

**Draft Final**

**NASA Ames Land Use Controls  
Implementation and Monitoring Plan**

**National Aeronautics and Space Administration  
Ames Research Center  
Moffett Field, CA**

**December 2016**

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## **NASA Ames Land Use Controls Implementation and Monitoring Plan**

**Prepared for:**  
**National Aeronautics and Space Administration**  
**Ames Research Center**  
**Moffett Field, CA**

**December 2016**

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## **List of Acronyms**

APD	Ames Policy Directive
APR	Ames Procedural Requirements
CAMU	Corrective Action Management Unit
CANG	California Air National Guard
CERCLA	Comprehensive Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CMP	Center Master Plan
cVOCs	chlorinated volatile organic compounds
DOD	Department of Defense
DTSC	Department of Toxic Substances Control
EIMPs	Environmental Issues Management Plans
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
ERD	Environmental Resources Document
EWIs	Environmental Work Instructions
FFA	Federal Facility Agreement
ICs	Institutional Controls
LUCs	Land Use Controls
MEW	Middlefield-Ellis-Whisman
MFA	Moffett Federal Airfield
NADP	NASA Ames Development Plan
NASA	National Aeronautics and Space Administration
NASA Ames	NASA Ames Research Center
NAS	Naval Air Station
Navy	United States Department of the Navy
NPD	NASA Procedural Directive
NPDES	National Pollution Discharge Elimination System
NRP	NASA Research Park
OU	Navy Operable Unit
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
Regional Water Board	San Francisco Bay Regional Water Quality Control Board
ROD	Records of Decision
R&D	research and development
TCE	trichloroethene
WATS	West-Side Aquifers Treatment System



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# 1 Introduction

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National Aeronautics and Space Administration (NASA) Ames Research Center (NASA Ames) is located at the southern end of the San Francisco Bay in Santa Clara County, adjacent to the Cities of Mountain View and Sunnyvale. NASA Ames includes the original NASA Ames Research Center, referred to as the NASA Ames Campus, and the NASA-administered portion of former Naval Air Station (NAS) Moffett Field, which consists of the NASA Research Park (NRP), airfield and airfield support facilities, support facilities for current and former military personnel and open space. The portion of former NAS Moffett Field not under NASA administration includes the Wescoat Village and former Orion Park Department of Defense (DOD)-administered housing areas. Three leasehold areas are located on NASA Ames: the California Air National Guard (CANG) Cantonment Area, Planetary Ventures, LLC Bay View parcel and the Planetary Ventures, LLC Moffett Federal Airfield (MFA) Leasehold. The composition of NASA Ames is shown on Figure 1.

In 2015, NASA entered into the NASA Moffett Federal Facility Agreement (FFA) with the United States Environmental Protection Agency (EPA) Region IX and San Francisco Bay Regional Water Quality Control Board (Regional Water Board). Pursuant to the FFA, as lead federal agency NASA Ames conducts response actions in accordance with the Comprehensive Response, Compensation and Liability Act (CERCLA) on NASA Ames. NASA Ames also implements Land Use Controls (LUCs) to ensure the protectiveness of both NASA Ames response actions and CERCLA response actions conducted by the Navy and the Middlefield-Ellis-Whisman (MEW) Companies on NASA Ames.

The following sections describe NASA Ames' implementing mechanisms, monitoring and associated reporting for administration of LUCs on NASA Ames.





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## 2 Land Use Controls Description

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LUCs are engineered and non-engineered controls undertaken to reduce environmental or health risk. Institutional Controls (ICs), a subset of LUCs, are non-engineered instruments such as administrative or legal controls (e.g., deed restrictions, permits, easements) to prevent exposure to contaminants or protect the integrity of response actions. Although active treatment and monitoring are primarily used in response actions, LUCs are often important components of response action implementation. LUCs can be implemented when contamination is first discovered, when remedies are being implemented, and when residual contamination does not allow for unrestricted use after completion of response actions.

NASA Ames has responsibility for LUCs arising from the following:

- Response actions undertaken by NASA at sites for which NASA is the source of contamination; and
- Response actions undertaken by Responsible Parties (Navy and MEW Companies) on NASA Ames that require implementation of LUCs to be fully protective of human health and the environment. Such LUCs are documented in the Responsible Parties' Records of Decision (RODs), approved by EPA and the Regional Water Board.

In addition to specific LUCs that are established for response actions at individual sites, as property custodian, NASA Ames' general LUC responsibilities for NASA and other Responsible Parties' response actions include:

- Provide reasonable site access for response action implementation and regulatory agency oversight;
- Prevent alteration of, interference with or damage to response actions by NASA, NASA contractors or tenants;
- Prevent activities and land use inconsistent with LUCs;
- Obtain concurrence from EPA, Regional Water Board and Responsible Parties, as applicable, prior to changing land use or modifying or terminating LUCs; and
- Incorporate LUC requirements in NASA Ames land planning documents, contracts, leases, agreements and deed covenants.



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## 3 Land Use Controls Sites Description

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The sites and associated LUCs for which NASA Ames has LUC responsibilities subject to the FFA are listed on Table 1 and shown on Figure 2. The site boundaries in Figure 2 also represent the LUC boundaries.

### 3.1 Navy Site 1 Landfill

Navy Site 1 is a closed landfill of approximately 12 acres located in the northeastern portion of NASA Ames to the north of the airfield. Figure 2 and Figure 3 depict the Navy Site 1 Landfill boundary and LUC boundary. Site 1 is surrounded on three sides by security fencing and is bordered on the northern side by a storm water retention pond (Figure 3). It is estimated that approximately 423,000 cubic yards of domestic waste and waste from military operations were placed in the Site 1 landfill from the mid-1960s to late 1970s.

In 1991, nearby Navy Site 2 landfill was administratively combined with the Navy Site 1 landfill for regulatory oversight and remedy implementation purposes as Navy Operable Unit (OU) 1 (OU1). The 1997 Navy ROD for OU1 presented the Navy's selected remedy to address potential exposure to the contents of the landfills and production of leachate from rain infiltration (PRC, 1997). In the 1997 Navy ROD, Site 1 was designated as a corrective action management unit (CAMU) to allow waste from Site 2 to be removed and placed into Site 1. Approximately 23,000 cubic yards of waste from Site 2 were transferred and consolidated within Site 1. The material from Site 2 included scrap metal, glass, empty paint containers, and soil. Site 1 was then capped with a multilayer soil cap consisting of a biotic barrier, low-permeability layer, and vegetative cover layer.

The 1997 Navy ROD specified LUCs to maintain the protectiveness of the remedy, including restricting cap disturbances, maintaining fencing and signage, continuing operation of the Building 191 lift station, and restricting domestic groundwater use. (PRC, 1997). Table 1 includes a complete description of the LUCs for Navy Site 1 Landfill. In 2003, EPA and the Regional Water Board approved clean closure of Site 2, allowing unrestricted use of the Site 2 area.

### 3.2 Navy Site 22 Landfill

Navy Site 22 is a closed landfill located in the northeastern portion of NASA Ames. Figure 2 and Figure 4 depict the Navy Site 22 Landfill boundary and LUC boundary. Navy Site 22 occupies approximately 9.4 acres in the area overlain by golf course holes 3, 6 and 7. The Site 22 landfill operated from 1950 to 1967 primarily for disposal of domestic waste. Other wastes disposed of at the landfill included scrap equipment, paint, paint thinners, solvents, oil, fuel filters, and sawdust contaminated with polychlorinated biphenyls (PCBs).

