

## **Appendix 5: Environmental Considerations, Regulations, and Guidance for Soil Disturbing Activities at Lowry**

*The Lowry Community Master Association (LCMA) is conveying this notice as a courtesy to future developers and builders at the request of the Colorado Department of Public Health and Environment/Hazardous Materials and Waste Management Division (CDPHE/HMWMD). The LCMA makes no express or implied warranty as to the contents of this document. Further, the LCMA bears no responsibility to ensure that future developers and builders comply with all applicable local, state, and federal environmental regulations.*

This appendix provides information that all developers and builders should be aware of when undertaking new construction and renovation projects at Lowry where soil disturbing activities, such as foundation excavation, trenching, grading, drilling, or boring, will occur. The contents of this appendix are arranged as follows:

1. Background Regarding Environmental Issues at Lowry
2. Lowry Operational History and Potential Environmental Issues
3. Developer/Builder Responsibilities for Soil Disturbing Activities
  - 3.1 Defining Soil Disturbing Activities
  - 3.2 Applicable Environmental Regulations, Guidance, and Notifications
    - 3.2.1 Asbestos-Containing Material (ACM) and/or Regulated Asbestos Contaminated Soil (RACS)
    - 3.2.2 Petroleum, Oil, and Lubricant (POL) Contaminated Soil
    - 3.2.3 Other Contaminated Soil (Non-ACM, Non-RACS, and Non-POL Contaminated Soil)
    - 3.2.4 Unknown Environmental Conditions in Soil and Regulatory Notifications for Discovery
4. Contaminated Groundwater Considerations

In the event the developer/builder wishes to follow other procedures, those alternative procedures must be submitted to, and approved by, CDPHE prior to the commencement of soil disturbing activities. Figure 1 illustrates the boundaries of Lowry to which this appendix applies.

### **1. Background Regarding Environmental Issues at Lowry**

As an “infill” development of a former Air Force base, Lowry had a rich history before it was redeveloped into a vibrant Denver neighborhood. As the former Lowry Air Force Base, it housed thousands of service men and women for over 57 years as a technical training center and airfield. After the base was closed in 1994 and redevelopment began in the late 1990’s, an environmental program was instituted at Lowry to identify and resolve impacts from past Air Force operations, in accordance with federal and state regulations. The environmental program was overseen in succession by the U.S. Air Force, the U.S. Environmental Protection Agency (USEPA), and subsequently by the CDPHE/HMWMD. Through the implementation of the environmental program at Lowry, all of the known environmental

conditions in soil were successfully addressed to the satisfaction of CDPHE. As the former base was being redeveloped a number of previously unrecognized or unexpected environmental conditions were encountered in soil and those conditions also were satisfactorily addressed with CDPHE concurrence. That noted, because of its role as a former Air Force base and the historical operations conducted at the base, there is always the potential to encounter additional previously unrecognized environmental conditions during soil disturbing activities at Lowry.

Documentation of the historical environmental program implemented at Lowry can be found at the following websites:

- Colorado Department of Public Health and Environment
  - [https://www.colorado.gov/pacific/cdphe/lowry\\_afb](https://www.colorado.gov/pacific/cdphe/lowry_afb)
- Air Force Administrative Record – (found under the BRAC section of the website)
  - <http://afcec.publicadmin-record.us.af.mil/Search.aspx>
- Lowry Assumption, LLC website
  - <http://www.lowryafbcleanup.com/Lowryhome.html>

Additionally, the CDPHE maintains an information repository where the public can review and study site-specific documents at the CDPHE/HMWMD Records Center located at 4300 Cherry Creek Drive South, Denver. For an appointment to review documents at the CDPHE/HMWMD Records Center, contact personnel there by telephone at (303) 692-3331 or by e-mail at [comments.hmwmd@state.co.us](mailto:comments.hmwmd@state.co.us).

