PROPOSED PLAN

Operable Unit 6
Wallops Flight Facility Formerly Used Defense Site
Project 13 – Old Wastewater Treatment Plant – Soil, Sludge, Sediment, and Surface Water
Wallops Island, Virginia

The Cleanup Proposal

This Proposed Plan identifies **Sludge Removal and Off-Site Disposal** as the final remedy for the soil, sludge, sediment, and surface water at Wallops Flight Facility (WFF) Operable Unit (OU) 6, Formerly Used Defense Site (FUDS) Old Wastewater Treatment Plant (WWTP).

Introduction

This **Proposed Plan** (1) identifies **Sludge Removal and Off-Site Disposal** as the preferred alternative for protection of ecological receptors as the final remedy for soil, sludge, sediment, and surface water at the OU 6 FUDS Old WWTP at the WFF. The National Aeronautics and Space Agency (NASA) also considered land use controls, installation of a low-permeability cap, or no action as alternatives. NASA prefers sludge removal and off-site disposal because it would provide overall protection of human health and the environment at a lower cost. **Figure 1** shows the location of the NASA WFF property and **Figure 2** shows the location of the Old WWTP on the WFF property.

This document is issued by NASA. NASA is the lead agency under the **Comprehensive Environmental Response, Compensation, and Liability Act** (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), to address contamination from Department of Defense (DoD)-related activities at this Site as designated in a Memorandum of Agreement between the Department of the Army and NASA as authorized under section 315 of the National Defense Authorization Act for Fiscal Year 2015. The activities are conducted under the Administrative Agreement and Order on Consent RCRA-03-2021-0022TH (AAOC), signed by NASA and the United States Environmental Protection Agency (USEPA) Region 3 in 2021.

The Virginia Department of Environmental Quality (VDEQ) and the USEPA Region 3 are the regulatory agencies. Pursuant to the AAOC, NASA and USEPA, after consulting with VDEQ and after reviewing and considering all information submitted during the 30-day public **comment period**, NASA will select a final remedy for the Old WWTP with regard to contaminants present due to past DoD activities as necessary to protect human health, welfare, and the environment.

This Proposed Plan addresses soil, sludge, sediment, and surface water at the site. There are no unacceptable human health or ecological risks associated with soil, surface water, and sediment. NASA, in consultation with the regulatory agencies, may modify the proposed remedy or NASA and USEPA may select another response action, based on new information or public comments. The public is encouraged to review the alternatives considered and comment on this Proposed Plan. Contaminants in groundwater will be addressed in the FUDS Project 11 Main Base **Remedial Investigation** (RI) and the Main Base Expanded Site Investigation for per- and polyfluoroalkyl substances (PFAS), currently in progress. For FUDS Project 11, the goal is to identify non-PFAS contamination in site soil, groundwater, surface water, and sediment associated with past site activities at WFF. Phase 1 field activities have been completed and the report will be submitted this year while Phase 2 activities will take place in 2023. PFAS investigations and treatability studies are on-going. NASA will continue to keep the public informed of environmental activities at the site as they progress.

Let us know what you think!

PUBLIC COMMENT PERIOD
August 19, 2022 through September 18, 2022

NASA will accept written comments on the Proposed Plan during a 30-day public comment period. Written comments should be addressed to:

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PUBLIC INFORMATION SESSION
August 24, 2022

NASA, VDEQ, and USEPA will hold a public meeting to discuss the Proposed Plan for the WFF FUDS Old WWTP. The meeting will be held at the NASA Wallops Flight Facility Visitors Center, Wallops Island, VA, from 4:00 p.m. to 6:00 p.m. Copies of the Proposed Plan and the presentation will be available at the meeting.

For more information on the Site, see the FUDS Administrative Record at the locations provided on Page 22.

Selected technical documents for Old WWTP, including the RI Report, are available to the public online at https://code200-external.gsfc.nasa.gov/250-WFF/operable-unit-06.

(1) Terms in **bold** are defined in the Glossary of Terms.

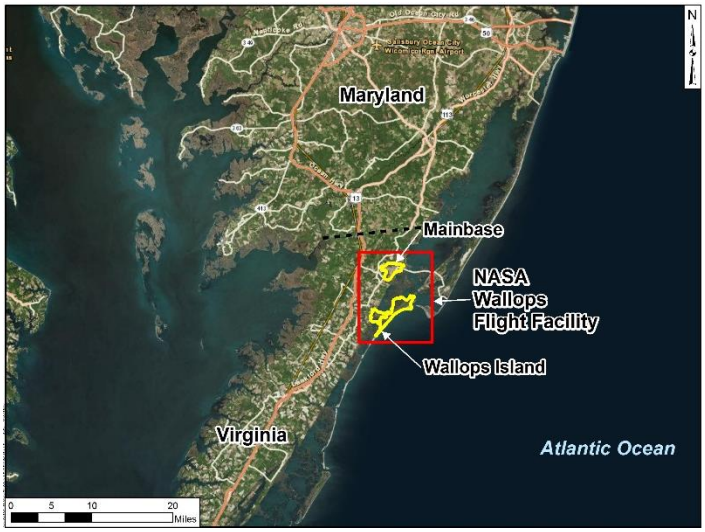

Figure 1: WFF Location Map

NASA is issuing this WFF FUDS Old WWTP Proposed Plan as part of its public participation responsibilities under Section 113(k)(2)(B), 117(a), 120(f), and 121(f)(1)(G) of CERCLA as amended by SARA, commonly known as "**Superfund**" and Sections 300.430(f)(2) and 300.430(f)(3) of the **National Oil and Hazardous Substances Pollution Contingency Plan** (NCP). CERCLA requires the lead agency (NASA) to publish a notice and brief analysis of the Proposed Plan and make such plan available to the public, and provide a reasonable opportunity for submission of comments and an opportunity for a public meeting.

This Proposed Plan summarizes information that can be found in greater detail in the Final RI Report (Weston, 2013) and **Focused Feasibility Study** (FFS) (Weston, 2015), which are available within the FUDS **Administrative Record** at the Eastern Shore Public Library and Chincoteague Island Library. Selected technical documents for Old WWTP, including the RI Report, are available to the public online at https://code200-external.gsfc.nasa.gov/250-WFF/operable-unit-06.

NASA encourages the public to review these documents to gain a more comprehensive understanding of activities that have been conducted at the Old WWTP.

The Proposed Plan is a document used to facilitate public involvement in the remedy selection process and provides the following site and remedy information:

- Summary of the site history and the results of past investigations,
- Rationale for selection of the preferred alternative, and
- Description of the proposed remedy.

Figure 3 summarizes the process flow and public participation steps to select the remedy (USEPA, 1999).

