED0204-MSD1)** | **Source: 21D0149-01** | | | Prepared & Analyzed: 04/07/2021 | | | | | | |
| Methyl-t-butyl ether (MTBE) | 77.5 ug/kg | 5.00 | ug/kg | 94.7 | <5.00 ug/kg | 81.8 | 70-130 | 8.99 | 20 | |
| Benzene | 80.6 ug/kg | 5.00 | ug/kg | 94.7 | <5.00 ug/kg | 85.1 | 70-130 | 14.4 | 20 | |
| Toluene | 80.4 ug/kg | 5.00 | ug/kg | 94.7 | <5.00 ug/kg | 84.9 | 70-130 | 16.6 | 20 | |
| Ethylbenzene | 77.6 ug/kg | 5.00 | ug/kg | 94.7 | <5.00 ug/kg | 81.9 | 70-130 | 18.0 | 20 | |

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|---|---|---|---|
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| | | Project Number: | [none] |
| | | Purchase Order: | PC02658723 |
| Submitted To: | Donna Milligan | | |
| Client Site I.D.: | Shallow Water Dredging | | |

## Volatile Organic Compounds by GC - Quality Control

## Air Water & Soil Laboratories, Inc.

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch BED0204 - SW5030B** | | | | | | | | | | |
| **Matrix Spike Dup (BED0204-MSD1)** | **Source: 21D0149-01** | | Prepared & Analyzed: 04/07/2021 | | | | | | | |
| m+p-Xylenes | 157 ug/kg | 10.0 | ug/kg | 189 | <10.0 ug/kg | 82.9 | 70-130 | 18.8 | 20 | |
| o-Xylene | 76.8 ug/kg | 5.00 | ug/kg | 94.7 | <5.00 ug/kg | 81.2 | 70-130 | 18.1 | 20 | |
| *Surr: 2,5-Dibromotoluene (Surr PID)* | 98.3 | | ug/L | 100 | ug/L | 98.3 | 80-120 | | | |

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| Submitted To: | Donna Milligan | | |
| Client Site I.D.: | Shallow Water Dredging | | |

## Semivolatile Hydrocarbons by GC - Quality Control

## Air Water & Soil Laboratories, Inc.

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch BED0223 - SW3510C** | | | | | | | | | | |
| **Blank (BED0223-BLK1)** | | | | Prepared: 04/07/2021 Analyzed: 04/08/2021 | | | | | | |
| TPH-Semi-Volatiles (DRO) | <10.0 mg/kg | 10.0 | mg/kg | | | | | | | |
| *Surr: Pentacosane (Surr)* | 2.59 | | mg/kg | 5.00 | | 51.8 | 45-160 | | | |
| **LCS (BED0223-BS1)** | | | | Prepared: 04/07/2021 Analyzed: 04/08/2021 | | | | | | |
| TPH-Semi-Volatiles (DRO) | 59.8 mg/kg | 10.0 | mg/kg | 100 | mg/kg | 59.8 | 40-160 | | | |
| *Surr: Pentacosane (Surr)* | 2.76 | | mg/kg | 5.00 | mg/kg | 55.3 | 45-160 | | | |
| **Matrix Spike (BED0223-MS1)** | | **Source: 21D0250-04** | | Prepared: 04/07/2021 Analyzed: 04/08/2021 | | | | | | |
| TPH-Semi-Volatiles (DRO) | 54.2 mg/kg | 10.0 | mg/kg | 100 | <10.0 mg/kg | 54.2 | 40-160 | | | |
| *Surr: Pentacosane (Surr)* | 2.42 | | mg/kg | 5.00 | mg/kg | 48.4 | 45-160 | | | |
| **Matrix Spike Dup (BED0223-MSD1)** | | **Source: 21D0250-04** | | Prepared: 04/07/2021 Analyzed: 04/08/2021 | | | | | | |
| TPH-Semi-Volatiles (DRO) | 72.8 mg/kg | 10.0 | mg/kg | 100 | <10.0 mg/kg | 72.8 | 40-160 | 29.2 | 20 | P |
| *Surr: Pentacosane (Surr)* | 3.09 | | mg/kg | 5.00 | mg/kg | 61.8 | 45-160 | | | |

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| | | Project Number: | [none] |
| | | Purchase Order: | PC02658723 |
| Submitted To: | Donna Milligan | | |
| Client Site I.D.: | Shallow Water Dredging | | |

## Organochlorine Pesticides and PCBs by GC/ECD - Quality Control

## Air Water & Soil Laboratories, Inc.

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch BED0267 - SW3550B** | | | | | | | | | | |
| **Blank (BED0267-BLK1)** | | | | Prepared: 04/08/2021 Analyzed: 04/09/2021 | | | | | | |
| PCB as Aroclor 1016 | <0.100 mg/kg wet | 0.100 | mg/kg wet | | | | | | | |
| PCB as Aroclor 1221 | <0.100 mg/kg wet | 0.100 | mg/kg wet | | | | | | | |
| PCB as Aroclor 1232 | <0.100 mg/kg wet | 0.100 | mg/kg wet | | | | | | | |
| PCB as Aroclor 1242 | <0.100 mg/kg wet | 0.100 | mg/kg wet | | | | | | | |
| PCB as Aroclor 1248 | <0.100 mg/kg wet | 0.100 | mg/kg wet | | | | | | | |
| PCB as Aroclor 1254 | <0.100 mg/kg wet | 0.100 | mg/kg wet | | | | | | | |
| PCB as Aroclor 1260 | <0.100 mg/kg wet | 0.100 | mg/kg wet | | | | | | | |
| *Surr: DCB* | 0.0138 | | mg/kg wet | 0.0164 | | 83.6 | 30-105 | | | |
| *Surr: TCMX* | 0.0142 | | mg/kg wet | 0.0164 | | 86.6 | 30-105 | | | |
| **LCS (BED0267-BS1)** | | | | Prepared: 04/08/2021 Analyzed: 04/09/2021 | | | | | | |
| PCB as Aroclor 1016 | 0.152 mg/kg wet | 0.100 | mg/kg wet | 0.167 | mg/kg wet | 91.2 | 60-140 | | | |
| PCB as Aroclor 1260 | 0.157 mg/kg wet | 0.100 | mg/kg wet | 0.167 | mg/kg wet | 94.4 | 60-140 | | | |
| *Surr: DCB* | 0.0145 | | mg/kg wet | 0.0167 | mg/kg wet | 87.0 | 30-105 | | | |
| *Surr: TCMX* | 0.0139 | | mg/kg wet | 0.0167 | mg/kg wet | 83.4 | 30-105 | | | |
| **Matrix Spike (BED0267-MS1)** | | **Source: 21D0319-01** | | Prepared: 04/08/2021 Analyzed: 04/09/2021 | | | | | | |
| PCB as Aroclor 1016 | 0.177 mg/kg dry | 0.127 | mg/kg dry | 0.211 | <0.127 mg/kg | 83.6 | 60-140 | | | |
| PCB as Aroclor 1260 | 0.176 mg/kg dry | 0.127 | mg/kg dry | 0.211 | <0.127 mg/kg | 83.3 | 60-140 | | | |
| *Surr: DCB* | 0.0158 | | mg/kg dry | 0.0211 | mg/kg dry | 74.7 | 30-105 | | | |
| *Surr: TCMX* | 0.0182 | | mg/kg dry | 0.0211 | mg/kg dry | 86.3 | 30-105 | | | |
| **Matrix Spike Dup (BED0267-MSD1)** | | **Source: 21D0319-01** | | Prepared: 04/08/2021 Analyzed: 04/09/2021 | | | | | | |
| PCB as Aroclor 1016 | 0.271 mg/kg dry | 0.127 | mg/kg dry | 0.211 | <0.127 mg/kg | 128 | 60-140 | 42.2 | 20 | P |
| PCB as Aroclor 1260 | 0.267 mg/kg dry | 0.127 | mg/kg dry | 0.211 | <0.127 mg/kg | 126 | 60-140 | 41.2 | 20 | P |
| *Surr: DCB* | 0.0146 | | mg/kg dry | 0.0211 | mg/kg dry | 68.9 | 30-105 | | | |
| *Surr: TCMX* | 0.0171 | | mg/kg dry | 0.0211 | mg/kg dry | 81.0 | 30-105 | | | |

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| Client Site I.D.: | Shallow Water Dredging | | |

## TCLP Organochlorine Herbicides by GC/ECD - Quality Control

## Air Water & Soil Laboratories, Inc.

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch BED0366 - SW3510C** | | | | | | | | | | |
| **Blank (BED0366-BLK1)** | | | | Prepared & Analyzed: 04/12/2021 | | | | | | |
| 2,4,5-TP (Silvex) | <0.0005 mg/L | 0.0005 | mg/L | | | | | | | |
| 2,4-D | <0.001 mg/L | 0.001 | mg/L | | | | | | | |
| *Surr: DCAA (Surr)* | 0.00837 | | mg/L | 0.0100 | | 83.7 | 60-112 | | | |
| **LCS (BED0366-BS1)** | | | | Prepared & Analyzed: 04/12/2021 | | | | | | |
| 2,4,5-TP (Silvex) | 0.005 mg/L | 0.0005 | mg/L | 0.00500 mg/L | | 95.0 | 62-132 | | | |
| 2,4-D | 0.005 mg/L | 0.001 | mg/L | 0.00500 mg/L | | 92.9 | 74-139 | | | |
| *Surr: DCAA (Surr)* | 0.00791 | | mg/L | 0.0100 mg/L | | 79.1 | 60-112 | | | |
| **Matrix Spike (BED0366-MS1)** | | **Source: 21D0213-02** | | Prepared & Analyzed: 04/12/2021 | | | | | | |
| 2,4,5-TP (Silvex) | 0.006 mg/L | 0.0005 | mg/L | 0.00500 | <0.0005 mg/L | 118 | 52-129 | | | |
| 2,4-D | 0.005 mg/L | 0.001 | mg/L | 0.00500 | <0.001 mg/L | 102 | 53-126 | | | |
| *Surr: DCAA (Surr)* | 0.0133 | | mg/L | 0.0100 mg/L | | 133 | 60-112 | | | S |
| **Matrix Spike Dup (BED0366-MSD1)** | | **Source: 21D0213-02** | | Prepared & Analyzed: 04/12/2021 | | | | | | |
| 2,4,5-TP (Silvex) | 0.005 mg/L | 0.0005 | mg/L | 0.00500 | <0.0005 mg/L | 99.7 | 52-129 | 17.0 | 20 | |
| 2,4-D | 0.005 mg/L | 0.001 | mg/L | 0.00500 | <0.001 mg/L | 97.4 | 53-126 | 4.46 | 20 | |
| *Surr: DCAA (Surr)* | 0.0122 | | mg/L | 0.0100 mg/L | | 122 | 60-112 | | | S |

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| Submitted To: | Donna Milligan | | |
| Client Site I.D.: | Shallow Water Dredging | | |

## TCLP Organochlorine Pesticides and PCBs by GC/ECD - Quality Control

## Air Water & Soil Laboratories, Inc.

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch BED0380 - SW3510C** | | | | | | | | | | |
| **Blank (BED0380-BLK1)** | | | | Prepared: 04/12/2021 Analyzed: 04/13/2021 | | | | | | |
| Chlordane | <0.030 mg/L | 0.030 | mg/L | | | | | | | |
| Endrin | <0.005 mg/L | 0.005 | mg/L | | | | | | | |
| gamma-BHC (Lindane) | <0.005 mg/L | 0.005 | mg/L | | | | | | | |
| Heptachlor | <0.005 mg/L | 0.005 | mg/L | | | | | | | |
| Heptachlor Epoxide | <0.005 mg/L | 0.005 | mg/L | | | | | | | |
| Methoxychlor | <0.005 mg/L | 0.005 | mg/L | | | | | | | |
| Toxaphene | <0.500 mg/L | 0.500 | mg/L | | | | | | | |
| *Surr: TCMX* | 0.00127 | | mg/L | 0.00200 | | 63.4 | 18-112 | | | |
| *Surr: DCB* | 0.00119 | | mg/L | 0.00200 | | 59.5 | 27-131 | | | |
| **LCS (BED0380-BS1)** | | | | Prepared: 04/12/2021 Analyzed: 04/13/2021 | | | | | | |
| Endrin | <0.005 mg/L | 0.005 | mg/L | 0.00100 | mg/L | 84.3 | 23-134 | | | |
| Heptachlor | <0.005 mg/L | 0.005 | mg/L | 0.00100 | mg/L | 67.1 | 23-134 | | | |
| Heptachlor Epoxide | <0.005 mg/L | 0.005 | mg/L | 0.00100 | mg/L | 75.1 | 23-134 | | | |
| Methoxychlor | <0.005 mg/L | 0.005 | mg/L | 0.00100 | mg/L | 83.3 | 23-134 | | | |
| *Surr: TCMX* | 0.00133 | | mg/L | 0.00200 | mg/L | 66.7 | 18-112 | | | |
| *Surr: DCB* | 0.00117 | | mg/L | 0.00200 | mg/L | 58.3 | 27-131 | | | |
| **LCS (BED0380-BS2)** | | | | Prepared: 04/12/2021 Analyzed: 04/13/2021 | | | | | | |
| Toxaphene | <0.500 mg/L | 0.500 | mg/L | 0.0250 | mg/L | 71.5 | 23-134 | | | |
| *Surr: TCMX* | 0.00118 | | mg/L | 0.00200 | mg/L | 59.0 | 18-112 | | | |
| *Surr: DCB* | 0.00102 | | mg/L | 0.00200 | mg/L | 51.1 | 27-131 | | | |
| **LCS (BED0380-BS3)** | | | | Prepared: 04/12/2021 Analyzed: 04/13/2021 | | | | | | |
| Chlordane | <0.030 mg/L | 0.030 | mg/L | 0.0250 | mg/L | 66.6 | 23-134 | | | |
| *Surr: TCMX* | 0.00121 | | mg/L | 0.00200 | mg/L | 60.6 | 18-112 | | | |
| *Surr: DCB* | 0.00104 | | mg/L | 0.00200 | mg/L | 52.2 | 27-131 | | | |

