Environmental Evaluation/Cost Analysis Investigation Summary Report

Virgin Islands National Park

Areas 1, 2, and 3 of the Caneel Bay Resort
St. John, U.S. Virgin Islands
EDL Number 5SER3346

Prepared by

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List of Abbreviations and Acronyms

ACM	asbestos-containing material
ARAR	Applicable or Relevant and Appropriate Requirement
AST	aboveground storage tank
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DDT-total	DDT plus its metabolites DDD and DDE
DU	decision unit
EE/CA	Engineering Evaluation/Cost Analysis
EMI	electromagnetic induction
ESV	Ecological Screening Value
ft bgs	feet below ground surface
GPR	ground-penetrating radar
GPS	global positioning system
IDW	investigation-derived waste
ISM	incremental sampling methodology
ITRC	Interstate Technology and Regulatory Council
JJBA	Javier J. Bidot Associates
kg	kilogram
L	liter
MCL	Maximum Contaminant Level
mg	milligram
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEH	New Environmental Horizons, Inc.
NPS	National Park Service
PAH	polycyclic aromatic hydrocarbon
PAL	project action level
PID	photo-ionization detector
PVC	polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
RSL	Regional Screening Level
SAP	Sampling and Analysis Plan
Site	Caneel Bay Resort Site
SLERA	Screening Level Ecological Risk Assessment
SVOC	semi-volatile organic compound
TCLP	Toxicity Characteristic Leaching Procedure

µg	microgram
USEPA	U.S. Environmental Protection Agency
UST	underground storage tank
USVI	U.S. Virgin Islands
VIIS	Virgin Islands National Park
VOC	volatile organic compound
WWTP	wastewater treatment plant

1. Introduction

This Environmental Evaluation/Cost Analysis (EE/CA) Investigation Summary report presents the results of investigation activities completed in February 2021 at the Caneel Bay Resort (the Resort) located within Virgin Islands National Park (VIIS) on St. John, U.S. Virgin Islands (USVI). The National Park Service (NPS) performed an EE/CA field investigation pursuant to its lead agency authority under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The NPS retained VHB (formerly the Johnson Company, Inc.) under Blanket Purchase Agreement No. P16PA00039; Call Order No. P16PB00350 to perform an EE/CA investigation at the Site. This report was prepared as an appendix to the EE/CA report, which provides detailed information regarding the Site location, history, setting, and conceptual site model.

Based on the results of previous Site investigations, available information regarding historical use of the Site, and a Site reconnaissance performed in 2016, the EE/CA Sampling and Analysis Plan (SAP) identified three primary investigation areas, which comprise the Site:

- **Area 1**: approximately 1.7 acres near the wastewater treatment plant (WWTP) structures, on the southeastern side of the resort. Of this total area, NPS investigated approximately 0.8 acres, which is primarily the gravel staging area.
- **Area 2**: approximately 5.4 acres that encompass the engineering, maintenance, landscaping, and fuel buildings and facilities, to the southwest of the WWTP.
- **Area 3**: approximately 1.5 acres immediately east of Honeymoon Beach (undeveloped except for a donkey shelter) that will be referred to in this document as the landfill to reflect historical usage.

Due to changes in Site conditions since the previous investigation and the 2016 reconnaissance, NPS conducted additional limited investigation activities related to building materials and potentially buried wastes outside the three primary areas, but within the resort. The Site boundaries and locations and extents of Areas 1, 2, and 3 are depicted on Figure B-1. Changes to site conditions since 2016 are primarily a result of 2017 hurricanes Irma and Maria.

Based on the results of previous Site investigations, the SAP identified the following preliminary contaminants of potential concern (the study constituents) in the noted media and investigation areas:

- Resource Conservation and Recovery Act (RCRA) 8 and 13 Priority Pollutant metals in all media—all areas. These metals include antimony, arsenic, barium, beryllium, cadmium, chromium (III and VI), copper, lead, mercury, nickel, selenium, silver, thallium, and zinc.
- Volatile organic compounds (VOCs) in surface soil near aboveground storage tanks, in landfill contents, and in groundwater—Areas 2 and 3
- Polychlorinated biphenyls (PCBs) in soil (landfill contents) and groundwater near the landfill—Area 3
- Toxicity Characteristic Leaching Procedure (TCLP) RCRA 8 metals, VOCs, semi-volatile organic compounds (SVOCs), and pesticides in soil (landfill contents) —Area 3. RCRA 8 metals include arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver.
- Polycyclic aromatic hydrocarbons (PAHs) in surface soil and landfill contents and in groundwater—all areas
- Pesticides in soil and landfill contents and in groundwater—all areas

In addition to the study constituents, the investigation sought visual evidence of asbestos-containing materials (ACM) and lead-based paint that may be impacting the environment. The limited visual investigation related to asbestos was not intended to fully characterize the nature and extent of asbestos contamination. Soil samples were collected to screen for the presence of potential impacts by lead-based paint (this sampling was not intended to assess the full nature and extent of lead-based paint impacts). Additional investigation may be necessary to assess the full nature and extent of lead and asbestos-related impacts.

As documented in the SAP, the primary goal of the field investigation was to provide sufficient data to complete an EE/CA. The field investigation was designed to:

1. Assess the nature and extent of Site-related contamination in Site surface soil
2. Assess the nature and extent of study constituents in landfill debris
3. Provide sufficient data to support assessing risk to human receptors
4. Provide sufficient data to support assessing risk to ecological receptors
5. Assess local background/reference concentrations for the study constituents in soil
6. Assess whether study constituents in groundwater downgradient of potential source areas are present in elevated concentrations
7. Assess local reference concentrations for the study constituents in groundwater
8. Survey the area around Cottage 7 (shown in Figure B-1) for evidence of an abandoned underground storage tank (UST)

9. Provide preliminary data to assess the need for further investigation of potential impacts from the presence of lead-based paint and asbestos
10. Provide sufficient data to evaluate if the known asbestos pipe is connected to an existing pipe network or if the buried pipe has been removed
11. Provide sufficient data to determine and evaluate potential response actions with respect to territorial and federal Applicable or Relevant and Appropriate Requirements (ARARs)
12. Provide information to support the evaluation of removal alternatives and their costs

Investigation objectives were generally met; however, shallow groundwater was not present in several of the target exploration locations and groundwater sampling could only be conducted at existing well MW-01. Therefore, groundwater data are insufficient to fully meet objectives 6 and 7. Also, more information is needed to assess potential risks that may be posed by asbestos and lead in soil outside of Areas 1, 2, and 3, which would provide additional information about objectives 1 and 3.These and other data gaps are identified and discussed in Section 3 of this report.