The 2002 Navy ROD presented the Navy's selected remedy consisting of a landfill cap with biotic barrier, groundwater monitoring, landfill gas monitoring and LUCs. LUCs include maintaining the structural aspects of the cap, maintaining vegetation, topsoil, irrigation system, surface contours and surrounding surface water drainage, preventing use of site groundwater, continuing operation of the Building 191 lift station and restricting residential use of the site. Table 1 includes a complete description of the LUCs for Navy Site 22 Landfill.



### 3.3 Navy Site 26

Navy Site 26 is located east of the airfield within Navy OU5. The Navy Site 26 site boundary and LUC boundary is shown on Figure 2 and Figure 5. OU5 consists of two cVOC groundwater plumes (northern and southern plumes) that have impacted the upper portion of the shallow aquifer. Since the northern plume is located in an area where high total dissolved solids concentrations preclude use of groundwater as a possible drinking water source (State Water Resources Control Board Resolution 88-63, 2006), the Navy selected groundwater monitoring for the Northern Plume in the 1996 Navy OU5 ROD and the southern plume was named Site 26 (Navy and EPA, 1996).

The 1996 Navy OU5 ROD remedy specified groundwater extraction and treatment for Site 26, groundwater monitoring, and ICs to prevent exposure to, or ingestion of, contaminated groundwater by restricting domestic groundwater use. The Navy operated a groundwater extraction and treatment system from 1999 to 2003 for Site 26. The 2014 Navy ROD Amendment changed the Site 26 remedy to bioaugmentation/biostimulation with monitored natural attenuation and ICs.

### 3.4 Navy Site 28

Navy Site 28 is located in the west-central area of NASA Ames, on the western side of the airfield. Figure 2 and Figure 6 depict the Navy Site 28 WATS Area boundary and LUC boundary. The area of Site 28 contains historical Navy contaminant source areas located west of the runways comingled with chlorinated volatile organic compounds (cVOCs) in groundwater that has migrated to Site 28 from the upgradient MEW Regional Plume (Figure 5).

The MEW Regional Plume is addressed under the 1989 MEW Study Area ROD (EPA, 1989). The 1989 MEW Study Area ROD specifies cleanup goals for soil and groundwater and presents remedies to achieve the cleanup goals. The 1989 MEW Study Area ROD selected trichloroethene (TCE) as the indicator chemical for groundwater cleanup based on the assumption that achieving the cleanup goal for TCE would result in cleanup of the other site contaminants. The TCE groundwater cleanup goals specified in the 1989 MEW Study Area ROD are 5 µg/L for the shallow aquifers and 0.8 µg/L for the deep aquifers, to be achieved by groundwater extraction and treatment with hydraulic controls. The soil cleanup goal is based on the concentration of contaminants that could remain in soil, leach into the groundwater, and still achieve the cleanup goal for the shallow aquifers.

The Navy's 1993 amendment to the 1990 Navy Moffett FFA adopted the 1989 MEW Study Area ROD for Site 28 to address historical Navy source areas to the MEW Regional Plume in the shallow aquifers (EPA et al., 1993). The West-Side Aquifers Treatment System (WATS) is the groundwater treatment system implemented by the Navy in 1998 under the 1989 MEW Study Area ROD and Navy Moffett FFA to treat historical Navy source areas to groundwater at Site 28 that have comingled with the MEW Regional Plume (EPA, 1989). WATS extracts groundwater from nine extraction wells (six in the upper zone and three in the lower zone of the shallow A aquifer) and treats groundwater using an advanced oxidation



process followed by liquid-phase granular activated carbon. Treated water is discharged into the storm drain system under a National Pollution Discharge Elimination System (NPDES) permit and eventually enters the storm water retention pond.

In addition to WATS, the Navy is addressing Navy source areas (former Building 88 dry cleaners, traffic island area, well W9-18 area) that have contributed to groundwater contamination at Site 28, including deeper groundwater zones. In 2005, the Navy investigated residual tetrachloroethene (PCE) source areas and concluded that the former Building 88 Dry Cleaner area and traffic island area are continuing sources to groundwater contamination (Tetra Tech, 2008). Since 2012, the Navy has been conducting supplemental investigations and treatability studies to evaluate methods to reduce contaminant concentrations in these source areas of Site 28 (Shaw, 2012).

The 1989 MEW Study Area Rod established a LUC for restricting domestic use of groundwater.

### **3.5 Navy Site 29 Hangar 1**

Navy Site 29 (Hangar 1) is located on the west side of the airfield and consists of the Hangar 1 aboveground structure, concrete floor, small areas of exposed soil on the east side of the structure and surrounding storm water drainage system. The Navy Site 29 boundary and LUC boundary is shown on Figure 2 and Figure 7. The building materials and paint used to construct Hangar 1 contained PCBs, asbestos, lead and zinc. Contaminants released from these materials migrated into the environment around the hangar and entered the storm drain system. In 2003, NASA and Navy removed contaminated sediment from the storm water collection trench surrounding the hangar and applied a temporary coating to prevent migration of PCBs from the exterior surfaces of the hangar. In 2010, the Navy conducted a non-time-critical removal action to remove the hangar siding and coat the steel frame and other exposed surfaces. In 2013, the Navy finalized an After-Action Completion Report and Long-Term Management Plan for Site 29 to address long-term maintenance of the coating, which includes LUCs to protect the coating remedy from site activities and use, ensure building inhabitants are notified of potential exposure hazards, address worker exposure hazards, and require post-construction repairs over the coating for building modifications (AMEC, 2013).

### **3.6 Former NAS Moffett Field Area of MEW Regional Plume**

In accordance with the 1989 MEW Study Area ROD, the MEW companies, Navy and NASA have been addressing the MEW Regional Plume and source areas comingled with the MEW Regional Plume at NASA Ames by operating groundwater extraction and treatment systems. The extent of the MEW Regional Plume is defined in the 1989 MEW Study Area ROD as the area of TCE groundwater concentrations greater than 5 µg/L in the shallow aquifers and greater than 0.8 µg/L in the deep aquifers. Pursuant to an agreement among NASA, Navy and the MEW Companies, each entity is responsible for implementing the remedy in their designated area of responsibility under the 1989 MEW Study Area ROD. The estimated area of the MEW Regional Plume on NASA Ames and LUC boundary is shown on Figure 2. NASA



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Ames maintains LUCs associated with the 1989 MEW Study Area ROD on NASA Ames, which includes restriction of domestic groundwater use.