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## TCLP Organochlorine Pesticides and PCBs by GC/ECD - Quality Control

## Air Water & Soil Laboratories, Inc.

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch BED0380 - SW3510C** | | | | | | | | | | |
| **Matrix Spike (BED0380-MS1)** | **Source: 21D0213-01** | | | Prepared: 04/12/2021 Analyzed: 04/13/2021 | | | | | | |
| Endrin | <0.005 mg/L | 0.005 | mg/L | 0.00100 | <0.005 mg/L | 87.4 | 23-134 | | | |
| Heptachlor | <0.005 mg/L | 0.005 | mg/L | 0.00100 | <0.005 mg/L | 80.9 | 23-134 | | | |
| Heptachlor Epoxide | <0.005 mg/L | 0.005 | mg/L | 0.00100 | <0.005 mg/L | 79.6 | 23-134 | | | |
| Methoxychlor | <0.005 mg/L | 0.005 | mg/L | 0.00100 | <0.005 mg/L | 86.2 | 23-134 | | | |
| *Surr: TCMX* | 0.00164 | | mg/L | 0.00200 mg/L | | 82.2 | 18-112 | | | |
| *Surr: DCB* | 0.00153 | | mg/L | 0.00200 mg/L | | 76.5 | 27-131 | | | |
| **Matrix Spike Dup (BED0380-MSD1)** | **Source: 21D0213-01** | | | Prepared: 04/12/2021 Analyzed: 04/13/2021 | | | | | | |
| Endrin | <0.005 mg/L | 0.005 | mg/L | 0.00100 | <0.005 mg/L | 81.9 | 23-134 | 6.43 | 20 | |
| Heptachlor | <0.005 mg/L | 0.005 | mg/L | 0.00100 | <0.005 mg/L | 76.0 | 23-134 | 6.20 | 20 | |
| Heptachlor Epoxide | <0.005 mg/L | 0.005 | mg/L | 0.00100 | <0.005 mg/L | 74.0 | 23-134 | 7.32 | 20 | |
| Methoxychlor | <0.005 mg/L | 0.005 | mg/L | 0.00100 | <0.005 mg/L | 82.7 | 23-134 | 4.10 | 20 | |
| *Surr: TCMX* | 0.00152 | | mg/L | 0.00200 mg/L | | 75.9 | 18-112 | | | |
| *Surr: DCB* | 0.00134 | | mg/L | 0.00200 mg/L | | 66.8 | 27-131 | | | |

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| | | | |
|---|---|---|---|
| Client Name: | Virginia Institute of Marine Science<br>1370 Greate Road<br><br>Gloucester VA, 23062-1346 | Date Issued: | April 13, 2021 17:15 |
| | | Project Number: | [none] |
| | | Purchase Order: | PC02658723 |
| Submitted To: | Donna Milligan | | |
| Client Site I.D.: | Shallow Water Dredging | | |

## Wet Chemistry Analysis - Quality Control

## Air Water & Soil Laboratories, Inc.

| Analyte | Result | Reporting Limit | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch BED0259 - No Prep Wet Chem** | | | | | | | | | | |
| **Blank (BED0259-BLK1)** | | | | Prepared & Analyzed: 04/08/2021 | | | | | | |
| Percent Solids | 100 % | 0.10 | % | | | | | | | |
| **Duplicate (BED0259-DUP1)** | | | **Source: 21D0213-01** | Prepared & Analyzed: 04/08/2021 | | | | | | |
| Percent Solids | 38.1 % | 0.10 | % | | 37.2 % | | | 2.50 | 20 | |

ENTHALPY ANALYTICAL
formerly Air, Water & Soil Laboratories

1941 Reymet Road ● Richmond, Virginia 23230 ● Tel: (804)-358-8295 Fax: (804)-358-8297

# Certificate of Analysis

***Final Report***

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## Certified Analyses included in this Report

| Analyte | Certifications |
|---|---|
| ***SW1311 in Solids*** | |
| Extraction Fluid, Metals | VELAP |
| Extraction Fluid, SV Organics | VELAP |
| ***SW6010D in Non-Potable Water*** | |
| Arsenic | VELAP,WVDEP |
| Barium | VELAP,WVDEP |
| Cadmium | VELAP,WVDEP |
| Chromium | VELAP,WVDEP |
| Lead | VELAP,WVDEP |
| Selenium | VELAP,WVDEP |
| Silver | VELAP,WVDEP |
| ***SW7470A in Non-Potable Water*** | |
| Mercury | VELAP,WVDEP |
| ***SW8015C in Solids*** | |
| TPH-Semi-Volatiles (DRO) | VELAP,NCDEQ,WVDEP |
| ***SW8021B in Solids*** | |
| Methyl-t-butyl ether (MTBE) | VELAP,WVDEP |
| Benzene | VELAP,WVDEP |
| Toluene | VELAP,WVDEP |
| Ethylbenzene | VELAP,WVDEP |
| m+p-Xylenes | VELAP,WVDEP |
| o-Xylene | VELAP,WVDEP |
| Xylenes, Total | VELAP,WVDEP |
| ***SW8081B in Non-Potable Water*** | |
| Chlordane | VELAP,WVDEP |
| Endrin | VELAP,WVDEP |
| gamma-BHC (Lindane) | VELAP,WVDEP |
| Heptachlor | VELAP,WVDEP |
| Heptachlor Epoxide | VELAP,WVDEP |
| Methoxychlor | VELAP,WVDEP |
| Toxaphene | VELAP,WVDEP |
| ***SW8082A in Solids*** | |
| PCB as Aroclor 1016 | VELAP,NCDEQ,WVDEP |
| PCB as Aroclor 1221 | VELAP,NCDEQ,WVDEP |
| PCB as Aroclor 1232 | VELAP,NCDEQ,WVDEP |
| PCB as Aroclor 1242 | VELAP,NCDEQ,WVDEP |

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## Certified Analyses included in this Report

| Analyte | Certifications |
|---|---|
| PCB as Aroclor 1248 | VELAP,NCDEQ,WVDEP |
| PCB as Aroclor 1254 | VELAP,NCDEQ,WVDEP |
| PCB as Aroclor 1260 | VELAP,NCDEQ,WVDEP |
| ***SW8151A in Non-Potable Water*** | |
| 2,4,5-TP (Silvex) | VELAP,WVDEP |
| 2,4-D | VELAP,WVDEP |

| Code | Description | Laboratory ID | Expires |
|---|---|---|---|
| MdDOE | Maryland DE Drinking Water | 341 | 12/31/2021 |
| NC | North Carolina DENR | 495 | 12/31/2021 |
| NCDEQ | North Carolina DEQ | 495 | 12/31/2021 |
| NCDOH | North Carolina Department of Health | 51714 | 07/31/2021 |
| NJDEP | NELAC-New Jersey DEP | VA015 | 06/30/2021 |
| PADEP | NELAC-Pennsylvania Certificate #006 | 68-03503 | 10/31/2021 |
| VELAP | NELAC-Virginia Certificate #11064 | 460021 | 06/14/2021 |
| WVDEP | West Virginia DEP | 350 | 04/30/2021 |

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**Summary of Data Qualifiers**

| | |
|---|---|
| P | Duplicate analysis does not meet the acceptance criteria for precision |
| S | Surrogate recovery was outside acceptance criteria |
| RPD | Relative Percent Difference |
| Qual | Qualifers |
| -RE | Denotes sample was re-analyzed |
| D.F. | Dilution Factor. Please also see the Preparation Factor in the Analysis Summary section. |
| TIC | Tentatively Identified Compounds are compounds that are identified by comparing the analyte mass spectral pattern with the NIST spectral library. A TIC spectral match is reported when the pattern is at least 75% consistent with the published pattern. Compound concentrations are estimated and are calculated using an internal standard response factor of 1. |
| PCBs, Total | Total PCBs are defined as the sum of detected Aroclors 1016, 1221, 1232, 1248, 1254, 1260, 1262, and 1268. |

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formerly *Air, Water & Soil Laboratories*

1941 REYMET ROAD
RICHMOND, VIRGINIA 23237
(804) 358-8295 PHONE
(804)358-8297 FAX

Chain of Custody
Form #: F1331
Rev. 2.0
Effective: Jun 28, 2016

# CHAIN OF CUSTODY

PAGE ____ OF ____

| | | |
|---|---|---|
| COMPANY NAME: Virginia Institute of Marine Science | INVOICE TO: Virginia Institute of Marine Science | PROJECT NAME: Shallo Water Dredging |
| CONTACT: Donna Milligan | INVOICE CONTACT: Donna Milligan | SITE NAME: |
| ADDRESS: 1370 Greate Road, Gloucester, VA 23062 | INVOICE ADDRESS: | PROJECT NUMBER: Shallow Water Dredging |
| PHONE #: 804-684-7596 | INVOICE PHONE #: | P.O. #: |
| FAX #: EMAIL: milligan@vims.edu | | Pretreatment Program: |
| Is sample for compliance reporting? YES NO | Is sample from a chlorinated supply? YES NO | PWS I.D. #: |
| SAMPLER NAME (PRINT): | SAMPLER SIGNATURE: | Turn Around Time: Circle: 10 (5) Days or __ Day(s) |

Matrix Codes: WW=Waste Water/Storm Water GW=Ground Water DW=Drinking Water S=Soil/Solids OR=Organic A=Air WP=Wipe OT=Other_____

| CLIENT SAMPLE I.D. | Grab | Composite | Field Filtered (Dissolved Metals) | Composite Start Date | Composite Start Time | Grab Date or Composite Stop Date | Grab Time or Composite Stop Time | Time Preserved | Matrix (See Codes) | Number of Containers | ANALYSIS / (PRESERVATIVE) Herb, Pest, Predetermination SVOC TCLP | TPH-DRO SW 8015 | MBTEX SW 8021 | PCB SW 8082 | Percent Solids | TCLP Metals | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1) Parrotts Up Creek | X | | | | | 04/05/21 | 11:52 | 13:00 | S | 2 | X | X | X | X | X | X | | | |
| 2) Parrotts Down Creek | X | | | | | 04/05/21 | 13:27 | 15:60 | S | 2 | X | X | X | X | X | X | | | |
| 3) | | | | | | | | | | | | | | | | | | | |
| 4) | | | | | | | | | | | | | | | | | | | |
| 5) | | | | | | | | | | | | | | | | | | | |
| 6) | | | | | | | | | | | | | | | | | | | |
| 7) | | | | | | | | | | | | | | | | | | | |
| 8) | | | | | | | | | | | | | | | | | | | |
| 9) | | | | | | | | | | | | | | | | | | | no seal |
| 10) | | | | | | | | | | | | | | | | | | | on ice |

Preservative Codes: N=Nitric Acid C=Hydrochloric Acid S=Sulfuric Acid H=Sodium Hydroxide A=Ascorbic Acid Z=Zinc Acetate T=Sodium Thiosulfate M=Methanol

PLEASE NOTE PRESERVATIVE(S), INTERFERENCE CHECKS or PUMP RATE (L/min)

| RELINQUISHED: | DATE / TIME | RECEIVED: | DATE / TIME |
|---|---|---|---|
| Rivolli | 04/06/21 | RC8 | 4/6/21 1341 |
| RELINQUISHED: | DATE / TIME | RECEIVED: | DATE / TIME |
| | 13:41 | | |
| RELINQUISHED: | DATE / TIME | RECEIVED: | DATE / TIME |
| | | | |

QC Data Package
Level III ☐
Level IV ☐

**LAB USE ONLY** COOLER TEMP 2.2 °C #277

**Virginia Institute of 21D0213**
**Shallow Water Dredging**
**Recd: 04/06/2021 Due: 04/13/2021**

v130325002 22.21

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## Sample Conditions Checklist

| | |
|---|---|
| Samples Received at: | **3.20°C** |
| How were samples received? | Walk In |
| Were Custody Seals used? If so, were they received intact? | No |
| Are the custody papers filled out completely and correctly? | Yes |
| Do all bottle labels agree with custody papers? | Yes |
| Is the temperature blank or representative sample within acceptable limits or received on ice, and recently taken? | Yes |
| Are all samples within holding time for requested laboratory tests? | Yes |
| Is a sufficient amount of sample provided to perform the tests included? | Yes |
| Are all samples in appropriate containers for the analyses requested? | Yes |
| Were volatile organic containers received? | No |
| Are all volatile organic and TOX containers free of headspace? | NA |
| Is a trip blank provided for each VOC sample set? VOC sample sets include EPA8011, EPA504, EPA8260, EPA624, EPA8015 GRO, EPA8021, EPA524, and RSK-175. | NA |
| Are all samples received appropriately preserved? Note that metals containers do not require field preservation but lab preservation may delay analysis. | Yes |

**Work Order Comments**

# Appendix E

# Draft Joint Permit Application

# STANDARD JOINT PERMIT APPLICATION

United States Army Corps of Engineers (USACE) - Norfolk District
803 Front Street, ATTN: CENAO-WR-R
Norfolk, Virginia 23510-1011
Phone: (757) 201-7652, Fax: (757) 201-7678
Website: http://www.nao.usace.army.mil/Missions/Regulatory.aspx

Virginia Marine Resources Commission (VMRC)
Habitat Management Division
380 Fenwick Road, Building 96
Fort Monroe, VA 23651
Phone: (757) 247-2200, Fax: (757) 247-8062
Website: http://www.mrc.virginia.gov/hmac/hmoverview.shtm

Virginia Department of Environmental Quality (DEQ)
Virginia Water Protection Permit Program
Post Office Box 1105
Richmond, Virginia 23218
Phone: (804) 698-4000
Websites: http://www.deq.virginia.gov/
http://www.deq.virginia.gov/Locations.aspx

The following instructions and information are designed to assist you in applying for permits from federal, state, and local regulatory agencies for work in waters and/or wetlands within the Commonwealth of Virginia. The intent is to provide general information on the permit process, not to act as a complete legal and technical reference. Refer to the applicable laws, regulations, and/or guidance materials of each agency for a complete understanding of each agency's application requirements.