The EE/CA investigation identified soil concentrations of study constituents, including metals, PAHs, and pesticides, above Site-specific natural and anthropogenic background concentrations, and project action levels (PALs) in all surface soil sampling areas and in the landfill subsurface soil. A risk assessment was completed using the 2021 data, and only some of these constituents result in unacceptable risk at the Site (Appendix 3 to the EE/CA report). Groundwater sampling could only be conducted at existing well MW-01, where concentrations of certain metals above PALs were identified. Additional groundwater monitoring is recommended during the rainy season to identify the presence of groundwater at MW-3-01 and, if present, collect a sample.

The EE/CA investigation identified evidence of possible ACM and lead-based paint in and around Site structures and scattered through many areas of the Site. Preliminary data show lead concentrations in soil at resort structure driplines above background at more than half of sample locations. Further investigation, including additional soil sampling, would be required to characterize the nature and extent of asbestos and lead-based paint impacts to soil.

2. Field Investigation Activities and Assessment

VHB conducted EE/CA investigation field work from February 11 through 24, 2021. Table 1 of Attachment D, Field Activities Report, summarizes daily activities. As discussed in Sections 2.3 through 2.7, field work included a site reconnaissance, potential ACM survey, and preliminary lead-based paint investigation; a geophysical investigation; surface and subsurface soil

investigations; and groundwater investigation. Fieldwork activities were designed to answer decision and estimation questions identified in the SAP. A summary of the rationale for selecting individual soil sampling locations is provided as Table B-1

Subcontractor Javier J. Bidot Associates (JJBA) provided utility and buried materials surveying, using ground penetrating radar (GPR) and electromagnetic induction (EMI). JJBA completed surveys in Areas 2 and 3, at Cottage 7, and in the catchment basin storage area. JJBA conducted the survey in advance of drilling to locate utilities and to define the approximate extent of the landfill.

Drilling subcontractor On-Site Environmental, a USVI-certified driller, provided direct-push and auger drilling and installed a groundwater monitoring well. On-Site Environmental completed soil borings in and around Areas 2 and 3.

The NPS Federal Government Lead, Kelly Kachurak, was present during the week of February 15, 2021. Brad Dow and Fred Iannazzi, representatives of Caneel Bay Resort operator CBIA, were present during the investigation.

2.1. General Site Procedures

VHB and its subcontractors performed the EE/CA investigation fieldwork in general conformance with the SAP, dated February 5, 2021, with minor deviations as discussed in Attachment D, Field Activities Report. The Field Activities Report includes details on field program operation, including field forms (e.g., boring logs, sample forms, calibration logs, etc.) generated during the field program.

Due to Hurricanes Irma and Maria in 2017 and apparent subsequent inattention, Site conditions at the time of the fieldwork had changed significantly from those encountered during the 2016 reconnaissance and prior environmental investigations. Building debris was observed scattered and piled in many areas of the Site, and many previously cleared and/or landscaped areas were overgrown with dense vegetation. The presence of the debris and over-grown vegetation slowed some aspects of the work and limited access to some investigation areas. At the request of VHB, CBIA cleared part of Area 2 to allow for drill rig and surface sampling access. With CBIA's consent, VHB used hand tools to cut additional vegetation in other areas to permit access by foot for surface soil sampling. Due to the potential for physical hazards and disturbance of possible ACM, VHB did not move building materials or debris and adjusted proposed surface sampling locations based on the presence of such debris.

VHB performed work according to the Health and Safety Plan provided as Appendix 3 of the SAP. VHB posted a notice sign and a copy of the Spring 2021 Community Update at the entrance to the landfill along the access road to Honeymoon Beach. VHB and NPS did not

witness or receive reports of health and safety-related incidents associated with the EE/CA investigation, nor did they receive complaints regarding drilling activities creating unacceptable dust, vapor, odor, or noise.

VHB and NPS did not identify items of potential historical significance during drilling or surface soil sampling.

On-Site Environmental established a central decontamination area for the drilling rig and tooling within the engineering and maintenance area. On-Site Environmental lined a decontamination pad with heavy-gauge plastic sheeting to capture decontamination water, which was transferred to a 55-gallon drum for characterization and disposal.

Eurofins shipped sample containers to VIIS in Cruz Bay, USVI. Following sampling, VHB packed samples with wet ice in coolers and shipped via FedEx to the designated Eurofins laboratories according to the required analyses. FedEx's warehouse in Memphis, Tennessee, was adversely impacted by a winter storm in February, and some coolers were delayed during shipping. New Environmental Horizons' (NEH) data validator was aware of the delays and provided guidance regarding resampling. VHB recollected one pH sample because the delay exceeded the hold time for the analysis. Analytical laboratory reports, including chains of custody, are provided in Attachment E.

NEH validated analytical data using the criteria established in the SAP. NEH concluded that, except for VOCs in three ISM samples, the reported results are usable for the intended purpose, with qualifications applied where necessary based on the validation effort. The VOC results from three DUs were rejected because the laboratory analyzed only the water-preserved samples, which exceeded the allowable hold times, and did not analyze the methanol-preserved vials for the same samples. The laboratory maintains that the sample results, which were not above laboratory quantitation levels, are usable because the concentrations of detected analytes did not require additional analysis, but NEH has rejected these results. Although the data were rejected for risk assessment and decision-making purposes, they are included in this report for context and future reference. Because only one decision unit was affected and field observations support the intended evaluation of the historical petroleum release, the EE/CA can proceed without resampling this area for VOCs. Data validation reports are provided in Attachment C.

Investigation-derived waste (IDW) generated during the field investigation was contained in 55-gallon drums; one drum containing IDW water and two containing IDW soil were produced during the EE/CA fieldwork. VHB collected and Eurofins analyzed samples of IDW water and soil. All drums were placed on a pallet in the equipment and maintenance zone of Area 2 and covered with a tarp. Laboratory results, provided in Attachment E, indicate the IDW is not

hazardous. On-Site Environmental removed all drums in early May for appropriate disposal based on the analytical results.

2.2. Screening Criteria

As defined in the SAP, VHB used the following project screening levels to compare study constituent concentrations to human health and ecological screening levels. The lowest screening level for each study constituent was selected as the PAL.

Medium	Human Health	Ecological
Soil	USEPA Regional Screening Level (RSL) for Resident Soil, target cancer risk of 1E-06 and target hazard quotients of 0.1 (USEPA, 2020) Virgin Islands UST Rules and Regulations Soil Cleanup Target Levels (Virgin Islands Rules and Regulations, 2014)	NPS Ecological Screening Values (ESVs) for Soil – Screening Level Ecological Risk Assessment (SLERA) Contaminant of Potential Ecological Concern (COPEC) Selection ESV, lowest ESV from Table 5: Soil ESVs for Plants and Soil Invertebrates and Table 6: Soil ESVs for Birds and Mammals (NPS, 2018). This document reviews candidate sources for ecological screening levels and selects the most appropriate ESVs
Groundwater	USEPA RSL for Tapwater, target cancer risk of 1E-06 and target hazard quotients of 0.1 (USEPA, 2020) USEPA Vapor Intrusion Screening Levels (VISLs) for groundwater adjusted for a target hazard quotient of 0.1 (USEPA, 2016) Virgin Islands maximum contaminant levels (MCLs), which are the same as the National Primary Drinking Water Regulations (USEPA, 2010) Virgin Islands UST Rules and Regulations Water Cleanup Target Levels, Groundwater Cleanup Criteria (Virgin Islands Rules and Regulations, 2014)	NPS ESVs for Surface Water – lowest value from SLERA COPEC ESV, Table 1a: Surface Water ESVs for Aquatic Receptors (Freshwater) and SLERA COPEC Selection ESV, Table 7, Surface Water Ecological Screening Values for Amphibian Receptors (NPS, 2020). This document reviews candidate sources for ecological screening levels and selects the most appropriate ESVs. The document suggests that if aquatic receptors may come into contact with contaminated groundwater, it would be appropriate to compare groundwater "concentrations to surface water ESVs to determine if further assessment of this exposure scenario is warranted" (NPS, 2020).

