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# **Vieques Restoration Advisory Board Meeting Vieques Environmental Restoration Program Update**

**April 2011**

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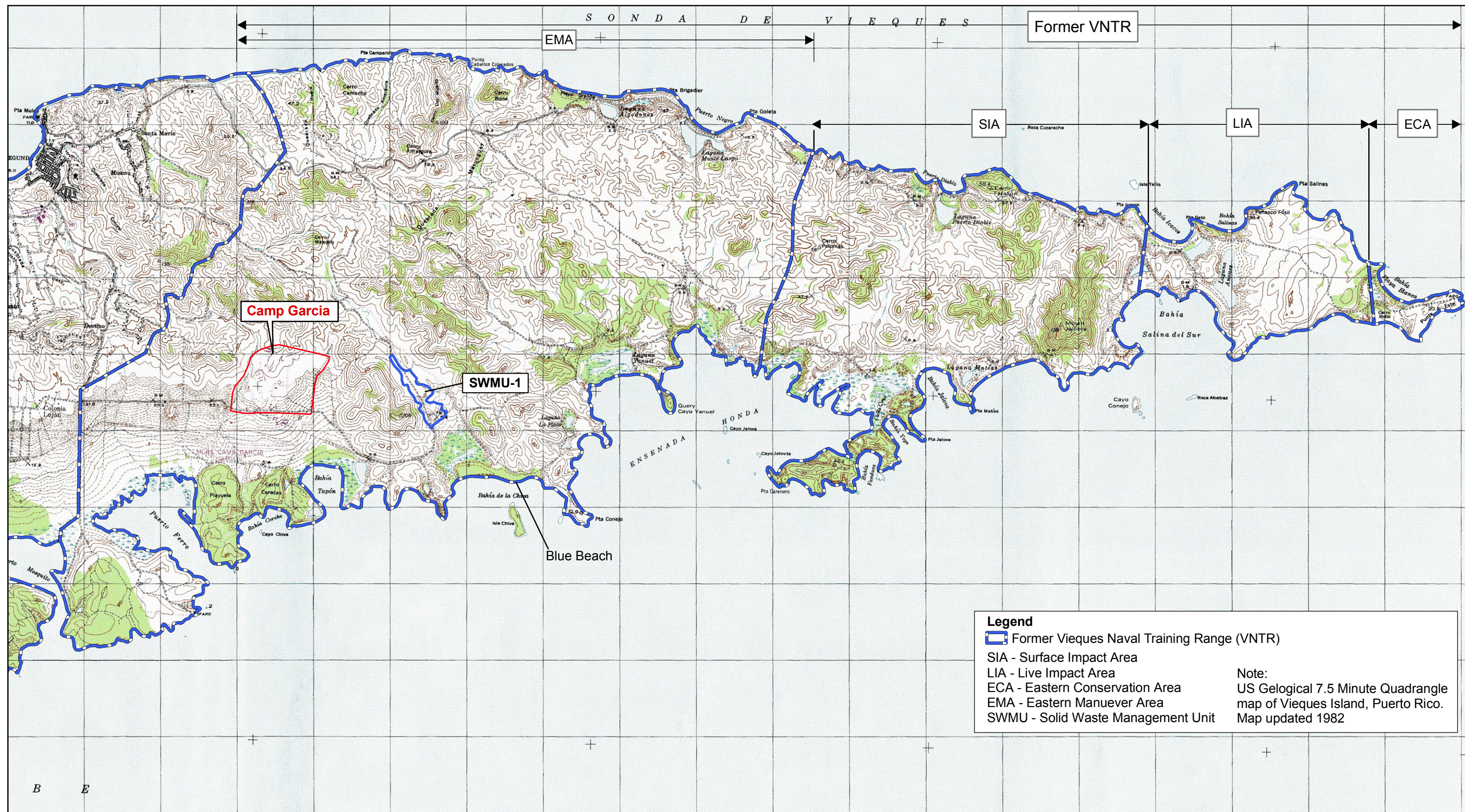
# **Streamlined Remedial Investigation/Feasibility Study (RI/FS)**