## JOINT PERMIT APPLICATION PROCESS

The Joint Permit Application (JPA) process and Standard JPA form are used by the United States Army Corps of Engineers (USACE), the Virginia Marine Resources Commission (VMRC), the Virginia Department of Environmental Quality (DEQ), and the Local Wetlands Boards (LWB) for permitting purposes involving water, wetlands, and dune/beach resources, including water supply and water withdrawals projects (as defined in DEQ Regulation 9 VAC 25-210).

The Tidewater Joint Permit Application form is used for proposed private or commercial aquaculture projects and most commercial and noncommercial projects in **tidal waters, tidal wetlands, and coastal primary sand dunes and beaches in Virginia** that require the review and/or authorization by the LWB, the VMRC, the DEQ, and/or the USACE. The Tidewater JPA may be downloaded from the same web page on which the Standard JPA is located: http://www.nao.usace.army.mil/Missions/Regulatory/JPA.aspx. *If using the Tidewater JPA, follow the instructions provided with that form.*

Please note that some health departments and local agencies, such as local building officials and erosion and sediment control authorities, do not use the Joint Permit Application process or forms and may have different informational requirements. The applicant is responsible for contacting these agencies for information regarding those permitting requirements.

**REGULATORY AUTHORITIES OF PARTICIPATING AGENCIES:** The USACE regulates activities in waters of the United States, including wetlands, under Section 404 of the Clean Water Act (33 U.S.C. §1344), Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. §403), and Section 103 of the Marine Protection Research and Sanctuaries Act of 1972 (33 U.S.C. §1413).

The VMRC regulates activities on state-owned submerged lands, tidal wetlands, and dunes/beaches under Code of Virginia Title 28.2, Chapters 12, 13, and 14.

The DEQ regulates activities in state surface waters and wetlands under Section 401 of the Clean Water Act (33 U.S.C. §1341), under State Water Control Law (Code of Virginia Title 62.1), and Virginia Administrative Code Regulations 9VAC25-210 et seq., 9VAC25-660 et seq., 9VAC25-670 et seq., 9VAC25-680 et seq., and 9VAC25-690 et seq.

The LWBs regulate activities in tidal wetlands and dunes/beaches under Code of Virginia Title 28.2, Chapters 13 and 14.

**LOCAL WETLANDS BOARD CONTACT INFORMATION:** Links to LWB information on the Web can be found at http://ccrm.vims.edu/permits_web/guidance/local_wetlands_boards.html.

**USACE FIELD OFFICE INFORMATION AND DEQ REGIONAL OFFICE INFORMATION:** Answers to technical questions and detailed information about specific aspects of the various permit programs may be obtained from the USACE field office in your project area (please refer to the Contact Information on the Regulatory web page at: http://www.nao.usace.army.mil/Missions/Regulatory.aspx or call 757-201-7652), or from the DEQ regional office in your project area (please refer to http://www.deq.virginia.gov/Locations.aspx or call 804-698-4000). Applicants may also seek assistance with completing the informational requirements and/or submittals from private consulting and/or engineering firms for hire.

**CHESAPEAKE BAY PRESERVATION ACT INFORMATION:** Development within the 84 Counties, Cities, and Towns of "Tidewater Virginia" (as defined in §62.1-44.15:68 of the Code of Virginia) is subject to the requirements of the Chesapeake Bay Preservation

Act. If your project is located in a Bay Act locality and will involve activities, including land disturbance or removal of vegetation, within a designated Resource Protection Area (RPA), these actions will require approval from your local government and completion of Appendix C. The individual localities, not the DEQ, USACE, or Local Wetlands Boards, are responsible for enforcing Bay Act requirements and, therefore, local approval for any activity in an RPA is not granted through this JPA process. Each Tidewater locality has adopted a program based on the Chesapeake Bay Preservation Act and the *Chesapeake Bay Preservation Area Designation & Management Regulations*.

The Act and regulations require Bay Act local governments to administer specific criteria for the use, development and redevelopment of land within locally designated Chesapeake Bay Preservation Areas. Since the requirements of the Bay Act may affect the ultimate design and construction of projects, applicants should contact their local government as early in the process as possible, in order to ensure that these requirements are considered early in the permitting process, and to avoid unnecessary and costly delays. Individual localities will request information regarding existing vegetation within the RPA as well as a description and site drawings of any proposed activity within the RPA. This information will be used by local staff charged with ensuring compliance with the Bay Act during the local approval process. Any use, development and redevelopment or land disturbance within the RPA must receive local approval PRIOR to the initiation of any land disturbance.

To determine if your project is located in a Bay Act locality (see map on page 31 or http://www.deq.virginia.gov/Programs/Water/ChesapeakeBay/ChesapeakeBayPreservationAct/LocalGovernmentOrdinances.aspx), learn more about Bay Act requirements, or find local government contacts, please visit the Virginia Department of Environmental Quality at http://www.deq.virginia.gov/Programs/Water/ChesapeakeBay/ChesapeakeBayPreservationAct.aspx.

## HOW TO APPLY

Sections A through D below provide a general list of information and drawings that are required, depending on the type of project being proposed. Prepare all required drawings or sketches as detailed in the lists provided in Appendix D (Drawings) and according to the sample drawings provided in Appendix D.

***Application materials should be submitted to VMRC:***

1. ***If by mail or courier, use the address on page 1.***
2. ***If by electronic mail, address the package to: JPA.permits@mrc.virginia.gov. The application must be provided in the .pdf format.***

When completing this form, use the legal name of the applicant, agent, and/or property owner. For DEQ application purposes, *legal name* means the full legal name of an individual, business, or other organization. For an individual, the legal name is the first name, middle initial, last name, and suffix. For an entity authorized to do business in Virginia, the legal name is the exact name set forth in the entity's articles of incorporation, organization or trust, or formation agreement, as applicable. Also provide the name registered with the State Corporation Commission, if required to register. DEQ issues a permit or grants coverage to the so-named individual or business, who becomes the 'permittee'. Correspondence from some agencies, including permits, authorizations, and/or coverage, may be provided via electronic mail. If the applicant and/or agent wish(es) to receive their permit via electronic mail, please remember to include an e-mail address at the requested place in the application.

**A. APPLICATIONS FOR PROJECTS INVOLVING IMPACTS TO *TIDAL* WATERS, WETLANDS, AND DUNES/BEACHES (INCLUDING SHORELINE STABILIZATION, PIERS, MARINAS, BEACH NOURISHMENT, BOATHOUSES, BOAT LIFTS, BREAKWATERS, AQUACULTURE ACTIVITIES, DREDGING, ETC.) SHOULD INCLUDE THE FOLLOWING:**

- ❖ All *applicable* portions of Sections 1 through 26 of the JPA, including necessary attachments, information required for projects located in CBPA localities as required in Appendix C (a map of CBPA localities can be found on page 31).
- ❖ Adjacent Property Owner's Acknowledgement Forms(1), as detailed in Appendix A or the name and address of the adjacent landowners.
- ❖ An analysis of the functions of wetlands proposed to be impacted may be required by DEQ. (3).
- ❖ A set of 8 ½ x 11 inch drawings. If you cannot include all of your project site on one page at a scale no smaller than 1" = 200', you **must** submit a set of 8 ½ x 11 inch match-line drawings **and** a set of large-sized drawings at a scale no smaller than 1"= 200'. If oversized drawings are used, attach **five** copies of the oversized drawings to your application.
- ❖ In order for projects requiring LWB authorization to be considered complete, applications must include the following information (per Virginia Code 28.2-1302): *"The permit application shall include the following: the name and address of the applicant; a detailed description of the proposed activities; a map, drawn to an appropriate and uniform scale, showing the area of wetlands directly affected, the location of the proposed work thereon, the area of existing and proposed fill and excavation, the location, width, depth and length of any proposed channel and disposal area, and the location of all existing and proposed structures, sewage collection and treatment facilities, utility installations, roadways, and other related appurtenances of facilities, including those on the adjacent uplands; a description of the type of equipment to be used and the means of access to the activity site; the names and addresses of record of adjacent land and known claimants of water rights in or adjacent to the wetland of whom the applicant has notice; an estimate of cost; the primary purpose of the project; and secondary purpose of the proposed project; a complete description of measures to be taken during and after alteration to reduce detrimental offsite effects; the completion date of the proposed work, project, or structure; and such additional materials and documentation as the wetlands board may require."*

**B. APPLICATIONS FOR PROJECTS INVOLVING IMPACTS TO *NONTIDAL* WATERS AND/OR WETLANDS *AND*:**

1) **WHERE AUTHORIZATION UNDER *STATE PROGRAM GENERAL PERMIT (SPGP)* IS REQUESTED:**

Programmatic general permits may be issued by the USACE in situations where a state, regional, or local authority has a regulatory program in place that provides similar review and regulation of activities in waters as does the USACE. In such cases, the programmatic general permit allows the state, region, or locality to provide the federal authorization, thus avoiding unnecessary duplication of effort by multiple regulatory authorities. In Virginia, DEQ provides authorization for certain activities regulated by the USACE through the State Program General Permit (SPGP). DEQ's authorization under the SPGP is a separate action from that providing coverage under any Virginia Water Protection permit. Certain Residential/Commercial/Institutional Development activities and Linear Transportation activities will be considered for coverage under the current SPGP. Details about the current SPGP can be found at http://www.nao.usace.army.mil/Missions/Regulatory/RBregional.aspx.

- ❖ Mark the "SPGP" checkbox on page 7 of this application.
- ❖ All *applicable* portions of Sections 1 through 26 of the JPA, including necessary attachments.
- ❖ A conceptual compensatory mitigation plan(2).
- ❖ A copy of the confirmed jurisdictional determination or confirmed delineation, including a waters and wetlands boundary map and data sheets(3).
- ❖ All information required for projects located in CBPA localities as required in Appendix C (a map of CBPA localities can be found on page 31).
- ❖ A copy of the FEMA flood insurance rate map or FEMA-approved local floodplain map for the project site (not applicable to <0.1 acre and < 300 linear feet projects by either USACE or DEQ).
- ❖ A set of 8 ½ x 11 inch drawings. If you cannot include all of your project site on one page at a scale no smaller than 1" = 200', you **must** submit a set of 8 ½ x 11 inch match-line drawings **and** a set of large-sized drawings at a scale no smaller than 1"= 200'. If oversized drawings are used, attach **five** copies of the oversized drawings to your application.

2) **WHERE NO SPGP IS REQUESTED:**

- ❖ All *applicable* portions of Sections 1 through 26 of the JPA, including necessary attachments.
- ❖ A conceptual compensatory mitigation plan(2).
- ❖ A copy of the confirmed jurisdictional determination or confirmed delineation, including a waters and wetlands boundary map and data sheets(3).
- ❖ All information required for projects located in CBPA localities as required in Appendix C (a map of CBPA localities can be found on page 31), and a copy of the FEMA flood insurance rate map or FEMA-approved local floodplain map for the project site.
- ❖ An analysis of the functions of wetlands proposed to be impacted may be required by DEQ (4).
- ❖ A set of 8 ½ x 11 inch drawings. If you cannot include all of your project site on one page at a scale no smaller than 1" = 200', you **must** submit a set of 8 ½ x 11 inch match-line drawings **and** a set of large-sized drawings at a scale no smaller than 1"= 200'. If oversized drawings are used, attach **five** copies of the oversized drawings to your application.