As discussed in Sections 2.5 through 2.7, VHB made a preliminary comparison of study constituent concentrations to PALs. In accordance with CERCLA guidance, screening levels are considered a preliminary step to risk assessment and do not necessarily indicate unacceptable risk. A risk assessment has been performed using the data from this investigation (see EE/CA Appendix C) to evaluate site-specific risk.

The EE/CA investigation included sampling to establish background, or reference, values.

2.3. Site Reconnaissance, Potential ACM Survey, and Preliminary Lead-Based Paint Investigation

2.3.1. Purpose and General Approach

The resort has been closed since 2017 when Hurricanes Irma and Maria caused significant destruction. The EE/CA Site reconnaissance and previous environmental investigation were conducted before the hurricanes, and full post-hurricane Site conditions were unknown when the SAP was prepared. At the beginning of the fieldwork, VHB conducted a Site reconnaissance and limited investigation to identify changes to Site conditions since the 2017 hurricanes and evidence of possible environmental contamination from ACM and lead-based paint in building materials. VHB inspected the following areas:

- Area 1: Proposed sampling locations and the surrounding gravel staging area and WWTP area to identify changes to Site conditions that could impact the investigation
- Area 2: Proposed sampling locations and the surrounding engineering and maintenance, grounds and landscaping, and emergency generator areas to identify changes to Site conditions that could impact the investigation.
- Area 3: Proposed sampling locations and landfill extents, immediate surroundings, and adjacent reference sampling locations to identify changes to Site conditions that could impact the investigation
- Other Resort Areas: Resort buildings and grounds outside the primary investigation areas for evidence of ACM and lead-based paint that could be causing environmental contamination. VHB identified buildings of apparent similar construction and condition and collected surface soil samples for lead analysis from along representative building driplines and debris piles. Sampling of building materials was not performed.
- Catchment basin storage area: Storage area below the catchment basin for evidence of possible or potential hazardous materials releases to the environment

2.3.2. Methods

Starting in the northern portion of the resort and working south, VHB inspected building interiors and exteriors for evidence of possible lead-based paint and ACM that could be causing environmental contamination. The investigation was not exhaustive and was limited by dense vegetation, the size of the Resort, the degree of destruction, and health and safety concerns regarding possible physical hazards. Referencing global positioning system (GPS)-enabled maps, VHB inspected proposed sampling areas for conditions that could impact the investigation.

Observations were recorded with georeferenced photographs, and sampling areas were adjusted as required, as discussed in Sections 2.5 through 2.7.

VHB collected surface soil samples for lead analysis along building and debris driplines from 19 representative locations: SC-Bldg-01 through SC-Bldg-19. Representative sample locations were identified by grouping buildings of apparently similar construction and condition. At each sample location, four subsamples of approximately equal volume were collected from 0 to 0.5 feet below ground surface (ft bgs) using a trowel and transferred to a stainless-steel bowl for compositing. Samples were mixed with a stainless-steel spoon and transferred to laboratory-supplied glassware. Following collection, sample containers were placed on wet ice for preservation, packed in sample coolers with wet ice, and shipped via FedEx to the designated Eurofins laboratory.

VHB decontaminated sampling equipment, including bowls, sampling spoons, and trowels, with detergent and distilled water between each sample location. Decontamination water was collected in 5-gallon buckets and transferred to a 55-gallon drum for characterization and disposal.

Eurofins analyzed surface soil samples for total lead using EPA Method 6020A.

2.3.3. Results

At the time of the EE/CA investigation fieldwork, much of the Site remained in the condition left by the 2017 hurricanes. Many areas that had been cleared, based on photographic evidence, were covered with dense vegetation. VHB observed a wide variety of damage to Site structures; some appeared generally intact apart from abandonment, while others were missing roofs and/or walls, or were collapsed entirely. Building debris, including roofing materials with possible ACM and lead-based paint, were observed scattered across the Site. In some cases, materials were observed hundreds of feet from their believed original locations, including submerged in Hawksnest Bay. Modifications to surface soil sampling areas required due to the presence of debris are discussed in Section 2.5.

Observations of potential ACM and lead-based paint are summarized in Table B-2. Sample locations, observation locations, and representative photographs are shown on Figure B-3. Analytical results for the lead-based paint investigation are summarized in Table B-3 and shown on Figure B-5. Discussions of the nature and extent of potential ACM and lead-based paint are provided in Sections 2.8.2 and 2.9, respectively. Discussion of other environmental conditions identified during Site reconnaissance and fieldwork is provided in Section 2.10.

2.4. Geophysical Investigation

2.4.1. Purpose and General Approach

VHB directed and oversaw geophysical investigation activities by subcontractor JJBA in the following areas:

- Area 2: to locate subsurface utilities in advance of drilling and to trace the previously identified asbestos-cement pipe in the grounds and landscaping area
- Area 3: to locate subsurface utilities in advance of drilling, to help delineate landfill boundaries, and to locate potential buried materials
- Cottage 7: to identify evidence of a possible historical UST
- Catchment basin storage area: to identify evidence of possible buried materials

The SAP did not include investigation activities at the catchment basin storage area; these were added during fieldwork based on an NPS review of correspondence from a citizen to CBIA and EHI (DiGiacomo, 2020).

2.4.2. Methods

Geophysical investigation activities began with an area reconnaissance to identify evidence of possible subsurface utilities and/or underground features. JJBA scanned areas with EMI and GPR equipment. Debris and dense vegetation limited equipment access in some areas. Where metallic pipes were observed at the ground surface, direct connections were made to introduce detectable signals along the utilities. As subsurface features were identified, JJBA marked locations with marking paint. JJBA and/or VHB subsequently recorded feature locations with a sub-meter accurate GPS.

2.4.3. Results

JJBA located, marked, and recorded subsurface utilities at all proposed drilling locations. Proposed locations were adjusted, as required, to provide adequate buffers around located utilities.