If issues arise associated with accessing information or contacting the CDPHE/HMWMD regarding environmental issues at Lowry, please contact the Customer Technical Assistance Line at (303) 692-3320, or access CDPHE/HMWMD via the following website: [www.Colorado.gov/cdphe/HM](http://www.Colorado.gov/cdphe/HM)

Similarly, if issues arise associated with accessing information or contacting the United States Air Force regarding environmental issues at Lowry, please contact the Air Force Civil Engineer Center (AFCEC) Public Affairs office at either (866) 725-7617 or (210) 925-0956, or via the following website: <http://www.afcec.af.mil/>

Also, if issues arise associated with accessing the information on the Lowry Assumption website, please contact Lowry Assumption at (303) 972-6633, or via the following website: [www.resight-ai.com](http://www.resight-ai.com)

*The developer/builder must perform their own due diligence and review of available historical documentation for their property prior to commencing soil disturbing activities. Please refer to the historical information repositories for Lowry environmental programs cited above.*

## **2. Lowry Operational History and Potential Environmental Issues**

Lowry Air Force Base (Lowry) operated from 1937 to 1994 as an Air Force technical training center. The primary mission at Lowry through its 57 years of operational history focused on training Air Force personnel. Based on the operational history, training programs at Lowry focused on armament and

photographic training. However, a variety of base-related operations such as routine aircraft overhaul and maintenance (prior to 1966) as well as facility maintenance and support activities occurred prior to base closure.

The training programs and the facilities associated with that training listed below are an indication of the various training programs throughout the operational duration of Lowry that may have resulted in potential environmental concerns, and include:

- Armament-Related Training (including small arms): Facilities where personnel were trained on the proper maintenance, handling, storage, and loading operations for conventional weapons.
- Chemical Warfare Training: Facilities where personnel were trained in chemical warfare including incendiary control, decontamination, and first-aid training for gas casualties
- Fire Fighting Training: Open areas, vehicle and aircraft mockups, and buildings used to train personnel on extinguishing fires.
- Flight Training: Facilities associated with flight training.
- Missile Training (guided and Intercontinental Ballistic Missile (ICBM)): Facilities associated with missile (e.g., Snark, Titan, and Peacekeeper) training and inspection.
- Ordnance Training: Facilities associated with small and medium-caliber (i.e., 20mm arms firing ranges, skeet and trap ranges, aircraft machine gun “pits,” and ordnance storage facilities).
- Photography and Cinematography Training: Facilities associated with the development of film and maintenance of photography equipment.
- Precision Measurement Equipment Laboratory (PMEL) Training: Facilities associated with field-level maintenance and calibration of test, measurement, and diagnostic equipment (TMDE).

The historical identification of potential contaminants of concern was divided into those associated with training programs and those associated with daily base operations. As for training programs at Lowry, chemicals and materials were generally used in quantities appropriate for instructional purposes, including the use of mockups. The types of chemicals that were potentially used, stored, and disposed of for training purposes included volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), radionuclides, metals, petroleum-based products (petroleum, oil, and lubricant [POL]), explosives, and ordnance-related materials, water and chemical based foams, powders used to extinguish fires (organic chemical); and dioxins and furans generated during chlorinated-fuel combustion.

During its operational history, Lowry was comprised of over 1,000 facilities (e.g., buildings, structures, or areas) that supported training, maintenance, and other missions. Although the initial training facilities were located in the western portion of the base, the tremendous expansion experienced in a relatively short period during World War II led to the construction of additional training facilities in the eastern portions of the base. A large infrastructure was developed to support and sustain a residential and working population that ranged from less than 200 to more than 10,000 people annually. These facilities included gas stations, garages, machine shops, hobby facilities, outdoor maintenance facilities, multiple coal-fired steam plants, and associated steam lines for heating. Other features of the infrastructure that are relevant to environmental concerns included storage and warehousing of materials and chemicals, waste accumulation facilities, and

on-base landfills. Other prominent features of the infrastructure were the sewer lines or septic systems, sumps, oil-water separators, and floor drains, as these are potential release points to the subsurface. Generally, potential contaminants of concern include asbestos used on underground steam lines or in building construction materials; fuels used in emergency power generating units; associated underground storage tanks, pipelines, and above ground storage tanks; POL products; solvents; paints; pesticides, herbicides, polychlorinated biphenyls (PCBs), and metals.

### **3. Developer/Builder Responsibilities for Soil Disturbing Activities**

All known and identified environmental conditions in soil were remediated at Lowry, and properties were subsequently approved for development. It is possible, however, given the historical base uses, that previously unrecognized environmental conditions could still be identified during future development activities. All developers and builders have the responsibility to follow all applicable local, state and federal environmental regulations and statutes when conducting soil disturbing activities at Lowry.

