



Case Study 23

Constructing Tidal Wetlands in an Overall Remediation Strategy for a Landfill	
Name and Location	<p>Site Name: Operable Unit 3 (Jamaica Island Landfill)</p> <p>Site Location: Portsmouth Naval Shipyard, Kittery, Maine</p>
Ecological Enhancement	Removal and consolidation of approximately 2.6 acres of landfill and construction of a tidal wetland comprised of tidal salt marsh and mudflat.
Site Description	<p>The Portsmouth Naval Shipyard (PNS) is a highly industrialized 278-acre island located in the Piscataqua River. The Piscataqua River is a tidal estuary that forms the southern boundary between Maine and New Hampshire.</p> <p>In March 1989 the USEPA issued a Corrective Action Permit under the RCRA Hazardous and Solid Waste Amendments of 1984 (HSWA Permit) (USEPA, 1989) that required PNS to investigate 13 solid waste management units (SWMUs) and take appropriate corrective action. However, effective May 31, 1994, PNS was included on the National Priorities List (NPL). The subsequent studies have been conducted under the authority of CERCLA, commonly known as Superfund.</p> <p>Operable Unit 3 (OU3) consists of Site 8 (Jamaica Island Landfill) and two additional sites (Site 9 – Mercury Burial Sites I and II and Site 11 – Former Waste Oil Tanks 6 and 7) within the boundaries of the Jamaica Island Landfill (JILF). The JILF, which is approximately 25 acres of PNS, was a tidal mudflat that the Navy used as a disposal area from 1945 to 1978 for general refuse, trash, construction rubble, and various industrial wastes. Prior to the initiation of the remedy for OU3, the JILF was covered with topsoil/vegetation, pavement, and gravel and was used for limited recreational activities, vehicle parking, and equipment storage.</p> <p>Sampling of the sites within OU3 was conducted as part of the RCRA Facility Investigation (RFI) for PNS, the RFI Data Gap for PNS, and the 1996/1997 groundwater monitoring for OU3 (under CERCLA) to determine the nature and extent of contamination at the site and the potential risks associated with the contamination. After the revised risk assessment for OU3 was complete (in 2000), the Navy prepared a Feasibility Study (FS) for OU3 in 2000. A Proposed Plan for OU3 was issued January 2001 and the Record of Decision (ROD) for the site was signed in August 2001. Remedial action at OU3 will consist of a cover over the landfill, institutional controls to limit use of and exposure to the area, shoreline erosion controls, and long-term monitoring of the</p>



effectiveness of the remedy. The design for Phase I was completed in June 2002. The first phase of the design included movement of the waste in the portion of the landfill near Jamaica Cove to the remaining portion of the landfill to consolidate the waste in a smaller area. After the consolidation, wetlands were constructed in Jamaica Cove. The consolidation activities were completed in September 2002. The wetland planting was completed in June 2003. The second phase of the design, completed in January 2003, includes construction of the cover over the remaining larger portion of the JILF and shoreline erosion controls. Construction activities for the second phase began in the Spring 2003.

Portion of the JILF nearest to Jamaica Cove Prior to Start of Phase I



Salt Marsh Establishment After Consolidation and Backfilling



<p>Site Reuse Description</p>	<p>The 2.6 acres portion of the JILF nearest to Jamaica Cove was consolidated onto the remaining 22 acres of the landfill, which allowed for the creation of tidal wetlands (i.e., saltmarsh and mudflat) in this area. The implementation of first phase of the overall JILF remediation was initiated to enhance the estuarine habitat surrounding PNS, while at the same time providing the opportunity to consolidate JILF waste to an overall smaller area, which will be capped as part of second phase of construction.</p>
<p>Stakeholder Involvement</p>	<p>In August 2001, after more than ten years of intensive and comprehensive scientific investigation and evaluation, PNS and USEPA, with concurrence from MEDEP, signed a ROD for the remediation of the JILF. As part of the CERCLA process, the Navy received input from the public, including the Restoration Advisory Board (RAB) for PNS on the ROD for the JILF. The consolidation of materials from the portion of the JILF near Jamaica Cove and subsequent creation of the over two acres of tidal wetlands (i.e., salt marsh and mudflat) in the excavated area was viewed as a positive outcome of the overall remediation of the JILF by all stakeholders involved in the project.</p> <p>The creation of the wetlands, as well as the overall remediation of the JILF, has been funded through the Navy’s Installation Restoration Program.</p>
<p>Site Assessment</p>	<p>Operable Unit 3 (OU3) is comprised primarily of Site 8 (Jamaica Island Landfill) and two additional sites (Site 9 – Mercury Burial Sites I and II</p>



Approach and Cleanup

and Site 11 – Former Waste Oil Tanks 6 and 7) within the boundaries of Site 8. The Jamaica Island Landfill (JILF), which comprises approximately 25 acres of PNS, was a tidal mudflat that the Navy used as a disposal area from 1945 to 1978 for general refuse, trash, construction rubble, and various industrial wastes.

Sampling of the sites within OU3 was conducted as part of the RCRA Facility Investigation (RFI) for PNS, the RFI Data Gap for PNS, and the 1996/1997 groundwater monitoring for OU3 to determine the nature and extent of contamination at the site and the potential risks associated with the contamination. After the revised risk assessment for OU3 was complete (in 2000), the Navy prepared an FS for OU3 in 2000. A Proposed Plan for OU3 was issued January 2001 and the ROD for the site was signed in August 2001.