JJBA was unable to delineate landfill boundaries by geophysical methods. Landfill extents were instead approximated based on surface topography and conditions. JJBA identified two subsurface linear features within the central portion of the landfill, which they described as possible buried tree trunks. JJBA did not identify other anomalies within the landfill.

Discussions of the geophysical investigation results at Cottage 7 and the catchment basin storage area are provided in Sections 2.8.1 and 2.10, respectively. JJBA's subsurface utility survey report is provided as Attachment A.

2.5. Surface Soil Investigation

2.5.1. Purpose and General Approach

VHB conducted surface soil sampling by incremental sampling methodology (ISM) to characterize the nature and extent of study constituents in the three primary investigation areas. Additionally, VHB conducted surface soil sampling by ISM in two reference areas to evaluate Site-specific background conditions. ISM sampling areas are shown on Figures B-2B and B-2C.

- Area 1: VHB collected ISM samples from four decision units (DUs) within the gravel staging area. IA-1-01 and IA-1-02 were identified in the SAP and defined to characterize the surface of the gravel staging area. IA-1-03 and IA-1-04 were not identified in the SAP but were defined during the fieldwork to characterize small possible discrete releases discovered during the investigation. IA-1-03 was defined to encompass an area of apparent paint dumping at the southern end of the gravel staging area. IA-1-04 was defined to encompass an area of at least 12 partially buried and rusted steel 55-gallon drums, some of which appeared to contain washed pebbles.
- Area 2: VHB collected ISM samples from five DUs surrounding the engineering & maintenance area (IA-2-01 and IA-2-03), in the grounds and landscaping area (IA-2-04), and near the emergency generator aboveground storage tanks (ASTs) (IA-2-05).
- Area 3: Prior to other surface soil sampling, VHB collected eight discrete soil samples from the landfill surface for asbestos. VHB collected ISM samples from four DUs within and around the landfill area. IA-3-01 and IA-3-02 were identified in the SAP and defined to characterize the surface of the landfill. IA-3-03 and IA-3-04 were not identified in the SAP. IA-3-03 was defined in the field to characterize the bottom of the drainage channel along the southern edge of the landfill. IA-3-04 was defined in the field to characterize the areas of apparent seeps along the southern face of the landfill.
- Reference Areas: VHB collected ISM samples from two reference DUs: IA-Ref-01 and IA-Ref-02.

2.5.2. Methods

VHB staked out proposed DU boundaries with a handheld GPS unit, adjusting DU boundaries in the field, as required, to encompass target areas and avoid areas where sampling was not feasible due to the presence of previously unmapped buildings, concrete pads, or extensive debris piles. DUs were not adjusted for smaller debris piles, scattered debris, or vegetation; VHB worked around these features. VHB recorded actual DU boundaries by GPS.

VHB collected eight discrete soil samples, SC-AS-01 through SC-AS-08, from the landfill surface for asbestos analysis. Sample locations were selected to be approximately evenly distributed

across the landfill surface. VHB collected samples from approximately 0 to 0.5 ft bgs and directly transferred them to plastic bags with zip-top closures using a trowel. Samples were packaged, without preservation, and shipped via FedEx to the EMSL laboratory in North Cinnaminson, NJ.

VHB collected three replicate ISM samples (designated as A, B, and C) and a discrete pH sample from each DU. Each ISM replicate was composed of 40 approximately equal volume increments. At each increment location, VHB used a cordless drill with a 1-inch diameter ship auger bit to obtain an approximately equal volume of soil from a depth of 0 to 0.5 ft bgs. Stainless steel spoons were used, as required, to transfer soil to sample containers without mixing or sieving. Samples were collected in plastic bags with zip-top closures for all study constituent analyses, except VOCs. For VOC analysis, VHB transferred approximately 5 grams of soil from each increment location to laboratory-provided, methanol-preserved vials. Following collection, sample containers were placed on wet ice for preservation. Periodically throughout the fieldwork, VHB packed sample coolers with wet ice and shipped them via FedEx to designated Eurofins laboratories.

VHB decontaminated sampling equipment, including augers, sampling spoons, and trowels, with detergent and distilled water between each sample location or replicate. Decontamination water was collected in 5-gallon buckets and transferred to a 55-gallon drum for characterization and disposal.

EMSL analyzed soil samples for asbestos via EPA method 600/R-93/116 using polarized light microscopy (PLM) and milling preparation.

Eurofins processed ISM samples by drying, disaggregating, sieving, and subsampling using the 2-Dimensional Slabcake method. Following ISM processing, surface soil samples were analyzed for the following analytes by the following methods:

- Total metals by EPA Methods 6020A and 7471A: antimony, arsenic, barium, beryllium, cadmium, chromium III, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc
- PCB Aroclors by EPA Method 8082A (in Area 3 only)
- 18 PAHs by EPA Method 8270D (acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, dibenz(a,h)anthracene, benzo(k)fluoranthene, chrysene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, pyrene, and phenanthrene)
- Organochlorine pesticides by EPA Method 8081A
- Total VOCs by EPA Method 8260C (In IA-2-05 only)
- pH

2.5.3. Results

VHB screened analytical results against PALs to determine whether to retain study constituents for further evaluation. Reported concentrations in surface soil of metals (antimony, arsenic, barium, cadmium, copper, lead, mercury, nickel, selenium, thallium, and zinc), pesticides (dichlorodiphenyldichloroethane [DDD], dichlorodiphenyldichloroethylene [DDE], dichlorodiphenyltrichloroethane [DDT], dieldrin), and SVOCs (benzo(a)pyrene) exceeded PALs in one or more replicate sample, so these compounds were retained. The SAP did not define a PAL for chromium, but this study constituent was also retained for further evaluation.

Analytical results are summarized in Tables B-4A through B-4E. In general, similar study constituents were found at Areas 1, 2, and 3, although at differing concentrations. Because the risk assessment will be used to select the contaminants that cause unacceptable risk and, therefore, may be subject to the removal action, figures are not presented as part of this report to show the nature and extent of contaminants with concentrations above PALs. These figures will be presented in the EE/CA.

A discussion of asbestos surface soil sampling in Area 3 is provided in Section 2.8.2.

2.6. Subsurface Soil Investigation

2.6.1. Purpose and General Approach

VHB conducted subsurface soil sampling in Area 3 and in one reference area to characterize the nature and extent of waste materials and study constituents in the landfill and compare study constituent concentrations to Site-specific background levels.

- Area 3: On-Site Environmental, with direction from VHB, advanced 11 soil borings within the extents of the landfill. Shallow refusal was encountered at one location, SC-3-05, thus samples were not collected at this location.
- Reference Area: On-Site Environmental advanced 3 soil borings in the reference area along the slope to the northeast and above the landfill. Relatively shallow refusal was encountered at 0.7 to 4 ft bgs.
- Soil borings were also advanced in Area 2 for the groundwater investigation; this is discussed in Section 2.7.

