



# ADDENDUM 1: SAMPLING AND ANALYSIS PLAN FOR THE PHASE 1 REMEDIAL INVESTIGATION FOR OPERABLE UNIT 2 GREAT KILLS PARK SITE, GATEWAY NATIONAL RECREATION AREA STATEN ISLAND, NEW YORK

Final

May 13, 2019

This Addendum to the Sampling and Analysis Plan (SAP) for the Phase 1 Remedial Investigation (RI) for Operable Unit 2 (OU2) (NPS, 2018) at the Great Kills Park (GKP) Site (Site) describes activities to be performed as part of a site visit to evaluate conditions in the Great Kills Harbor. During Phase 1 investigation activities in October 2018, radiological anomalies were identified by the underwater gamma radiation survey performed adjacent to the former Marine Unloading Operation in the Great Kills Harbor. As a result, additional investigations are recommended during the Phase 2 RI for OU2 to evaluate the source of the radiological anomalies identified within the Great Kills Harbor and assess whether they are related to the Marine Unloading Operation. Therefore, a site visit will be performed to evaluate conditions in the Great Kills Harbor prior to developing the SAP for the Phase 2 RI for OU2.

## Purpose

The purpose of the site visit is to gather information to support the technical approach for future investigations of radiological anomalies identified within the Great Kills Harbor. The specific goals are to (1) understand the physical characteristics of sediments within the Great Kills Harbor to support the development of a sampling approach for future investigations, and (2) evaluate whether distributed radiological contamination is present in sediment such that engineering controls and/or minimally disruptive investigation techniques would be required during future sampling to prevent the spread of contamination.

## Field Sampling Plan

Sediment will be collected from six locations within the Great Kills Harbor, including two locations directly adjacent to the bulkhead. Each of the six sampling locations correspond to areas of the Great Kills Harbor in which radiological anomalies were identified during the underwater gamma radiation survey performed during Phase 1 sampling activities in 2018. **Figure 1** shows the planned sediment sampling locations and **Table 1** presents the coordinates.

**Table 1. Sample Location Coordinates**

Location ID	Longitude	Latitude
Sediment		
GKH-SED-01	-74.13196	40.54661
GKH-SED-02	-74.13125	40.54641
GKH-SED-03	-74.13129	40.54633
GKH-SED-04	-74.132	40.54644
GKH-SED-05	-74.13179	40.54642
GKH-SED-06	-74.13347	40.54672

Prior to collecting each sample, a refined underwater gamma radiation survey will be performed within a 5 ft radius around each sample location listed in Table 1. The refined survey will be performed using a waterproofed 2-inch by 2-inch sodium iodide (NaI) detector (Ludlum 44-10) coupled to a ratemeter/scaler (Ludlum 2221) and a Trimble Geo 7X Global Positioning System (GPS), which is the same system configuration used to perform the underwater gamma radiation survey during the Phase 1 investigation in 2018. The refined survey will be performed by

advancing the NaI detector at a rate of 0.5 meters per second or less and by keeping the NaI detector in direct contact with the bathymetric surface or no greater than 1-inch above the sediment surface. The purpose of the refined survey is to pinpoint the final sediment sampling location, so that it aligns with the area exhibiting the highest count rate. Once the final sediment sampling location has been identified, the coordinates will be logged using the GPS and sampling will proceed.

For the two locations (see **Figure 1**) that can be accessed in shallow water from the bulkhead (i.e., GKH-SED-01 and GKH-SED-02), additional radiological surveys will be performed using a Canberra Osprey® multichannel analyzer (MCA). For these additional surveys, the MCA is coupled to a stabilized 2-inch by 2-inch NaI detector encased in a water tight PVC housing and connected to a field computer to operate the system. The MCA and field computer (i.e., with Canberra's proprietary software) allow the gamma radiation spectrum to be analyzed. Spectrums resulting from these additional radiological surveys will be reviewed by a Certified Health Physicist to evaluate the radionuclides that may be associated with the radiological anomalies identified during the underwater gamma radiation survey performed during Phase 1 investigation activities.