### **3.7 Former NAS Moffett Field Area of MEW Regional Plume Vapor Intrusion Study Area**

EPA amended the 1989 MEW Study Area ROD to select a vapor intrusion remedy for the MEW Superfund Site in the 2010 MEW Vapor Intrusion ROD Amendment. The source of vapor intrusion associated with the MEW Regional Plume in buildings at NASA Ames is from chlorinated volatile organic compounds in shallow groundwater. The Vapor Intrusion Study Area is generally defined as the area where TCE concentrations in shallow groundwater are greater than 5 µg/L. In 2011, EPA worked with the MEW Companies, NASA and Navy to develop the Statement of Work for the Vapor Intrusion Remedy remedial design and remedial action. Pursuant to an agreement among NASA, Navy and the MEW Companies, each entity is responsible for implementing the vapor intrusion remedy in their designated area of responsibility on NASA Ames. The area on NASA Ames subject to the 2010 MEW Vapor Intrusion ROD Amendment and the LUC boundary is shown on Figure 2. NASA Ames maintains LUCs associated with the 2010 MEW Vapor Intrusion ROD Amendment on NASA Ames, which include incorporating requirements for vapor intrusion engineering controls in future construction (or modifications to existing buildings) in permitting and building design processes, establishing Recorded Agreements to ensure installation and operation of vapor intrusion engineering controls, providing information on vapor intrusion to future owners, and providing information regarding building and occupancy changes to EPA.



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## 4 Land Use Controls Implementing Mechanisms

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NASA Ames has established LUC implementing mechanisms, including policy, regulations, processes, procedures and permits to administer LUCs. These are described below.

### 4.1 NASA Ames Development Plan (NADP) Final Programmatic Environmental Impact Statement (EIS)

As the operative planning document for NASA Ames, the NADP provides a framework to guide the future use, renovation, management and development of facilities at NASA Ames (Design, Community & Environment, 2002). Under the NADP, NASA Ames is divided into four major planning areas: the 234-acre NASA Ames Campus, the 213-acre NASA Research Park (NRP), the 952-acre Eastside/Airfield, and the 95-acre Bay View parcel. The remaining 357 acres of NASA-administered land consists of wetlands areas along the northern boundary of NASA Ames.

The Final Programmatic EIS for the NADP (2002) evaluated five development alternatives within the four major planning areas of NASA Ames. NASA issued a ROD (November 2002) approving implementation of Mitigated Alternative 5 (Preferred Alternative). Mitigated Alternative 5 under the NADP provides for new construction of approximately 2.5 million square feet of educational, office, research and development (R&D), museum, conference center, housing and retail space in the NRP area. The NADP also included the addition of approximately 1.2 million square feet of new development (primarily housing) in the Bay View development area, and approximately 500,000 square feet of new, high-density office and R&D space in the NASA Ames Campus (Design, Community & Environment, 2002). Land use on NASA Ames provided under the EIS is shown on Figure 8.

### 4.2 NASA Ames Environmental Resources Document (ERD)

NASA regulations (Title 14 of the Code of Federal Regulations [CFR], Section 1216.319, and NASA Procedural Requirements [NPR] 8580.1A) require each NASA Center to prepare an ERD to serve as a baseline description of all environmental aspects of the Center's operation against which the effects of subsequent proposed actions may be judged to determine significance. Each Center's ERD is updated every five years and as Center conditions change, in accordance with the procedures outlined in NPR 8580.1A.

All existing LUCs are documented in the NASA Ames ERD (ERT, 2015) and are updated during established ERD review periods and as necessary to incorporate new LUCs.

### 4.3 NASA Ames Center Master Plan (CMP)

Per NASA Procedural Requirement 8810.1, Master Planning Procedural Requirements, NASA Ames is required to develop and maintain a facilities and land use Center Master Plan (CMP) that addresses a planning horizon of not less than 20 years. The NASA Ames CMP is a living document and is reviewed and updated as necessary every five years. NASA Ames' CMP proposes to transform the current Ames Research Center Campus into a research and education community that will attract partners from academia, industry and non-profit corporations with shared goals in NASA's mission. The CMP serves as the framework for all future construction projects and related operations for a 20-year planning horizon.





All planning activities refer to the CMP to ensure efficient and effective use of real property resources. The CMP enables development of plans that are safe, practical and reflect the Center's environmental responsibilities and cultural resources stewardship role. The current CMP addresses the planning horizon of 2005 to 2020 and the most recent update to the CMP was completed on June 3, 2011.

The CMP incorporates existing LUCs and any new LUCs will be incorporated in future updates.

#### **4.4 NASA Procedural Directive (NPD) 8500.1, NASA Environmental Management**

Per NPD 8500.1, it is NASA policy to maintain compliance with all applicable federal, state, and local environmental requirements; to incorporate environmental risk reduction and sustainable practices to the extent practicable throughout NASA's programs, projects, and activities; and to consider environmental factors in planning, development, execution and disposition activities. Compliance with LUCs is inherent to NPD 8500.1.

#### **4.5 Ames Procedural Requirements (APR) 8500.1, Ames Environmental Procedural Requirements**

APR 8500.1 further sets forth general procedural requirements to ensure compliance with applicable federal, state, and local environmental laws and regulations, Executive Orders and NASA policies and procedures. NASA Ames personnel are responsible for planning, designing, constructing, managing, operating, and maintaining facilities in conformance with applicable regulatory directives. This includes environmental review early in project planning consistent with NASA's NEPA implementing procedures (NPR 8580.1 and EO 12114), NASA policies and procedures for programs and projects (NPR 7120), and NASA regulations related to environmental quality (14 CFR 1216). Compliance with LUCs is inherent to APR 8500.1.

#### **4.6 Ames Policy Directive (APD) 8822.1, NASA Research Park Design Review Program**

APD 8822.1 establishes specific policies, responsibilities, and procedures for the Design Review Program for all proposed projects within the NRP and Bay View development areas. New development projects in the NRP and Bay View areas are coordinated through the NRP Design Review process during conceptual design to ensure all applicable land use and design requirements are met. A NEPA Environmental Checklist and Record of Environmental Consideration is completed during Design Review to identify any environmental requirements or approvals for a project. Compliance with existing LUCs is reviewed during this process.

Although not addressed under APD 8822.1, larger Planetary Ventures development projects in the MFA Leasehold and NASA Ames projects in the NASA Ames Campus undergo NASA planning/design review. Environmental requirements, including LUCs, are incorporated into these reviews.



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#### **4.7 Ames Procedural Directive (APD) 8829.1, NASA Ames Construction Permits**

APD 8829.1 establishes specific policies and responsibilities for construction activities at NASA Ames. All construction work at NASA Ames is reviewed in accordance with the Construction Permit Process. Construction permits must be obtained prior to start of construction, modification, demolition, or replacement of any building, temporary structure, site utility, electrical or mechanical system, life safety alarm system, physical security system or fire suppression system, and roadway. The NASA Ames Environmental Management Division reviews all construction permit applications to ensure that all permitted work will be designed and constructed in accordance with applicable environmental requirements, including existing LUCs.

For NRP projects, the project proponent must first engage in the NRP Design Review process (described above) and obtain approval from the NRP Design Review Board before applying for a construction permit. As described in Section 4.6, planning and design reviews of larger projects in the MFA Leasehold and NASA Ames Campus areas ensure consistency with the NASA Ames CMP and compatibility with other planned work.

#### **4.8 NASA Ames Environmental Work Instructions (EWIs)**

NASA Ames Environmental Work Instructions (EWIs) set forth requirements to ensure that programs, projects, and activities comply with applicable federal, state, and local laws, regulations and EOs, and NASA policies and procedures. Each EWI lists relevant regulatory authorities and documents, assigns individual and organizational responsibilities within NASA Ames, and identifies specific requirements applicable to the work being performed. EWI 18, Environmental Requirements for Construction Projects, addresses existing LUCs in the construction review process.