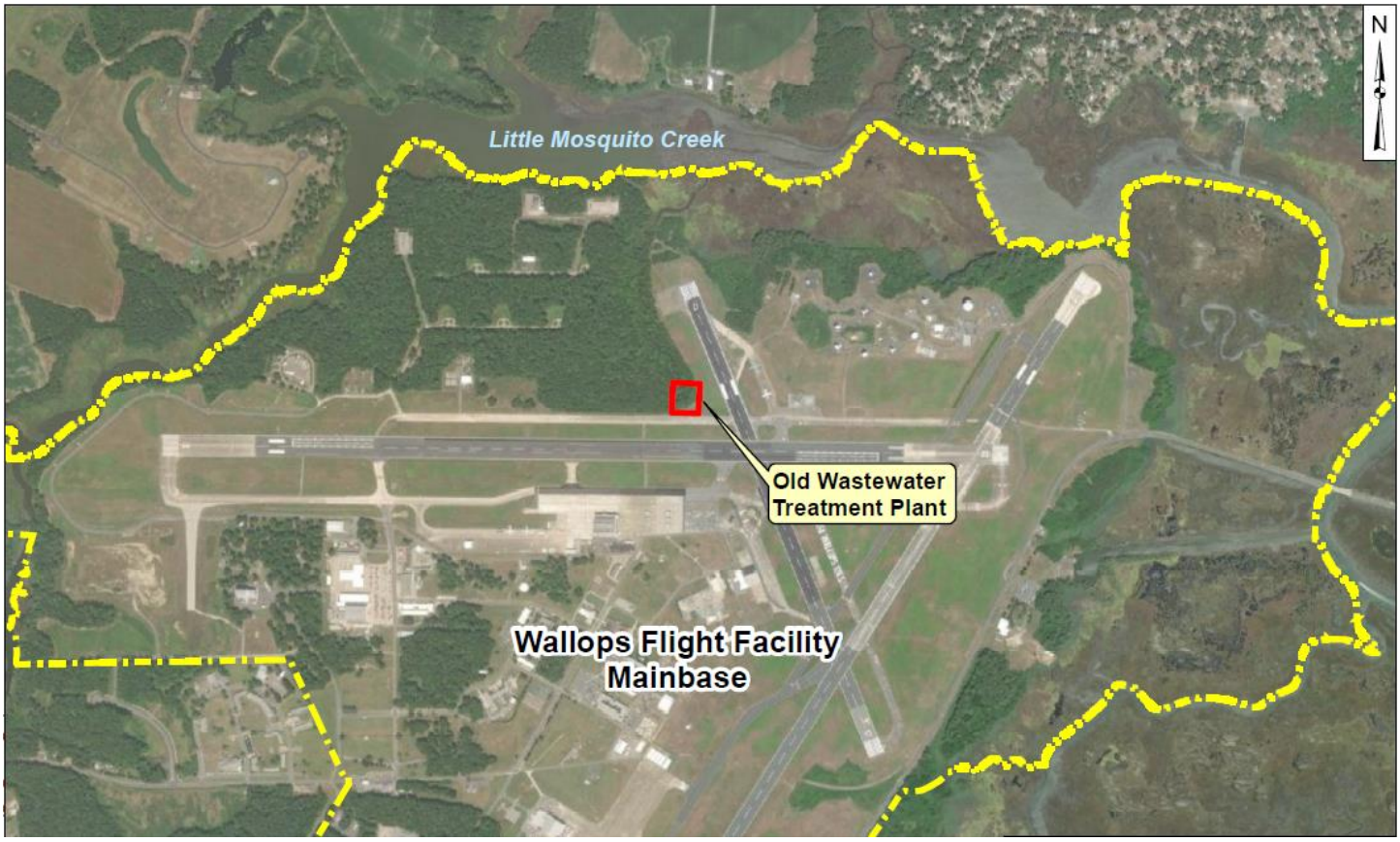

Figure 2: Old WWTP Location Map

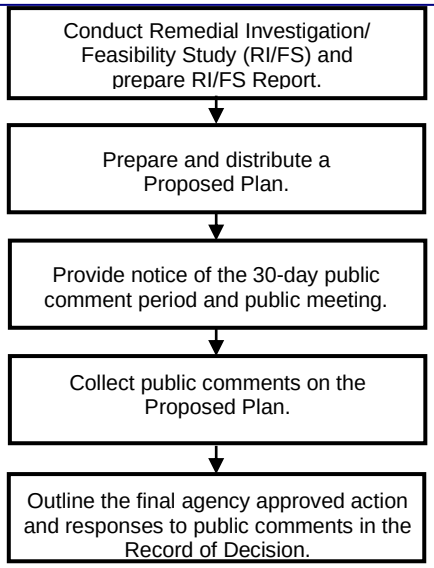

Figure 3: Public Participation Process

NASA responses to public comments on this WFF FUDS Old WWTP Proposed Plan will appear in a **Responsiveness Summary** section of the subsequent **Record of Decision** (ROD) selecting the remedy for the site. Following the public comment period and review of the ROD by NASA, VDEQ, and USEPA, a notice of availability will be published in the Eastern Shore Post and Shore Daily News. The ROD will be available for public view in the Administrative Record.

Site Background

Where is the Old WWTP?

The Old WWTP is located northwest of the intersection of Runway 17-35 and the abandoned taxiway that parallels Runway 10-28 in the north-central portion of the Main Base (see **Figure 2**).

What is the History of the Old WWTP?

The Department of the Navy began purchasing land for the Chincoteague Naval Auxiliary Air Station (CNAAS) in 1942 through condemnation to establish a training facility for World War II naval aviators. Prior to being developed for the CNAAS, the land principally consisted of farmland and marshes. Historical aerial photographs show that various buildings and three runways had been constructed by 1943.

On January 26, 1946, the Naval Aviation Ordnance Test Station was established on the Wallops Island portion of the Station. The former CNAAS was transferred to NASA on June 30, 1959. NASA identified this Station as Wallops Station from 1959 to 1974. In 1975, the Wallops Station was renamed Wallops Flight Center. In October 1981, Wallops Flight Center was consolidated with the Goddard Space Flight Center in Maryland, and the name was officially changed to WFF. Since then, WFF has become NASA's primary facility for suborbital programs and is home to the Mid-Atlantic Regional Spaceport.

The Old WWTP was constructed by the Navy in the early 1940s and consisted of three cinderblock structures and a trickling filter (removed in 2006). The cinder-block structures included a control/pump house, process tanks (chlorine reaction tanks, primary and final settling tanks, and sludge digestion tank), and sludge drying beds. In addition, a comminutor building (grinding process) and valve house were located south of the cinderblock structures connected via a 10-inch diameter sewer line. Operations are inferred from the layout of the system because historic documentation of Old WWTP processes is not available. With the exception of the control/pump house, the system was controlled by gravity flow. Three electrical transformers were formerly located adjacent to the south side of the control/pump house. A trickling filter, a 24-foot diameter concrete basin 4 feet in depth, was removed in May 2006 as part of the **Time Critical Removal Action** (TCRA) to address mercury contamination (discussed in greater detail in the RI section 3.2.7) (Weston, 2013). The United States Navy built a second WWTP in 1954 and abandoned the original, or Old WWTP, in 1955. NASA has not used the Old WWTP since the transfer of the facility ownership in 1959.

An overflow line was present at the control/pump house that may have been utilized on occasion, when the pumping system was not functional. The overflow pipe and its outfall were constructed of terracotta tile, based on site observations and consistent with the age of the Old WWTP. The overflow pipe's outfall could not be located during the TCRA. However, during the **Site Inspection** (SI) field activities, the pipe was located approximately 2 feet below grade and completely buried. The location of the suspected effluent outfall is shown on **Figure 4.**

What does the Old WWTP look like today?

The area surrounding the Old WWTP comprises approximately 0.8 acre, and includes mounded material identified in previous investigations as possible residual sludge piles located approximately 150 to 200 feet north of the Old WWTP structures. In addition, two sludge drying beds thought to contain residual sludge materials associated with Old WWTP activities are located in the eastern portion of the Old WWTP. A site layout map is provided as **Figure 4.**

The Old WWTP site consists of, and is surrounded by, dense vegetative cover including woodland underbrush and young trees. Prior to initiation of TCRA activities in 2006 (discussed in the RI), trees and underbrush were cleared to gain vehicle/heavy equipment access to the Site and establish a temporary gravel access road in the western portion of the Old WWTP area.

