



STATEMENT OF BASIS

LAUNCH EQUIPMENT TEST FACILITY (SWMU 091) NATIONAL AERONAUTICS AND SPACE ADMINISTRATION KENNEDY SPACE CENTER BREVARD COUNTY, FLORIDA

PURPOSE OF STATEMENT OF BASIS

This Statement of Basis (SB) has been developed to inform and give the public an opportunity to comment on a proposed remedy to address contamination at the Launch Equipment Test Facility (LETF). The site is located in the Industrial Area of the Kennedy Space Center (KSC), south of the Operations and Checkout Building (M7-355) as shown on [Figure 1](#). The Kennedy Space Center (KSC) Remediation Team (KSCRT), consisting of National Aeronautics and Space Administration (NASA) and Florida Department of Environmental Protection (FDEP) personnel, has determined that the proposed remedy is cost effective and protective of human health and the environment. However, prior to implementation of the proposed remedy, the KSCRT would like to give an opportunity for the public to comment on the proposed remedy. At any time during the public comment period, the public may comment as explained in the “How Do You Participate” section of this SB. After the end of the public comment period, the KSCRT will review all comments and issues raised in the comments and determine if there is a need to modify the proposed remedy prior to implementation.

WHY IS A REMEDY NEEDED?

The results of the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) indicated that vinyl chloride (listed in Table 1) is present in

groundwater, which could be potentially harmful to human health if this water is used now or in the future.

HOW DO YOU PARTICIPATE?

The KSCRT is soliciting public review and comment on this SB before implementing the proposed remedy. The remedy for the LETF will be incorporated into the next update of the Hazardous and Solid Waste Amendments (HSWA) Permit for KSC.

The public comment period for the SB will coincide with the date of publication for notice of availability of the HSWA Permit in major local newspapers of general circulation and will end 45 days thereafter.

The Cleanup Remedy

The proposed cleanup remedy for the LETF includes the following components:

- Operation of an air-sparge system to reduce vinyl chloride levels in groundwater
- Monitoring of the attenuation of vinyl chloride in groundwater through naturally occurring processes following air sparging
- Implementation of institutional controls to prohibit use of groundwater

If requested during the comment period, the KSCRT will hold a public meeting to respond to any oral comments or questions regarding the proposed remedy.

To request a hearing or to provide comments, contact the following persons in writing within the 45-day comment period:

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FACILITY DESCRIPTION

NASA established KSC as the primary launch site for the space program. These operations have involved the use of toxic and hazardous materials. Under the RCRA and applicable HSWA permit (Permit No. 0026028-HO-005) issued by the FDEP, KSC was required to perform an investigation to determine the nature and extent of contamination from Solid Waste Management Unit (SWMU) 091, the LETF.

SITE DESCRIPTION AND HISTORY

The LETF is located south of the Operations and Checkout Building (M7-355) on the western side of E Avenue S.E. and north of Third Street S.E., in the KSC Industrial Area. The LETF is located in Section 19, Township 22S, Range 37E in the Orsino Quadrangle. The site is located on the east

side of the Payload Support Building (M7-505) and encompasses the steel structures on the east side of the facility that are used for launch equipment testing (Figure 1).

The Supply, Shipping, and Receiving Warehouse (M7-504) was the first building constructed in this area between 1963 and 1964. In 1966, this building was incorporated into the Payload Support Building (M7-505). The area of investigation for the site included the LETF, eastern portion of Building M7-505, the Prototype Shop, and the Cryogenics building. A release from a former waste treatment tank, recorded on the western side of Building M7-505, is currently being managed under SWMU 039. The eastern and southern portions of the site contain asphalt areas that have launch equipment testing structures, and mowed and maintained grassy areas as shown on Figure 2.

The following investigations have been conducted at the site.

LETF Basin Soil and Groundwater Contamination Assessment Report (1993)

Soil samples were collected at the pond discharge point, and the analytes detected were below applicable screening criteria. Groundwater samples were collected and indicated all analytes were detected below the applicable screening criteria. The effluent sample indicated all analytes were below applicable screening criteria. The report recommended further sampling for petroleum hydrocarbons.