The CDPHE/HMWMD has the right to access, for the purpose of inspection, any properties on which soil disturbing activities are ongoing. As such, the developer/builder shall provide CDPHE with a minimum of a 72-hour notification prior to implementing soil disturbing activities at Lowry. This pre-construction notification should be provided to the CDPHE/HMWMD, Federal Facility Remediation & Restoration Unit Leader located at 4300 Cherry Creek Drive South, Denver, CO, 80246. The CDPHE/HMWMD Federal Facility Remediation & Restoration Unit Leader may also be contacted via the Customer Technical Assistance Line at (303) 692-3320 or the following website: [www.Colorado.gov/cdphe/HM](http://www.Colorado.gov/cdphe/HM)

#### **3.1 Defining Soil Disturbing Activities**

Pursuant to Section 1.2 of the *Regulations Pertaining to Solid Waste Sites and Facilities, 6 CCR 1007-2, Part 1*, as amended, ‘soil-disturbing activities’ means “digging, excavating, staging, loading, stockpiling, backfilling, compacting, grading, tilling, drilling, intrusive sampling, and equipment or vehicle movement or any other mechanical activity, that when used, disturbs the surface and/or subsurface soil. For the purposes of Section 5.5 disturbance or removal of debris and/or RACS is considered soil disturbing activity. For the purposes of Section 5.5 hand disturbance or removal of RACS is subject to this regulation, but is not considered to be a mechanical disturbance.”

Examples of soil disturbing activities that routinely occur during construction at Lowry include, but are not limited to:

- foundation excavations;
- underground utility installations (including wet utility installation (deep), dry utility installation (shallow) and utility tie-ins);
- bulk grading;
- foundation backfill;
- subsurface demolition;
- drilling and boring activities (soil cuttings brought to the surface); and,

- any other soil disturbing activity, except to the extent that any or all of these activities have been excluded below.

Soil disturbing activities exclude the following:

- normal maintenance and operation associated with the current ownership of previously developed or redeveloped commercial or residential property;
- site preparation (which means the initial land preparation activities for construction, i.e., clearing and grubbing of vegetation and surface impediments, mowing, removal of large surface debris, tree and shrub removal and survey staking);
- backfilling for grade or fine grading;
- utility tie-ins in soils previously disturbed and determined through observations not to contain environmental contamination;
- curb and gutter installation, sidewalk installation, residential irrigation installation in soils previously disturbed and determined through observations not to contain environmental contamination;
- fence, patio and light fixture installation;
- maintenance of previously installed utilities;
- park landscaping in soils previously disturbed and determined through observations not to contain environmental contamination;
- normal maintenance and operation of the golf course;
- maintenance of existing parks (including repairs and maintenance to sprinkler systems);
- planting of flowers, trees, sod and shrubs;
- maintenance and repair of existing roads and right of ways, including utilities located underneath these areas; and,
- import and placement of clean soils or other materials that originate from a location other than Lowry.

### **3.2 Applicable Environmental Regulations, Guidance, and Notifications**

Broadly, there are four (4) categories of potential environmental conditions that may be encountered in soil at Lowry including:

- Asbestos-Containing Material (ACM) and/or Regulated Asbestos Contaminated Soil (RACS);
- Petroleum, Oil, and Lubricant (POL) Contaminated Soil;
- Other Contaminated Soil (Non-ACM, Non-RACS, and Non-POL Contaminated Soil); and
- Unknown Environmental Condition in Soil and Regulatory Notifications for Discovery.

Different state and federal environmental regulations and guidance may be applicable to the handling and disposition of suspect materials at Lowry depending on the conditions encountered in soil.

*Developers and builders shall closely and continuously observe their soil-disturbing activities in order to identify any suspect materials in a timely manner to prevent worker and public exposure and to minimize or avoid the spreading of potential hazardous materials, including but not limited to, asbestos containing material and regulated asbestos contaminated soils.*

### **3.2.1 Asbestos-Containing Material (ACM) and/or Regulated Asbestos Contaminated Soil (RACS)**

Because of the potential to encounter asbestos containing material (ACM) and regulated asbestos contaminated soil (RACS), Section 5 of the *Regulations Pertaining to Solid Waste Sites and Facilities, 6 CCR 1007-2, Part 1*, as amended, must be followed by the developer/builder for all soil disturbing activities at Lowry. The handling of any discovery of ACM and/or RACS must be in accordance with Section 5, *6 CCR 1007-2, Part 1*, as amended.