Soil and groundwater data for Sites 8, 9, and 11 show similar chemical contamination throughout the area of the landfill. A variety of organic and inorganic constituents were detected in soil and groundwater and included volatile organic compounds, semi-volatile organic compounds, polychlorinated biphenyls (PCBs), pesticides, metals, and petroleum hydrocarbons. The identified COCs in soil for Site 8/9 and Site 11 were combined to develop the list of soil COCs for OU3. The following is a list of soil COCs:

- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Dibenzo(a,h)anthracene
- Indeno(1,2,3-cd)pyrene
- Arsenic
- Lead

The following is a list of COCs in fresh groundwater for OU3:

- Benzene
- Antimony
- Arsenic
- Cadmium
- Lead
- Nickel
- Thallium

The following RAOs were provided in the Feasibility Study Report for Operable Unit 3, which addressed exposure to materials within the JILF boundary (OU3) based on risks to potential receptors (human and ecological):

1. Prevent human exposure through ingestion, dust inhalation, and dermal contact to contaminated soils and/or waste within the landfill at unacceptable levels.



2. Prevent human exposure through ingestion of contaminated groundwater at unacceptable levels.
3. Prevent erosion of contaminated soils and/or waste on the edge of the landfill to the Piscataqua River or the Back Channel.
4. Provide for JILF's current and future uses (organized and unorganized sports, equipment storage, and parking) while providing sufficient protection of human health and the environment.

The selected remedial action for soil and groundwater within the boundary of the JILF at PNS was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). The selected remedy for OU3 was a hazardous waste landfill cover, institutional controls, erosion controls, and monitoring. The following components were deemed necessary to address soil and groundwater contamination within the boundary of the JILF:

- A multiple layer cover over the landfill surface that would prevent receptors on the surface from coming in contact with contaminated soil and/or waste and minimize infiltration of water through the cover to the landfill material. Portions of the JILF that have buildings and structures will not be covered under the hazardous waste landfill cover. The specific cover components will be determined as part of the cover design, based on pre-design investigation, as necessary.
- Institutional controls to restrict land and fresh water groundwater uses within the JILF boundary to prevent unacceptable human exposure to site contaminants. Institutional controls will also be used to prevent unrestricted disturbance of the hazardous waste landfill cover, shoreline erosion controls, and buildings and structures within the boundary of the JILF.
- Shoreline erosion controls, including rip-rap and/or wetlands placed along the shoreline, to minimize the potential for washing away of soil and/or waste materials from the edge of the JILF.
- Monitoring of site media to assess the effectiveness of the remedy over the long term. The appropriate media for monitoring, frequency, testing protocol, and evaluation criteria will be determined as part of the monitoring program development and will be documented in the monitoring plan.
- Routine inspections and maintenance of the cover, shoreline erosion controls, and institutional controls to ensure that the cover, erosion controls, and site controls remain effective. An operation and maintenance plan will be developed. The operation and maintenance plan will include identification of verification activities to determine whether the buildings and structures within the JILF boundary are still in place.



<p>Reuse</p>	<p>The creation of two acres of tidal wetland in the former Jamaica Cove portion of the Jamaica Island Landfill was seen as an innovative way to accomplish the required landfill cleanup, maintain positive community support, and at the same time add to the thriving biodiversity of the area. The wetland creation will provide additional estuarine habitat to that already existing around PNS. Additionally, completing the consolidation to support wetland creation provided the added benefit of removing landfill from a tidally influenced area and providing additional area for construction of shoreline erosion controls.</p>
<p>Obstacles</p>	<p>Some of the following obstacles were experienced during completion of the first phase (i.e., consolidation and creation of wetlands) of the overall JILF remedy:</p> <ul style="list-style-type: none"> • Designing the phase to minimize any impact to existing mudflat within Jamaica Cove. • Determining and locating the appropriate backfill to maximize the potential for successful establishment of salt marsh.
<p>Costs and Funding</p>	<p>The creation of the wetlands, as well as the overall remediation of the JILF, has been funded through the Navy's Installation Restoration Program.</p> <p>The costs for Phase I and II are as follows:</p> <ul style="list-style-type: none"> • Phase I (Consolidation and Creation of Tidal Wetlands)– \$2,028,120 • Phase II (Erosion Controls and Cap of Remaining Portion of the JILF) – Estimated at \$14,257,216
<p>Economic and Other Incentives</p>	<p>The main incentives for this project were as follows:</p> <ul style="list-style-type: none"> • The consolidation will allow less physical area of the JILF to be covered, monitored and maintained (as part of long-term operations, maintenance, and monitoring for the site). • The project allowed for the enhancement of the estuarine habitat surrounding PNS. • The public and the RAB for PNS supported the inclusion of tidal marsh creation as part of the overall JILF Remedy.
<p>Time</p>	<p>Phase I – Initiated in June 2002 and completed (planting of salt marsh species) in June 2003.</p> <p>Phase II (Installation of Landfill Cap and Erosion Controls) – Initiated in April 2003 and scheduled to be completed Fall of 2005.</p>
<p>Other</p>	<p>Initial design and subsequent modifications to planting scheme for establishment of the tidal wetlands was aided with careful monitoring of tidal cycle after regrading occurred.</p>



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