LETF Stormwater Basin SWMU Assessment PRL 76 (1995)

This investigation consisted of soil, groundwater, swale soil, and surface water sampling. Groundwater and soil sample

results were below the FDEP Groundwater Cleanup Target Levels (GCTLs). One analyte (bis(2-ethylhexyl)phthalate) was detected above the ecological screening criteria in surface water but was attributed to laboratory contamination and not further assessed. The report recommended further evaluation of metals in swale soil samples and recommended repair of the damaged pond liner or removal of the pond from service.

LETF Stormwater Basin Confirmatory Sampling PRL 76 (1997)

One shallow monitoring well was installed and sampled. Results indicated vanadium and zinc were below screening criteria. Antimony was detected above screening criteria but was below background values and No Further Action (NFA) was approved by the FDEP.

LOS Preliminary Spill Investigation (1997)

Approximately 2 to 3 gallons of hydraulic fluid leaked from the Lift-Off Simulator during equipment testing. The hydraulic fluid was flushed with water into the grated trench system that drains into the LETF Basin. The basin at the time was lined with plastic and, after flushing, a sheen was observed on the surface of the water in the basin by EC&PH personnel. Post clean-up was not conducted and no environmental contamination was noted at the time.

SWMU Assessment Report (2007)

The SAR identified eight locations of concern (LOCs). The LOCs consisted of: LOC 1 - the Tail Service Mast Structure; LOC 2 - the LETF Basin & Discharge; LOC 3 - the LETF Hazardous Waste Staging Area; LOC 4 - Electrical Transformers, Substations & Load Break Switches; LOC 5

- Northeast Stormwater Discharge Point; LOC 6 - Former LETF Test Area Soakage Pit; LOC 7 - Payload Support Building Floor Drain & Stormwater Discharge Point; and LOC 8 - the Payload Support Building Former Hazardous Waste Storage Building. A Confirmatory Sampling (CS) Work Plan was included that provided the sampling locations, analyses, and rationale for further investigation of the identified LOCs.

LETF CS Report (2006)

The CS Report investigated the eight LOCs identified in the SAR. Soil, sediment, and groundwater samples were collected. The results indicated NFA was warranted for LOC 1, LOC 2, LOC 3, LOC 6, and LOC 8. The KSCRT reached consensus for NFA in January 2006. LOC 4, LOC 5, and LOC 7 were retained and further evaluated for polychlorinated biphenyls (PCBs), carbazole, and total recoverable petroleum hydrocarbons (TRPH) in soil, respectively, during the RFI. Additionally, site-wide groundwater was further evaluated for volatile organic compounds (VOCs) during the RFI.

RCRA Facility Investigation (2007-2011)

The RFI for LETF further assessed PCB-affected media in the vicinity of three transformers, evaluated the leachate potential for carbazole in LOC 5, and assessed TRPH in groundwater in LOC 7. The RFI recommended an Interim Measure (IM) for soil in LOC 4a and LOC 4c, which were completed and documented in the IM Report in 2010. A Land Use Control (LUC) was recommended for soil in the vicinity of LOC 4b, where samples could not be collected below the existing transformer and an excavation cannot be performed until the replacement of this transformer is scheduled. This LUC is being managed under SWMU 039, as it is located on the western side of

Building M7-505. Additional sampling confirmed that carbazole in groundwater at LOC 5 and TRPH in soil at LOC 7 were below screening criteria and NFA was approved for LOC 5 and LOC 7 in January 2007. Groundwater around the LETF was delineated, and a Step 2 Engineering Evaluation was completed to determine the most appropriate remedial treatment for vinyl chloride in this area. Based on the Step 2 Engineering Evaluation, the KSCRT concluded that no action should be implemented and the long-term monitoring (LTM) should continue until the GCTL for vinyl chloride is achieved. However, with the implementation of an IM for the adjacent SWMU 039 on the western side of Building M7-505, NASA subsequently chose to incorporate the LETF affected groundwater above the FDEP Natural Attenuation default Concentrations (NADCs) into the IM.

Interim Measure Report for the LETF (2010)

After completion of the delineation of PCB-affected media at three LOCs located at the LETF, the soil, pavement, road base, and gravel removal activities for the two accessible LOCs (LOC 4a and LOC 4c) were completed in 2010. Confirmation samples were collected from soil and concrete after the completion of excavation activities. The results of the confirmatory samples indicated that a LUCIP was not required for these two LOCs. The report recommended NFA for LOC 4a and LOC 4c.