### **3.2.2 Petroleum, Oil, and Lubricant (POL) Contaminated Soil**

Suspect contaminated soil not associated with RACS at Lowry has been impacted most typically by petroleum-based products (petroleum, oil, and lubricant [POL]) whether related to former underground storage tanks (USTs) or uncontrolled releases to the surface or subsurface. In the event that the soil is contaminated with POL, the soil shall be handled in accordance with the regulations of the Colorado Department of Labor Division of Oil and Public Safety (OPS) *Storage Tank Regulations, 7 CCR 1101-14*, as amended.

- If petroleum products are found in soil, the developer/builder will follow the *Colorado Department of Labor, Oil Inspection Section, Owner/Operator Guidance*, dated May 2005, as amended. All samples collected are required to be analyzed for benzene, toluene, ethylbenzene, and xylene (BTEX) constituents. These compounds should be analyzed using USEPA methods 8021 or 602 as presented in SW-846, or an equivalent method approved by the OPS. USEPA method 8260 may also be appropriate, especially in cases where a waste oil tank is/was present. All samples collected are required to also be analyzed for Total Petroleum Hydrocarbons (TPH). TPH should be analyzed using USEPA methods 1664 or 8015B as presented in SW-846, or an equivalent method approved by the OPS.
- The OPS requires that soil samples for laboratory analysis be collected from the locations most likely to be contaminated. If TPH concentrations in soil exceed 500 parts per million (ppm) or milligrams per kilogram (mg/kg), and BTEX concentrations are below the USEPA Regional Screening Level (RSL), then a sample taken from the location where the TPH concentration was the highest must also be analyzed for polycyclic aromatic hydrocarbons (PAHs) and the results compared to the most current RSL Summary Tables for the intended land use (e.g., industrial or residential). Unless otherwise proposed and demonstrated to CDPHE, the residential RSLs are typically the most appropriate soil action levels at Lowry. The most current USEPA RSL Summary Tables are available on-line at the following website link: <https://www.epa.gov/risk/regional-screening-levels-rsls>

These RSLs are typically updated every six (6) months.

- If the PAH concentrations are lower than the applicable USEPA RSLs and the OPS TPH threshold of 500 ppm (or mg/kg) has not been exceeded, a No Further Action Required designation may be requested of CDPHE. If the source PAH concentrations exceed the USEPA RSLs, the owner/operator will propose further evaluation and/or a corrective action to CDPHE, which

typically involves contaminated soil excavation and confirmation resampling, with appropriate off-base landfill disposal of contaminated soil.

If potentially contaminated soil not associated with asbestos is encountered during soil disturbing activities, the following general guidelines are suggested for handling and removal of that soil.

- Make a determination as to whether the soil disturbing activities or excavation can continue and make an assessment of sampling needs. Developer/builder may excavate and stockpile suspect soil for characterization and subsequent disposal.
- Collect samples from the potentially contaminated soil prior to removal in order to characterize the potential contaminant(s). Samples will be collected according to the protocols listed below and submitted to a laboratory for analysis.
  - The impacted soil will be collected from locations that appear to be the most contaminated and an appropriate number of samples will be collected to characterize the observed contamination. Developer/builder should consult with CDPHE on the timing and frequency of sampling, and the parameters of the sampling suite.
  - Samples will be collected using appropriate sample containers and preservatives following USEPA protocols.
  - Samples will be collected practicing appropriate decontamination procedures when necessary.
  - Samples will be collected by following acceptable field quality assurance/quality control (QA/QC) measures.
- Submit samples to a laboratory in order to characterize the contamination and to determine the appropriate remedial action and disposal options.
  - Analyze samples for analytes based on the historical knowledge and operations of a particular site; the analyses may be limited or expanded to include the appropriate analytical groups, such as VOCs, SVOCs, TPH, metals, etc.
- Manage the potentially contaminated soil as hazardous waste, unless developer/builder can determine based upon observations, historical information or characteristic testing that the potentially contaminated soil is non-hazardous or sample results determine it is not a hazardous waste.
  - In the event that potentially contaminated soil is hazardous, the Resource Conservation and Recovery Act (RCRA) requires that all hazardous wastes must be containerized. In addition, RCRA hazardous waste cannot be stored for more than ninety (90) days without written approval from CDPHE. The ninety (90) days begin when the soil is removed from the excavation.
  - In the event that the soil is contaminated with petroleum, the soil will be handled in accordance with the regulations of the Colorado Department of Labor Division of Oil and Public Safety (OPS) *Storage Tank Regulations, 7 CCR 1101-14*, as amended.
  - In the event that the potentially contaminated soil is special waste and/or a solid waste, as that term is defined in RCRA, the developer/builder will address that waste pursuant to the applicable Colorado statutes and regulations.
- Collect and analyze confirmation samples from the floor and walls of the excavation to confirm removal meets the most current USEPA RSLs for the intended land use.