## **Solid Waste Management Unit (SWMU) 1**

**Former Vieques Naval Training Range  
Vieques, Puerto Rico**

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**FIGURE ES-2**  
Former VNTR and SWMU 1 Location Map  
Streamlined RI/FS Report for SWMU 1 (Camp Garcia Landfill)  
Former Vieques Naval Training Range  
Vieques, Puerto Rico

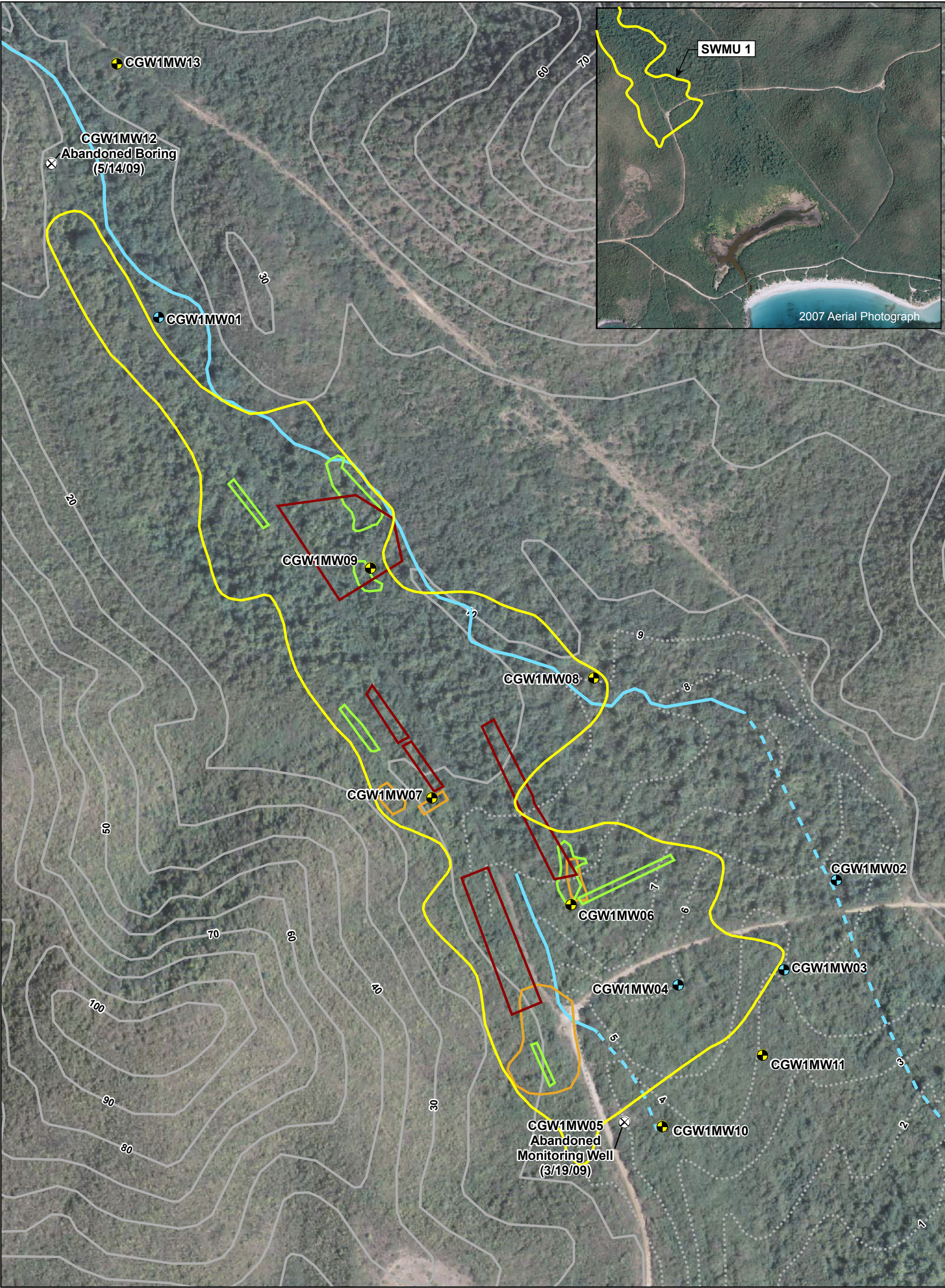


# History



- **Former Camp Garcia Landfill**
- **In use from 1954 to 1978**
- **Serviced an average military population of 150**
- **Used to dispose of general trash, such as paper, cardboard, cans and food packaging, rags, wood, scrap metal, yard waste**
- **No hazardous waste**
- **1,800 – 3,120 tons of waste**
- **Trench and fill method of disposal**