#### **4.9 Environmental Issues Management Plan (EIMPs)**

Environmental Issues Management Plans (EIMPs) have been prepared for the Bay View area (Iris, 2011), NASA Research Park (EKI, 2005) and MFA Leasehold (EKI, 2015). The EIMPs provide detailed information on the environmental conditions of the areas, including existing LUCs, and provide a decision framework for management of residual contaminants in structures and environmental media during development and occupancy of the areas. The EIMPs are updated periodically and as needed to incorporate new conditions, including LUCs.

#### **4.10 NASA Ames Leases**

All tenant leases contain provisions identifying environmental requirements, including LUCs.

#### **4.11 Land Use Controls Map**

A GIS-based map (Figure 2) is maintained on NASA Ames' Facilities GIS system. The map includes the Table 1 information. The map is updated as any new LUCs are added or modified. The map can be viewed internally and externally through NASA Ames' public website.





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## **5 Land Use Controls Responsibility**

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NASA Ames Center Operations Directorate, Environmental Management Division, identifies new LUCs, facilitates implementation of LUCs, communicates LUCs requirements to NASA Ames organizations, contractors and tenants, maintains the GIS-based LUCs map, monitors the maintenance of LUCs, and reports to EPA and the Regional Water Board on continued implementation of LUCs pursuant to the NASA Moffett FFA. All NASA Ames organizations, contractors and tenants are responsible for complying with and maintaining LUCs as described in the implementing mechanisms.



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## **6 Land Use Controls Monitoring and Reporting**

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NASA Ames Environmental Management Division conducts regularly scheduled site inspections to visually observe the continued maintenance of LUCs. Inspections are conducted quarterly or as needed. An annual LUC report is prepared in accordance with the NASA Moffett FFA Site Management Plan schedule. The annual report addresses the continued implementation and adequacy of LUCs, including the results of inspections, document reviews and updates, and any noted deficiencies and corrective actions undertaken.



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## 7 Notifications

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As part of LUCs administration, NASA Ames will:

- Notify EPA, Regional Water Board and other responsible parties, as applicable, for approval of any proposed land use changes that are inconsistent with LUCs.
- Notify EPA, Regional Water Board and other responsible parties, as applicable, at least six months prior (or as soon as possible but no later than 60 days prior) to any transfer or sale of land affected by LUCs (including federal agency to federal agency transfer) and inform GSA of LUCs on land proposed for transfer or sale. These notifications will allow for EPA and Regional Water Board review to help ensure appropriate provisions are included in conveyance and lease instruments to document existing environmental conditions and maintain LUCs.
- Provide EPA, Regional Water Board and other responsible parties, as applicable, a copy of executed deeds or transfer documents.



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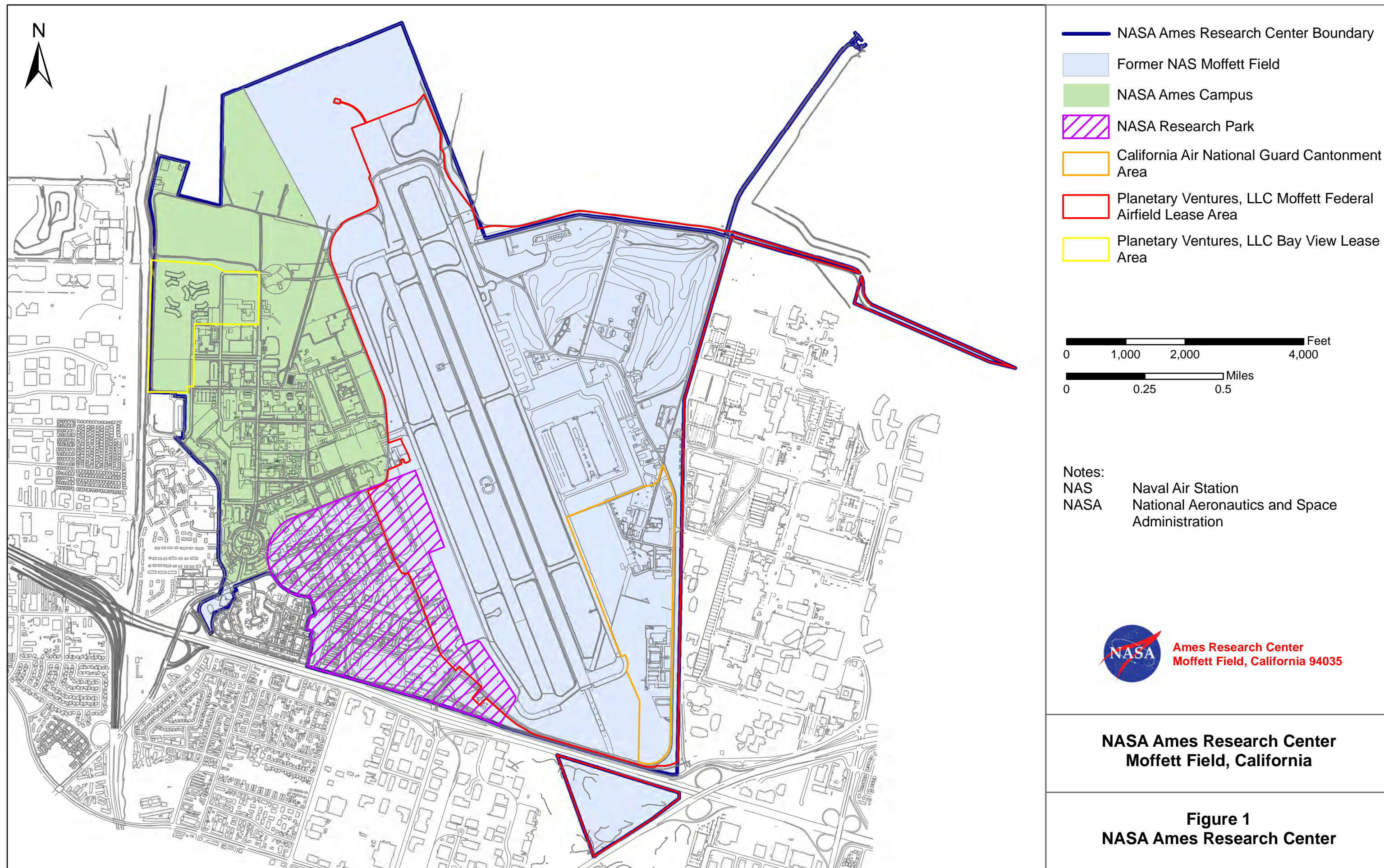
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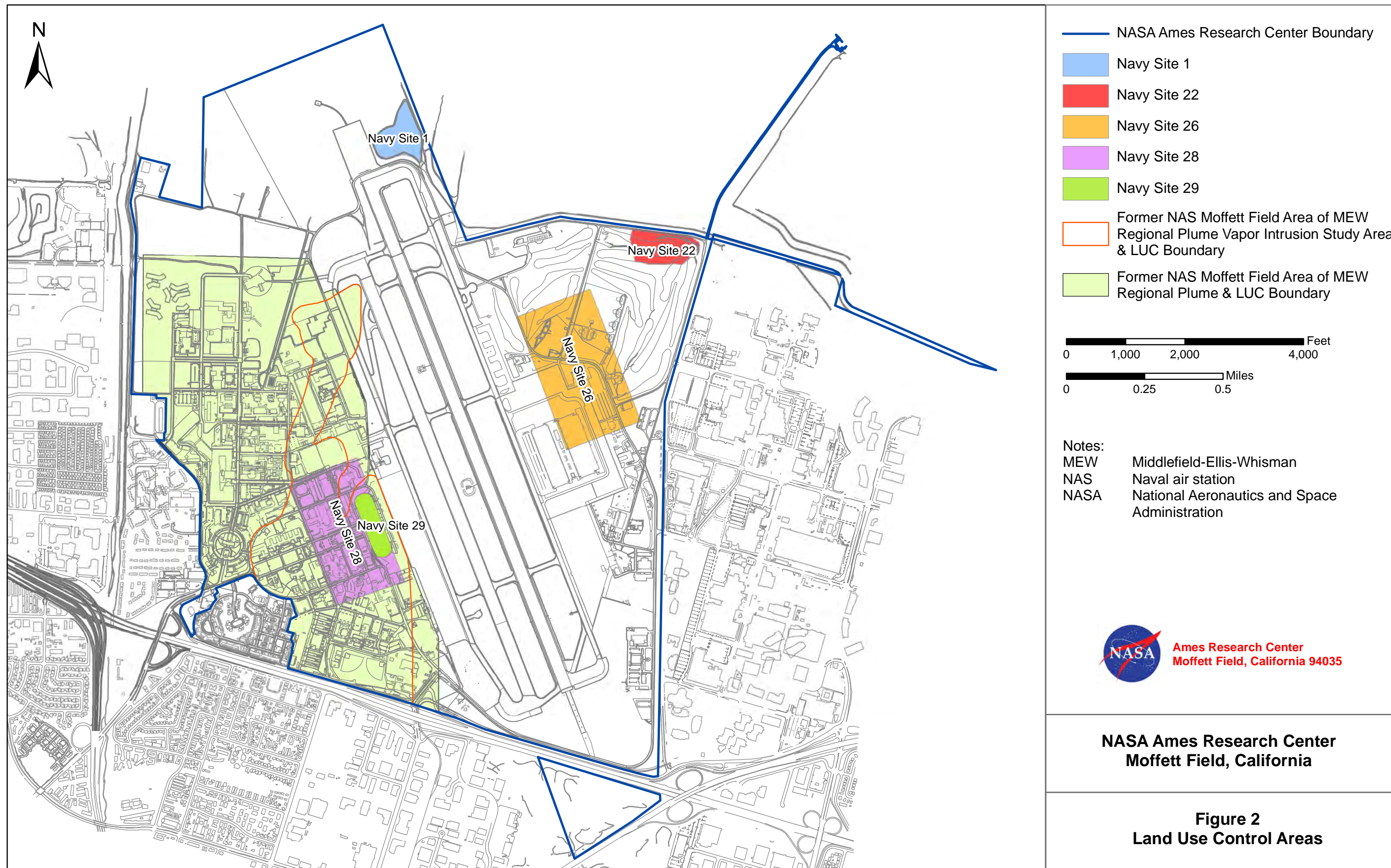
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## Figures