Remedial Investigation

The Final RI report for the WFF FUDS Old WWTP was completed in August 2013 (Weston, 2013). Details of the RI, including chemicals detected and the results of the risk analysis, are presented in subsequent sections of this Proposed Plan. Data were included in the RI from the following investigations:

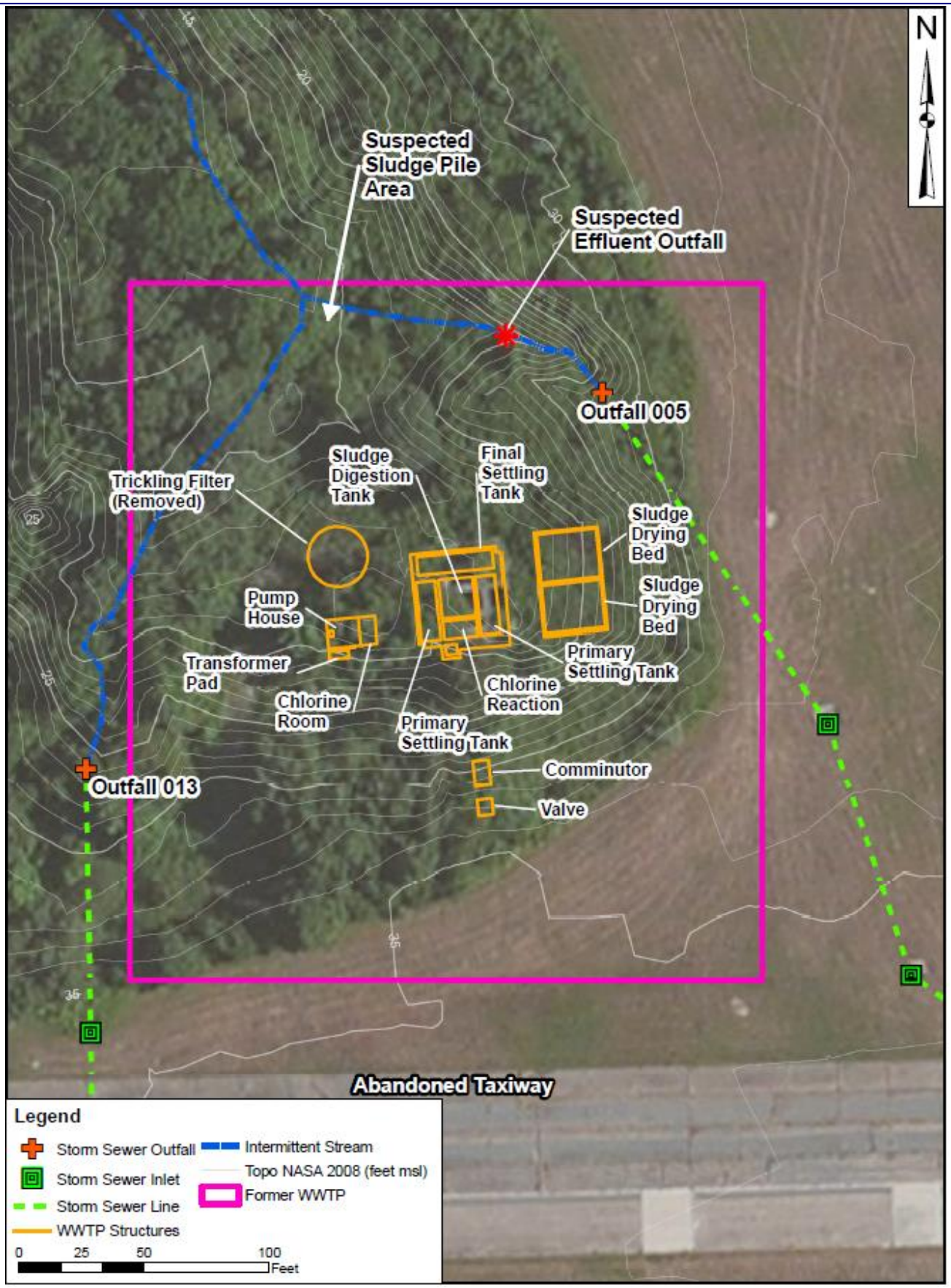

Figure 4: Old WWTP Site Layout Map

- **1990:** An Environmental Site Survey Report identified the Old WWTP for investigation, based on a lack of historical data and potential environmental significance (Ebasco, 1990).
- **1993:** Phase 1 of the SI was conducted which included an **unexploded ordnance** (UXO)/magnetometer survey. The report concluded that additional subsurface investigations (a UXO survey) should be conducted prior to any intrusive activity at this site (Metcalf & Eddy, 1996).
- **1993:** Phase 2 of the SI was conducted presenting the preliminary findings of the soil gas survey in the vicinity of the Old WWTP. **Volatile organic compounds** (VOCs) were present in the subsurface soil. The report indicated that additional evaluation of the Old WWTP would be conducted (Metcalf & Eddy, 1996).
- **1993-1995:** Phases III through V of the multi-phase SI were conducted at the entire Main Base area (Metcalf & Eddy, 1996). The SI Report reiterated the findings of the 1993 preliminary reports that no evidence of ordnance was noted during the initial phases of the investigation. However, field investigation of the Old WWTP was discontinued in 1993 after completion of the UXO/magnetometer and soil gas surveys because the Site was associated with former Navy activities (prior to 1959) and, therefore, falls under the jurisdiction of FUDS Program.
- **2000:** A site visit, personnel interviews, direct push technology soil sample collection (one boring), and laboratory analysis were conducted (Earth Tech, Inc., 2000). A relative risk evaluation was performed using existing data and found the relative risk to be high (Earth Tech, Inc., 2000). A 1999 status summary report for the sampling activities performed at sites located on the Main Base, including the Old WWTP, indicated that one **groundwater** sample collected at the Old WWTP contained aluminum, iron, and manganese concentrations exceeding their respective USEPA **secondary maximum contaminant levels** (SMCLs).
- **2003:** A Limited **Site Investigation** was completed in May 2003 (SAIC, 2003). Arsenic, iron, and silver were detected in surface and shallow subsurface samples that exceeded the human health and/or migration to groundwater screening criteria (USEPA Region III risk-based concentrations [RBCs] for residential and industrial soils, and USEPA Region III RBCs for protection of groundwater). **Organic compounds** detected at concentrations above screening criteria at the Old WWTP consisted of five **semi-volatile organic compounds** (SVOCs) (four **polycyclic aromatic hydrocarbons** [PAHs] and one non-PAH SVOC). No VOCs were detected at concentrations greater than screening criteria. It was recommended to collect additional soil samples adjacent to or beneath the sludge drying beds to confirm that concentrations exceeding screening criteria do not exist in the subsurface and to collect groundwater samples based upon the potential for **contaminants** detected in the soil to migrate to the groundwater.
- **2006:** A TCRA was conducted in May 2006 involving the demolition and removal of the trickling filter structure, including recovery of elemental mercury through vacuuming (approximately 7 to 8 pounds), from the Old WWTP (Weston, 2006). Soil samples collected below the trickling filter did not indicate an impact from the mercury release.
- **2007:** A Site Investigation of the Old WWTP was conducted and included monitoring well installation and groundwater, soil, surface water, sediment, and sludge sampling. The Site Investigation also included a human health screening level **risk assessment** and an ecological risk screening (Weston, 2007). The Site Investigation Report concluded that the preliminary screening suggests that soil, sediment, and surface water do not pose a potential risk, whereas sludge and groundwater may pose a potential risk to human health and/or ecological receptors.
- **2012:** A sampling event was conducted in the area around the Pump House and transformer pad to further assess the extent of lead contamination in soil. In addition, paint chip samples were collected from the Pump House exterior to determine whether elevated detections of lead in soil around the transformer pad were attributed to lead-based paint flaking off the Pump House. The investigation determined that the lead-based paints flaking off the exterior of the Pump House was the source for lead contamination in soil around the transformer pad.

What chemicals were found at or around the WWTP?

The RI indicated the following chemical detections:

- Soil: Numerous contaminants were detected in soil samples, and the list of contaminants of potential concern (COPCs) was developed using screening concentrations based on residential exposure and ecological exposure. COPCs for soils include metals (aluminum, antimony, arsenic, cobalt, iron, lead, and manganese), PCB Aroclor-1260, and PAHs (benzo(a)pyrene and dibenz(a,h)anthracene).
- Sludge: COPCs for sludge were developed in a similar manner as soil and include metals (antimony, arsenic, cobalt, chromium, iron, lead, manganese, mercury, and silver) and PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)-anthracene, DDD, DDE, and indeno(1,2,3-cd)pyrene. The volume of sludge containing these contaminants is estimated to be 82.5 cubic yards.
- Wastewater: COPCs for wastewater were developed in a similar manner as soil and include metals (aluminum, barium, iron, lead, and manganese) and PAHs (fluoranthene, phenanthrene, and pyrene).
- Groundwater: Contaminants present in groundwater underlying the Old WWTP include SVOCs (2,4-

dimethylphenol, 3- and 4-methylphenol, bis(2-ethylhexyl)-phthalate, diethyl phthalate, and phenol), VOCs (acetone, MEK, and PCE), metals (aluminum, arsenic, barium, calcium, chromium, cobalt, iron, magnesium, manganese, potassium, sodium, and vanadium), and PFAS. Contaminants in groundwater will be addressed in the FUDS Project 11 Main Base RI and the Main Base Expanded Site Investigation for PFAS, currently in progress.