- Legend**
- PA/SI Monitoring Well
  - SI/ESI Monitoring Well
  - Abandoned Boring or Monitoring Well
  - 10 Meter Elevation Contour
  - 1 Meter Elevation Contour
  - Apparent Landfill trench/cell evident in 1959 Aerial Photograph
  - Apparent Landfill trench/cell evident in 1962 Aerial Photograph
  - Apparent Landfill trench/cell evident in 1964 Aerial Photograph
  - Approximate Extent of Landfill Debris
  - Interpreted Ephemeral Stream and Depositional Areas
  - Ephemeral Stream



0 150 300 600 Feet  
1 inch = 300 feet

2007 Aerial Photograph

**FIGURE 2-2**  
Topographic Map and Monitoring Wells  
Streamlined RI/FS Report for SWMU 1 (Camp Garcia Landfill)  
Former Vieques Naval Training Range  
Vieques, Puerto Rico







# The Streamlined RI/FS



- **Conducted in accordance with U.S. Environmental Protection Agency (USEPA) guidance and policy**
  - *Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites (USEPA, 1991)*
  - *Presumptive Remedy for CERCLA Municipal Landfill Sites (USEPA, 1993)*
  - *Application of the CERCLA Municipal Landfill Presumptive Remedy to Military Landfills (USEPA, 1996)*