2.6.2. Methods

VHB staked out proposed drilling locations with a handheld GPS unit. Prior to subsurface investigation, On-Site Environmental located and marked buried utilities near the proposed locations, as described in Section 2.4. VHB adjusted drilling locations in the field, as required, based on utility mark-outs, drill-rig access limitations, and to provide coverage of the observed

landfill extents. Following drilling, VHB surveyed the locations and ground surface elevations of each boring. To characterize the topography of the landfill and immediate surroundings, VHB also surveyed the ground elevation at various locations across and around the landfill.

VHB directed and oversaw drilling activities by its subcontractor, On-Site Environmental. On-Site Environmental collected continuous soil cores at each boring location by advancing dual tube samplers with polyvinyl chloride (PVC) liners using a track-mounted direct-push drill rig. Soil borings were advanced to refusal at all boring locations (some duplicate borings were advanced adjacent to primary locations to provide sufficient sample volumes; these duplicate borings were only advanced as deep as necessary to obtain the requisite sample volume). After drilling, On-Site Environmental closed each borehole with hydrated bentonite.

VHB screened soil cores with a photo-ionization detector (PID) and logged observations, including soil type, color, odor, and presence of waste or debris. Soil boring logs are provided in Attachment B. VHB collected landfill subsurface soil from the shallow and deep sample intervals to support NPS's evaluation of risk, and from combined intervals to support evaluation of disposal alternatives. VHB collected analytical samples from each core at depth intervals of approximately 0.5 to 3 ft bgs (to evaluate potential risk to surface soil receptors) and 4 to 6 ft bgs (to evaluate potential risk to construction and utility workers). Due to shallow refusal, no samples were collected at SC-03-05, and only shallow intervals were collected at SC-Ref-01, SC-Ref-02, and SC-Ref-03. VHB also collected composite waste characterization samples from each boring within the landfill from core intervals where waste or debris was observed. A TCLP sample was mistakenly not collected from SC-03-09, despite the observation of waste.

Consistent with the SAP, VHB did not collect soil samples from soil cores near the ASTs and fuel dispensers at Area 2. Groundwater monitoring wells were intended to evaluate contaminant migration from these potential sources, but no groundwater was observed.

VHB collected soil samples in laboratory-supplied glassware with stainless steel spoons. Sample containers were placed on wet ice for preservation following collection. Periodically throughout the fieldwork, VHB packed sample coolers with wet ice and shipped them via FedEx to designated Eurofins laboratories.

On-Site Environmental constructed a decontamination pad in the engineering and maintenance area and decontaminated drilling equipment that contacted subsurface soils using detergent and potable water prior to use and between each boring location. Decontamination wastewater was contained in buckets or in the decontamination pad and transferred to a 55-gallon drum for characterization and disposal.

Eurofins analyzed subsurface soil samples for the following analytes by the following methods:

- Total metals by EPA Methods 6020A and 7471A: antimony, arsenic, barium, beryllium, cadmium, chromium III, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc
- PCB Aroclors by EPA Method 8082A
- 18 PAHs by EPA Method 8270D (acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, dibenz(a,h)anthracene, benzo(k)fluoranthene, chrysene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, pyrene, and phenanthrene)
- Organochlorine pesticides by EPA Method 8081A
- Total VOCs by EPA Method 8260C
- pH

Eurofins also analyzed composite samples from nine borings for waste characterization by the following methods:

- TCLP RCRA 8 metals
- TCLP SVOCs
- TCLP pesticides
- TCLP VOCs

2.6.3. Results

VHB screened subsurface soil analytical results against PALs to determine whether to retain study constituents for further evaluation. Reported concentrations in subsurface soil of metals (arsenic, barium, cadmium, copper, lead, nickel, and zinc) and pesticides (DDD, DDE, DDT, and beta-BHC) exceeded PALs in one or more sample, so these compounds were retained. The SAP did not define a PAL for chromium, but this study constituent was also retained for further evaluation.

Because the risk assessment will be used to select the contaminants that cause unacceptable risk and, therefore, may be subject to the removal action, figures are not presented as part of this report to show the nature and extent of contaminants with concentrations above PALs. These figures will be presented in the EE/CA. Analytical results are summarized in Tables B-5A through B-5F.

ASTs and Fuel Dispenser at Area 2

VHB identified PID, visual, and olfactory evidence of petroleum contamination at SC-2-03, to the west of the fuel dispenser in the emergency generator and AST area. Based on these observations, VHB directed the advancement of one additional boring north of the fuel

dispenser, SC-2-05. Possible drilling locations were restricted by identified subsurface utilities in the area and the limits of the geophysical investigation. Soil boring logs are provided in Attachment B.

Landfill at Area 3

VHB collected landfill subsurface soil from shallow and deep sample intervals to support risk evaluation and from combined intervals to support evaluation of disposal alternatives. Because the risk assessment will be used to select the contaminants that cause unacceptable risk and, therefore, may be subject to the removal action, figures are not presented as part of this report to show the nature and extent of contaminants with concentrations above PALs. These figures will be presented in the EE/CA.

Subsurface soil TCLP results do not exceed RCRA toxicity characteristic maximum concentrations. Based on these findings, the landfill material would not be considered a characteristic hazardous waste by toxicity for disposal purposes.

Based on soil core observations, landfill materials include silts, sands, and gravels with intermixed solid waste, including wood and other organic materials, concrete, brick, tar paper, plastic, textiles, glass, and metal. Solid waste was observed at all boring locations—except SC-3-05 where there was no core recovery—at maximum depths from 1 ft bgs at SC-3-07 to 26 ft bgs at SC-3-04. Boring refusal was encountered between 0 ft bgs at SC-3-05 and 27 ft bgs at SC-3-04. All borings were advanced to refusal and rock fragments were observed in cores at some locations, suggesting refusal on rock. Geologic cross-sections of the landfill are shown in Figure B-6. Cross-section locations are shown on Figure B-2C.

VHB identified an apparent ephemeral stream that had incised a drainage channel along the southern face of the landfill; the stream was dry at the time of the fieldwork. Two possible tributary ephemeral streams were observed along the upslope side of the drainage channel. VHB observed evidence of erosion of the landfill, including exposed waste, along the drainage channel. Based on visual observation and topographic survey data, the landfill slopes along the drainage channel to the south and Honeymoon Beach to the west are steep, with grades approaching 90% in some areas.

2.7. Groundwater Investigation

2.7.1. Purpose and General Approach

VHB conducted a groundwater investigation to characterize the nature and extent of potential shallow groundwater contamination in Areas 2 and 3. Shallow groundwater quality conditions in the unconsolidated formation below the Site may be indicative of more significant releases, and

migration, of hazardous substances. As no evidence of current or previous groundwater was observed at soil boring locations, drilling was not performed at the proposed reference monitoring well locations.