- Sediment: Site sediments are characterized by sediments in the intermittent stream directly downhill of the Site. DDD, DDE, DDT, acetone, MEK, and metals were detected in the sediment. Based on the concentrations present, the RI indicated that there were no unacceptable human health risks under any exposure scenario or ecological risks associated with the sediments.
- Surface Water: Surface water was collected from the intermittent stream directly downstream of the Site. Aluminum, barium, calcium, cobalt, iron, magnesium, manganese, potassium, sodium, vanadium, and chloromethane were detected in the surface water. Based on the concentrations present, the RI indicated that there were no unacceptable human health risks under any exposure scenario or ecological risks associated with the surface water.

Sampling locations within the boundaries of the WFF FUDS Old WWTP are presented in **Figure 5.**

The RI evaluated the **source areas** and the extent of soil, sediment, groundwater, and surface water contamination, and assessed potential impacts to human health and the environment.

Scope and Role

To manage cleanup efficiently, the WFF FUDS investigations have been divided into a number of different Projects. Currently, there are 13 Projects being investigated at the WFF FUDS. Details of these investigations are presented in the Site Management Plan for WFF, which is available in the FUDS Administrative Record file.

The FUDS and other sites at NASA WFF have been divided into Operable Units (OUs) by the USEPA to further address future investigations and remediation, and the Old WWTP is designated as OU 6. This Proposed Plan addresses the WFF FUDS Old WWTP and does not include or affect any other site or OU. The scope and role of the proposed remedy is to address contamination in soil, sludge, sediment, and surface water at the Old WWTP. Contaminants in groundwater are being addressed in the Project 11 Main Base RI. Project 11 is a large investigative effort to determine nature and extent of a wide range of potential contaminants (including VOCs, SVOCs, metals, and pesticides) in soil, groundwater, surface water, and sediment throughout the Main Base of WFF. Phase 1 of the sample collection activities has been completed and a report of the findings and recommendations for additional sampling will be completed later in 2022. An Expanded Site Investigation for PFAS in groundwater at the Main Base is also currently in progress.

Principal Threats

USEPA characterizes waste on a site as either principal threat or low-level threat waste. The concept of principal threat waste, as developed by USEPA in the NCP, is applied on a site-specific basis when characterizing source material. “Source material” is defined as material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to groundwater, surface water, air, or that act as a source for direct exposure. Principal threat wastes are those source materials considered to be highly toxic or highly mobile, which would present a significant risk to human health or the environment should exposure occur. Due to the low contaminant concentrations and limited volume, the contaminated sludge is a low-level threat waste and not categorized as a principal threat waste.

Summary of Site Risks

Detailed results of the Baseline Human Health Risk Assessment (BHHRA) and the Screening Level Ecological Risk Assessment (SLERA) conducted at the WFF FUDS Old WWTP are presented in the RI Report, which is available in the FUDS Administrative Record. The BHHRA and the SLERA estimate risks considering the hazardous substances, potential **exposure pathways**, and potential receptors to determine whether there is unacceptable risk if no action is taken. See the text box **“What is a Risk Assessment?”** on page 15 for an example of the process. This section of the Proposed Plan summarizes the results of the BHHRA and SLERA for soil, sludge, sediment, and surface water only. The full risk analysis is included in the Final RI Report.

Baseline Human Health Risk Assessment

The objectives of the BHHRA were to estimate potential risk to people contacting site related COPCs under scenarios of current and plausible future land uses, to provide an analysis of risks to help determine the need for **remedial action(s)** at the Site, and to identify specific media and areas associated with unacceptable risk, as applicable. Based on the environmental setting and the types of site activities, the BHHRA identified the following populations for evaluation:

- Current/future adolescent child trespasser.
- Future commercial/industrial worker.
- Future construction workers.
- Hypothetical future child and adult residents.

The estimated cancer risk for all receptors from the soil and sludge are within the USEPA risk management range of 1 x 10^{-6} to 1 x 10^{-4}. Noncancer health effects from the soil and sludge are below the USEPA **hazard index** (HI) of 1 for all receptor scenarios**.** The future residential scenarios were included in the evaluation to conservatively estimate site risks and HIs for the Old WWTP site.

Figure 5: Old WWTP Sampling Locations

The human health risks from exposure to residual sludge at the drying beds and in the settling tank were not evaluated for the hypothetical residential scenario due to the small amount of sludge present and the construction activities associated with the hypothetical scenario. In the scenario where the Old WWTP site is redeveloped for residential use, it was assumed that the existing WWTP structures, including residual sludge, would be removed from the site during development. The risks from exposure to individual contaminants in soil or sludge were as follows:

Arsenic in soil – the estimated risk is 1.3 x 10-5 for incidental soil ingestion in a hypothetical residential exposure scenario. In addition, the maximum detections of arsenic in soil were 5.4 milligram per kilogram (mg/kg) in surface soil and 1.4 mg/kg in subsurface soil. These levels are below the soil background threshold values of 13.72 mg/kg (surface soil) and 5.3 mg/kg (subsurface soil) calculated in 2021 and approved by USEPA and VDEQ.

Benzo(a)pyrene in sludge -– Risk from incidental ingestion and dermal contact with sludge is 2.1 x 10-6. Given the conservative assumptions for sludge exposure, the risk is likely over-estimated.

Screening Level Ecological Risk Assessment

A SLERA was performed to evaluate the potential ecological risk from exposure to the contaminants at the Site. The Old WWTP is located within a forested area near the intersection of two runways (see **Figures 2 and 5**). The Site is located in a transitional zone between the adjacent forested floodplain dominated by red maple, black cherry and loblolly pine, and the successional old field vegetation dominated by greenbrier, switch grass, ragweed, and goldenrod. The Site drains to an unnamed tributary to Little Mosquito Creek. The drainage way also receives runoff from the runway, taxiway, ramp area, and the surrounding vicinity.

The receptors evaluated in the SLERA included soil invertebrates, terrestrial plants, birds, mammals, sediment dwelling insects and animals, and fish. The contaminant concentrations, occurrence, distribution, and potential effects data were evaluated to determine whether unacceptable risks to receptors are likely from exposure to **contaminants of potential ecological concern** (COPEC). To establish the list of COPECs, the USEPA Region III Biological Technical Assessment Group Screening Benchmarks and other available sources were used to screen soil and sludge for ecological risks. Food chain modeling was also conducted for COPECs. Specific results of the SLERA evaluation are presented in the RI (Weston, 2013) and FFS (Weston, 2015) and the findings are summarized below.

The SLERA concluded that metals and pesticide levels in soils exceeded ecological screening benchmarks. However, further evaluation of the site data confirmed that the potential risk was associated with COPECs in one sample and/or from concentrations similar to background levels. Based on this finding and the low degree of risk over the limited geographic area, the SLERA concluded impacts on ecological receptors due to exposure to site soil is unlikely. Further food chain modeling for higher trophic-level receptors confirmed there is no evidence of potential ecological risks from exposure to soils at the Old WWTP. COPECs in sludge samples collected from the drying beds contained metals, pesticides, and PAHs at concentrations in excess of ecological screening levels. Further evaluation and food chain modeling indicated that chromium, mercury, DDD, and DDE concentrations in the sludge present a moderate to high ingestion risk to ecological receptors (insectivorous birds and mammals).

Based on the results of the SLERA, contaminated WWTP sludge poses an unacceptable ecological risk to insectivorous birds and mammals from the ingestion of soil invertebrates. Although the contaminated sludge area is small and partially contained, it is possible the sludge beds can be used as primary habitat for ecological receptors.

It is the lead agency's current judgment that the Preferred Alternative identified in this Proposed Plan, or one of the other active measures considered in the Proposed Plan, is necessary to protect public health or welfare or the environment from actual or threatened releases of pollutants or contaminants from this site which may present an imminent and substantial endangerment to public health or welfare.