LETF Annual LTM (2009-2011)

Vinyl chloride concentrations exceeded the GCTL in seven monitoring wells and exceeded the NADC in one well. Based on the vinyl chloride concentrations above the NADC, additional assessment was

recommended for this area. The additional assessment was completed while the LTM program was in effect to monitor the concentrations of vinyl chloride. The LTM continued through the end of 2011 when the program was suspended to allow for the installation of a remedial treatment system, which required a operation, maintenance, and monitoring (OM&M) program.

M505/LETF Area Limited Engineering Evaluation Step 2 (2010)

This evaluation of sampling results from previous investigations that indicated an exceedance of NADC criteria in MW0001. A total of five remedial alternatives were evaluated: 1) air sparge for NADC area; 2) air sparge for NADC and GCTL areas; 3) biostimulation/bioaugmentation of NADC area; 4) chemical oxidation of NADC area; and 5) monitored natural attenuation of NADC and GCTL areas. Based on the site characteristics and lack of parent source contamination, natural attenuation with monitoring was selected as the remedy

Building M7-505 Treatment Tank (SWMU 039) and Launch Equipment Test Facility (SWMU 091) Interim Measure Work Plan (2011)

The IM Work Plan presented the approach and design for the remediation of chlorinated VOCs in groundwater using an air sparge system (IAS) at the M505 Treatment Tank (SWMU 039) and LETF (SWMU 091) areas. The IM treatment zone was defined by the area with VOC concentrations above the NADCs along the western side of Building M505. In addition, affected groundwater along the eastern edge of Building M505 at the LETF was incorporated with SWMU 039 IM activities based upon a decision by NASA to use the adjacent remediation system.

Building M7-505 Treatment Tank (SWMU 039) and Launch Equipment Test Facility (SWMU 091) Construction Completion Report (2012)

The Construction Completion Report (CCR) summarizes the construction and startup of an IAS system that was installed to remediate groundwater at the Building M7-505 Treatment Tank area and the LETF. Based on the KSCRT Engineering Evaluation process, the goal of the IM activity is to implement air sparging to reduce the concentrations of groundwater constituents of concern to the NADCs. Between November 7, 2011, and January 10, 2012, the IAS system, consisting of nine IAS wells, was connected to the remediation system located on the western side of Building M7-505 associated with the Treatment Tank area (SWMU 039). Startup of the system occurred between January 9 through 11, 2012. OM&M activities are scheduled for up to 12 months. Groundwater sampling is planned to be conducted quarterly for specified performance monitoring wells to provide sufficient data to evaluate whether remedial operations are reducing the concentrations of constituents detected in groundwater.

WHAT ARE THE REMEDY OBJECTIVES AND LEVELS?

The remedial action objective (RAO) is to protect humans from exposure to groundwater that exceeds FDEP cleanup target levels by prohibiting use of site groundwater. Table 1 lists the COCs present in groundwater. The first column lists the chemical name, the second column lists the range of concentrations detected in monitoring wells, and the last column presents the site-specific cleanup target level.

Table 1

Site-Related COC	Range of Detections (µg/L)	GCTL ¹ (µg/L)
Vinyl Chloride	1.0 to 270	1

¹ Cleanup levels established by Chapter 62-777 F.A.C.

REMEDIAL ALTERNATIVES FOR THE LETF

Remedial alternatives are different combinations of plans or technologies to restrict access, and to contain or treat contamination to protect human health and the environment.

Land Use Controls with an active remediation system to treat groundwater

An IAS system was installed at the LETF in January 2012 to treat groundwater affected with vinyl chloride. Upon reducing vinyl chloride concentrations below the NADC, an LTM program will be reinstated at the site and continued until vinyl chloride concentrations are reduced below the GCTL.

Under this alternative, the active treatment system followed by monitoring of natural attenuation processes—such as biological degradation, dispersion, advection, and adsorption—will reduce COC concentrations to cleanup levels over time.

Groundwater will be regularly sampled and analyzed to monitor and document the decrease in COC concentrations during system operation and LTM. In the long term, this alternative will meet the RAO. Ongoing evaluation of the alternative will be conducted to determine whether the remedy is working and to provide an opportunity for change if necessary. In

addition, institutional controls for groundwater will be implemented to prohibit the use of groundwater.