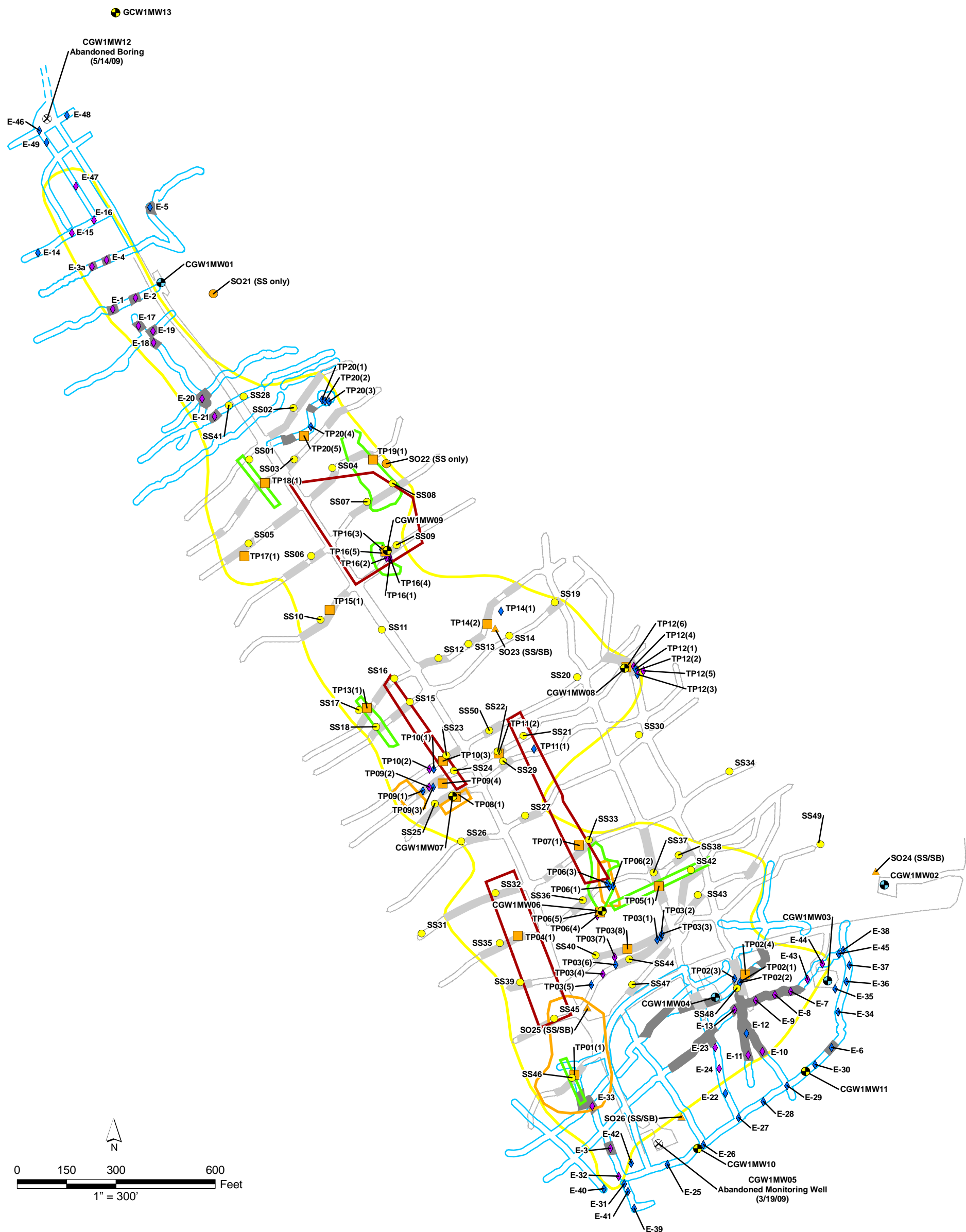


# Elements of the Streamlined RI/FS



- **Site Characterization**
  - Geophysical survey to delineate the landfill extent
  - Test pits to characterize the waste material
  - Samples of soil and groundwater in and around the landfill to evaluate nature and extent of contamination
- **Risk Assessment**
  - Human Health
  - Ecological
- **Evaluation of Presumptive Remedies (Feasibility Study)**





- Legend**
- PA/SI Monitoring Well
  - SI/ESI Monitoring Well
  - Abandoned Boring or Monitoring Well
  - PA/SI Surface Soil Sample Location
  - SI/ESI Ephemeral Stream Surface Soil Sample
  - SI/ESI Ephemeral Stream Surface and Subsurface Soil Sample
  - SI/ESI Test Pit Subsurface (SB) and Composite (SO) Soil Samples
  - SI/ESI Exploratory Excavations/Test Pits with Debris
  - SI/ESI Exploratory Excavations/Test Pits with no Debris
  - PA/SI Geophysical Transect
  - SI/ESI Geophysical and Exploratory Transect
  - Approximate Extent of Landfill Debris
  - 2004 PA/SI Geophysical Anomaly
  - 2009 SI/ESI Geophysical Anomaly
  - Apparent Landfill trench/cell evident in 1959 Aerial Photograph
  - Apparent Landfill trench/cell evident in 1962 Aerial Photograph
  - Apparent Landfill trench/cell evident in 1964 Aerial Photograph

Notes:

1. SS/SB27 is not shown on this figure. Please refer to figure 3-2 for SS/SB27'.
2. 'E' represents an exploratory excavation for the purpose of delineating the extent of the landfill.
3. 'TP16(1)' represents Test Pit 16, Trench 1. Trenches were excavated until significant debris was located. At that time a sample was collected for that test pit designator.

**FIGURE 3-1**  
Geophysical Survey and Sample Location Map, SWMU 1  
*Streamlined RI/FS Report for SWMU 1 (Camp Garcia Landfill)*  
Former Vieques Naval Training Range  
Vieques, Puerto Rico



# Site Characterization



- **Geophysical Survey and Test Pits**
  - Used magnetic and electromagnetic equipment to locate buried debris
  - Used backhoe to dig test pits
  - Determined the landfill debris covered an area of approximately 41 acres
  - Test pits confirmed waste type as municipal (general trash); some munitions-related debris also found











# Site Characterization



- **Sample Collection**

- **Collected several types of soil samples**

- From the cover material
    - From within the buried debris
    - From beneath the debris
    - From the adjacent ephemeral streams

- **Collected several types of groundwater samples**

- From immediately upgradient of landfill
    - From directly beneath landfill
    - From immediately downgradient of landfill