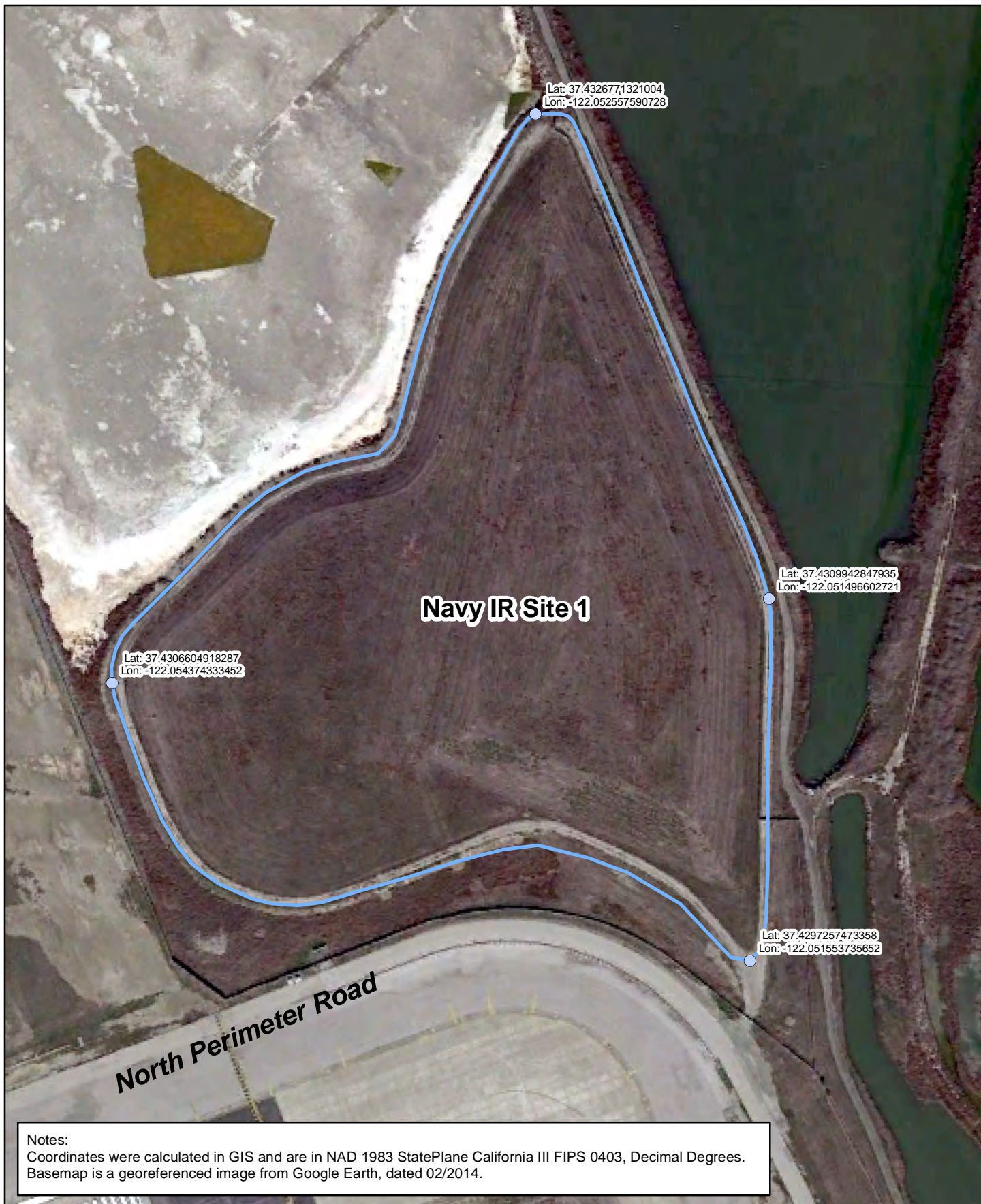













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**Figure 3**  
**Land Use Control Boundary**  
**Navy Site 1 Landfill**

 Navy Site 1

0 50 100 200 Feet







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Figure 4  
Land Use Control Boundary  
Navy Site 22 Landfill