NASA and the FDEP have entered into a Memorandum of Agreement (MOA) that outlines how institutional controls will be managed at NASA¹. Controls will include periodic inspection, condition certification, and agency notification. The area of the site that will be under institutional control is shown on [Figure 3](#).

EVALUATION OF REMEDY

The selected remedy was evaluated to determine whether it will comply with the four threshold criteria and five balancing criteria established for corrective measures.

The four threshold criteria for corrective measures are:

- Overall protection of human health and the environment
- Attain media cleanup standards
- Control the sources of releases
- Comply with standards for management of wastes

The following are the five balancing criteria considered for corrective measures:

- Long-term reliability and effectiveness
- Short-term effectiveness
- Reduction in the toxicity, mobility, and volume of wastes
- Implementability
- Cost

Land Use Controls with active remediation and natural attenuation with LTM meet the threshold criteria and were determined to be the most appropriate approach with respect to consideration of the balancing criteria.

WHAT IMPACTS WOULD THE REMEDY HAVE ON THE LOCAL COMMUNITY?

There would be no impacts to the local community because administrative actions to limit access to the site are consistent with current operating procedures, and the projected future land use of the LETF is industrial in nature.

¹ By separate MOA effective February 23, 2001, with the FDEP and KSC, on behalf of NASA, agreed to Center-wide implementation of periodic site inspections, condition certification, and agency notification procedures designed to ensure the maintenance by Center personnel of any site-specific LUCs deemed necessary for future protection of human health and the environment. A fundamental premise underlying execution of that agreement was that through the Center's substantial good faith compliance with the procedures called for herein, reasonable assurances would be provided to the FDEP as to the permanency of those remedies which included the use of specific LUCs.

Although the terms and conditions of the MOA are not specifically incorporated or made enforceable herein by reference, it is understood and agreed by NASA KSC, and FDEP that the contemplated permanence of the remedy reflected herein shall be dependent upon the Center's substantial good faith compliance with the specific LUC maintenance commitments reflected herein. Should such compliance not occur or should the MOA be terminated, it is understood that the protectiveness of the remedy concurred in may be reconsidered and that additional measures may need to be taken to adequately ensure necessary future protection of human health and the environment.

**WHY DOES THE KSCRT
RECOMMEND THIS REMEDY?**

The KSCRT recommends the proposed remedy because the remedial system, along with the naturally occurring processes observed at the site, are sufficient for the reduction of vinyl chloride concentrations in groundwater to the RAO. Long-term monitoring will be used to monitor and document reduction in the COC concentrations to the cleanup target levels.

The institutional controls will also prevent exposure to contaminants prior to the cleanup levels being achieved. The proposed remedy meets the four general standards for corrective measures and was determined to be the best overall approach with respect to the balancing criteria.

NEXT STEPS

The KSCRT will review all comments on this SB to determine whether the proposed remedy needs modification prior to implementation and prior to incorporating the proposed remedy into KSC's HSWA permit. If the proposed remedy is determined to be appropriate for implementation, then a long-term monitoring program will be initiated, and a Land Use Control Implementation Plan will be developed to incorporate the institutional controls at this site.