### 3.2.3 Other Contaminated Soil (Non-ACM, Non-RACS, and Non-POL Contaminated Soil) (3.2.3)

- For impacts in suspect contaminated soil not associated with ACM, RACS or petroleum-based products (POL), analytical sample results for the suspect soil should first be evaluated by comparison to the most current USEPA Regional Screening Level (RSL) Summary Tables for the intended land use (e.g., industrial or residential). Unless otherwise proposed and demonstrated to CDPHE, the residential RSLs are typically the most appropriate soil action levels at Lowry. The most current USEPA RSL Summary Tables are available on-line at the following website link: <https://www.epa.gov/risk/regional-screening-levels-rsls>.

These RSLs are typically updated every six (6) months. If the analytical results for the contaminants of concern exceed the applicable RSL concentrations, the developer/builder should contact CDPHE to establish an acceptable removal plan for the impacted soil.

### 3.2.4 Unknown Environmental Conditions in Soil and Regulatory Notifications for Discovery

In the event that unknown environmental conditions in soil are discovered during the development of a property at Lowry, the following notifications should be made within 24 hours of the discovery:

Colorado Department of Public Health and Environment  
Hazardous Materials and Waste Management Division  
Federal Facility Remediation & Restoration Unit Leader  
4300 Cherry Creek Drive South  
Denver, CO 80246-1530  
Phone: (303) 692-3320 (Customer Technical Assistance Line) or via the following website:  
[www.Colorado.gov/cdphe/HM](http://www.Colorado.gov/cdphe/HM)

## 4. Contaminated Groundwater Considerations

In addition to the environmental conditions in the soils, historical Air Force activities also impacted groundwater in certain locations at Lowry. Extensive studies were conducted which characterized the nature and extent of impacted groundwater and a groundwater remediation program was implemented to address those impacts. The properties affected by impacted groundwater at Lowry are encumbered by State Environmental Covenant HMC0V00022. Details of this groundwater covenant specific to Lowry can be found on the CDPHE website at:

[https://www.colorado.gov/pacific/sites/default/files/HM\\_HMCOV00022.pdf](https://www.colorado.gov/pacific/sites/default/files/HM_HMCOV00022.pdf)

If issues arise associated with accessing information regarding this environmental covenant at Lowry, please contact the Customer Technical Assistance Line at (303) 692-3320 or access CDPHE/HMWMD via the following website to access this information: [www.Colorado.gov/cdphe/HM](http://www.Colorado.gov/cdphe/HM)






The associated use restrictions of the groundwater covenant apply to the encumbered properties as well as adjacent properties, if work on an adjacent property could affect the groundwater beneath the covenant area.