**C. APPLICATIONS FOR PROJECTS INVOLVING SURFACE WATER WITHDRAWALS or FERC LICENSE OR RELICENSE ASSOCIATED WITH A SURFACE WATER WITHDRAWAL:**

- ❖ Mark the "DEQ Reapplication" checkbox on page 7 of this application and provide the current/existing permit number.
- ❖ All *applicable* portions of Sections 1 through 26 of the JPA, including necessary attachments.
- ❖ All *applicable* portions of Part A and B above if the project involves wetland and/or stream impacts.
- ❖ Copy of any pre-application review panel documentation and summary of the issues raised
- ❖ For new or expanded surface water withdrawals proposing to withdraw 90 million gallons a month or greater, a summary of the steps taken to seek public input as required by 9VAC25-210-320 and an identification of the issues raised during the course of the public information meeting process.

**D. ANY APPLICATIONS USING THE JPA FORM AS A PRE-CONSTRUCTION NOTIFICATION (PCN) FOR A USACE NATIONWIDE PERMIT:**

- ❖ Mark the "PCN" checkbox on page 7 of this application and insert the number of the intended Nationwide permit. If you fail to mark this box, the PCN will be deemed incomplete and the USACE 45-day time clock will not start.
- ❖ All *applicable* portions of Sections 1 through 26 of the JPA, including necessary attachments and all information required for projects located in CBPA localities as required in Appendix C (a map of CBPA localities can be found on page 31).
- ❖ A set of 8 ½ x 11 inch drawings. If you cannot include all of your project site on one page at a scale no smaller than 1" = 200', you **must** submit a set of 8 ½ x 11 inch match-line drawings **and** a set of large-sized drawings at a scale no smaller than 1"= 200'. If oversized drawings are used, attach **five** copies of the oversized drawings to your application.

## WHAT HAPPENS NEXT

Upon receipt of an application, VMRC will assign a permit application number to the JPA and will then distribute a copy of the application and any plan copies submitted to the other regulatory agencies that are involved in the JPA process. All agencies will conduct separate but concurrent reviews of your project. Please be aware that each agency must issue a separate permit (or a notification that no permit is required). Note that in some cases, DEQ may be taking an action on behalf of the USACE, such as when the State Program General Permit (SPGP) applies. Make sure that you have received all necessary authorizations, or documentation that no permit is required, from each agency prior to beginning the proposed work.

During the JPA review process, site inspections may be necessary to evaluate a proposed project. Failure to allow an authorized representative of a regulatory agency to enter the property, or to take photographs of conditions at the project site, may result in either the withdrawal or denial of your permit application.

For certain federal and state permit applications, a public notice is published in a newspaper having circulation in the project area, is mailed to adjacent and/or riparian property owners, and/or is posted on the agency's web page. The public may comment on the project during a designated comment period, if applicable, which varies depending upon the type of permit being applied for and the issuing agency. In certain circumstances, the project may be heard by a governing board, such as a Local Wetlands Board, the State Water Control Board, or VMRC in cases where a locality does not have a wetlands board. You may be responsible for bearing the costs for advertisement of public notices.

Public hearings that are held by VMRC occur at their regularly scheduled monthly commission meetings under the following situations: Protested applications for VMRC permits which cannot be resolved; projects costing over $500,000 involving encroachment over state-owned subaqueous land; and all projects affecting tidal wetlands and dunes/beaches in localities without a LWB. All interested parties will be officially notified regarding the date and time of the hearing and Commission meeting procedures. The Commission will usually make a decision on the project at the meeting unless a decision for continuance is made. If a proposed project is approved, a permit or similar agency correspondence is sent to the applicant. In some cases, notarized signatures, as well as processing fees and royalties, are required before the permit is validated. If the project is denied, the applicant will be notified in writing.

## PERMIT APPLICATION OR OTHER FEES

***DO NOT send any fees with the JPA***. *VMRC is not responsible for accounting for fees required by other agencies.* Please consult agency websites or contact agencies directly for current fee information and submittal instructions.

- USACE: Permit application fees are required for USACE Individual (Standard) permits. A USACE project manager will contact you regarding the proper fee and submittal requirements.
- DEQ: Permit application fees required for Virginia Water Protection permits – while detailed in 9VAC25-20 – are conveyed to the applicant by the applicable DEQ office (http://www.deq.virginia.gov/Locations.aspx). Complete the Permit Application Fee Form and submit it per the instructions listed on the form. Instructions for submitting any other fees will be provided to the applicant by DEQ staff.
- VMRC: An application fee of $300 may be required for projects impacting tidal wetlands, beaches and/or dunes when VMRC acts as the LWB. VMRC will notify the applicant in writing if the fee is required. Permit fees involving subaqueous lands are $25.00 for projects costing $10,000 or less and $100 for projects costing more than $10,000. Royalties may also be required for some projects. The proper permit fee and any required royalty is paid at the time of permit issuance by VMRC. VMRC staff will send the permittee a letter notifying him/her of the proper permit fees and submittal requirements.
- LWB: Permit fees vary by locality. Contact the LWB for your project area or their locality website for fee information and submittal requirements. Contact information for LWB may be found at http://ccrm.vims.edu/permits_web/guidance/local_wetlands_boards.html.

## INFORMATION REGARDING THREATENED OR ENDANGERED SPECIES

In order to find preliminary information regarding federal or state threatened or endangered species on your project site, you may contact the following four agencies:

| | |
|---|---|
| United States Fish and Wildlife Service<br>6669 Short Lane<br>Gloucester, Virginia 23061<br>Voice: (804) 693-6694<br>Fax: (804) 693-9032<br>http://virginiafieldoffice.fws.gov/ | NOAA Fisheries Greater Atlantic Region Fisheries Office<br>National Marine Fisheries Service<br>55 Great Republic Drive<br>Gloucester, MA 01930<br>Voice: (978) 281-9300<br>https://www.greateratlantic.fisheries.noaa.gov/contact_us/index.html |
| Project Review Coordinator<br>Virginia Department of Conservation and Recreation<br>Natural Heritage Division<br>217 Governor Street<br>Richmond, Virginia 23219<br>Voice: (804) 786-7951<br>Fax: (804) 371-2674<br>http://www.dcr.virginia.gov/natural_heritage/index.shtml | Virginia Department of Game and Inland Fisheries<br>Environmental Services Section<br>4010 West Broad Street<br>Richmond, Virginia 23230-1104<br>(804) 367-1000<br>http://www.dgif.virginia.gov/wildlife/ |

## INFORMATION REGARDING FEMA-MAPPED FLOODPLAINS

You may obtain "Online Hazard Maps" for FEMA-mapped floodplains by visiting https://hazards.fema.gov/femaportal/wps/portal. Local governments also keep paper copies of FEMA maps on hand.

## FOOTNOTES

***(1) Adjacent Property Owner Notification:*** When determining whether to grant or deny any permit for the use of state-owned submerged lands, the VMRC must consider, among other things, effects of a proposed project on adjacent or nearby properties. Discussing the proposed project with these property owners can be done on your own using the forms in Appendix A of this package. Local Wetlands Boards (LWB) must also consider the effects on adjacent properties and notify adjoining property owners of the required public hearings for all applications. The completed forms will assist VMRC and LWB in processing the application. The forms in Appendix A may be photocopied if more copies are needed. This information will not be used by DEQ to meet the requirements of notifying riparian land owners.

***(2) Compensatory mitigation plans. Conceptual*** compensatory mitigation plans, when required, should include all information stipulated in Sections 80 B and 116 F of DEQ Regulation 9VAC25-210 for Virginia Water Protection individual permit applicants, or in Sections 60 B and/or 70 of DEQ Regulations 9VAC25-660, 9VAC25-670, 9VAC25-680, or 9VAC25-690 for Virginia Water Protection general permit coverage applicants. Regulations may be obtained from DEQ's web site at http://www.deq.virginia.gov/Programs/Water/WetlandsStreams.aspx. Information on wetland and stream compensatory mitigation is available at http://www.deq.virginia.gov/Programs/Water/WetlandsStreams/Mitigation.aspx. The SPGP applicant is required to provide a conceptual mitigation plan in accordance with the current SPGP (http://www.nao.usace.army.mil/Missions/Regulatory/RBregional.aspx). ***Final*** compensatory mitigation plans will be required *prior to commencement of impacts to waters and/or wetlands* on your project site. If no mitigation is planned, submit a detailed statement as to why no mitigation is planned. For projects requiring a LWB or VMRC tidal wetlands permit, please consult the VMRC Wetlands Mitigation-Compensation Policy and Supplemental Guidelines: 4 VAC 20-390 at http://www.mrc.virginia.gov/regulations/regindex.shtm.

***(3) Wetland and waters boundary delineation map:*** Wetlands/waters delineations must be performed using the USACE "Wetland Delineation Manual, Technical Report Y-87-1, January 1987, Final Report" (Federal Manual) and if applicable, the current version of the Regional Supplement to the Corps of Engineers Wetlands Delineation Manual (Atlantic and Gulf Coastal Plain Region or Eastern Mountains and Piedmont Region. The SPGP applicant is required to provide a Corps-confirmed jurisdictional determination or Corps-confirmed delineation approved for use with a permit application, in accordance with the current SPGP (http://www.nao.usace.army.mil/Missions/Regulatory/RBregional.aspx). Contact the appropriate USACE District office or field office to obtain a delineation confirmation by referencing the Contact Information on the Regulatory web page at: http://www.nao.usace.army.mil/Missions/Regulatory.aspx or call the Regulator of the Day (ROD) at 757-201-7652. If a USACE confirmation is not available at the time of application, it must be submitted as soon as it becomes available during the DEQ permit review. For DEQ application purposes, the requirements for delineations apply to all applications, regardless of the amount of impacts. The information to be submitted is detailed in 9VAC25-210-80 B 1 h and is the same regardless of the type of VWP permit being sought.

***(4) An analysis of the functions of wetlands***, when required for DEQ permitting purposes, shall assess water quality or habitat metrics and shall be coordinated with DEQ in advance of conducting the analysis. For DEQ permitting purposes, please refer to the requirements in 9VAC25-210-80 C, which are the same regardless of the type of VWP permit being sought.

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| FOR AGENCY USE ONLY | |
|---|---|
| | Notes: |
| JPA# | |

# APPLICANTS

**PLEASE PRINT OR TYPE ALL ANSWERS.** If a question does not apply to your project, please print N/A (not applicable) in the space provided. ***If additional space is needed, attach extra 8 ½ x 11 inch sheets of paper.***

| ***Check all that apply*** | | | |
|---|---|---|---|
| ☐ Pre-Construction Notification (PCN)<br>☐ NWP # _____<br>☐ RP # 05<br>(*For NWPs & RP 05 ONLY - No DEQ-VWP permit writer will be assigned*) | ☐ SPGP | ☐ DEQ Reapplication<br>Existing permit number:<br>_____ | ☐ Receiving federal funds<br>Agency providing funding:<br>_____ |
| ☐ Regional Permit 17 Checklist (RP-17) | | | |

***PREVIOUS ACTIONS RELATED TO THE PROPOSED WORK (Include all federal, state, and local pre application coordination, site visits, previous permits, or applications whether issued, withdrawn, or denied)***

Historical information for past permit submittals can be found online with VMRC - https://webapps.mrc.virginia.gov/public/habitat/ - or VIMS - http://ccrm.vims.edu/perms/newpermits.html

| Agency | Action / Activity | Permit/Project number, including any non-reporting Nationwide permits previously used (e.g., NWP 13) | Date of Action | If denied, give reason for denial |
|---|---|---|---|---|
| | | | | |
| | | | | |

**1. APPLICANT, AGENT, PROPERTY OWNER, AND CONTRACTOR INFORMATION**
**The applicant(s) is/are the legal entity to which the permit may be issued (see How to Apply at beginning of form). The applicant(s) can either be the property owner(s) or the person/people/company(ies) that intend(s) to undertake the activity. The agent is the person or company that is representing the applicant(s). If a company, please also provide the company name that is registered with the State Corporation Commission (SCC), or indicate no registration with the SCC.**

| Legal Name(s) of Applicant(s) | | | Agent (if applicable) | | |
|---|---|---|---|---|---|
| Mailing address | | | Mailing address | | |
| City | State | ZIP Code | City | State | ZIP Code |
| Phone number w/area code | Fax | | Phone number w/area code | Fax | |
| Mobile | E-mail | | Mobile | E-mail | |
| State Corporation Commission Name and ID number (if applicable) | | | State Corporation Commission Name and ID number (if applicable) | | |

***Certain permits or permit authorizations may be provided via electronic mail. If the applicant wishes to receive their permit via electronic mail, please provide an e-mail address here:*** _____

## 1. APPLICANT, AGENT, PROPERTY OWNER, AND CONTRACTOR INFORMATION (Continued)

| Property owner(s) legal name, if different from applicant | | | Contractor, if known | | |
|---|---|---|---|---|---|
| Mailing address | | | Mailing address | | |
| City | State | ZIP code | City | State | ZIP code |
| Phone number w/area code | Fax | | Phone number w/area code | Fax | |
| Mobile | E-mail | | Mobile | E-mail | |
| State Corporation Commission Name and ID number (if applicable) | | | State Corporation Commission Name ID number (if applicable) | | |

