REGION 7
LENEXA, KS 66219

June 16, 2025

MEMORANDUM

SUBJECT: Quality Assurance Project Plan for Davis School Soil Sampling; Clinton, Missouri – Approved with Comment

FROM: Diane Harris, Regional Quality Assurance Manager
Laboratory Services and Applied Science Division

DIANE HARRIS
Digitally signed by DIANE HARRIS
Date: 2025.06.16 10:43:35 -05'00'

TO: Andrew Jennings, EPA Project Manager
Applied Sciences Branch
Laboratory Services & Applied Science Division

The review of the subject document prepared by LSASD/ASB and dated 06/05/2025 has been completed according to Quality Assurance Project Plan Standard," CIO 2105-S-02.

Based on the comments below, the document is approved with comment. Although the document satisfactorily addresses most of the key elements, minor issues were noted which are summarized below as general comments. These issues do not have an impact on the approval of the document but are noteworthy of pointing out for the record.

General Comments

1. § A5. Project Task Description, page 7. Although this section clearly describes the five-year submittal of the QAPP and that any needed revisions will be made during this time, the new QAPP Standard does now require documented annual QAPP reviews for a project that lasts more than one year. This section should make mention of documented annual reviews.

2. § A11. Personnel Training/Certification, page 12. This section describes the documentation of health and safety training in FedTalent. Who will document training for this project not related to health and safety and what system or procedures will be used?

3. § Table 11: Soil Sampling Design and Strategy, page 16. Please note the equivalent CWA method for 6010 (ICP-AES) is 200.7 rather than 200.8 and the determinative method for hex chrome should be 7199 rather than 2199.

4. § B2. Methods for Environmental Information Acquisition.

    a. Field Methods and Procedures, page 16. If there are other QAFAP SOPs that apply here, they should also be referenced in the QAPP.

    b. Integrity of Environmental Information, page. 17. The general reference to the lab's key operational and quality control SOPs for sample receipt and storage should be replaced with specific references to SOP 2420.01 "LSASD Procedures for Sample Receipt and Log-In" and SOP 2420.02 "STC Environmental Samples Storage, Security, and the Element LIMS Internal Sample Custody Procedures."

5. Table 14: Laboratory Analyses, page 17. Please note the R7 SOP for analysis of metals by ICP-MS (6020/200.8) is 3123.01 rather than 3122.03.

6. §B4. Quality Control, page 19. Will any corrective action based on field QC results be noted in the report or field log?

7. Table 17: Equipment/Instrument Testing, Inspection, Maintenance, and Calibration Activities, page 20. This table should also reference analytical SOPs 3122.03 and 3123.01 and include a line for hex chrome even though it would reference back to the contract lab doing the work.

8. § B7. Environmental Information Management, page 21. In addition to the process described for errors related to hand-written field notes, this section should also address the process for detecting and correcting errors related to the electronic data management process.

9. §C1. Assessments and Response Actions, page 21. In addition to addressing any assessments and response actions related to field activities, this section should also address this information for the laboratory activities even if that is simply thru reference to their existing procedures. Because samples will be submitted to the Regional Laboratory, the SOPs 2430.06 "Periodic Internal Program Review of the Region 7 Laboratory" (current version); 2430.14 "Internal Technical Methods Review" (current version), and 2430.16 Corrective Action System for the Region 7 Laboratory (current version) can be referenced here.

If you have any questions, please contact me at x7258.

R7QAO Document Number: 2025170

Section A – Administration

A1. Title Page

Quality Assurance Project Plan

for

Davis School Soil Sampling

for the

United States Environmental Protection Agency
Region 7
Laboratory Services and Applied Sciences Division
Applied Sciences Branch

Submitted to

U.S. Environmental Protection Agency

Date of QAPP Preparation: 06/12/2025
Period of Applicability: 6/05/2025 – 6/05/2026
Revision: #01

A2. Approval Page

Organization Project Manager
Name: Andrew Jennings
Title: Geologist
Organization: USEPA Region 7, Laboratory Services & Applied Science Division, Applied Sciences Branch