- Area 2: On-Site Environmental, with direction from VHB, advanced four soil borings at proposed monitoring well locations and one additional soil boring in the emergency generator and AST area. Temporary piezometers were installed at three boring locations to check for the presence of groundwater, but groundwater was determined not to be present. The existing monitoring well in the engineering and maintenance area, MW-01, was redeveloped and sampled.
- Area 3: On-Site Environmental, with direction from VHB, installed one monitoring well in the southern portion of the landfill, near the apparent seeps along the southern landfill face. The well was dry at the time of installation and was not sampled.
- Soil boring and groundwater monitoring locations are shown on Figures B-2B and B-2C.

2.7.2. Methods

VHB staked out proposed drilling locations with a handheld GPS unit. Prior to subsurface investigation, On-Site Environmental located and marked buried utilities near the proposed locations, as described in Section 2.4. VHB adjusted drilling locations in the field, as required, based on utility mark-outs, drill rig access limitations, and field observations. Following drilling, VHB surveyed the locations and ground surface elevations of each boring. The top-of-casing elevation at installed well MW-3-01 was also surveyed.

On-Site Environmental collected continuous soil cores to refusal at four proposed well locations. VHB screened soil cores with a PID and logged observations, including soil type, color, odor, and moisture. VHB did not observe evidence of groundwater in the recovered soil cores. On-Site Environmental installed 1-inch diameter PVC riser pipe in boreholes at SC-2-01, SC-2-02, and SC-2-03 as temporary piezometers. VHB checked each piezometer for water with an electronic water-level meter at approximately one, two, and four days after installation, and detected no water. After NPS decided not to install permanent monitoring wells in these locations, On-Site Environmental removed the temporary piezometers and closed each borehole with hydrated bentonite.

Based on the observation of possible seeps along the southern bank of the landfill, NPS elected to install a well, for future monitoring if groundwater is present during the rainy season, in the southern portion of the landfill. On-Site Environmental installed monitoring well MW-3-01 adjacent to soil boring SC-3-09 with 8-inch diameter hollow stem augers and 1.5-inch diameter PVC prepack well screen and riser. The well is screened from approximately 9 to 14 ft bgs in silty

sand to gravelly silt, immediately below a silty sand interval with observed waste materials, including plastic, sea shells, carpet fibers, and woody matter. On-Site Environmental completed the well above ground surface with a pad-locked, steel standpipe. Approximately one day after installation, VHB checked MW-3-01 for the presence of groundwater with an electronic water-level meter and found it dry.

Boring logs and the well construction log for MW-3-01 are provided in Attachment B. To avoid confusion, soil boring identifiers at proposed well locations where wells were not installed were updated from "MW" to "SC" (e.g., the soil boring at proposed well location MW-2-01 is now identified as SC-2-01).

VHB attempted to redevelop existing monitoring well MW-01 with a peristaltic pump. The well was purged dry after removing approximately 0.5 gallons of water. After four days of recharge, VHB attempted to sample MW-01 with low-flow methods, in accordance with the SAP, but the well was purged dry after removing less than 0.5 gallons of water. After two days of recharge, VHB collected a grab sample by peristaltic pump. Due to the limited well volume and slow recharge, samples were only collected for VOCs, SVOCs, and metals. VHB collected groundwater samples in laboratory-supplied bottles placed them on wet ice in coolers and shipped them via FedEx to designated Eurofins laboratories.

Eurofins analyzed the groundwater sample for the following analytes with the following methods:

- Metals by EPA Methods 6020A and 7470A: antimony, arsenic, barium, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc
- VOCs by EPA Method 8260C: The full standard analytical laboratory list of VOCs
- 18 PAHs by EPA Method 8270D (acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, dibenz(a,h)anthracene, benzo(k)fluoranthene, chrysene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, pyrene, and phenanthrene)

2.7.3. Results

The fieldwork was conducted during St. John's dry season under "moderate drought" conditions (NOAA/NWS, 2021). The lack of evidence for the presence of groundwater in unconsolidated soil during the fieldwork does not preclude the possible presence of groundwater during other seasonal or environmental conditions. VHB collected one groundwater sample from MW-1 in Area 2 and installed one monitoring well at Area 3, which may yield at water sample in a wetter season. VHB did not observe evidence of groundwater at boring locations, temporary

piezometers, or installed well MW-3-01. The possible presence of groundwater during other seasonal or environmental conditions is unknown. The potential for contamination of possible seasonal groundwater is also unknown. Additional investigation during a wetter season may be warranted.

Analytical results are summarized in Tables B-6A through B-6C.

Area 2

VHB measured groundwater at and collected a sample from existing well MW-01; however, there is evidence to suggest that MW-01 collects infiltrating surface runoff, rather than representing groundwater in the subsurface geologic formation. VHB observed that MW-01 is screened to the surface and had a poorly secured road box. Based on the well's condition and location—on the low side of the paved engineering and maintenance area—the well may act as conduit for surface runoff to the subsurface. In that case, the groundwater sampled at MW-01 would represent localized infiltration and not a larger aquifer. Observations at downslope soil borings, SC-2-01 and SC-2-02, where groundwater was not observed in temporary piezometers at deeper depths (10.2 and 12 ft bgs, respectively, compared to 7 ft bgs at MW-01) support this possibility. Reported concentrations of some metals in groundwater at MW-01 exceed PALs.

Petroleum contamination was identified by observation in subsurface soil near the fuel dispenser in the emergency generator and AST area. Characterization and delineation of the contamination was not possible during this fieldwork because the contamination appeared to lead to buried utilities that are currently in-use, reportedly including electrical and possible water lines. The potential for contamination of seasonal groundwater and the presence of mobile LNAPL could not be evaluated and is unknown.

Area 3

VHB did not observe evidence of groundwater at boring locations or installed well MW-3-01. The observation of possible seeps, as evidenced by salt deposits, along the southern face of the landfill, suggests that groundwater may be present in the landfill intermittently, which likely relates to seasonal precipitation. The seep locations were dry at the time of the fieldwork. When flowing, seeps would appear to discharge to the drainage channel that leads to Honeymoon Beach. NPS elected to install MW-3-01 in the southern portion of the landfill to monitor for the presence of groundwater and, if groundwater is found, to collect samples at a later date.

2.8. Other Investigated Media

2.8.1. Cottage 7

As discussed in Section 2.4, VHB identified evidence of an historical UST at Cottage 7 but did not identify evidence of an existing UST. A pneumatic tank level gauge and two possible metallic fuel lines were identified in the electrical room of the former bomb shelter at Cottage 7. The metallic lines were observed exiting the northern exterior wall of the bomb shelter and traced by EMI outside to the north. The signal was lost beneath several air conditioning units. The patio and clearings north of the air conditioning units were scanned by GPR; evidence of a UST in those areas was not identified. Access limitations, caused by the presence of air conditioning units, dense vegetation, and debris, prevented scanning the immediate and surrounding areas where the metallic line signal was lost. Digging in the general area may uncover a UST, although this would need to occur after removing air conditioning units, vegetation, and debris. VHB did not observe evidence of vent or fill pipes in the area. The suspected underground fuel line location is shown on Figure B-4.