## 2. PROJECT LOCATION INFORMATION

**(Attach a copy of a detailed map, such as a USGS topographic map or street map showing the site location and project boundary, so that it may be located for inspection. Include an arrow indicating the north direction. Include the drainage area if the SPGP box is checked on Page 7.)**

| Street Address (911 address if available) | City/County/ZIP Code |
|---|---|
| None - Parrotts Creek Channel | Middlesex County |
| Subdivision | Lot/Block/Parcel # |

Name of water body(ies) within project boundaries and drainage area (acres or square miles).
Parrotts Creek and Rappahannock River >5 sq. miles

Tributary(ies) to: Parrotts Creek/Rappahannock River/Chesapeake Bay
Basin: Rappahannock River Sub-basin: Lower Rappahannock
(*Example: Basin: James River Sub-basin: Middle James River*)

Special Standards (based on DEQ Water Quality Standards 9VAC25-260 et seq.): N/A

Project type (check one)
_____ Single user (private, non-commercial, residential)
x Multi-user (community, commercial, industrial, government)
_____ Surface water withdrawal

Latitude and longitude at center of project site (decimal degrees): 37.73075 / -76.61859
(Example: 37.33164/-77.68200)

USGS topographic map name: Urbanna

8-digit USGS Hydrologic Unit Code (HUC) for your project site (See http://cfpub.epa.gov/surf/locate/index.cfm ): 02080104
If known, indicate the 10-digit and 12-digit USGS HUCs (see http://consapps.dcr.virginia.gov/htdocs/maps/HUExplorer.htm) :
020801040602

Name of your project (*Example: Water Creek driveway crossing*) Parrotts Creek Channel Dredging

Is there an access road to the project? ☑ Yes ☐ No. If yes, check all that apply: ☑ public ☐ private ☐ improved ☐ unimproved

Total size of the project area (in acres): 13.4 acres (7.7 acres channel and disposal 5.7 acres)

**2. PROJECT LOCATION INFORMATION (Continued)**

Provide driving directions to your site, giving distances from the best and nearest visible landmarks or major intersections:

Take Rt. 17 North from the Coleman Bridge to Rt. 640. Turn right onto Rt. 640. Travel for about 1.5 miles to stay on Rt. 640. Turn left to stay on Rt. 640. Travel about 3 miles to Rt. 608. Turn left onto Rt. 608. Travel about 1 mile. You have arrived at Millstone Landing, the waterfront of Parrotts Creek.

Does your project site cross boundaries of two or more localities (i.e., cities/counties/towns)? ☐ Yes ☑ No

If so, name those localities: Middlesex. VA

**3. DESCRIPTION OF THE PROJECT, PROJECT PRIMARY AND SECONDARY *PURPOSES*, PROJECT *NEED*, INTENDED USE(S), AND ALTERNATIVES CONSIDERED** (Attach additional sheets if necessary)

- The purpose and need must include any new development or expansion of an existing land use and/or proposed future use of residual land.
- Describe the physical alteration of surface waters, including the use of pilings (#, materials), vibratory hammers, explosives, and hydraulic dredging, when applicable, and *whether or not tree clearing will occur* (include the area in square feet and time of year).
- Include a description of alternatives considered and measures taken to avoid or minimize impacts to surface waters, including wetlands, to the maximum extent practicable. Include factors such as, but not limited to, alternative construction technologies, alternative project layout and design, alternative locations, local land use regulations, and existing infrastructure
- For utility crossings, include both alternative routes and alternative construction methodologies considered
- For surface water withdrawals, public surface water supply withdrawals, or projects that will alter in stream flows, include the water supply issues that form the basis of the proposed project.

This project consists of new dredging at Parrotts Creek with dredged material placement upland at Upper Middlesex Volunteer Fire Department (UMV-FD) property adjacent to Parrotts Creek, approximately 0.5 miles from Millstone Landing. Dredging of Parrotts Creek is necessary to allow safe navigation for vessels utilizing boat slips at the working waterfront of Millstone Landing. The channel design uses the existing federally-authorized channel at the location. The channel will be dredged to a maximum depth of -7 ft MLLW including allowable overdepth and non-pay depth. The Parrots Creek channel is 4,800 ft long and 60 ft wide with a turning basin at Millstone Landing. Approximately 24,300 cy of material will be dredged. Dredged material placement will occur at an upland disposal site using Geotubes for containment.

| Date of proposed commencement of work (MM/DD/YYYY) | Date of proposed completion of work (MM/DD/YYYY) |
|---|---|
| _____ | _____ |
| Are you submitting this application at the direction of any state, local, or federal agency? _____Yes _____No | Has any work commenced or has any portion of the project for which you are seeking a permit been completed? _____ Yes __X___ No |

If you answered "yes" to either question above, give details stating when the work was completed and/or when it commenced, who performed the work, and which agency (if any) directed you to submit this application. In addition, you will need to clearly differentiate between completed work and proposed work on your project drawings.

Not applicable

Are you aware of any unresolved violations of environmental law or litigation involving the property? _____Yes __X__No
(If yes, please explain)

Not applicable

**4. PROJECT COSTS**

Approximate cost of the entire project, including materials and labor: $_____
Approximate cost of only the portion of the project affecting state waters (channelward of mean low water in tidal areas and below ordinary high water mark in nontidal areas): $ _____

**5. PUBLIC NOTIFICATION** (Attach additional sheets if necessary)
Complete information for all property owners adjacent to the project site and across the waterway, if the waterway is less than 500 feet in width. If your project is located within a cove, you will need to provide names and mailing addresses for all property owners within the cove. If you own the adjacent lot, provide the requested information for the first adjacent parcel beyond your property line. Per Army Regulation (AR 25-51) outgoing correspondence must be addressed to a person or business.
***Failure to provide this information may result in a delay in the processing of your application by VMRC.***

| Property owner's name | Mailing address | City | State | ZIP code |
|---|---|---|---|---|
| Shannon Fedors (oyster lease) | P.O. Box 2 | Bena | VA | 23018 |

Name of newspaper having general circulation in the area of the project: Southside Sentinel
Address and phone number (including area code) of newspaper 276 Virginia St., Urbanna, VA, 23175 Phone: 804-758-2328

Have adjacent property owners been notified with forms in Appendix A? _____Yes X No (attach copies of distributed forms)

**6. THREATENED AND ENDANGERED SPECIES INFORMATION**

Please provide any information concerning the potential for your project to impact state and/or federally threatened and endangered species (listed or proposed). Attach correspondence from agencies and/or reference materials that address potential impacts, such as database search results or confirmed waters and wetlands delineation/jurisdictional determination. Include information when applicable regarding the location of the project in Endangered Species Act-designated or -critical habitats. Contact information for the U.S. Fish and Wildlife Service, National Oceanic and Atmospheric Administration, Virginia Dept. of Game and Inland Fisheries, and the Virginia Dept. of Conservation and Recreation-Division of Natural Heritage can be found on page 4 of this package.

**7. HISTORIC RESOURCES INFORMATION**

*Note: Historic properties include but are not limited to archeological sites, battlefields, Civil War earthworks, graveyards, buildings, bridges, canals, etc. Prospective permittees should be aware that section 110k of the NHPA (16 U.S.C. 470h-2(k)) prevents the USACE from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the USACE, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant.*

Are any historic properties located within or adjacent to the project site? ____ Yes X No _____ Uncertain
If Yes, please provide a map showing the location of the historic property within or adjacent to the project site.

Are there any buildings or structures 50 years old or older located on the project site? ____ Yes X No _____ Uncertain
If Yes, please provide a map showing the location of these buildings or structures on the project site.

Is your project located within a historic district? ____ Yes X No ____ Uncertain

If Yes, please indicate which district: _____

## 7. HISTORIC RESOURCES INFORMATION (Continued)

Has a survey to locate archeological sites and/or historic structures been carried out on the property?
___ Yes ___ No ___ Uncertain

If Yes, please provide the following information: Date of Survey: _____

Name of firm: _____

Is there a report on file with the Virginia Department of Historic Resources? ____ Yes ____ No ___Uncertain

Title of Cultural Resources Management (CRM) report: _____

Was any historic property located? ____ Yes ____ No __ Uncertain

## 8. WETLANDS, WATERS, AND DUNES/BEACHES IMPACT INFORMATION

**Report each impact site in a separate column. If needed, attach additional sheets using a similar table format. Please ensure that the associated project drawings clearly depict the location and footprint of each numbered impact site. For dredging, mining, and excavating projects, use Section 17.**

| | Impact site number 1 | Impact site number 2 | Impact site number 3 | Impact site number 4 | Impact site number 5 |
|---|---|---|---|---|---|
| Impact description (use all that apply):<br>F=fill<br>EX=excavation<br>S=Structure<br>T=tidal<br>NT=non-tidal<br>TE=temporary<br>PE=permanent<br>PR=perennial<br>IN=intermittent<br>SB=subaqueous bottom<br>DB=dune/beach<br>IS=hydrologically isolated<br>V=vegetated<br>NV=non-vegetated<br>MC=Mechanized Clearing of PFO<br>(*Example: F, NT, PE, V)* | Channel Dredging<br><br>EX, T, PE, SB | Upland Disposal Site<br><br>F | | | |
| Latitude / Longitude (in decimal degrees) | 37.73075, -76.61859 | 37.71953, -76.61883 | | | |
| Wetland/waters impact area<br>(square feet / acres) | 335,412sqft/7.7 acres | | | | |
| Dune/beach impact area (square feet) | | | | | |
| Stream dimensions at impact site<br>(length and average width in linear feet, and area in square feet) | Tidal | | | | |
| Volume of fill below Mean High Water or Ordinary High Water (cubic yards) | | | | | |

| 8. WETLANDS/WATERS IMPACT INFORMATION (Continued) | | | | | |
|---|---|---|---|---|---|
| Cowardin classification of impacted wetland/water or geomorphological classification of stream *Example wetland: PFO; Example stream: 'C' channel and if tidal, whether vegetated or non-vegetated wetlands per Section 28.2-1300 of the Code of Virginia* | E1UBL | | | | |
| Average stream flow at site (flow rate under normal rainfall conditions in cubic feet per second) and method of deriving it (gage, estimate, etc.) | Tidal | | | | |
| Contributing drainage area in acres or square miles (*VMRC cannot complete review without this information*) | > 5 sq. miles | | | | |
| DEQ classification of impacted resource(s):<br>Estuarine Class II<br>Non-tidal waters Class III<br>Mountainous zone waters Class IV<br>Stockable trout waters Class V<br>Natural trout waters Class VI<br>Wetlands Class VII<br>https://law.lis.virginia.gov | Estuarine Class II | | | | |
| **For DEQ permitting purposes, also submit as part of this section a wetland and waters boundary delineation map – see (3) in the Footnotes section in the form instructions.** | | | | | |
| **For DEQ permitting purposes, also submit as part of this section a written disclosure of all wetlands, open water, or streams that are located within the proposed project or compensation areas that are also under a deed restriction, conservation easement, restrictive covenant, or other land-use protective instrument.** | | | | | |

## 9. APPLICANT, AGENT, PROPERTY OWNER, AND CONTRACTOR CERTIFICATIONS

***READ ALL OF THE FOLLOWING CAREFULLY BEFORE SIGNING***

PRIVACY ACT STATEMENT: The Department of the Army permit program is authorized by Section 10 of the Rivers and Harbors Act of 1899, Section 404 of the Clean Water Act, and Section 103 of the Marine Protection Research and Sanctuaries Act of 1972. These laws require that individuals obtain permits that authorize structures and work in or affecting navigable waters of the United States, the discharge of dredged or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters prior to undertaking the activity. Information provided in the Joint Permit Application will be used in the permit review process and is a matter of public record once the application is filed. Disclosure of the requested information is voluntary, but it may not be possible to evaluate the permit application or to issue a permit if the information requested is not provided.

CERTIFICATION: I am hereby applying for permits typically issued by the DEQ, VMRC, USACE, and/or Local Wetlands Boards for the activities I have described herein. I agree to allow the duly authorized representatives of any regulatory or advisory agency to enter upon the premises of the project site at reasonable times to inspect and photograph site conditions, both in reviewing a proposal to issue a permit and after permit issuance to determine compliance with the permit.