Signature ANDREW JENNINGS Digitally signed by ANDREW JENNINGS Date: 2025.06.16 07:34:10 -05'00' Date

Project Supervisor
Name: Randy Brown
Title: Applied Sciences Branch Manager
Organization: USEPA Region 7, Laboratory Services & Applied Science Division, Applied Sciences Branch

Signature RANDOLPH BROWN Digitally signed by RANDOLPH BROWN Date: 2025.06.16 09:56:18 -05'00' Date

Organization Project QA Manager
Name: Diane Harris
Title: Region 7 Quality Assurance Manager
Organization: USEPA Region 7, Laboratory Services & Applied Science Division

Signature DIANE HARRIS Digitally signed by DIANE HARRIS Date: 2025.06.16 10:37:49 -05'00' Date

A3. Table Of Contents

List of Figures:

List of Appendices/Attachments:

A4. Project Purpose, Problem Definition, and Background

Table 1: Document List

Title of Document	Date of Document	Pertinence to this QAPP
Region 7 Quality Management Plan (QMP)	April 2020 (or current version)	This QAPP is being prepared by and implemented by United States Environmental Protection Agency, Region 7 staff, and therefore this QAPP must be prepared, submitted, reviewed and approved per the Region 7 QMP.
Superfund Residential Lead Sites Handbook	March 2024	The methods for and approach to site characterization referenced in Superfund's 2024 Residential Lead Sites Handbook are directly relevant to this investigation.
Superfund Residential Lead Sites Handbook	August 2003	The methods for and approach to site characterization referenced in Superfund's 2003 Residential Lead Sites Handbook are directly relevant to this investigation.
ProUCL 5.2.0 Technical Guide	June 2022	The document provides instruction and technical guidance for statistical analysis, including but not limited, outlier testing, background threshold values, normality, etc.

Project Purpose, Problem Definition, and Background

The Davis R-XII school is located at 6714 SW Hwy T, Clinton, MO 64735 (see Figure 1). The school is approximately three miles northeast of Montrose Lake and approximately five miles southeast of the city of Clinton, Missouri. The surrounding land use is predominately agricultural with historical areas of mining activity, including at a property directly adjacent to the school.

Three sampling events (September 2024, October 2024, and November 2024) were conducted by Triangle Environmental Science and Engineering Inc. on behalf of a concerned citizen living in Henry County, Missouri. These investigations consisted of potable tap water, surface water, sediment, and soil sampling. In January 2025, Occu-Tec conducted an additional investigation consisting of indoor surface wipe and soil sampling at the school on behalf of Davis R-XII School. The Occu-Tec report concluded that additional soil investigation would be necessary to characterize the extent of potentially elevated hexavalent chromium soil results at the school (Occu-Tec, 2025). Following this sampling event, Sunbelt Environmental Service Inc. (Sunbelt), on behalf of Henry County, Missouri, collected soil samples from the school and several roadside ditches and surface water samples from Montrose Lake, Deepwater Creek, and Truman Lake. The conclusions from Sunbelt's report indicated hexavalent chromium potentially exceeding EPA's Regional Screening Levels (TR = 1E-06; THQ = 0.1) in some soil samples collected from the school property (Sunbelt, 2025). These previous sampling results have been used for general background information and to select Contaminants of Potential Concern (COPCs) and potential sampling locations for this project.

In January 2025, the Davis R-XII school closed due to concerns of potential exposure to contamination in a water well and potential soil contamination. The school has remained closed during the spring semester and the status of the fall semester has yet to be determined. The goal of this project is to collect additional soil data from the Davis R-XII property, compare the soil data to EPA's Removal Management Levels (RMLs) (TR = 1E-04; THQ = 1.0), develop background threshold values (BTVs) from published background data, compare soil analytical results with BTVs, and provide these data to the Davis R-XII school district to support decision making.