2.8.2. Potential ACM

Prior to ISM sampling at the landfill in Area 3, VHB collected eight discrete surface soil samples (identified as SC-AS-01 through 08) and shipped them to EMSL laboratory for a rapid-turnaround asbestos analysis. The results indicated that asbestos was not present in surface soil at concentrations that would require upgrading personal protective equipment during sampling or canceling ISM soil preparation at the laboratory. Asbestos was identified in one sample at a concentration of 0.75%.

VHB observed a variety of possible ACM at other locations in the resort, including plaster, drywall, tile, grout, acoustic tile, tar paper, and pipes within and surrounding many structures. In many areas, these materials were observed damaged and exposed to the environment. Roofing debris, including tar paper with exposed possible ACM fibers, was observed scattered around many areas of the Site. Evidence of possible ACM exposure to the environment was identified in the areas around the rooms at Turtle Bay Beach, the Turtle Bay Estate, the Turtle Town Children's Center, the rooms at Hawksnest Beach, the rooms at Scott Beach, the rooms at Cottage Point, the rooms at Caneel Beach, the Beach Terrace Dining Room, the Tennis Pro Shop and Massage Center, the Equator Restaurant, the Courtside rooms, the Fitness Center, the Garden View rooms, and the gravel staging area. Observations of possible ACM are summarized in Table B-2 and observation areas and representative photographs are shown on Figure B-3.

Due to scattered debris and dense vegetation, VHB and JJBA were initially unable to locate the asbestos-cement pipe that had been previously identified in the grounds and landscaping area.

JJBA used GPR to scan open areas surrounding the suspected pipe location. Two possible subsurface pipes were identified in the outskirts of this area; however, based on depths and orientations, they were not considered to be the previously identified pipe. The asbestos-cement pipe was later identified at the ground surface during surface soil sampling in the same area. VHB uncovered approximately 14 feet of the top of the pipe (at approximately 2 to 3 inches below ground surface) by scraping away soil with a shovel to evaluate its orientation and whether it appeared to be part of a piping system or an isolated section of pipe. The pipe was recovered after evaluation. Based on field observations, the pipe appeared to be part of a piping system and was oriented towards the west and the former greenhouse. During fieldwork, seven other possible asbestos-cement pipes were observed at various areas around the Site. The locations of these pipes are identified in Table B-2 and shown on Figure B-3. Identification of potential ACM was based on visual observation and known historical uses of ACM in building materials.

Sampling of building materials was not performed to confirm the presence of ACM. Apart from limited surface soil sampling in Area 3, sampling of environmental media for asbestos was not performed. Additional investigation to analyze possible asbestos contamination may be warranted.

2.9. Potential Lead-Based Paint

VHB observed a variety of painted surfaces on buildings and scattered building debris with severely peeling or chipping paint exposed to the environment. Surface layers of paint generally appeared to be latex-based, but underlying layers of paint were observed in some areas. Reported concentrations of lead in surface soil samples range from 6.8 mg/kg at SC-Bldg-06 to 280 mg/kg at SC-Bldg-19. Reported concentrations at 11 of the 19 sampling locations exceed the effective Site-specific background threshold concentration of 18.12 mg/kg used for preliminary ISM result evaluation. Reported concentrations at SC-Bldg-01 (96 mg/kg) and SC-Bldg-19 (280 mg/kg) are substantially elevated above other locations. Observations of possible lead-based paint are summarized in Table B-2; sample results are shown on Figure B-5. Analytical results are summarized in Table B-3.

Identification of potential lead-based paint was based on visual observation and context. Sampling of building materials to confirm the presence of lead-based paint was not performed. Soil sampling was preliminary and not intended to evaluate the extent of possible environmental contamination from potential lead-based paint. Additional investigation to determine the nature and extent of possible lead contamination may be warranted.

2.10. Other Environmental Conditions Identified during the Investigation

During fieldwork at the Site, VHB observed other environmental conditions that were outside the scope of the SAP. These conditions may warrant additional investigation.

2.10.1. Leaking Transformers

VHB observed several electrical transformers at the Site, including three that were leaking oil to the ground surface. CBIA representatives indicated that there were 25 non-PCB transformers at the Site and that they had reported the three leaking transformers and initiated cleanup actions. During fieldwork, VHB observed evidence of partial soil removal around the three leaking transformers and stockpiling of soil on a concrete pad near the WWTP in Area 1.

2.10.2. Catchment Basin Storage Area

Based on correspondence from local resident, Mr. David DiGiacomo, VHB conducted a reconnaissance and oversaw geophysical investigation activities by JJBA at the catchment basin storage area.

Based on VHB's observations, the storage area below the catchment basin appeared to have been used for quarrying, material and/or equipment storage, and possible debris storage. Fill and debris (including scrap metal, buckets, concrete, and a rusted-out 55-gallon drum) were observed on portions of the downslope side of the access road and storage area. Piles of fill, debris, and possible quarry material were observed along both sides of the storage area. Cars, car parts, and vehicle batteries were observed in the overgrown southern portion of the storage area.

JJBA scanned clearings within the catchment basin storage area; access was limited by debris, rubble piles, and dense vegetation. The southern portion of the storage area was densely vegetated, and investigation was not performed. JJBA identified a 5-ft by 22-ft GPR anomaly at approximately 2 ft bgs in the central portion of the storage area. JJBA also identified an apparent underground pipe, at approximately 2 ft bgs, running along the access road, towards the base of the catchment basin. The features JJBA identified are shown on Figure B-4.

3. Conclusions

The purpose of this EE/CA field investigation was to provide sufficient data to assess the nature and extent of contamination at the Site and support assessment of human health and ecological risks. NPS will use data collected during this field investigation to decide if removal actions are needed to address unacceptable risks and, if warranted, identify and evaluate removal action alternatives. The field investigation provided data to address the principal investigation questions identified in the SAP:

- Decision Question 1: Has the distribution of study constituents across the Site been adequately delineated such that human health and ecological risks can be quantified?
  - The EE/CA investigation adequately delineated study constituent concentrations in surface soil in Areas 1, 2, and 3, and subsurface soil in Area 3. The risk assessment can be completed with these data.
- Decision Question 2: Are concentrations of study constituents present in Site surface soil posing an unacceptable potential for risk to human and/or ecological receptors?
  - The data collected in this EE/CA investigation will be used to assess risks in surface soil in Areas 1, 2, and 3.
- Decision Question 3: Are concentrations of study constituents present in soil in the landfill posing an unacceptable potential for risk to human and/or ecological receptors?
  - The data collected in this EE/CA investigation will be used to assess risks in subsurface soil in Area 3.
- Decision Question 4: Are concentrations of study constituents present in Site groundwater posing an unacceptable potential for risk to human and/or ecological receptors?
  - Information gathered during this investigation related to the lack of shallow groundwater at the Site will be considered in the risk assessment.
  - Evidence for the presence of groundwater in unconsolidated soil during the fieldwork was not observed at boring locations or temporary piezometers. The possible presence of groundwater during other seasonal or environmental conditions is

unknown. The potential for contamination of possible seasonal groundwater is also unknown.