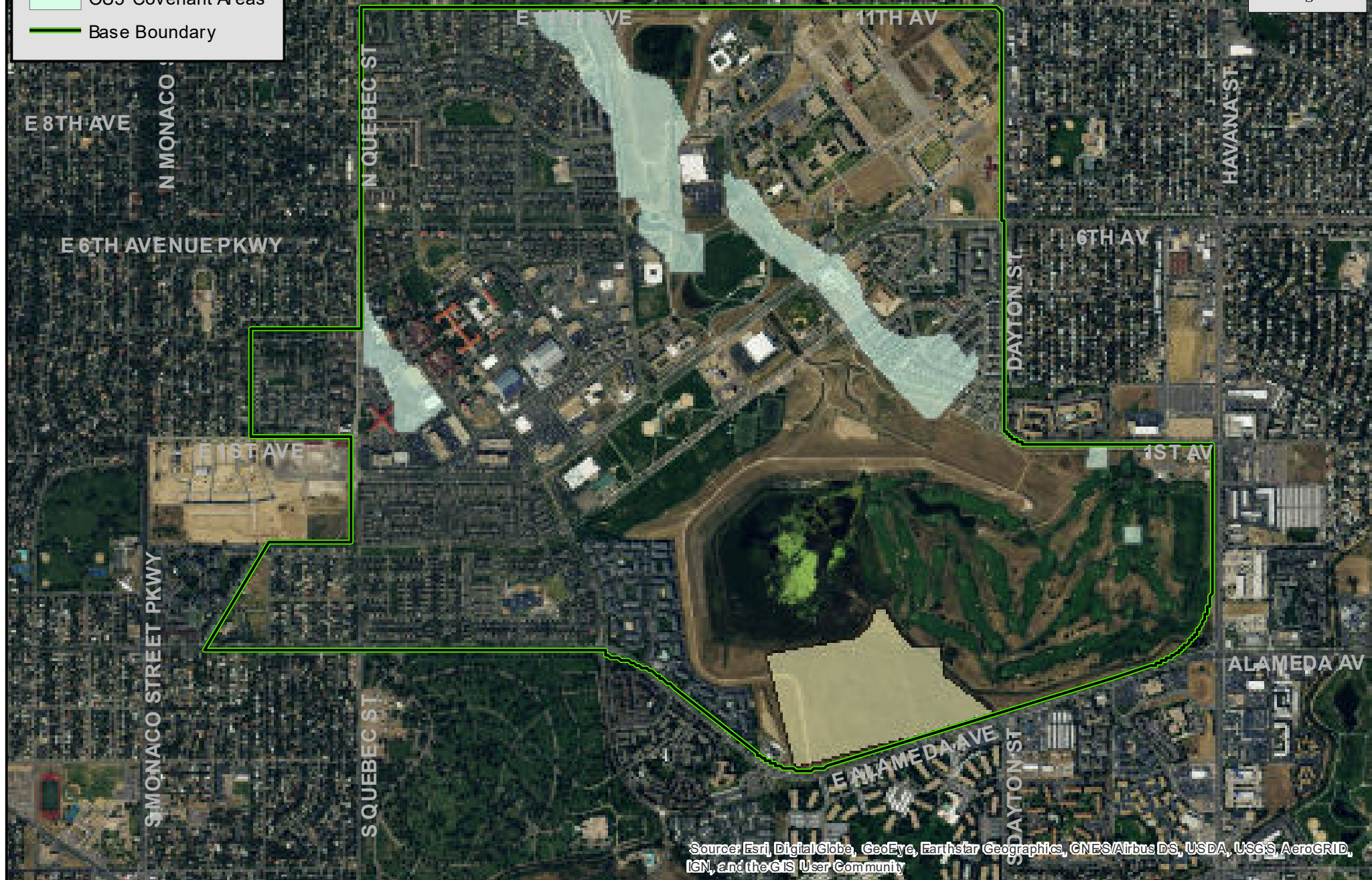
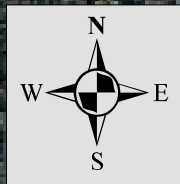
*Developers and builders should review the chain of title for the property to determine if their property is encumbered by the Environmental Covenant and to assure their project is in compliance with the use restrictions. In the event groundwater extraction, associated with the construction project, is anticipated within or adjacent to the environmental covenant boundary, the potential for extracting contaminated groundwater shall be evaluated by the developer or builder and, if appropriate, planned for with appropriate treatment and/or groundwater disposal options. Developers and builders should consult the deed(s) to determine whether such treatment or disposal must be approved by CDPHE or the Air Force, or both.*

If issues arise associated with accessing information regarding this environmental covenant at Lowry, please contact the Customer Technical Assistance Line at (303) 692-3320 or access CDPHE/HMWMD via the following website to access this information: [www.Colorado.gov/cdphe/HM](http://www.Colorado.gov/cdphe/HM)

**Legend**

-  OU2 Covenant Area
-  OU5 Covenant Areas
-  Base Boundary

**Figure 1**  
**Former Lowry AFB**  
**(Buckley Annex Not Included)**



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

0.5 0.25 0 0.5 Miles