Remedial Action Objectives

Based on the ecological COPECs and the exposure pathways and receptors present at the WWTP site, the following **remedial action objectives** (RAOs) were developed for the Old WWTP site:

- Prevent the exposure of insectivorous birds and mammals via ingestion of invertebrates to chromium, mercury, DDD, and DDE in the Old WWTP site sludge at levels exceeding the **Cleanup Goals**.

The Old WWTP COPECs and associated cleanup goals for the RAOs are presented in **Table 1**. In developing the cleanup goals, the same methodology used to calculate the ecological risks was used to calculate the concentration that would result in no adverse effects to the ecological receptors. The calculated concentration was compared to site background concentration and the higher of the two was selected as the cleanup goal. Based on the background threshold values calculated and approved in 2021, all cleanup values are based on risk-based levels.

Table 1:
Cleanup Goals for Contaminated Sludge at WWTP

COPEC	Cleanup Goal (mg/kg)
Chromium	61.1
Mercury	0.538
DDD	0.342
DDE	0.143

The Cleanup Goals for the Old WWTP site are based on the protection of ecological receptors (insectivorous birds and mammals). In addition to these RAOs, remedial actions must also have minimal impact on NASA's operations.

Summary of Remedial Alternatives

Remedial alternatives to address the potential risks associated with the contaminated sludge at the Old WWTP and to achieve the RAOs were developed. The remedial alternatives discussed in this section represent a range of remedial actions in terms of cost-effectiveness, protection of the environment and of the level of difficulty of implementation. The development of these alternatives considers the RAOs. These RAOs focus on minimizing ecological exposure to the COPECs in sludge at the site.

The four remedial alternatives for the Old WWTP site are described in the following subsections:

Alternative 1 – No Action
Alternative 2 – Land Use Controls
Alternative 3 – Low-Permeability Cap Installation
Alternative 4 – Sludge Removal and Off-Site Disposal

Alternative 4 – Sludge Removal and Off-Site Disposal is the preferred alternative. A detailed analysis of these alternatives is presented in Section 5.0 [Detailed Analysis of Alternatives] of the FFS report (Weston, 2015).

ALTERNATIVE 1 – NO ACTION. Under Alternative 1, no action would be implemented to address the existing contamination in the sludge. Alternative 1 serves as the baseline for comparing the other alternatives. The no-action alternative is required under the NCP. No action would result in zero cleanup costs.

ALTERNATIVE 2 – LAND USE CONTROLS. This alternative would manage risks through **Land Use Controls** (LUCs) (administrative or engineered). A LUC plan would be prepared to specify actions and restrictions to be implemented and maintained for the Site to ensure long-term effectiveness and permanence. Access restrictions in the form of fine mesh fencing and avian netting would be implemented to prevent ecological receptors from contacting the sludge and potentially being exposed to COPECs above cleanup goals.

In general, LUCs recommended for the Old WWTP include the following:

- Signs,
- Master Plan revisions to document access restrictions and maintenance of LUCs, and
- Installation of fine mesh fencing and avian netting.

Long-term monitoring (LTM) of the WWTP site will be implemented to ensure land use controls remain effective and protective of the environment and to assess whether the access restrictions need to remain in place. The LTM program will include sampling and analysis of sludge in the current areas where concentrations of COPECs (chromium, mercury, DDD, and DDE) exceed the cleanup goals. Preparation of the **five-year review** report would also be required if Alternative 2 is selected as the preferred alternative. Alternative 2 has a 30-year **total present worth** (TPW) of $365,000, a capital cost of $117,000, and an average annual operations and maintenance (O&M) cost of $10,000.

ALTERNATIVE 3 – LOW-PERMEABILITY CAP INSTALLATION. Alternative 3 includes the following steps:

- Installation of a **low-permeability cap**, consisting of a clay cover and a geotextile liner, for the contaminated sludge area,
- Ground cover restoration in the form of a vegetative cover, and
- LUCs.

In Alternative 3, the sludge from the areas containing contamination above Cleanup Goals would be covered with a clay cap consisting of a geotextile liner (to prevent burrowing) and approximately 2 feet of clean clay. LUCs (listed below) would also be implemented to control or manage any intrusive activities that will penetrate the soil cap, including demolition of the structure containing the sludge. Depending upon the WWTP site conditions at the time of the remedial action, dust controls might be necessary during cap construction to reduce potential exposure to workers through inhalation of contaminated particulates. Erosion controls (i.e., silt fence) would be installed as a vertical barrier around the work area to prevent the potential migration of contaminated sludge off-site via runoff. A vegetative ground cover and geotextile liner would be established on top of the soil cover for erosion control purposes. **Five-year reviews** would be required to demonstrate that the remedy remains protective of human health and the environment. Alternative 3 has a 30-year TPW of approximately $563,000, a capital cost of $305,000, and an average annual O&M cost of $9,700.

Sludge COPECs would remain on-site indefinitely, although capped. The cap would ensure that no animals are exposed to the contamination and the LUCs are needed to make sure that the cap doesn't get damaged, such that animals could contact the contamination. Therefore, the following LUCs would be implemented as part of Alternative 3:

- Master Plan to restrict intrusive activities in the sludge drying bed areas,
- Signs, and
- Access restrictions to control access to the sludge settling tanks until they are removed.

ALTERNATIVE 4 – SLUDGE REMOVAL AND OFF-SITE DISPOSAL. Alternative 4 includes the following steps:

- Sampling of sludge for off-site disposal requirements,
- Excavation of contaminated sludge,
- Off-site disposal of excavated sludge,
- Post-excavation confirmation sludge sampling,
- Backfill of the excavated areas with clean fill material, and
- Ground cover restoration.

In Alternative 4, the contaminated sludge above the Cleanup Goals would be excavated from the Old WWTP site, thereby preventing ecological exposure to the contaminants.

The volume of sludge requiring remediation is estimated to be 82.5 cubic yards. Prior to excavation activities, the sludge will be sampled for analytical requirements required for disposal at an off-site facility. It is anticipated that sludge from the settling tanks will be removed using a vacuum truck and removed from the site or placed in the contained sludge drying bed. It is anticipated that excavated sludge and soils from the drying beds will be loaded directly into the dump truck with no need of on-site management. The sludge analytical data collected will be submitted to the appropriate disposal facilities for ultimate approval prior to implementation of any alternative that includes off-site disposal. It is anticipated that excavated sludge from the Site will be transported to a **Resource Conservation and Recovery Act** (RCRA) Subtitle D landfill for disposal as non-hazardous waste. Depending upon site conditions at the time of the remedial action, dust controls may be necessary during excavation activities to reduce the potential exposure to workers through inhalation of particulates. Prior to excavation activities, erosion controls (e.g., silt fence) will be installed around the excavation area to prevent the contaminated sludge from migrating beyond construction areas via surface erosion and runoff. Prior to site restoration activities, post-excavation confirmation sludge sampling for COPECs (chromium, mercury, DDD, and DDE) will be conducted in the excavated areas to document compliance with the sludge Cleanup Goals. Alternative 4 has a TPW of $316,000, capital cost of $316,000, and $0 of average annual O&M costs.

Evaluation of Alternatives

Nine criteria were used to evaluate the four remedial alternatives individually and against each other in order to select an appropriate remedy (See, ***How are Remedial Alternatives Evaluated****?* on page 12). A detailed analysis of alternatives can be found in Section 5.0 [Detailed Analysis of Alternatives] of the FFS report (Weston, 2015). A summary of the evaluation of alternatives is provided in **Table 2**, ***Relative Ranking of Alternatives*****,** on page 12. The nine criteria are distributed between three groups: threshold criteria, primary balancing criteria, and modifying criteria.