- Decision Question 5: Do study constituent concentrations in Site soil exceed study constituent concentrations in reference/background soil samples?
  - Sufficient background soil samples were collected during the investigation to compare Site soil concentrations to background in the EE/CA report.
- Decision Question 6: Do study constituents in groundwater downgradient of potential source areas exceed screening levels?
  - Information gained during this investigation related to the usability of groundwater samples from MW-01 and the lack of shallow groundwater at the Site will be considered in the risk assessment.
  - Evidence for the presence of groundwater in unconsolidated soil during the fieldwork was not observed at boring locations or temporary piezometers. The possible presence of groundwater during other seasonal or environmental conditions is unknown. The potential for contamination of possible seasonal groundwater is also unknown.
- Decision Question 7: Are the study constituents detected in groundwater above screening levels related to a release on Site, or are they consistent with local background/reference concentrations?
  - Information gained during this investigation related to the lack of shallow groundwater at the Site indicated that local background groundwater concentrations are not required to evaluate the Site.
- Decision Question 8: Is the soil in the landfill characterized as hazardous by chemical concentration?
  - Based on TCLP results of waste samples, the landfill material would not be considered a characteristic hazardous waste by toxicity for disposal purposes, although additional characterization would be necessary prior to disposal. It is possible some waste would be nonhazardous for disposal purposes and other waste would be hazardous.

- Decision Question 9: Is there evidence of a UST at Cottage 7?
  - Evidence of an historical UST at Cottage 7 was identified. Evidence of a currently existing UST was not identified; however, investigation was restricted by access limitations. As discussed below, NPS will conduct additional investigation of this condition.
- Decision Question 10: Is there visual evidence of ACM within and around Site structures at the resort that may be impacting the environment?
  - Evidence of possible ACM that is damaged, fragmented, or otherwise exposed to the environment was identified within and around As discussed below, NPS will conduct additional investigation of this condition.
- Decision Question 11: Is there evidence that known asbestos pipes are connected to an existing buried network?
  - The previously identified asbestos-cement pipe in the grounds and landscaping area appears to be connected to an existing piping network.
  - Seven similar pipes, possibly asbestos-cement, were identified at various locations around the resort, suggesting widespread use of the pipes. As discussed below, NPS will conduct additional investigation of this condition.
- Decision Question 12: Is there visual and/or analytical evidence of lead-based paint on and around Site structures that may be impacting the environment?
  - Painted surfaces that may contain lead-based paint and are peeling, chipping, or are otherwise exposed to the environment were observed on and around Resort structures. Painted debris was observed scattered through many areas of the Resort.
  - Preliminary surface soil results show lead concentrations along building driplines over background concentrations at more than half of the sample locations. As discussed below, NPS will conduct additional investigation of this condition.
- Estimation Question 1: In the event potential response actions are necessary, what is the areal and vertical extent of the landfill at the Site?
  - This investigation collected sufficient evidence of the areal and vertical extents of the landfill to reasonably estimate its volume. The volume to be addressed by the

removal action will be determined in the EE/CA report, accounting for risk assessment results.

Some of the conditions described above were not investigated as part of Areas 1, 2 and 3, but warrant more consideration. NPS will conduct additional investigations to address these data gaps before the RUE expires, if possible.

1. **Asbestos-containing material**. NPS identified potential asbestos-containing building materials in buildings, pipe insulation, buried pipes, and hurricane debris scattered throughout various parts of the Resort property. Asbestos releases to soil may have occurred or could occur in the future as the material degrades. Appropriate debris removal and asbestos abatement, performed according to applicable solid waste regulations, should be conducted as soon as possible to avoid future releases. Additional soil sampling may be required to evaluate risks to human health and the environment that may result from existing concentrations. Asbestos released to the environment is a CERCLA hazardous substance release and will be further investigated.

2. **Lead-based paint**. NPS found lead in soils at building and debris driplines at concentrations, in some areas, that indicate lead paint was used on the buildings. Lead-paint abatement should be performed to avoid future releases of lead to soil. Additional soil sampling may be required to evaluate risks to human health and the environment that may result from existing concentrations. Lead released to the environment is a CERCLA hazardous substance release and will be further investigated.

3. **UST at Cottage 7**. Based on a gauge and pipes in the Cottage 7 basement, an underground storage tank (UST) was, and may still be, present outside the building. Soil excavation will be necessary to definitively establish if the UST has been removed. If the location (or former location) of the UST and/or fill pipe can be determined, surface and subsurface soil sampling will be performed to identify potential releases to the environment.

4. **Petroleum in soil in Area 2**. A 2010 accidental diesel release from a buried fiberglass pipe at the AST was addressed by a 2010 emergency response and possibly in a later response. A list of reports related to this release from DPNR indicates that no further action is required. However, in 2021, NPS encountered petroleum odors in soil near the release area. Additional soil sampling may be required to evaluate risks to human health and the environment that may result from existing concentrations. NPS is arranging to

review the DPNR's release files and, if necessary, conduct additional investigation to evaluate the petroleum nature and extent in soil and, if possible, groundwater.

5. **MW-1 closure.** The monitoring well installed to monitor the former UST closure is functioning as a conduit to the subsurface, rather than as a groundwater monitoring well. The 2021 groundwater analysis from MW-1 did not indicate a reason to collect additional samples from this location. If petroleum or other chemicals enter the well at the surface, they could contaminate underlying soils. The monitoring well should be closed in accordance with USVI well abandonment requirements.

6. **Catchment Basin buried items.** In 2021, a ground-penetrating radar survey detected evidence of a large, unidentified buried, rectangular item. This, in combination with anecdotal reports that wastes may have been buried near the catchment basin, raises a question about possible contaminant burial and related releases. The top of the buried item, which is 2 feet below the surface, could be uncovered to evaluate if additional investigation is required.

7. **Possible migration of contaminants in groundwater at the landfill.** In 2021, no evidence of intermittent groundwater was observed in any soil borings, but whitish stains were present on the eroded edge of the landfill. These stains indicate rainwater moves through part of the landfill, and could carry contamination with it. NPS installed a monitoring well in the landfill near the seeps and plans to collect a groundwater sample in the rainy season.

4. References

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FIGURES

TABLES

ATTACHMENTS

Attachment A – Subsurface Utility Survey Report

Attachment B – Soil Boring and Well Construction Logs

Attachment C - Data Validation Reports

Attachment D- Field Activities Report

Attachment E - Analytical Laboratory Reports

Attachment A – Subsurface Utility Survey Report

Attachment B – Soil Boring and Well Construction Logs

Attachment C - Data Validation Reports

Attachment D - Field Activities Report

Attachment E - Analytical Laboratory Reports