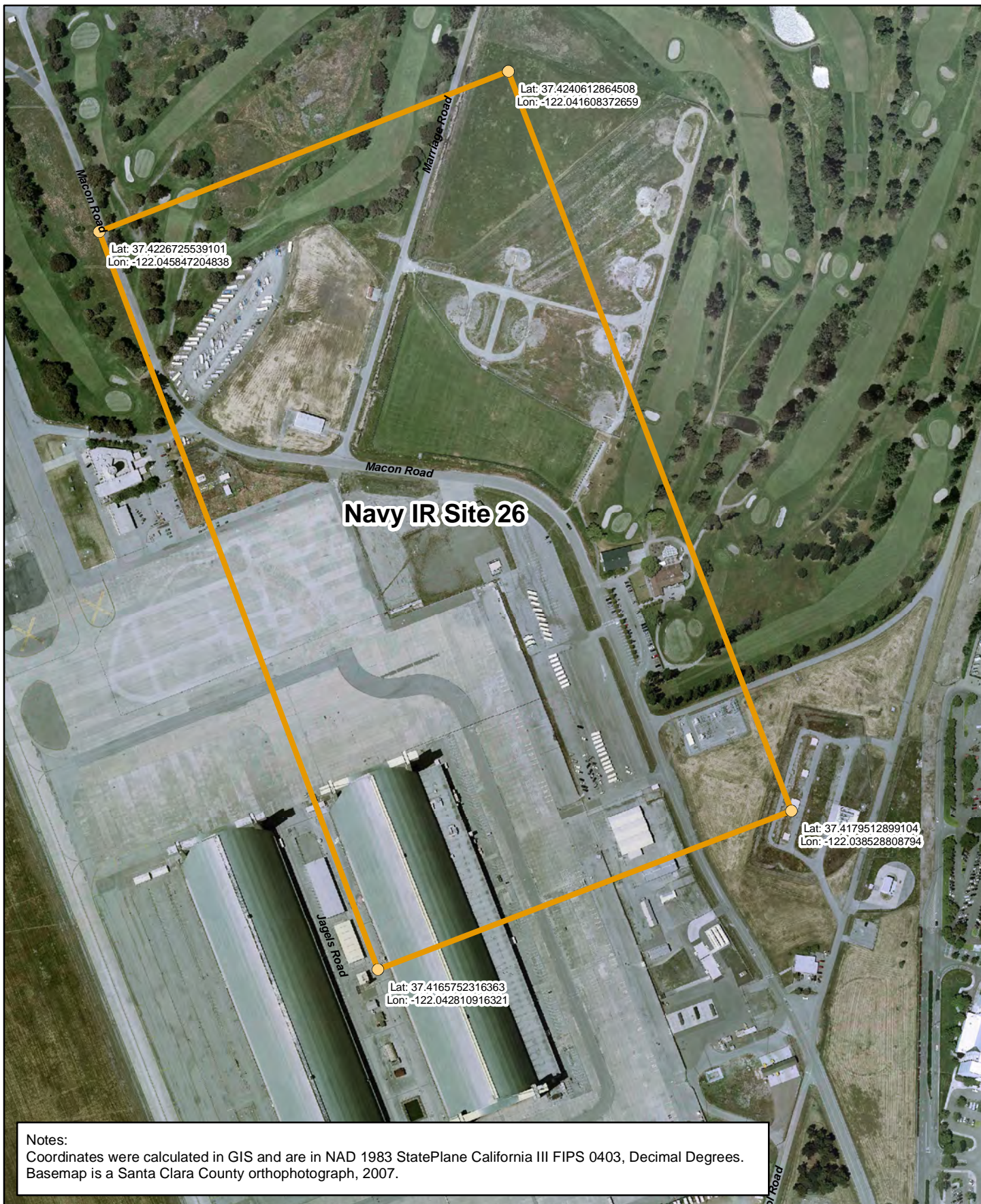


Navy Site 22

0 150 300 Feet







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Figure 5  
Land Use Control Boundary  
Navy Site 26

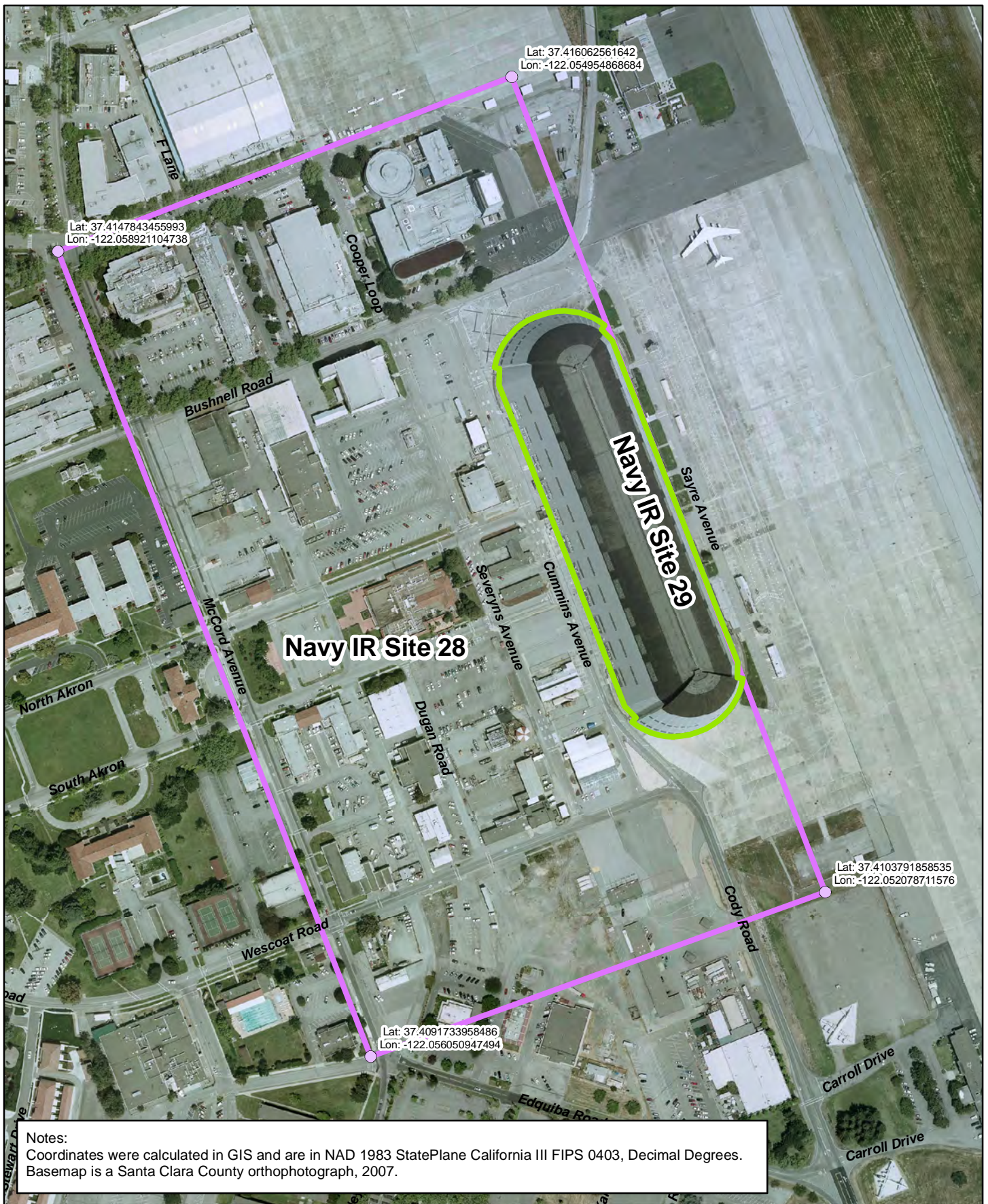


Navy Site 26

0 150 300 600 Feet








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Figure 6  
Land Use Control Boundary  
Navy Site 28