Threshold Criteria

Overall Protection of Human Health and the Environment: Alternative 1 will not provide protection to human health and the environment because no reduction in sludge contaminant concentrations and no reduction in ecological receptor exposures will occur. Because Alternative 1 does not satisfy this threshold criterion, it will not be evaluated further. Alternatives 2, 3, and 4 are more protective of the environment because they will provide some level of protection to ecological receptors. Alternative 2 will be protective by installing a barrier to minimize environmental receptors' access to the contaminated sludge. COPECs will remain on-site. Alternative 3 will reduce the potential for ecological receptors to access the sludge, provided the integrity of the cap is maintained. COPECs will remain on-site. Potential contact with the contaminants will be controlled by the installation of the cap and geotextile liner. Under Alternative 4 contaminated sludge above the Cleanup Goals will be removed, thus eliminating the potential ecological risks.

Compliance with ARARs: No chemical-specific or location - specific **Applicable or Relevant and Appropriate Requirements (ARARs)** were identified for the Old WWTP site. Alternatives 2, 3, and 4 will comply with action-specific ARARs. However, the substantive provisions of the *Virginia Pollution Abatement Permit Regulation* would apply to the extent that allowing the contaminated sludge to remain on-site is viewed as a form of on-site sewage sludge disposal. If so, Alternatives 2 and 3 would not comply with this ARAR.

Primary Balancing Criteria

Long-Term Effectiveness and Permanence: Alternative 4 will provide the greatest long-term effectiveness because potential risks to ecological receptors will be eliminated by the removal and offsite disposal of COPECs above Cleanup Goals. Alternative 3 is less effective than Alternative 4 because COPECs above Cleanup Goals will remain on-site and the effectiveness of Alternative 3 is a function of maintaining the integrity of the low-permeability cap. Alternative 2 will be less effective than Alternatives 3 and 4 because the installation of avian netting and fine mesh fencing may only minimize direct contact of ecological receptors with COPECs above Cleanup Goals. As with Alternative 3, the effectiveness of Alternative 2 is a function of maintaining the integrity of the netting and fencing. Only Alternative 4 will provide future unrestricted land use because the contaminated sludge above the Cleanup Goals will be removed from the Old WWTP site.

Reduction of Toxicity, Mobility, or Volume Through Treatment: None of the alternatives provide treatment. Therefore, none of the alternatives satisfy the preference for treatment as a principal element.

Short-Term Effectiveness: Alternative 1 is most effective in the short term because there will be no additional risk. Alternative 2 would pose fewer risks to the community and workers and short-term impacts to the environment than the other alternatives because of fewer invasive activities. Alternatives 3 and 4 will have minor short-term impacts to on-site workers during implementation. These impacts, however, will be addressed by using standard work practices, safety measures, and dust control measures. Alternative 3 will involve more truck traffic and its associated physical hazards than Alternative 4 because the volume of clay needed for the low-permeability cap is greater than the volume of contaminated sludge to be transported off-site under Alternative 4. These hazards will be mitigated by using standard work practices and safety measures. The increased truck traffic under both Alternatives 3 and 4 will not be concentrated in a manner that will significantly impact local traffic patterns. Although Alternative 3 involves more truck traffic than Alternative 4, only non-contaminated materials will be transported under Alternative 3.

Table 2: Old WWTP Relative Ranking of Alternatives

CRITERION	Alternative 1 - No Action	Alternative 2 - Land Use Controls	Alternative 3 - Low-Permeability Cap Installation	Alternative 4 - Sludge Removal and Off-Site Disposal
Overall Protection of Human Health and the Environment	⦸	○	◑	●
Compliance with ARARs	⦸	⦸	⦸	●
Long-term Effectiveness and Permanence	NA	○	◑	●
Reduction of Toxicity, Mobility, or Volume through Treatment	NA	⦸	⦸	⦸
Short-term Effectiveness	NA	◑	●	●
Implementability	NA	●	◑	◑
Cost				
Capital	$0	$117,000	$305,000	$316,000
Average Annual O&M	$0	$10,000	$9,700	$0
Total Present Worth	$0	$365,000	$563,000	$316,000

⦸ = Not Achieved ○ = Low Ranking ◑ = Moderate Ranking ● = High Ranking NA = Not Applicable

Preferred Remedial Alternative identified by NASA

How are Remedial Alternatives Evaluated?

The remedial alternatives were analyzed in detail and compared to each other using seven of the nine criteria provided in the National Oil and Hazardous Substance Pollution Contingency Plan (NCP) and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). These nine criteria are as follows:

Threshold Criteria

- Overall Protection of Human Health and the Environment and
- Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) and To-Be-Considered (TBCs) guidance criteria.

Primary Balancing Criteria

- Long-term Effectiveness and Permanence,
- Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment,
- Short-term Effectiveness,
- Implementability, and
- Cost.

The remaining two criteria, State Acceptance and Community Acceptance, referred to as Modifying Criteria, are also considered in selecting a remedy. VDEQ and USEPA have been consulted in identifying the preferred alternative, but final State and Federal comments will not be submitted until after the community has had an opportunity to participate in the selection process. Community Acceptance is evaluated based on comments received during the public comment period **(see text box, *Let Us Know What You Think! on page 1).***

Implementability: Alternatives 3 and 4 are less easily implemented than Alternative 2 because they require more difficult and complex construction-related activities and operations. Alternative 2 is the most implementable of the alternatives because it involves only LUCs and fine mesh fencing, avian netting, and sign installation. Revisions to the Master Plan are easily implemented as NASA is knowledgeable of current documents and conditions at the Old WWTP site. The low-permeability cap in Alternative 3 is a proven technology that has been implemented at other sites and is often used on landfills. Contaminant removal in Alternative 4 is a common practice and is used often for small sites such as this site. No technical difficulties are associated with either Alternative 3 or 4. There is little difference in the implementability of Alternatives 3 and 4, although implementation of Alternative 3 requires the transport of more materials and potentially a larger construction area.

Cost: Alternative 3 is the costliest with a 30-year TPW of approximately $563,000, a capital cost of $305,000, and an average annual O&M cost of $9,700. Alternative 2 has a TPW of $365,000, a capital cost of $117,000, and an average annual O&M of $10,000. Alternative 4 has a TPW and a capital cost of $316,000, as well as $0 of annual O&M costs. Although Alternative 2 has lower capital costs, Alternative 4 has less TPW due to the lack of O&M costs.

Modifying Criteria

Modifying Criteria are assessed during the selection of the final remedy after the close of the public comment period.

State Acceptance: The Commonwealth of Virginia's acceptance of NASA's preferred remedial alternative will be evaluated after the public comment period and will be described in the ROD.

Community Acceptance: Community acceptance of NASA's preferred remedial alternative will be evaluated after the public comment period ends and will be described in the ROD.

The Preferred Remedial Alternative

NASA has identified Alternative 4, Sludge Removal and Off-Site Disposal as the Preferred Remedial Alternative, and is recommending it because Alternative 4:

- Eliminates all known and potential ecological risks associated with the Old WWTP;
- Eliminates all of the contaminated sludge that poses potential risks to ecological receptors;
- Complies with chemical-, location-, and action-specific ARARs and other state and federal guidance - To-Be-Considered (TBCs);
- Provides long-term effectiveness and permanence for ecological receptors;
- Provides minimal short-term impact concerns to site workers;
- Is a permanent solution that provides long-term protection;
- Implements with readily available construction equipment, labor, and materials; and
- Provides an effective balance of costs.

In particular, NASA finds that Alternative 4 is the most cost-effective remedy, because it costs $250,000 less than Alternative 3 while providing a greater level of protection to potential ecological receptors.

Based on information currently available, NASA, in consultation with USEPA and VDEQ, believes the Preferred Alternative meets the threshold criteria and provides the best balance of tradeoffs among the alternatives with respect to the balancing criteria. NASA expects the Preferred Alternative to satisfy the following statutory requirements of CERCLA Section 121(b): (1) be protective of human health and the environment; (2) comply with ARARs (or justify a waiver); (3) be cost effective; and (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The preference for treatment as a principal element is not satisfied because there were no cost-effective treatment processes for the contaminated media at the site. However, the preferred alternative can change in response to public comment or new information.

Community Participation

Public input is important in the decision-making process. Nearby residents and other interested parties are encouraged to use the comment period for questions and concerns about the proposed remedial action at the Old WWTP. (See pages 1 and 22 for details about how to provide comments.) NASA will summarize and respond to public comments in a Responsiveness Summary that will become part of the ROD.