This project will consist of composite soil sampling the Davis R-XII property generally following EPA's Superfund Lead-Contaminated Residential Sites Handbook procedures. The school property will be subdivided into sampling units (see Figures 2 and 3). Composite soil samples will be collected from each sampling unit and submitted to the EPA Region 7 laboratory for analysis of the contaminants of potential concern for all analyses except hexavalent chromium. Hexavalent chromium will be shipped to the Region 4 laboratory for analysis. For BTVs, the published United States Geological Survey's (USGS) National Soil Geochemical Database will be utilized to develop a BTV for each COPC calculated through EPA's ProUCL software to be included in the sampling results report.

Table 2: Applicable Programs and/or Standards

Regulatory Program/Standard	Citation	Description
Resource Conservation and Recovery Act (RCRA), as amended by the Water Infrastructure Improvements Act (WIIN)	42 U.S. Code § 6901 et seq., as amended by 42 U.S. Code § 6945	Federal law governing the management and disposal of solid and hazardous wastes, and its amendments
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)	42 U.S. Code § 9601 et seq.	Federal law governing the response to and liability for releases of hazardous substances into the environment
Region 7 Removal Management Levels (RMLs)	CERCLA Section 106 & 40 Code of Federal Regulations (CFR) 300	Action levels and/or standards utilized for removal actions (cleanups) under CERCLA section 106 authority Region 7 calculates RMLs at a cancer risk of $1x10^{-4}$ and a hazard quotient of 1.0

A5. Project Task Description

Table 3: Summary of Project Tasks, Schedule, and Products

Type of Task	Schedule for accomplishing the Task	Description of the work to be Performed	Products to be Produced
Residential soil sampling for lab analysis	One sampling event in June 2025	Collected residential soil samples per the 2024 EPA Residential Lead Handbook	Field logbook & field activity report
Lab analysis	For each sample from the sampling event (July 2025)	Samples submitted to laboratory for metals analysis	Laboratory analytical report
Data review and reporting	By 7/30/2025	Validate analytical data, compare results to USEPA RMLs, develop conclusions and recommendations	Investigation report

Develop Background Threshold Values (BTVs) for COPCs	By 7/30/2025	Collect data published in United States Geological Survey Soil Geochemical Database	Appendix to Investigation Report

This QAPP will be in effect for a period of one year after approval. An annual review will be conducted and the QAPP reviewed to remain applicable, if necessary. If any revisions to the QAPP are needed during this period that could impact data quality or usability, a QAPP addendum will be submitted for the same review and approval process as the original QAPP. If the project will continue after the project period, the QAPP will be updated as needed and resubmitted for review and approval per the same process as the original QAPP.

A6. Information/Data Quality Objectives (DQO) and Performance/Acceptance Criteria

The data quality objective for this project is to quantify the concentrations of metal COPCs in soil at the Davis R-XII school and compare with calculated BTVs and RMLs to determine if additional sampling is warranted. COPCs are listed in Table 15. This DQO is directly related to and supports to project goal of providing data and data evaluation to the Davis R-XII school district to support school district decision making. Achieving this data quality objective will require collecting an adequate number of samples from the school property while utilizing sampling methods that are known to produce reasonable estimates of exposure concentrations. Additionally, to achieve this DQO a statistical analysis of the USGS Soil Geochemical Database for COPCs in Henry County, Missouri will need to be conducted to support the development of BTVs. Utilizing laboratory analytical methods with reporting limits below the RML for each COPC will be of critical importance to understanding potential risks to public health or the environment exist. See Table 15 for a comparison of the analytical reporting limits and RMLs for each COPC for this project.

Table 4: Data Quality Summary

Matrix	Measurement	Precision	Accuracy	Sensitivity	Performance Criteria
Surface Soils (< 1" bgs)	Metals (via Method 6010/200.7)	Blind field duplicate at one per day or one per 20 samples. Laboratory method QA/QC (matrix spike duplicates, etc.)	Laboratory QA/QC (matrix spikes etc.) Rinsate blank samples	Reporting limits < RMLs (see Table 15)	±30% RPD for field duplicate precision All reporting limits < RMLs No detections in rinsate blanks
Surface Soils (< 1" bgs)	Hexavalent chromium (via EPA method 3060/7196/ 7199)	Blind field duplicate at one per day or one per 20 samples. Laboratory method QA/QC (matrix spike duplicates,	Laboratory QA/QC (matrix spikes etc.) Rinsate blank samples	Reporting limits < RMLs (see Table 15)	±30% RPD for field duplicate precision All reporting limit < RMLs