In addition, I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

**9. APPLICANT, AGENT, PROPERTY OWNER, AND CONTRACTOR CERTIFICATIONS (Continued)**

*Is/Are the Applicant(s) and Owner(s) the same?* ☐ *Yes* ☐ *No*

| | |
|---|---|
| Legal name & title of Applicant | Second applicant's legal name & title, if applicable |
| Applicant's signature | Second applicant's signature |
| Date | Date |
| Property owner's legal name, if different from Applicant | Second property owner's legal name, if applicable |
| Property owner's signature, if different from Applicant | Second property owner's signature |
| Date | Date |

***CERTIFICATION OF AUTHORIZATION TO ALLOW AGENT(S) TO ACT ON APPLICANT'S(S') BEHALF (IF APPLICABLE)***

I (we), _____ (and) _____ ,
APPLICANT'S LEGAL NAME(S) – *complete the second blank if more than one Applicant*

hereby certify that I (we) have authorized _____ (and) _____
AGENT'S NAME(S) – *complete the second blank if more than one Agent*
to act on my (our) behalf and take all actions necessary to the processing, issuance, and acceptance of this permit and any and all standard and special conditions attached. I (we) hereby certify that the information submitted in this application is true and accurate to the best of my (our) knowledge.

| | |
|---|---|
| Applicant's signature | Second applicant's signature, if applicable |
| Date | Date |
| Agent's signature and title | Second agent's signature and title, if applicable |
| Date | Date |

***CONTRACTOR ACKNOWLEDGEMENT (IF APPLICABLE)***

I (we), _____ (and) _____ ,
APPLICANT'S LEGAL NAME(S) – *complete the second blank if more than one Applicant*

have contracted _____ (and) _____
CONTRACTOR'S NAME(S) – *complete the second blank if more than one Contractor*

to perform the work described in this Joint Permit Application, signed and dated _____.

I (we) will read and abide by all conditions as set forth in all federal, state, and local permits as required for this project. I (we) understand that failure to follow the conditions of the permits may constitute a violation of applicable federal, state, and local statutes and that we will be liable for any civil and/or criminal penalties imposed by these statutes.
In addition, I (we) agree to make available a copy of any permit to any regulatory representative visiting the project site to ensure permit compliance. If I (we) fail to provide the applicable permit upon request, I (we) understand that the representative will have the option of stopping our operation until it has been determined that we have a properly signed and executed permit and are in full compliance with all of the terms and conditions.

| | | |
|---|---|---|
| Contractor's name or name of firm (printed/typed) | Contractor's or firm's mailing address | |
| Contractor's signature and title | Contractor's license number | Date |
| Applicant's signature | Second applicant's signature, if applicable | |
| Date | Date | |

## 16. BEACH NOURISHMENT (Continued)

Describe the type(s) of vegetation proposed for stabilization and the proposed planting plan, including schedule, spacing, monitoring, etc. Attach additional sheets if necessary.

## 17. DREDGING, MINING, AND EXCAVATING

FILL OUT THE FOLLOWING TABLE FOR DREDGING PROJECTS

| | NEW dredging | | | | MAINTENANCE dredging | | | |
|---|---|---|---|---|---|---|---|---|
| | Hydraulic | | Mechanical (clamshell, dragline, etc.) | | Hydraulic | | Mechanical (clamshell, dragline, etc.) | |
| | Cubic yards | Square feet | Cubic yards | Square feet | Cubic yards | Square feet | Cubic yards | Square feet |
| Vegetated wetlands | | | | | | | | |
| Non-vegetated wetlands | | | | | | | | |
| Subaqueous land | 24,300 | 656,100 | | | | | | |
| Totals | 24,300 | 656,100 | | | | | | |

Is this a one-time dredging event? [X] Yes _____ No If "no", how many dredging cycles are anticipated: _____
(____ initial cycle in cu. yds.) (_____ subsequent cycles in cu. yds.)

Composition of material (percentage sand, silt, clay, rock):
Provide documentation (i.e., laboratory results or analytical reports) that *dredged* material from on-site areas is free of toxics. If not free of toxics, provide documentation of proper disposal (i.e., bill of lading from commercial supplier or disposal site).

Parrotts Creek is a small tributary to the Rappahannock River in rural Middlesex County far removed from the sources of industrial contamination. Dredged material is relatively recently shoaled sediments migrating through the littoral system. Sediment was tested in 2 locations for chemicals and none were found.

Please include a dredged material management plan that includes specifics on how the dredged material will be handled and retained to prevent its entry into surface waters or wetlands. If on-site dewatering is proposed, please include plan view and cross-sectional drawings of the dewatering area and associated outfall.

Dredged material will be hydraulically- pumped to an upland site and placed in Geotubes as shown in the permit drawings. In addition, silt fencing will be used to prevent dredged material entrance to surface waters while drying.

Will the dredged material be used for any commercial purpose or beneficial use? _____Yes [X]____No
If yes, please explain:

If this is a maintenance dredging project, what was the date that the dredging was last performed? 1956?
Permit number of original permit: N/A *(It is important that you attach a copy of the original permit.)*

**17. DREDGING, MINING, AND EXCAVATING (Continued)**

*For mining projects:* On separate sheets of paper, explain the operation plans, including: 1) the frequency (e.g., every six weeks), duration (i.e., April through September), and volume (in cubic yards) to be removed per operation; 2) the temporary storage and handling methods of mined material, including the dimensions of the containment berm used for upland disposal of dredged material and the need (or no need) for a liner or impermeable material to prevent the leaching of any identified contaminants into ground water; 3) how equipment will access the mine site; and 4) verification that dredging: a) will not occur in water body segments that are currently on the effective Section 303(d) Total Maximum Daily Load (TMDL) priority list (available at http://www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs/TMDL/TMDLDevelopment/TMDLProgramPriorities.aspx) or that have an approved TMDL; b) will not exacerbate any impairment; and c) will be consistent with any waste load allocation/limit/conditions imposed by an approved TMDL (see, "What's in my backyard" or subsequent spatial files at http://www.deq.virginia.gov/ConnectWithDEQ/VEGIS.aspx to determine the extent of TMDL watersheds and impairment segments).

*Have you applied for a permit from the Virginia Department of Mines, Minerals and Energy?* _____Yes _X_____No If Yes:
Existing permit number:_____ Date permit issued: _____

| | |
|---|---|
| Contributing drainage area: >5 square miles | Average stream flow at site (flow rate under normal rainfall conditions): Tidal cfs |

**18. FILL (not associated with backfilled shoreline structures) AND OTHER STRUCTURES (other than piers and boathouses) IN WETLANDS OR WATERS, OR ON DUNES/BEACHES**

Source and composition of fill material (percentage sand, silt, clay, rock):

_____

Provide documentation (i.e., laboratory results or analytical reports) that *fill* material from *off-site* locations is free of toxics. If not free of toxics, provide documentation of proper disposal (i.e., bill of lading from commercial supplier or disposal site). Documentation is not necessary for fill material obtained from on-site areas.

Explain the purpose of the filling activity and the type of structure to be constructed over the filled area (if any):

Describe any structure that will be placed in wetlands/waters or on a beach dune and its purpose:

| | |
|---|---|
| Will the structure be placed on pilings? ____ Yes ____ No | Total area occupied by any structure. _____ Square Feet |
| How far will the structure be placed channelward from the back edge of the dune? _____feet | How far will the structure be placed channelward from the back edge of the beach? _____feet |

**19. NONTIDAL STREAM CHANNEL MODIFICATIONS FOR RESTORATION OR ENHANCMENT, or TEMPORARY OR PERMANENT RELOCATIONS**

*If proposed activities are being conducted for the purposes of compensatory mitigation, please attach separate sheets of paper providing all information required by the most recent version of the stream assessment methodology approved by the Norfolk District of the U.S. Army Corps of Engineers and the Virginia Department of Environmental Quality, in lieu of completing the questions below. Required information outlined by the methodology can be found at:*
http://www.nao.usace.army.mil/Missions/Regulatory/UnifiedStreamMethodology.aspx *or*
http://www.deq.virginia.gov/Programs/Water/WetlandsStreams/Mitigation.aspx.

*For all projects proposing stream restoration provide a completed Natural Channel Design Review Checklist and Selected Morphological Characteristics form. These forms and the associated manual can be located at:*
https://www.fws.gov/chesapeakebay/StreamReports/NCD%20Review%20Checklist/Natural%20Channel%20Design%20Checklist%20Doc%20V2%20Final%2011-4-11.pdf

Has the stream restoration project been designed by a local, state, or federal agency? ____ Yes ____ No. If yes, please include the name of the agency here: _____.

Is the agency also providing funding for this project? _____ Yes _____ No

Stream dimensions at impact site (length and average width in linear feet, and area in square feet):
L: _____(feet) AW:_____ (feet) Area:_____ (square feet)

Contributing drainage area: _____acres *or* _____square miles

**APPENDIX A**

**Adjacent Property Owner's Acknowledgement Form**

I, _____, own land next to/ across the water from/ in the same cove
(print adjacent property owner's name)

as the land of _____.
(print applicant's name)

I have reviewed the applicant's project drawings dated _____ to be submitted for all
(date of drawings)

necessary federal, state, and local permits.

_____ I have no comment regarding the proposal

_____ I do not object to the proposal

_____ I object to the proposal

***The applicant has agreed to contact me for additional comments if the proposal changes prior to construction of the project.***

(Before signing this form, please be sure that you have checked the appropriate option above)

_____
Adjacent property owner's signature

_____
Date

**NOTE:** IF YOU OBJECT TO THE PROPOSAL, THE REASON(S) YOU OPPOSE THE PROJECT MUST BE SUBMITTED TO VMRC IN WRITING. AN OBJECTION WILL NOT NECESSARILY RESULT IN A DENIAL OF A PERMIT FOR THE PROPOSED WORK. HOWEVER, VALID COMPLAINTS WILL BE GIVEN FULL CONSIDERATION DURING THE PERMIT REVIEW PROCESS.

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**APPENDIX C**

**Chesapeake Bay Preservation Act Information**

Please answer the following questions to determine if your project is subject to the requirements of the Bay Act Regulations:

1. Is your project located within Tidewater Virginia? X Yes ____No (See map on page 31) - If the answer is "no", the Bay Act requirements do not apply; if "yes", then please continue to question #2.

2. Please indicate if the project proposes to impact any of the following Resource Protection Area (RPA) features:

   ____ Tidal wetlands,

   ____ Nontidal wetlands connected by surface flow and contiguous to tidal wetlands or water bodies with perennial flow,

   ____ Tidal shores,

   ____ Other lands considered by the local government to meet the provisions of subsection A of 9VAC25-830-80 and to be necessary to protect the quality of state waters (contact the local government for specific information),

   ____ A buffer area not less than 100 feet in width located adjacent to and landward of the components listed above, and along both sides of any water body with perennial flow.

If the answer to question #1 was "yes" and any of the features listed under question #2 will be impacted, compliance with the Chesapeake Bay Preservation Area Designation and Management Regulations is required. **The Chesapeake Bay Preservation Area Designation and Management Regulations** are enforced through locally adopted ordinances based on the Chesapeake Bay Preservation Act (CBPA) program. Compliance with state and local CBPA requirements mandates the submission of a ***Water Quality Impact Assessment (WQIA)*** for the review and approval of the local government. Contact the appropriate local government office to determine if a WQIA is required for the proposed activity(ies).

The individual localities, not the DEQ, USACE, or the Local Wetlands Boards, are responsible for enforcing the CBPA requirements and, therefore, local permits for land disturbance are not issued through this JPA process. **Approval of this wetlands permit does not constitute compliance with the CBPA regulations nor does it guarantee that the local government will grant approval for encroachments into the RPA that may result from this project.**

**Notes for all projects in RPAs**

Development, redevelopment, construction, land disturbance, or placement of fill within the RPA features listed above requires the approval of the locality and may require an exception or variance from the local Bay Act ordinance. Please contact the appropriate local government to determine the types of development or land uses that are permitted within RPAs.