NASA has established a community involvement program that includes periodic mailings and announcements. If you are interested in being added to the mailing list, please use the contact information provided on the last page of this Proposed Plan.

Public Comment Period

The public comment period for the Proposed Plan offers the public an opportunity to provide input on the appropriate cleanup action for the Old WWTP. The public comment period will begin August 19, 2022, and end on September 18, 2022. A public information session will be held on August 24, 2022 (see page 1 for details). The meeting will provide an additional opportunity for the public to submit comments regarding the Proposed Plan. All interested parties are encouraged to attend the public meeting to learn more about the alternatives developed for the Old WWTP.

Record of Decision

Following the public review and comment period for this Proposed Plan, NASA will notify the public of the remedial action(s) selected by NASA and USEPA in a ROD. If the remedial action(s) selected by NASA and USEPA after consideration of public comments differs significantly from the remedial action(s) recommended in the Proposed Plan, NASA will explain in the ROD the basis for such difference.

WHAT IS A RISK ASSESSMENT?

What is a Human Health Risk Assessment?

A human health risk assessment estimates the baseline risk, an estimate of the likelihood of health problems occurring if no cleanup action is taken at a site. To estimate the baseline risk at a site, the following four-step process is performed:

Step 1: Analyze Contamination
Step 2: Estimate Exposure
Step 3: Assess Potential Health Dangers
Step 4: Characterize Site Risk

In **Step 1**, the concentrations of contaminants found at a site as well as past scientific studies describing the effects these contaminants have had on people (or animals, when human studies are unavailable) are evaluated. Comparisons between site-specific concentrations and concentrations reported in past studies are made to determine which contaminants are most likely to pose threats to human health.

In **Step 2**, the different ways that people might be exposed to the contaminants identified in Step 1, the concentrations that people might be exposed to, and the potential frequency (how often) and length of exposure are considered. Using this information, a "reasonable maximum exposure" scenario is calculated that portrays the highest level of human exposure that could reasonably be expected to occur.

In **Step 3**, the information from Step 2 combined with information on the toxicity of each chemical is used to assess potential health risks. Two types of risk are considered: (1) cancer risk and (2) noncancer risk. The likelihood of any kind of cancer resulting from a contaminated site is generally expressed as an upper bound probability; for example, a "1 in 10,000 chance." In other words, for every 10,000 people who could be exposed, one extra cancer may occur as a result of exposure to site contaminants. An extra cancer case means that one more person could get cancer than normally would be expected from all other causes. For noncancer health effects, a "hazard index" is calculated. The key concept here is that a "threshold level" (measured usually as a hazard index of less than 1) exists below which noncancer health effects are no longer predicted.

In **Step 4**, site risks are evaluated whether they are great enough to cause health problems for people at or near the site. The results of the three previous steps are combined, evaluated, and summarized. The potential risks from the individual contaminants and exposure pathways are summed and a total site risk is calculated.

The acceptable range for **carcinogens** under the NCP is within $1x10^{-6}$ to $1x10^{-4}$ (chance of developing an additional case of cancer is 1 in 1,000,000 to 1 in 10,000). A **noncarcinogenic** HI of 1 or less indicates that no adverse effects are expected. An HI greater than 1 suggests that adverse health effects cannot be ruled out. In general, calculated risk greater than these ranges would require consideration of clean up alternatives.

What is an Ecological Risk Assessment?

An ecological risk assessment evaluates the potential adverse effects human activities have on the plants and animals that make up ecosystems. The ecological risk assessment process follows a phased approach similar to the human health risk assessment. The risk assessment results are used to help determine what measures, if any, are necessary to protect plants and animals.

Ecological risk assessment includes three steps:

Step 1: Problem Formulation
Step 2: Analysis
Step 3: Risk Characterization

Step 1, problem formulation includes the following:

- Compiling and reviewing existing information on the site habitat, plants, and animals that are present.
- Evaluating how plants and animals may be exposed.
- Identifying and evaluating area(s) where site-related chemicals may be found.
- Evaluating potential movement of chemicals in the environment.
- Evaluating routes of exposure (for example, ingestion).
- Identifying receptors (plants and animals that could be exposed).
- Identifying exposure media (soil, air, water).
- Developing how the risk will be measured for all complete pathways (determining the risk where plants and/or animals can be exposed to chemicals).

In **Step 2**, the potential exposures to plants and animals are estimated and the concentrations of chemicals at which an effect may occur are evaluated.

In **Step 3**, all of the information identified in the first two steps is used to estimate the risk to plants and animals. Also included is an evaluation of the uncertainties (potential degree of error) that are associated with the predicted risk evaluation and their effects on the conclusions that have been made.

Glossary of Terms

Administrative Record: An official compilation of site-related documents, data, reports, and other information that are considered important to the status of and decisions made relative to a Superfund site. The public has access to this material.

Applicable or Relevant and Appropriate Requirements (ARARs): Any standard, requirement, criteria, or limitation under any Federal environmental law, or State law if more stringent, that is applicable or relevant and appropriate to the remedial action. A selected remedy must attain ARARs unless an ARAR is waived pursuant to CERCLA Section 121 (d)(4).

Background threshold value: The calculated concentration of a chemical already present in an environmental medium due to sources other than those under study, including naturally occurring phenomena.

Carcinogen: A type of chemical that may cause cancer in one or more organs.

Cleanup Goal: A chemical-specific initial cleanup goal that (1) is protective of human health and the environment and (2) complies with ARARs.

Comment Period: A time for the public to review and comment on various documents and actions taken. A minimum of a 30-day comment period is held to allow community members to review the FUDS Administrative Record file and review and comment on the Proposed Plan.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), *42 U.S.C. § 9601 et seq.***:** Commonly referred to as Superfund Law, CERCLA is a federal law which was passed in 1980, as amended by SARA in 1986 and then amended again in 2002. CERCLA provides broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health and safety or the environment.

Contaminant: Any physical, biological, chemical, or radiological substance or matter that, at a high enough concentration, could be harmful to human health or to the environment.

Contaminant of Potential Concern (COPC): A contaminant found in site-specific media, deemed by the human health assessment estimation calculation rules to be a compound potentially contributing to human health risk. Contaminants are selected to represent site contamination.

Contaminant of potential ecological concern (COPEC): A contaminant identified through the ecological risk assessment process as the primary chemicals that may cause unacceptable ecological risk.

Exposure pathway: The route a substance takes from its source (where it began) to its end point (where it ends), and how people can come into contact with (or get exposed to) it. An exposure pathway has five parts: a source of contamination (such as an abandoned business); an environmental media and transport mechanism (such as movement through groundwater); a point of exposure (such as a private well); a route of exposure (such as eating, drinking, breathing, or touching), and a receptor population (such as people potentially or actually exposed). When all five parts are present, the exposure pathway is termed a completed exposure pathway.

Feasibility Study (FS): An evaluation of potential remedial technologies and treatment options that can be used to clean up a site.

Five-year review: The purpose of a five-year review is to evaluate the implementation and performance of the remedy in order to determine if the remedy is or will be protective of human health and the environment.

Focused Feasibility Study (FFS): An evaluation of specific or limited alternatives for a problem where treatment has already been planned or initiated.

Groundwater: Water beneath the ground surface that fills spaces between materials such as sand, soil, or gravel to the point of saturation. In aquifers, groundwater occurs in quantities sufficient enough for drinking water, irrigation, and other uses. As groundwater flows towards its point of discharge, it may transport substances that have percolated downward from the ground surface.

Groundwater contours: Groundwater contours show the elevations of the groundwater surface. These elevations indicate the direction groundwater is moving below ground. Groundwater moves from high elevations to low.

Glossary of Terms (continued)

Hazard Index (HI): The sum of chemical-specific Hazard Quotients. A Hazard Index of greater than 1 is associated with an increased level of concern about adverse non-cancer health effects.