# Site Characterization



- **Sample Analysis**

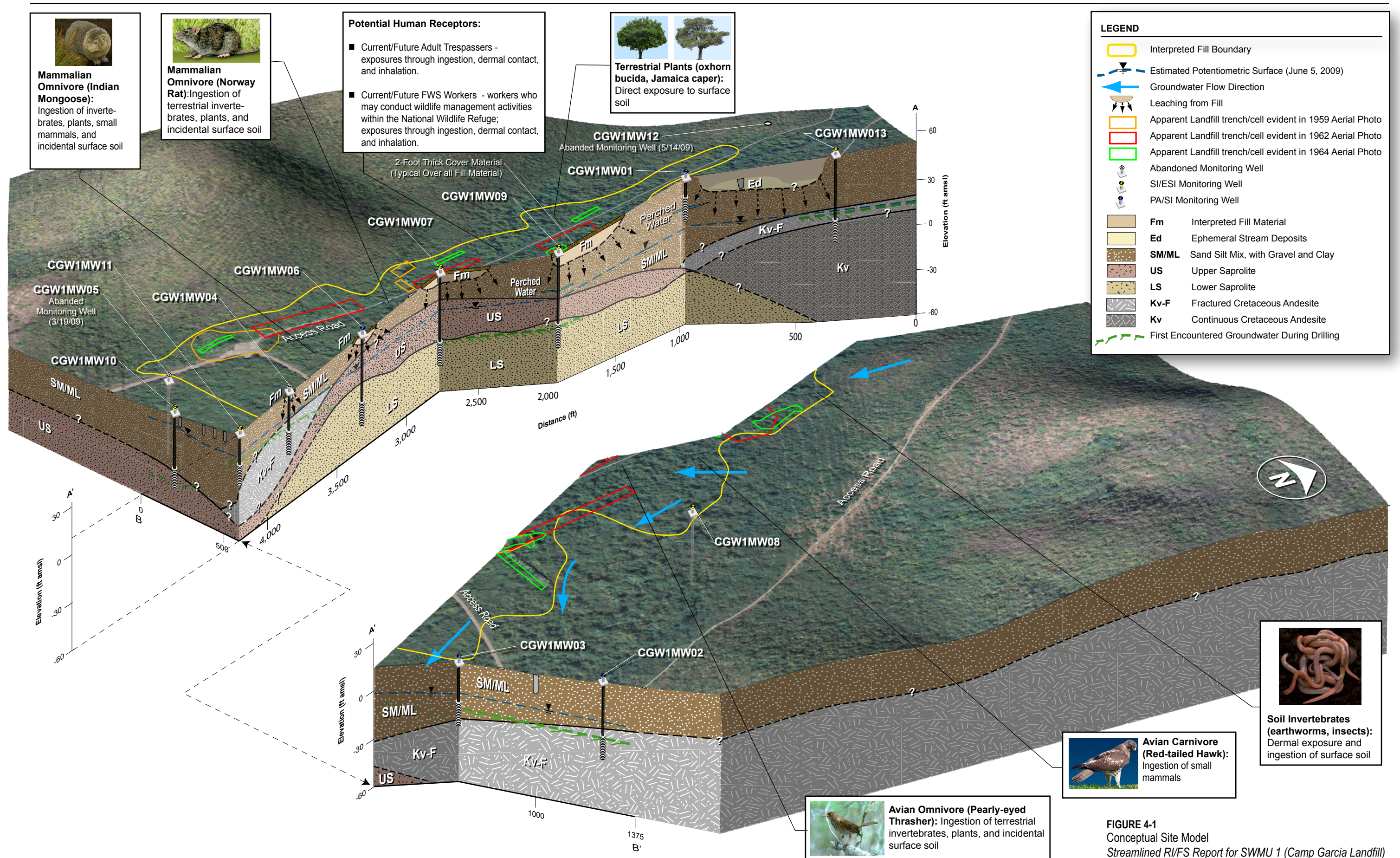
- **All samples were analyzed for:**

- Volatile Organic Compounds (VOCs)
    - Semi-volatile Organic Compounds (SVOCs)
    - Pesticides/PCBs
    - Explosives
    - Inorganics