Legend

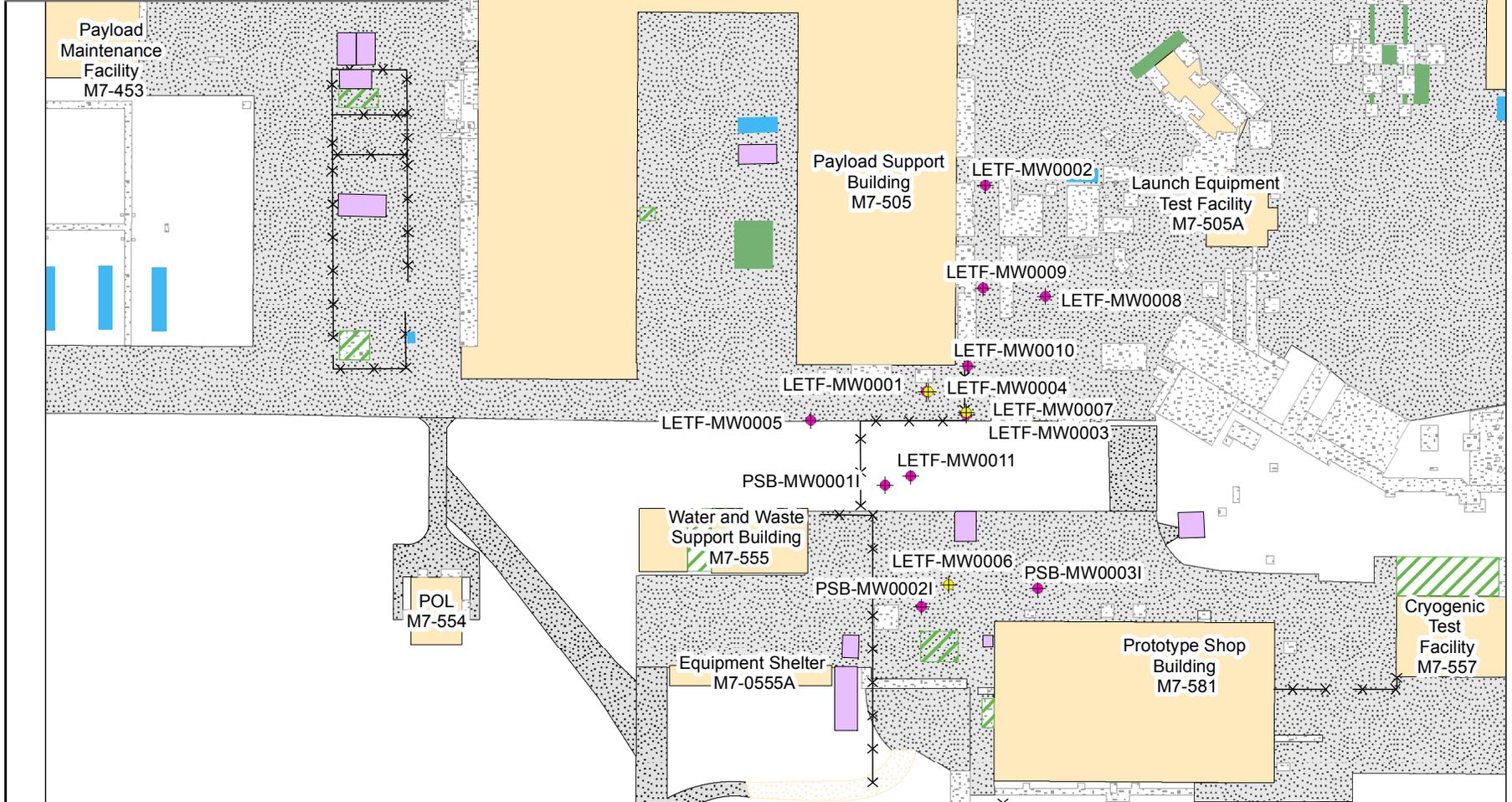
 SWMU Location

- Notes:
- KSC - Kennedy Space Center
 - LETF - Launch Equipment Test Facility
 - NASA - National Aeronautics and Space Administration
 - SB - Statement of Basis
 - SWMU - Solid Waste Management Unit

**Site Location Map - SWMU 091
Statement of Basis**

Launch Equipment Test Facility
NASA Kennedy Space Center, Florida

Notes:
 LETF - Launch Equipment Test Facility
 NASA - National Aeronautics and Space Administration
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Legend