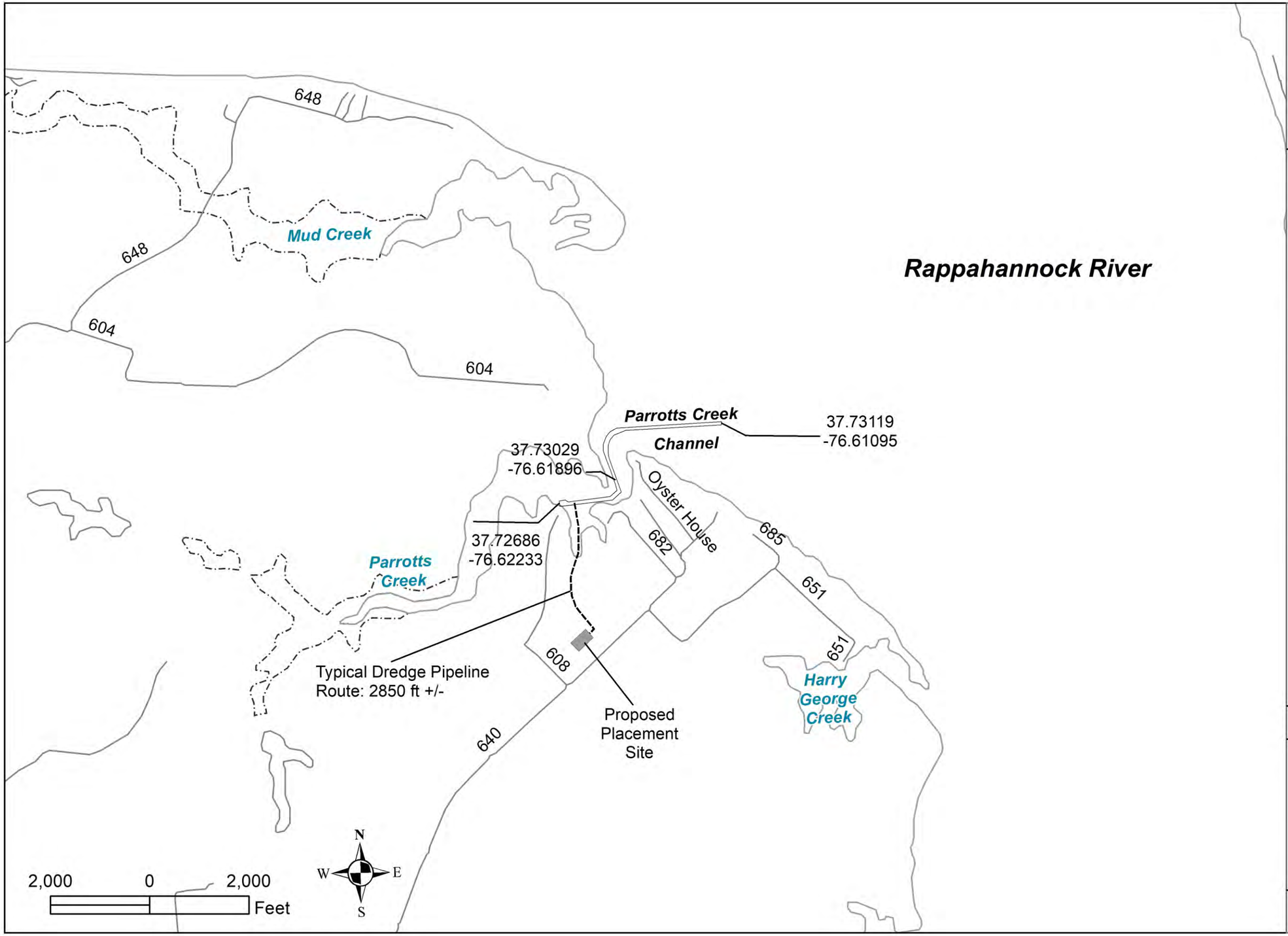
Pursuant to 9VAC25-830-110, *on-site delineation of the RPA is required for all projects in CBPAs*. Because USGS maps are not always indicative of actual "in-field" conditions, they may not be used to determine the site-specific boundaries of the RPA.

**Notes for shoreline erosion control projects in RPAs**

Re-establishment of woody vegetation in the buffer will be required by the locality to mitigate for the removal or disturbance of buffer vegetation associated with your proposed project. Please contact the local government to determine the mitigation requirements for impacts to the 100-foot RPA buffer.

Pursuant to 9VAC25-830-140 5 a (4) of the Virginia Administrative Code, shoreline erosion projects are a permitted modification to RPAs provided that the project is based on the "best technical advice" and complies with applicable permit conditions. In accordance with 9VAC25-830-140 1 of the Virginia Administrative Code, the locality will use the information provided in this Appendix, in the project drawings, in this permit application, and as required by the locality, to make a determination that:

1. Any proposed shoreline erosion control measure is necessary and consistent with the nature of the erosion occurring on the site, and the measures have employed the "best available technical advice"
2. Indigenous vegetation will be preserved to the maximum extent practicable
3. Proposed land disturbance has been minimized
4. Appropriate mitigation plantings will provide the required water quality functions of the buffer (9VAC25-830-140 3)
5. The project is consistent with the locality's comprehensive plan
6. Access to the project will be provided with the minimum disturbance necessary.

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Virginia Institute of Marine Science
Shoreline Studies Program

## Vicinity Map


Virginia Institute of Marine Science
Gloucester County, Virginia

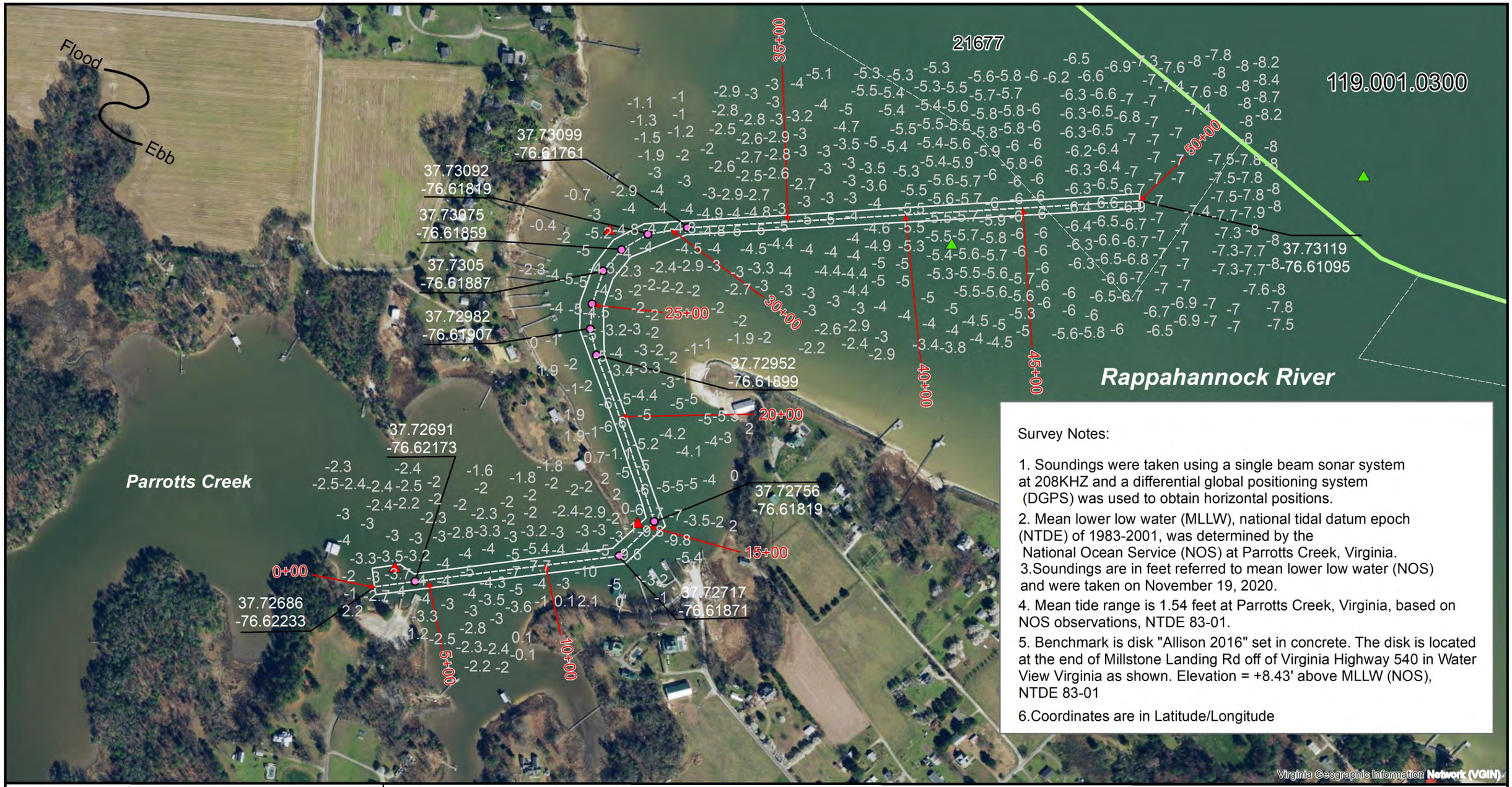
# COVERSHEET

**Plans for Dredging**

Parrotts Creek Channel
Middlesex County
Virginia

SCALE: AS SHOWN ON SHEET

September 9, 2021




Survey Notes:

1. Soundings were taken using a single beam sonar system at 208KHZ and a differential global positioning system (DGPS) was used to obtain horizontal positions.
2. Mean lower low water (MLLW), national tidal datum epoch (NTDE) of 1983-2001, was determined by the National Ocean Service (NOS) at Parrotts Creek, Virginia.
3. Soundings are in feet referred to mean lower low water (NOS) and were taken on November 19, 2020.
4. Mean tide range is 1.54 feet at Parrotts Creek, Virginia, based on NOS observations, NTDE 83-01.
5. Benchmark is disk "Allison 2016" set in concrete. The disk is located at the end of Millstone Landing Rd off of Virginia Highway 540 in Water View Virginia as shown. Elevation = +8.43' above MLLW (NOS), NTDE 83-01
6. Coordinates are in Latitude/Longitude

# EXISTING CONDITIONS MAP 1

PARROTTS CREEK
MIDDLESEX COUNTY, VIRGINIA

SCALE: AS SHOWN

**Aids to Navigation**
- Other
- Green
- Red
- Parrotts Creek Centerline
- Parrotts Creek Channel

- Private Oyster Leases
- Oyster Lease Applications
- Public Oyster Grounds

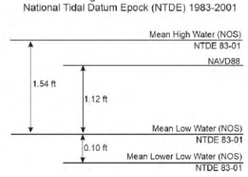
N W E S

400 0 400 Feet

**Private Oyster Leases**

Lease # 21677
Lease Holder: Shannon Fedors

Diagram of Datum Plane
National Tidal Datum Epoch (NTDE) 1983-2001

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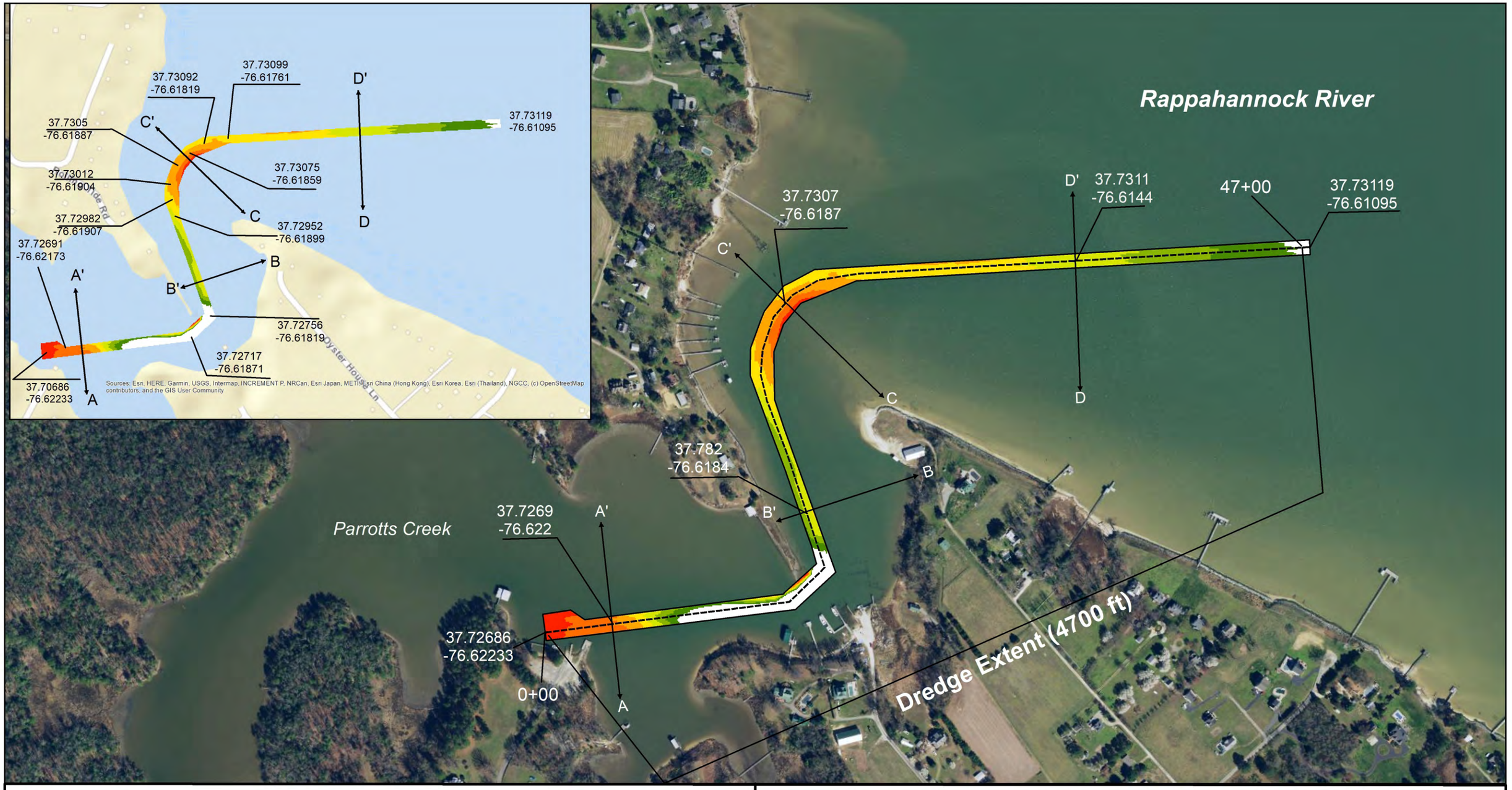


## Dredge Extent

Parrotts Creek
Middlesex County, Virginia

SCALE: AS SHOWN

N
W E
S

400 0 400
Feet

PC_CenterLine
Parrotts Creek Channel
No Dredging
0.1-1
1-2
2-3
3-4
4-5
5-6
6-7
VBMP 2017 WGS