		etc.)			No detections in rinsate blanks

Representativeness will be ensured by collecting all samples as described in this QAPP using methodologies established by USEPA's Office of Land and Emergency Management (OLEM) for sites contaminated with lead and other heavy metals. Specifically, the collection of rinsate blanks will ensure that the generated data represents soil media concentrations and not cross-contamination between samples due to inadequate decontamination procedures. Blind duplicates will ensure effective precision of the sampling process and analytical procedures. To ensure comparability of the data generated by this project, each sample will be collected and analyzed using identical procedures and methods and reported with consistent units. The completeness goal is that at least 70% of the sampling locations must be sampled, and valid data reported for 90% of the samples collected. If these criteria cannot be met, efforts will be made to reanalyze the samples where possible, or to resample locations if samples are not able to be reanalyzed.

After ensuring the soil data are complete, usable, and valid, the project manager, with assistance of an EPA human health risk assessor, will compare the composite sampling data from each sampling unit to EPA's RML values (TR = 1E-04; THQ = 1.0). Additionally, the maximum detection reported for each COPC will be compared to EPA's RML values (TR = 1E-04; THQ = 1.0). Further, the composite sampling data will be reviewed and compared to BTVs calculated from the USGS soil database using EPA's ProUCL software.

Table 5: Existing Information Sources and Performance Criteria

Existing Information	Source	Acceptance Criteria	Procedures Used to Apply Acceptance Criteria	Use of existing data
March 2025 Henry County soil & water metals results	May 2025 Sunbelt Environmental Sampling Report	None – this data is not being utilized in the project beyond background information and to identify COPCs		
February 2025 Davis School Surface Wipe and Sediment Sampling	March 2025 Soil Sediment and Surface Wipe Sampling from Occu-Tec			
September-November 2024 Sampling Events	January 2025 Data Transmittal Letter from Triangle Environmental			
USGS Soil Geochemical Database	https://mrdata.usgs.gov/general/map-us.html	Published Henry County soil data collected by USGS. Only positive integers will be utilized. Data qualified by USGS as	Project manager will review data for negative values and remove these from consideration. Estimated values will be used in statistical evaluation.	Yes

		estimated will be utilized.		

At least three sampling events have been conducted at the Davis R-XII school or in Henry County within the last year. The data from these events are included in the summary reports or transmittal letters summarized in Table 5. These data will not be utilized as part of this project in terms of informing conclusions, recommendations, or actions taken. However, these data were utilized for basic background information on the history of the problem/situation and to identify COPCs.

The project manager will obtain data from the USGS Soil Geochemical Database at the website listed in Table 5. The database will be filtered to include only soil geochemistry results collected from Henry County, Missouri and then downloaded for processing. After downloading the data, the EPA project manager will review the data for results with non-positive integers or data that have been qualified by USGS to not be usable. After the completion of the steps above these data will be considered valid and usable because they were collected and published by the USGS. These data from USGS will be used by the project manager to develop a BTV. The development of the BTV is for an initial site-specific statistical evaluation of the historical USGS data for use in comparison to the analytical results of the sampling proposed in this QAPP. The analytical results will be compared to the BTVs to determine if sampling results exceed apparent background concentrations from the published USGS data, If exceedances are noted, additional sampling such as a more detailed background study may be considered but is outside of the scope of this QAPP.