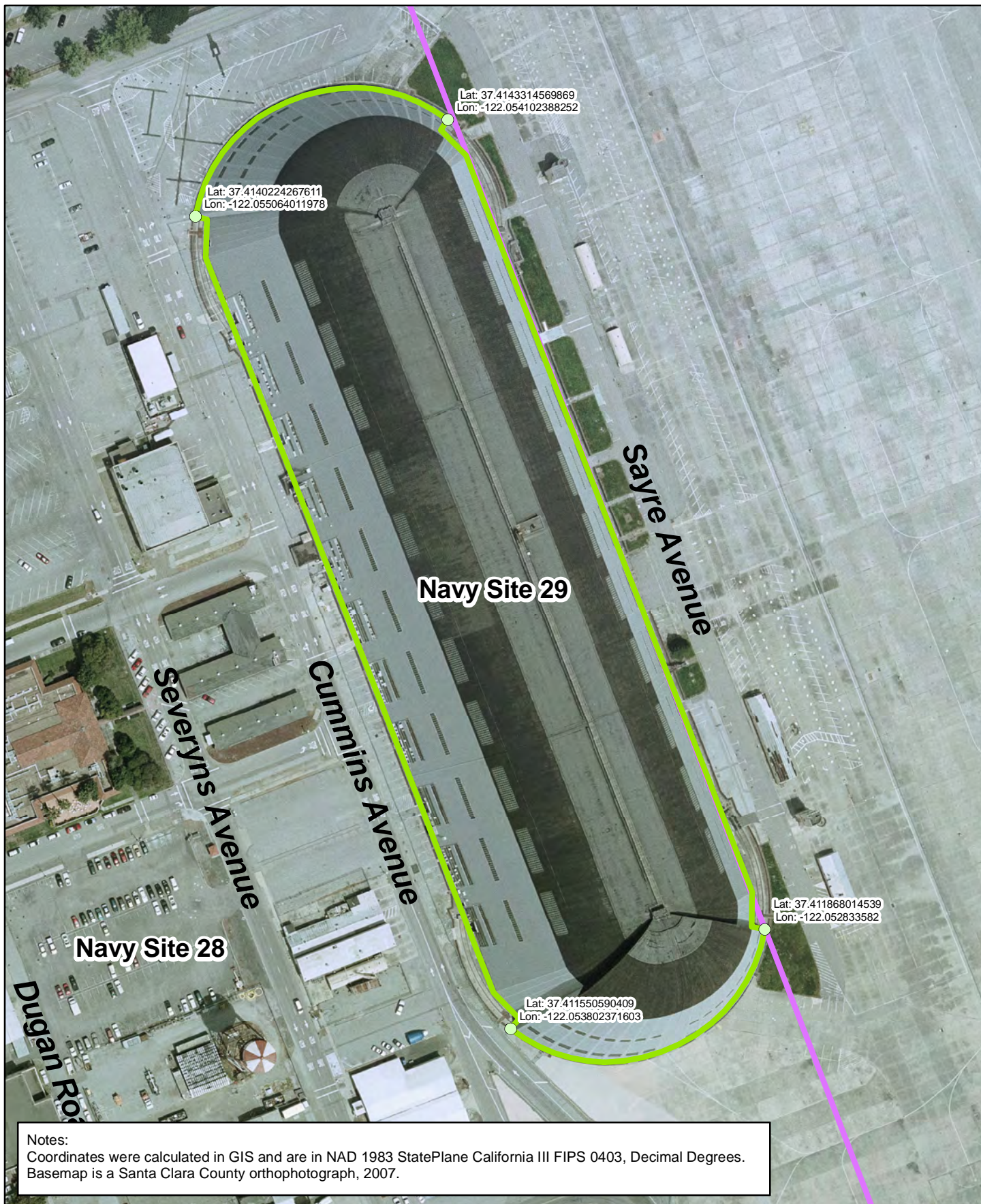
 Navy Site 28

 Navy Site 29

0 125 250 500 Feet







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Figure 7  
Land Use Control Boundary  
Navy Site 29 Hangar 1

Navy Site 29  
Navy Site 28

0 50 100 200 Feet





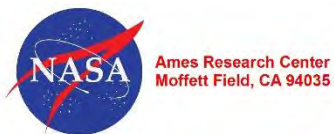
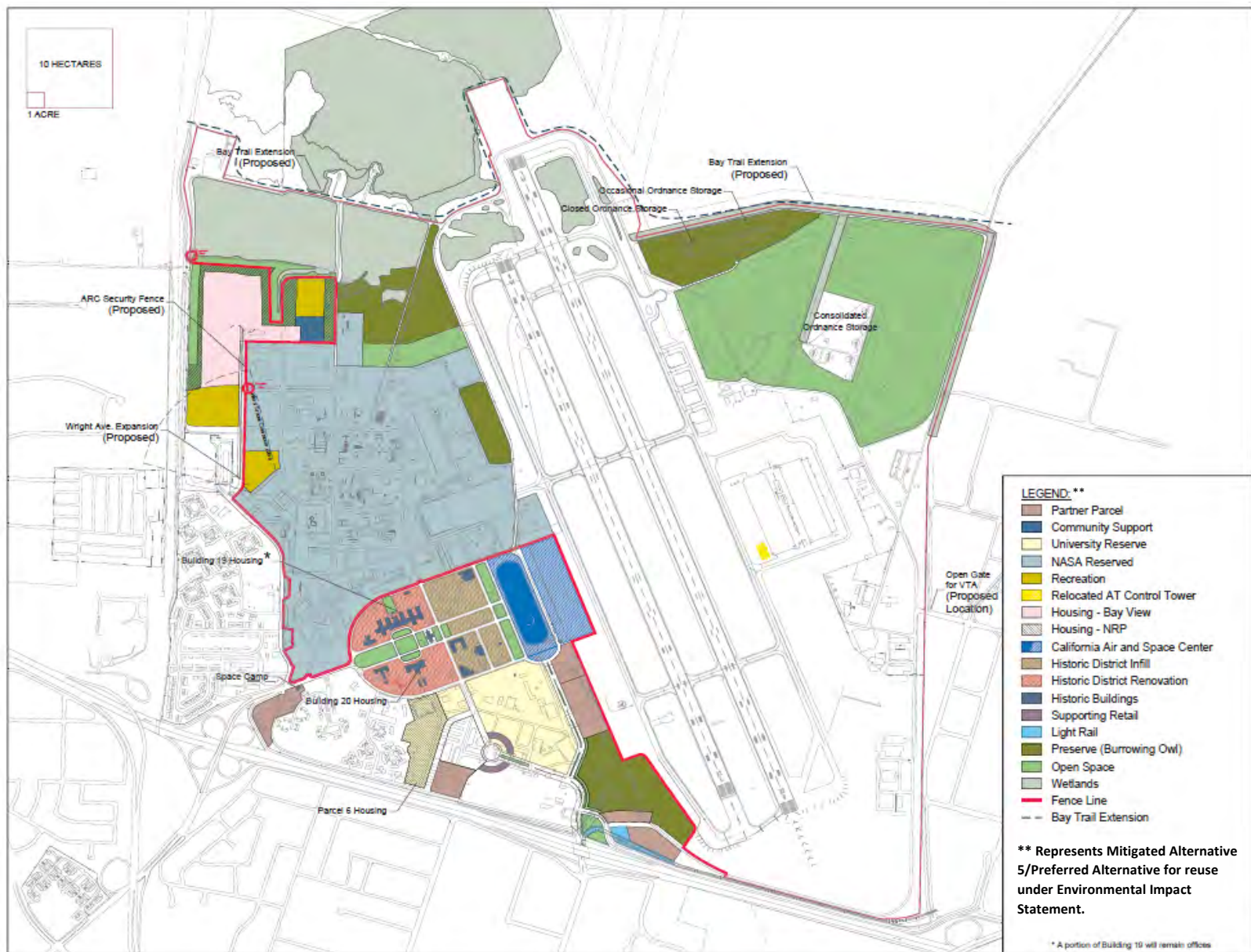