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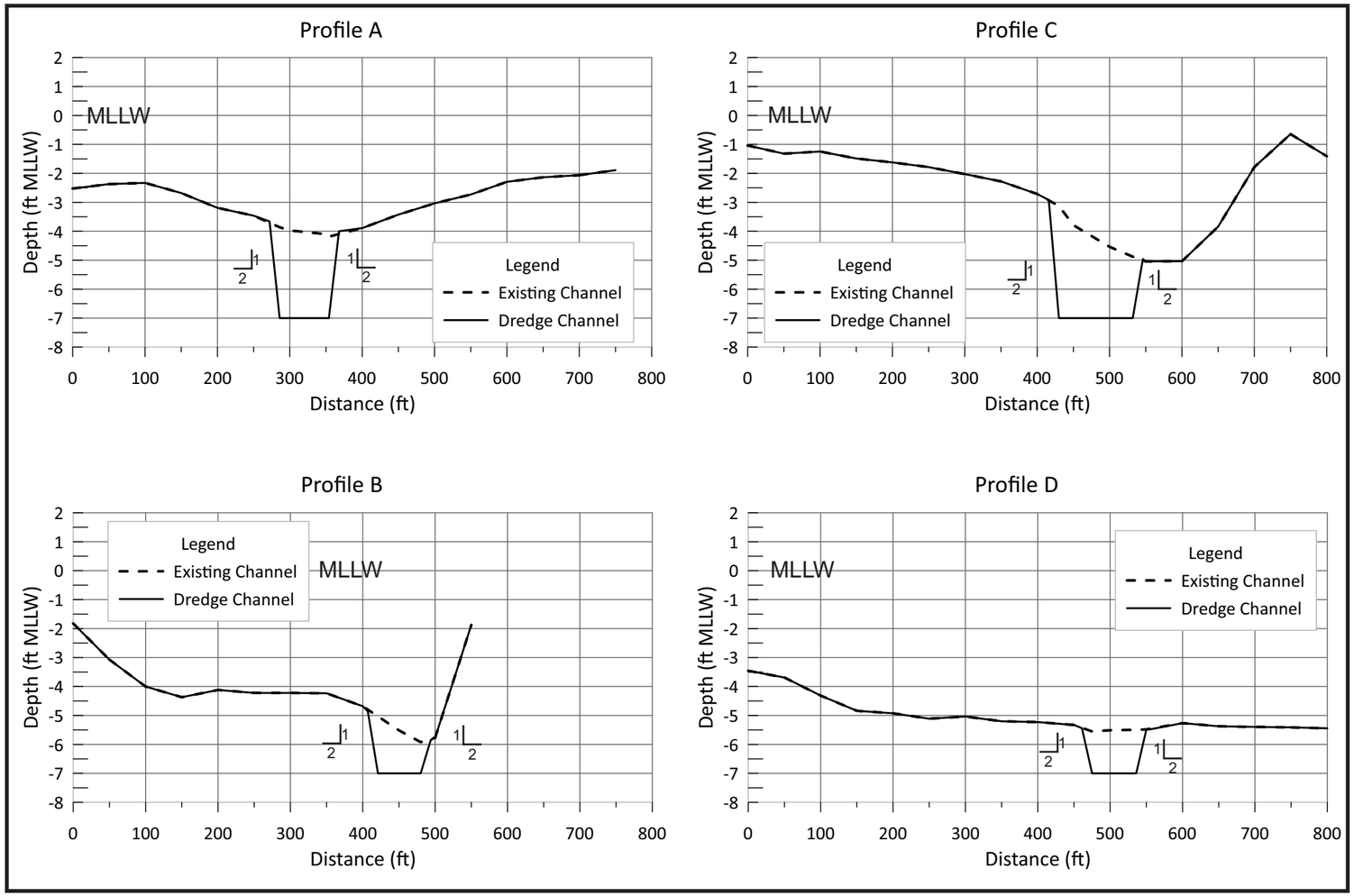
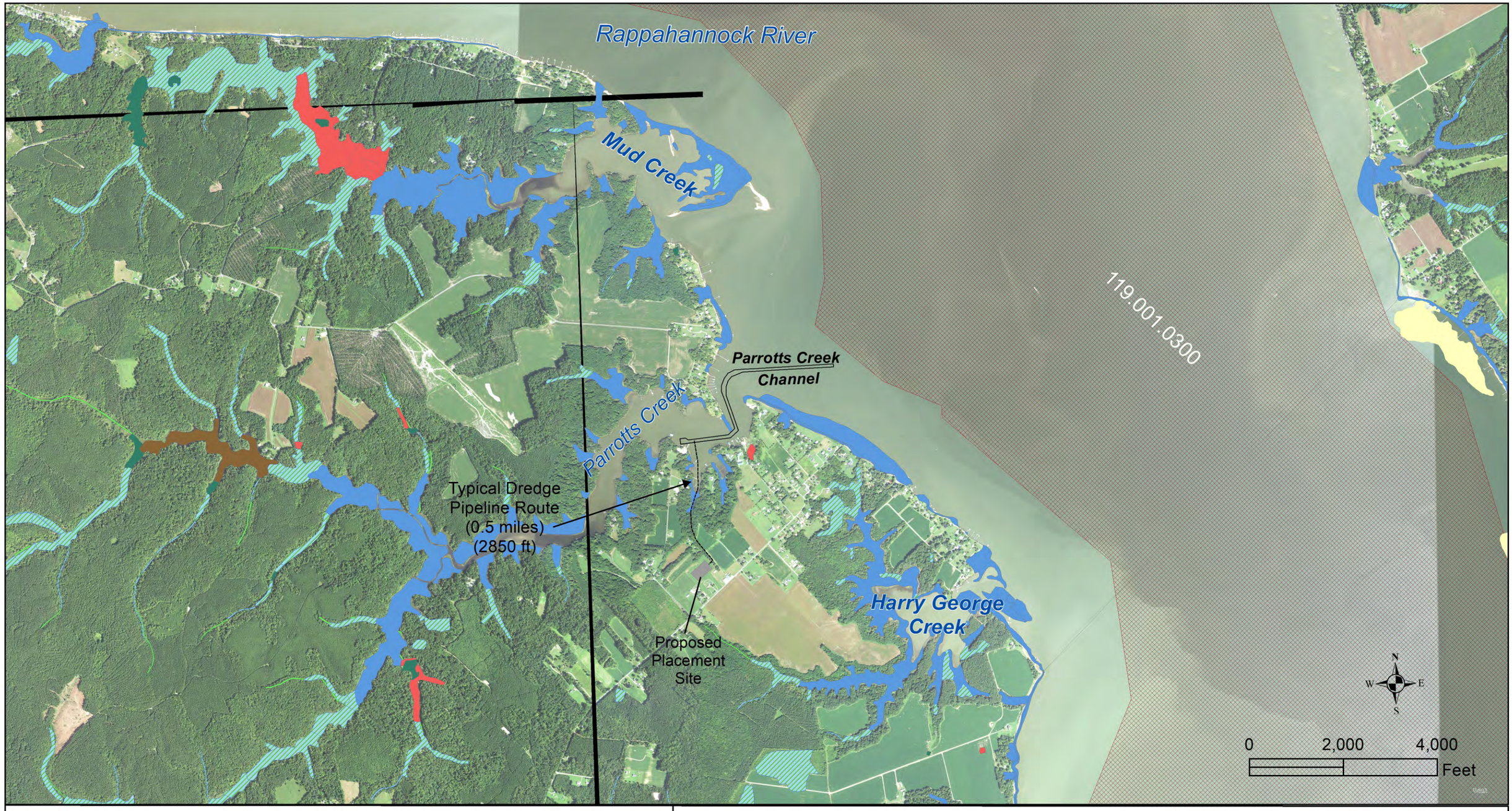
Sheet 3 of 6
September 9, 2021




**CROSS-SECTIONS**
Timberneck Creek Channel
Gloucester County, Virginia

Scale: As Shown

September 9, 2021




# RESOURCES

PARROTTS CREEK
MIDDLESEX COUNTY, VIRGINIA

SCALE: AS SHOWN  Image: NAIP 2018

**National Wetlands Inventory**

- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine
- Parrotts Creek Channel
- SAV Composite Footprint (2015-2019)
- Public Oyster Grounds

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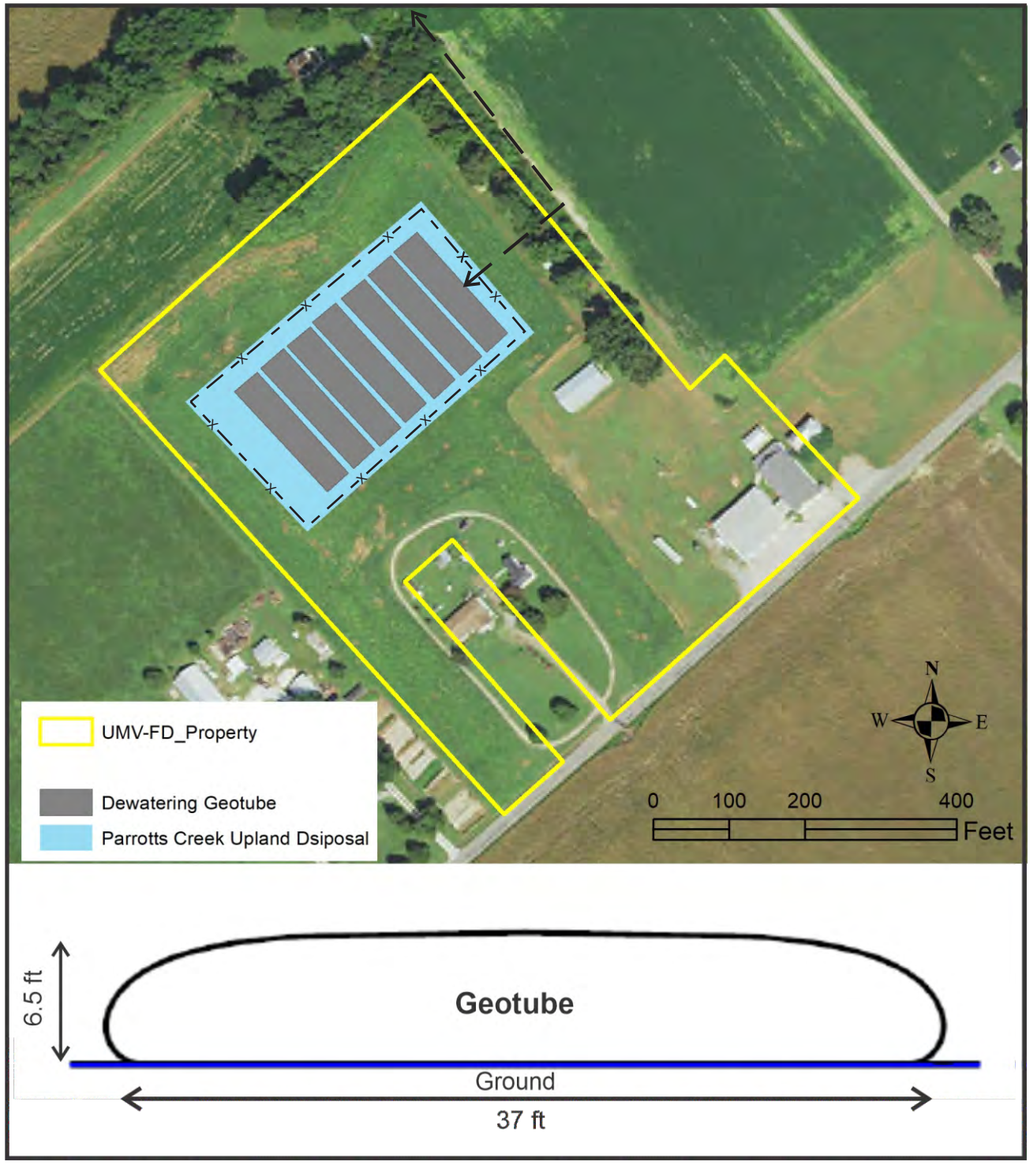


| | | |
|---|---|---|
| Units: | English | |
| Water Level: | Fully Emerged | |
| Geotube® Height (H) = | 6.5 | ft |
| Geotube® Circumference (C) = | 80 | ft |
| Relative Density of Fill Material = | 1.4 | sg |
| Geotube® Fabric Type: | GT500 | |
| Geotube® Fabric Type: | Rigid Mechanical | |

| | | |
|---|---|---|
| Circumferential Tensile Force (T) = | 76.67 | lb/in. |
| Geotube® Base Contact Width (B) = | 33.45 | ft |
| Geotube® Filled Width (W) = | 36.97 | ft |
| Geotube® Cross Section Area (A) = | 217.56 | sq ft |
| Geotube® Volume Per Unit of Length (V) = | 8.06 | cu yd/ft |
| FS of Circumferential Failure = | 5.9 | FS |
| Axial Direction FS (AFS) = | 5.8 | FS |
| FS of Fill Port Failure = | 5.9 | FS |



**Disposal Area**
Timberneck Creek Channel
Gloucester County, Virginia

Scale: As Shown

- —x— —x— - Silt Fencing
Property Boundary
— — — - Pipe

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September 9, 2021