- **Additionally, some samples were analyzed for:**

- Dioxins





**FIGURE 4-1**  
 Conceptual Site Model  
 Streamlined RI/FS Report for SWMU 1 (Camp Garcia Landfill)  
 Former Vieques Naval Training Range  
 Vieques, Puerto Rico



# Site Characterization



- **Findings**

- **Constituent concentrations in the cover soil are low and consistent with background conditions**
- **The highest soil concentrations are within the debris, but overall are relatively low**
- **Low concentrations in soil beneath debris indicate leaching from debris is not readily occurring**
- **Low concentrations in ephemeral stream soil indicate contaminant runoff from landfill is not likely occurring**
- **Low concentrations in groundwater indicate negligible leaching and no groundwater plume**



# Human Health Risk Assessment



- **Evaluated potential receptors and exposure scenarios based on current and future land use**
  - **Receptors**
    - Adult Trespassers
    - US Fish and Wildlife Service Workers
  - **Exposure Scenarios**
    - Ephemeral stream surface soil
    - Existing landfill cover soil
- **All calculated risk estimates were within or below EPA's target acceptable risk range/level**



# Ecological Risk Assessment



- **Evaluated potential receptors and exposure scenarios based on current and future land use**

- **Receptors**

- Those identified in the Master Ecological Risk Assessment (ERA) Protocol (CH2M HILL, 2010), including plants and animals potentially present at the site

- **Exposure Scenarios**

- Ephemeral stream surface soil
- Existing landfill cover soil

- **No contaminants of concern were identified; risks to ecological receptors are acceptable**



# Feasibility Study



- **Remedial Action Objectives (RAOs)**
  - Goals for protecting human health and the environment
  - Factor in the current site conditions, future land use, exposure routes and receptors, and results of the risk assessments
- **The SWMU 1 RAOs are:**
  - Prevent direct contact with subsurface debris and contamination
  - Minimize the potential for erosion of landfill debris
  - Ensure land use within landfill boundaries is controlled



# Feasibility Study



- **Remedial Alternatives Evaluated**

- **No Action (baseline)**

- Leave the site as is

- **Enhanced Native Soil Cover and Institutional Controls (ICs)**

- Add cover soil to areas where debris is exposed; re-vegetate
    - Implement land use controls (LUCs), long-term monitoring (LTM), and Operations and Maintenance (O&M)

- **Additional Soil Cover and Institutional Controls (ICs)**

- Clear-cut vegetation on entire landfill and add cover soil across entire area; re-vegetate
    - Implement land use controls (LUCs), long-term monitoring (LTM), and Operations and Maintenance (O&M)

# Feasibility Study



- **Nine Evaluation Criteria for Each Alternative**

- **Threshold Criteria**

- Overall protection of human health/environment
    - Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

- **Balancing Criteria**

- Long-term effectiveness and permanence
    - Reduction in the toxicity, mobility, and volume through treatment
    - Short-term effectiveness, including sustainability
    - Implementability
    - Cost

- **Modifying Criteria**

- Community acceptance
    - Commonwealth acceptance



# Feasibility Study



- **Results of Detailed Alternatives Analysis**
  - **No Action (baseline)**
    - Does not achieve RAOs; lowest (worst) score on most of the nine evaluation criteria; lowest overall score
  - **Enhanced Native Soil Cover and Institutional Controls (ICs)**
    - Highest overall score (relative to the other alternatives)
    - Scores higher than other alternatives for most of the criteria
    - Most “sustainable” alternative
  - **Additional Soil Cover and Institutional Controls (ICs)**
    - Scores marginally higher than the other alternatives for only one criterion
    - Least “sustainable” alternative

# Path Forward



- **Recommended remedial alternative will be formally presented to the public in the Proposed Plan**
  - Sometime between July and September 2011
- **45-day public comment period followed by Record of Decision (ROD) in late 2011**
  - Final decision will consider public input received during public comment period
  - Responses to substantive public comments will be included in the ROD
- **Remedy implementation, long-term monitoring, and operations/maintenance to begin shortly thereafter**



# QUESTIONS?