A7. Distribution List

Table 6: QAPP Distribution List

QAPP Recipient	Title	Organization	Contact Information
Andrew Jennings (project manager)	Geologist	R7/LSASD/ASB	jennings.andrew@epa.gov 913-551-7744
Randy Brown	Supervisor	R7/LSASD/ASB	brown.randolph@epa.gov 913-551-7978
Diane Harris	RQAM	R7/LSASD	harris.diane@epa.gov 913-551-7258
Cecilia Tapia	Division Director	R7/LSASD/ASB	Tapia.Cecilia@epa.gov 913-551-7733
Dave Cozad	Division Director	R7/ECAD	Cozad.David@epa.gov 915-551-7587
Jonathon Klusmeyer	Press Officer	R7/IOD/PGAB	Klusmeyer.Jonathon@epa.gov 913-343-2991
Larry Lehman	Deputy Director	Missouri Department of Natural Resources	Larry.Lehman@dnr.mo.gov 573-751-1233
Jeff Wenzel	Bureau Chief	Missouri Department of Health and Senior Services	Jeff.Wenzel@health.mo.gov 573-522-6102
Karen Mefford	Principal &	Davis R-XII	Karen.Mefford@davisr12.com

	Superintendent		660-885-2629
Mark Hardin	Director	Henry County Emergency Management	director@henrycoem.com 660-383-1061
Field Personnel	--	USEPA Region 7	--

A8. Project Organization

Table 7: General Roles and Responsibilities

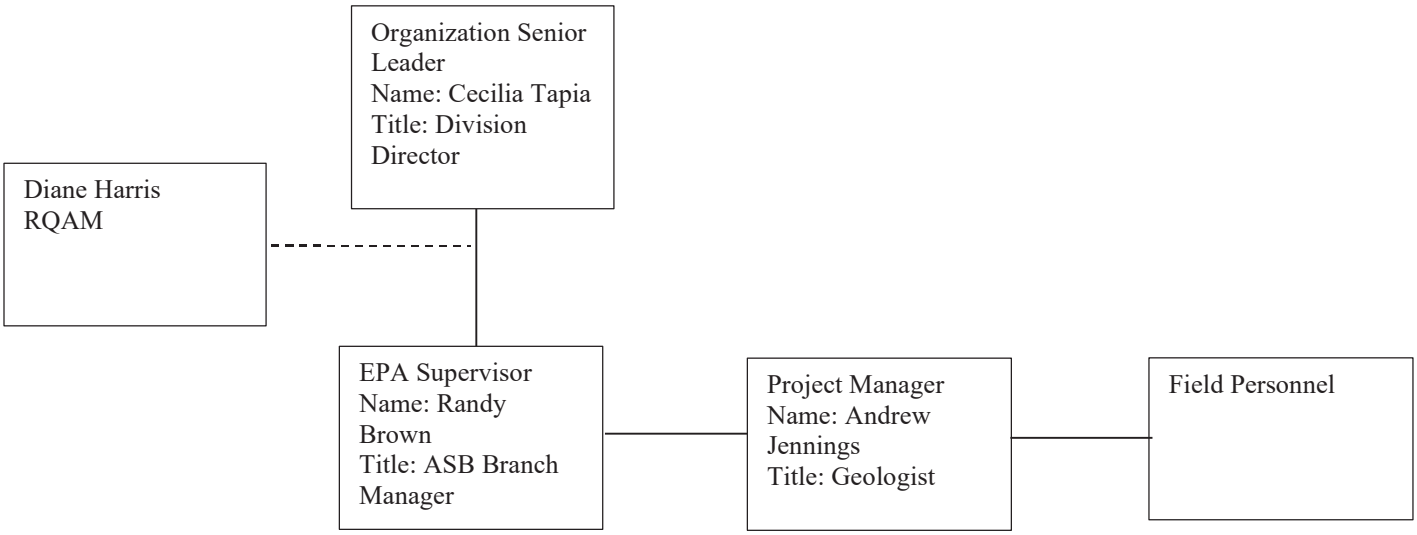
Role	QAPP Approval Authority	Executive Leadership Authority	Conducting the project	Principal information/data operations user	Maintains QAPP	Project responsibilities
Cecilia Tapia Division Director (Senior leader)	--	***X***	--	--		Provides resources. Assist with stakeholder engagement, data interpretation, and decision making.
Andrew Jennings Geologist (project manager)	***X***	--	***X***	***X***	***X***	QAPP development, oversee field sampling, general project management
Randy Brown Branch Supervisor	***X***	--	--	***X***	--	Oversee all aspects of the project. Assist with stakeholder engagement, data interpretation, and decision making.
Diane Harris RQAM	***X***	--	--	--	--	The RQAM is responsible for providing QA assistance and guidance and for review and approval of the QAPP.