Sediment samples will be collected using a hand-held piston corer, which was selected because sampling can be performed with minimal disturbance and/or suspension of surrounding sediments. If the sediments are soft and unconsolidated, the corer will be advanced by hand. However, if the sediments are firm, a slide hammer, operated by a minimum of two sampling technicians, will be used to advance the corer. For this investigation, the corer will be driven to a target depth of 3 ft or until refusal is encountered. The piston corer will be retrieved by hand, with both sampling technicians pulling the sampling device with equal force to smoothly remove the core. The bottom of the core barrel will be capped before it is pulled onto the vessel for processing.

Once the core has been retrieved and placed on the deck of the vessel, the sediment core will be scanned in 6-inch increments using a 3-inch by 3-inch NaI (Ludlum Model 44-20) connected to a Ludlum Model 2221 data logger. The measurements will be one-minute integrated counts reported in counts per minute. In addition, each sediment core will be logged to define the physical characteristics observed along the core. Each core will also be evaluated for the presence of waste fill. The identification of waste fill will be accomplished by observing pieces of debris that were less susceptible to decomposition, such as glass, masonry, ceramics, rubber, and metal, in the core. A sediment sample will be collected at the interval of the soil core exhibiting the highest levels of gamma radiation (i.e., as determined by radiological scans of the soil core). One sediment sample will be collected at each of the six planned sampling locations and sent offsite for laboratory analysis. Each sample will be analyzed for radium-226, thorium-232, and uranium-238 via EPA 901.1m in accordance with the Final Phase 1 RI SAP for OU2 (NPS, 2018). Sediment samples will be screened with a gamma radiation detector, labeled and transferred to a cooler. Sediment sampling activities will be documented using the log sheets provided in Appendix C of the Final Phase 1 RI SAP for OU2 (NPS, 2018).