Hazard Quotient: The ratio of the potential exposure to the substance and the level at which no adverse effects are expected. If the HQ is calculated to be equal to or less than 1, then no adverse health effects are expected as a result of exposure. If the HQ is greater than 1, then adverse health effects are possible. The HQ cannot be translated to a probability that adverse health effects will occur, and it is unlikely to be proportional to risk. It is especially important to note that an HQ exceeding 1 does not necessarily mean that adverse effects will occur.

Land Use Controls (LUCs): Consist of non-engineered instruments, such as administrative and legal controls or engineered and physical barriers, such as fences and security guards. LUCs help to minimize the potential for exposure to contamination and/or protect the integrity of a response action and are typically designed to work by limiting land and/or resource use or by providing information that helps modify or guide human behavior at a site.

Long-term monitoring (LTM): Long-term collection of information about the environment that helps gauge the effectiveness of a cleanup action. This includes the collection of samples with laboratory analysis for the contaminants of interest.

Low permeability cap: A clay cap used to prevent the transport mechanisms from contact with contaminated media and to isolate contaminants from human and ecological contact.

Metals: Metals are naturally occurring elements in the earth. Arsenic, manganese, iron, and silver are examples of metals. Exposure to some metals, such as arsenic, can have toxic effects even at low concentrations. Other metals, such as iron, are essential to metabolism for humans and animals.

Noncarcinogen: A type of chemical that may cause systemic human health effects.

National Contingency Plan; National Oil and Hazardous Substance Pollution Contingency Plan (NCP): The NCP is codified in 40 Code of Federal Regulations Part 300. The purpose of the NCP is to provide the organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, or contaminants.

Organic Compounds: These are naturally occurring or man-made chemicals containing carbon. Some organic compounds may cause cancer; however, their strength as a cancer-causing agent can vary widely. Other organics may not cause cancer but may be toxic. The concentrations that cause harmful effects can also vary widely.

Polychlorinated Biphenyls (PCBs): Class of chlorinated aromatic organic compounds (formerly used as cooling fluids in electrical devices) which are strongly adsorbed on solid particles.

Polycyclic Aromatic Hydrocarbons (PAHs): Class of organic compounds related to petroleum products containing more than 100 different chemicals that are released from burning coal, oil, gasoline, trash, tobacco, wood, or other organic substances such as charcoal-broiled meat.

Proposed Plan: A plan which summarizes the preferred cleanup strategy and rationale. It also reviews the alternative(s) presented in detail in the FS. The preparation of a Proposed Plan is a public participation requirement of CERCLA and the National Contingency Plan.

Record of Decision (ROD): An official public document that explains which cleanup alternatives were selected. The ROD is based on information and technical analysis generated during the RI/FS process and considers public comments and community concerns raised upon the issuance of the Proposed Plan. The ROD explains the remedy selection process and is issued following the conclusion of the public comment period during the Proposed Plan.

Remedial Action: The actual construction or implementation phase that follows the remedial design for the selected cleanup alternative at a site.

Remedial Action Objective (RAO): An objective selected in the FS, against which all potential remedial actions are judged.

Glossary of Terms (continued)

Remedial Investigation (RI): A study of a site that provides information supporting the evaluation for the need for a remedy and/or selection of a remedy for a site where hazardous substances have been disposed. The RI identifies the nature and extent of contamination at the facility.

Resource Conservation and Recovery Act (RCRA), *as amended, 42 U.S.C. §§ 6901-6939(e)***:** A federal law which ensures 1) the proper management of hazardous waste from the point of generation until final disposal and 2) that an owner and operator of a hazardous waste treatment, storage, and disposal facility investigates and cleans up releases as necessary to protect human health and the environment.

Responsiveness Summary: A summary of oral and written public comments received during a comment period following issuance of the Proposed Plan and the responses to these. The responsiveness summary is an important part of the ROD, highlighting community concerns for decision makers.

Risk Assessment: This process evaluates and estimates the current and future potential for adverse human health or environmental effects resulting from exposure to contaminants.

Site Inspection (SI): Sampling investigation with the goal of identifying potential sources of contamination, types of contaminants, and potential migration of contaminants. The purpose of a Site Investigation is to augment the data collected and to determine if further action or investigation is appropriate. The Site Inspection is conducted prior to the RI.

Site Investigation: The Site Investigation includes the analysis of samples of building materials and environmental media, such as soil and soil gas, groundwater, surface water, sediment, and indoor air. For sites where contamination is confirmed, additional site investigation efforts are used to delineate the nature and extent, source locations and significance of contamination for the purpose of supporting subsequent cleanup and reuse decisions. Contaminant migration pathways through media (for example, soil, groundwater, and air) are also examined in relation to potential receptors (for example, humans, animals, and plants). A baseline risk assessment to quantify risk to human health and or the environment may be conducted.

Sludge Removal and Off-Site Disposal: Removal of contaminated sludge above Cleanup Goals will be excavated using a vacuum truck (approximately 82.5 cubic yards) and loaded directly into the dump truck. The sludge will be disposed at a RCRA Subtitle D landfill as non-hazardous waste.

Secondary maximum contaminant level (SMCL): The USEPA has established non-mandatory water quality standards and does not enforce these secondary MCLs. They are established only as guidelines to assist public water systems in managing their drinking water for aesthetic considerations, such as taste, color, and odor. These contaminants are not considered to present a risk to human health.
Source Area: The zone of highest soil or groundwater concentrations, or both, of the chemicals of concern. The area considered to be the point of release.

Superfund: The common name for Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA).

Semi-volatile organic compounds (SVOC): Organic compounds that evaporate slowly under normal atmospheric conditions and are typical components of petroleum and cleaning products.

Time Critical Removal Action (TCRA): TCRAs are those removal actions where, based on a site evaluation, on-site activities must be initiated within six months of the determination.

To-Be-Considered(s) (TBCs): Non-promulgated advisories or guidance issued by federal or state governments that are not legally binding but may be considered during development of remedial alternatives.

Total present worth (TPW): Total cost, in current dollars, of the remedial action. The net present worth cost includes capital costs required to implement the remedial action, as well as the cost of long-term operations, maintenance, and monitoring.

Unexploded ordnance (UXO): Unexploded ordnance are explosive weapons (bombs, bullets, shells, grenades, land mines, naval mines, etc.) that did not explode when they were employed and still pose a risk of detonation, potentially many decades after they were used or discarded.

Volatile organic compounds (VOC): Organic chemical compounds whose composition makes it possible for them to evaporate under normal atmospheric conditions of temperature and pressure. VOCs are typically components of petroleum and cleaning products.

List of Acronyms

ARAR	Applicable or Relevant and Appropriate Requirements
BHHRA	baseline human health risk assessment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CNAAS	Chincoteague Naval Auxiliary Air Station
COPC	contaminant of potential concern
COPEC	contaminant of potential ecological concern
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DoD	Department of Defense
FS	Feasibility Study
FFS	Focused Feasibility Study
FUDS	formerly used defense site
HI	hazard index
LTM	long-term monitoring
LUC	land use control
MEK	methyl ethyl ketone
mg/kg	milligram per kilogram
MIBK	methyl isobutyl ketone
NASA	National Aeronautics and Space Administration
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPW	net present worth
OU	Operable Unit
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
RAO	remedial action objective
RBC	risk-based concentration
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SI	Site Inspection
SLERA	screening level ecological risk assessment
SVOC	semi-volatile organic compound
TCRA	time-critical removal action
TBC	To-Be-Considered
USEPA	United States Environmental Protection Agency
UXO	unexploded ordnance
VDEQ	Virginia Department of Environmental Quality
VOC	volatile organic compound
WFF	Wallops Flight Facility
WWTP	Wastewater Treatment Plant

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AVAILABLE INFORMATION

Final technical documents, including the RI Report and other relevant technical reports for Project 13 - Old Wastewater Treatment Plant are available to the public at the following locations and online at https://code200-external.gsfc.nasa.gov/250-WFF/operable-unit-06:

Eastern Shore Public Library
23610 Front Street
Accomac, Virginia 23301
(757) 787-3400

Chincoteague Island Library
4077 Main Street
Chincoteague, Virginia 23336
(757) 336-346