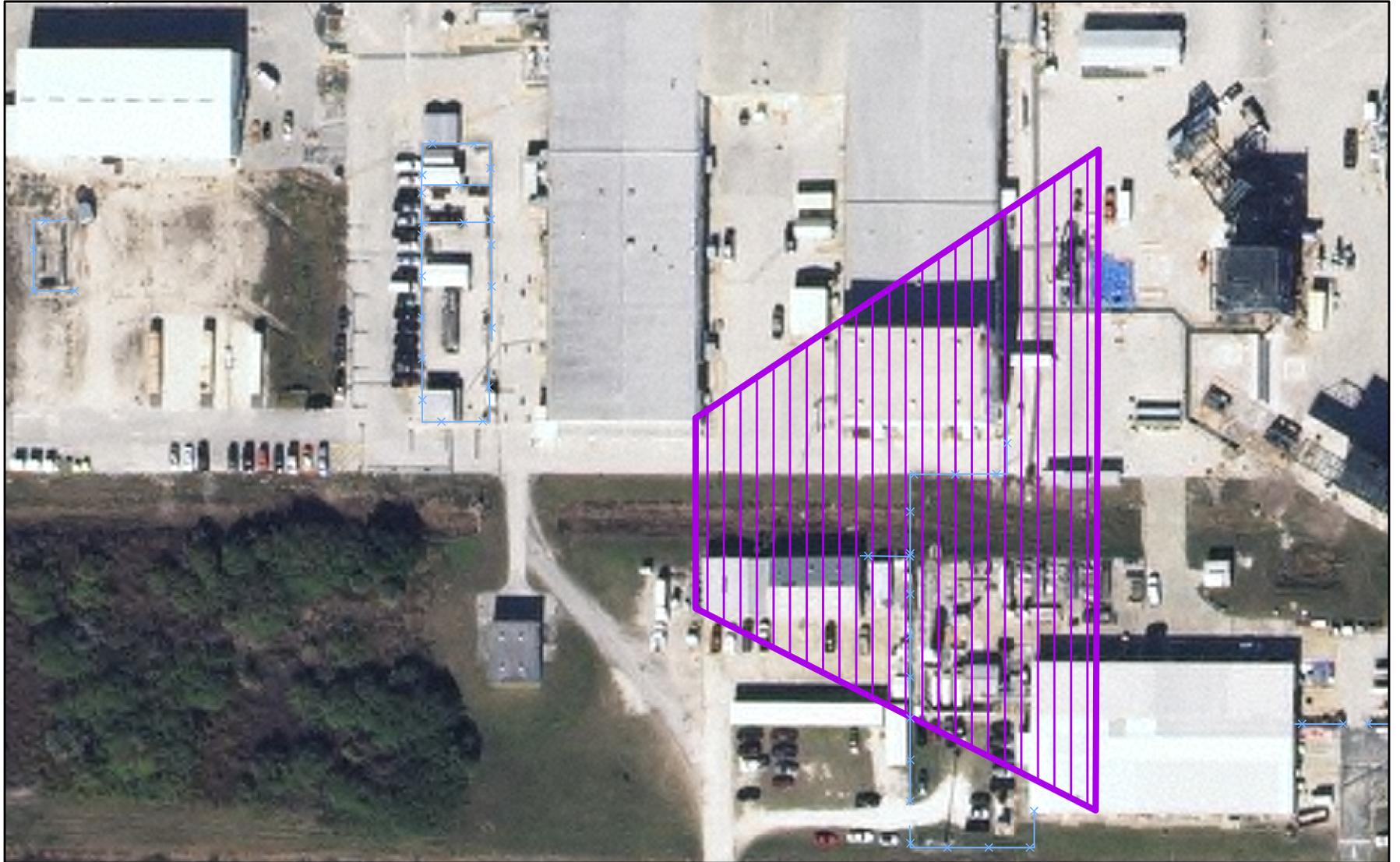
- ◆ Monitoring Well Screened between 15 and 30 ft bls
- ◆ Monitoring Well Screened between 30 and 40 ft bls
- ×× Fence
- Permanent Shed Location
- Temporary Shed Location
- ▨ Canopy Area
- ▨ Concrete Slab or Sidewalk
- Permanent Structure
- Temporary Structure
- ▨ Pavement
- ▨ Dirt Road



Site Plan - SWMU 091
Statement of Basis

Launch Equipment Test Facility
 NASA Kennedy Space Center, Florida

Project Number: TL014018.0000 **Figure 2**

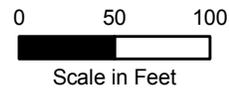


Legend

-  Fence
-  LUC Area

Notes:

- LETF - Launch Equipment Test Facility
- LUC - Land Use Control
- NASA - National Aeronautics and Space Administration
- SB - Statement of Basis
- SWMU - Solid Waste Management Unit



**Area Under Institutional Controls - SWMU 091
Statement of Basis**

Launch Equipment Test Facility
NASA Kennedy Space Center, Florida

Project Number: TL014018.0000

Figure 3