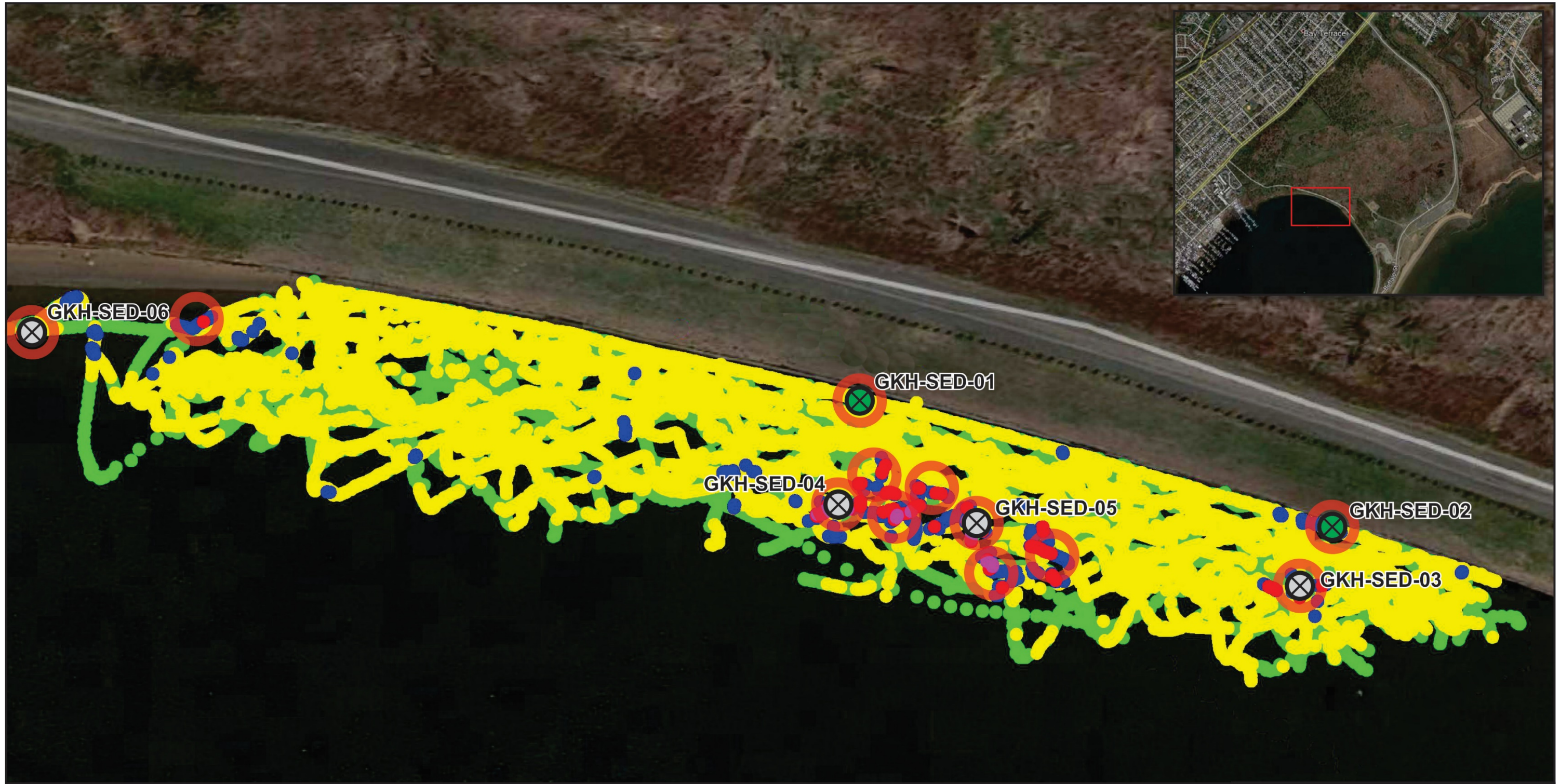
## **Health and Safety**

While it is not anticipated, in the event that a radiological article is recovered during sediment sampling operations, the location and depth of the article will be logged and the item will be surveyed for radioactivity and photographed prior to being turned over to the United States Army Corps of Engineer's Health Physicist for proper storage and disposal. All field sampling activities described in this SAP Addendum will be performed in accordance with the Final Site-Wide Accident Prevention Plan (AECOM-Tidewater JV, 2018).

## **References**

AECOM-Tidewater JV, 2018. *Great Kills Park Site-Wide Accident Prevention Plan (Revision 01)*. April.

National Park Service (NPS). 2018. *Final Sampling and Analysis Plan for the Phase 1 Remedial Investigation for Operable Unit 2, Gateway National Recreation Area, New York*. September 7.



<p><b>Gamma Survey Results:</b></p> <ul style="list-style-type: none"> <li><span style="color: green;">●</span> 86 to 2300 cpm</li> <li><span style="color: yellow;">●</span> 2300 to 4600 cpm</li> <li><span style="color: blue;">●</span> 4600 to 6000 cpm</li> <li><span style="color: red;">●</span> 6000 to 8000 cpm</li> <li><span style="color: purple;">●</span> 8000 to 17820 cpm</li> </ul>	<p><b>Legend:</b></p> <ul style="list-style-type: none"> <li><span style="color: red; border: 1px solid red; border-radius: 50%; width: 15px; height: 15px; display: inline-block;"></span> Denotes the Location of a Suspected Radiological Anomaly</li> <li><span style="color: green; border: 1px solid green; border-radius: 50%; width: 15px; height: 15px; display: inline-block; margin-right: 5px;"></span> <span style="color: green; border: 1px solid green; border-radius: 50%; width: 15px; height: 15px; display: inline-block; margin-left: 5px;"></span> Sediment Sampling Location with Additional Radiological Surveys to Identify Radionuclides Associated with the Anomaly</li> <li><span style="color: black; border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; display: inline-block; margin-right: 5px;"></span> <span style="color: black; border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; display: inline-block; margin-left: 5px; text-align: center; vertical-align: middle;">X</span> Sediment Sampling Location</li> </ul>	<p>0 25 50 100</p> <p style="text-align: center;">Scale in Feet</p>		<p> <b>National Park Service</b> Gateway National Recreation Area</p> <p><b>Map Showing the Underwater Gamma Survey Results and Planned Sampling Activities</b></p> <p>Great Kills Park, Staten Island, NY <span style="float: right;">May 2019</span></p>
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**Figure 1. Map Showing the Underwater Gamma Survey Results and Planned Sampling Activities**