Figure 8  
NASA Ames Research Center Land Use

Source: Design, Community  
& Environment, 2002



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## Tables



**Table 1: NASA Ames Research Center Land Use Controls and Implementation Mechanisms**  
**NASA Ames Research Center, Moffett Field, California**

Site	Description	Basis for LUCs	NASA Ames LUCs	LUCs Implementation Mechanisms
Navy Site 1 Landfill	Landfill cap vegetative cover, biotic barrier and low permeability layer, gas venting trench, landfill gas and groundwater monitoring system. (1997 Navy OU1 ROD)	Prevent exposure to waste and domestic use of groundwater	<ol style="list-style-type: none"> <li>1. Prohibit landfill cap disturbance.</li> <li>2. Maintain fencing and signage.</li> <li>3. Operate and maintain Building 191 pump station and drainage system.</li> <li>4. Restrict domestic groundwater use.</li> </ol>	<ol style="list-style-type: none"> <li>1. Incorporate LUCs in NASA's land use planning documents and maps.</li> <li>2. Notify subsequent landowners or lessees of LUCs by appropriate notices and land use restrictions.</li> </ol>
Navy Site 22 Landfill	Landfill cap with vegetative cover and biotic barrier, landfill gas and groundwater monitoring system. (2002 Navy Site 22 Landfill ROD)	Prevent exposure to waste and domestic use of groundwater	<ol style="list-style-type: none"> <li>1. Protect the structural aspects of the landfill cap (biotic barrier) by restricting activities that could potentially disturb the cap.</li> <li>2. Maintain vegetation, topsoil layer, irrigation system, and drainage components, including surface contours, encompassed within and adjacent to the Site 22 remedy boundary.</li> <li>3. Maintain and operate the Building 191 pump station.</li> <li>4. Prohibit extraction of groundwater from Site 22.</li> <li>5. Prohibit residential land use of the site and obtain regulatory approval for consideration of alternative land use.</li> </ol>	<ol style="list-style-type: none"> <li>1. Incorporate LUCs in NASA's land use planning documents and maps.</li> <li>2. Include a restrictive covenant in the deed for conveyance of any portion of the Site 22 landfill to include LUCs.</li> <li>3. Requirement of annual reporting to EPA regarding the implementation, monitoring, and efficacy of the ICs.</li> <li>4. Conduct regular (no less than quarterly or other agreed upon frequency) monitoring or visual inspections of the site to ensure compliance with, and proper maintenance of, the ICs.</li> <li>5. Provide periodic updates to the Navy, EPA, and the Regional Water Quality Control Board describing status and continuing efficacy of institutional controls for which NASA is responsible</li> </ol>
Navy Site 26 (OU 5)	Groundwater treatment by biostimulation/bioaugmentation and monitored natural attenuation.	Prevent domestic use of groundwater	<ol style="list-style-type: none"> <li>1. Restrict domestic groundwater use.</li> </ol>	<ol style="list-style-type: none"> <li>1. Incorporate LUCs in NASA's land use planning documents and maps.</li> </ol>





Site	Description	Basis for LUCs	NASA Ames LUCs	LUCs Implementation Mechanisms
	(1996 Navy OU5 ROD and 2014 Navy Site 26 ROD Amendment)		2. Address vapor intrusion in new construction or modifications to existing structures.	2. Notify subsequent landowners or lessees of LUCs by appropriate notices and land use restrictions.
Navy Site 28 WATS	Groundwater extraction, treatment and monitoring system. Treated water discharged to NASA storm drain system and storm water retention pond. (1989 MEW Study Area ROD)	Prevent domestic use of groundwater	1. Restrict domestic use of groundwater.	1. Incorporate LUCs in NASA's land use planning documents and maps.
Navy Site 29 Hangar 1	Navy removal action conducted in 2013 consisting of siding removal, soil excavation, storm drain sediment removal, and frame coating application. (2013 Navy Long-Term Management Plan; 2013 Navy Proposed Plan)	Prevent exposure to underlying paint on the Hangar 1 structure	<ol style="list-style-type: none"> <li>1. Protect the remedy through restrictions on site access, activities and use, including site development or modifications to the Hangar 1 structure.</li> <li>2. Ensure building inhabitants are notified of potential exposure hazards.</li> <li>3. Address worker exposure hazards and require post-construction repairs over the coating for building modifications.</li> </ol>	<ol style="list-style-type: none"> <li>1. Incorporate LUCs in NASA's land use planning documents and maps.</li> <li>2. Incorporate LUCs into all current and prospective lease agreements.</li> <li>3. Provide a restrictive covenant in the deed for conveyance of any portion of the Hangar 1 site, include LUCs.</li> </ol>
Former NAS Moffett Field Area of MEW Regional Plume	Former NAS Moffett Field Area of MEW Regional Plume (1989 MEW Study Area ROD)	Prevent domestic use of groundwater	1. General LUCs under the 1989 MEW Study Area ROD restricting domestic use of groundwater.	1. Incorporate LUCs in NASA's land use planning documents and maps.
Former NAS Moffett Field Area of MEW Regional Plume Vapor Intrusion Study Area	Former NAS Moffett Field Area of MEW Regional Plume Vapor Intrusion Study Area. (2010 MEW Vapor Intrusion ROD Amendment)	Prevent exposure to volatile organic compounds in indoor air	<ol style="list-style-type: none"> <li>2. Incorporate requirements for vapor intrusion engineering controls in future construction (or modifications to existing buildings) in permitting and building design processes.</li> <li>3. Establish Recorded Agreements to ensure installation and operation of vapor intrusion engineering controls.</li> </ol>	1. Incorporate LUCs in NASA's land use planning documents and maps.



Site	Description	Basis for LUCs	NASA Ames LUCs	LUCs Implementation Mechanisms
			<ol style="list-style-type: none"><li>4. Provide information on vapor intrusion to future owners.</li><li>5. Provide information regarding building and occupancy changes to EPA.</li></ol>	