The project manager and ASB supervisor have managerial authority over all aspects of the project and have approval authority with respect to this QAPP. The Region 7 Quality Assurance Manager (RQAM) is the quality assurance manager for this project and has independent QAPP review and approval authority outside of ASB's managerial hierarchy. It is through the review and approval of this QAPP that the quality assurance manager ensures the effectiveness of the QAPP so that project objectives are met, and the resulting environmental information/data can be used as intended. See the project organizational chart in A10 for the reporting relationships of project and quality personnel.

A10. Project Organization Chart and Communications

The Project Organization Chart

Lines of Authority ———— Lines of Communication ----------



Lines of Communication, Communication Pathways, and Communication Mechanisms

Table 8: Communication, Communication Pathways, and Communication Mechanisms

Description of Communication	Individual Responsible	Pathway	Mechanism	Procedures including timing
Discrepancies and QAPP non-conformances between project personnel and the project manager	Any project personnel can identify a discrepancy or non-conformance	Must be communicated to the Project Manager	Can be verbal or in an email	Immediately upon discovery. The Project Manager will approve the discrepancy or non-conformance or the corrective action to be taken before the project can proceed
Discrepancies and QAPP non-conformances to management	Primarily the project manager, but any project personnel can communicate a discrepancy or non-conformance to management	The Project Manager must communicate discrepancies and non-conformances to the ASB supervisor	Can be verbal or in an email	Immediately upon discovery. The Project Manager will obtain management approval as well as RQAM approval (when information/data quality and usability is impacted) of the discrepancy or non-conformance or the corrective action to be taken before the

				project can proceed
Process improvement	Any project personnel can and are encouraged to identify a process improvement	Must be communicated to the Project Manager	Can be verbal or in an email	The Project Manager will review the proposed improvement and approve it before implementation. If the process improvement impacts information/data quality or usability, the EPA Project Manager will consult the RQAM
QAPP revisions	Any project personnel can identify a need for a QAPP revision	Must be communicated to the Project Manager	Can be verbal or in an email	The Project Manager will ensure the QAPP revision is made and forwarded to the RQAM for review and approval.

A11. Personnel Training/Certification

All project sampling personnel will need to be trained in soil sampling methodology including labeling, sample collection technique, sample compositing, sample homogenization, sample preservation, and chain of custody procedures. Select field personnel will also need to be trained in photographic documentation and field note taking. All field personnel will have up-to-date field health and safety training recorded with USEPA Region 7's health and safety program (e.g., fedtalent), including having a current 40-hour HAZWOPER certification. The project manager is trained in all the methods of data collection, health and safety, and field documentation and will ensure, in conjunction with the branch supervisor, that all field personnel are trained before any individuals perform work independently. The project manager will be responsible for noting in the field book that all staff are adequately trained in soil sampling methodology including labeling, sample collection technique, sample compositing, sample homogenization, sample preservation, and chain of custody procedures. All field personnel shall be required to read this QAPP, USEPA Region 7's standard operating procedure (SOP) 4230.19D, and the project-specific health and safety plan before mobilizing to the field. The project manager shall verbally authorize each member of the field sampling team to perform individual activities after conducting on-site training as necessary. The project manager may designate other field personnel as competent to both perform field activities and to train other field personnel as necessary based on their experience or based on having achieved competency in the field. None of the field activities for this project are anticipated to require training beyond reviewing this QAPP, SOP 4230.19D, SOP 4321.2012 and a brief on-site training/demonstration of each activity.

A12. Documents and Records

Table 9: Documents and Records

Document or Record Name	How will the Document or Record be Managed	Requirements for Final Disposition including Location and Length of Time
QAPP	Final version and revisions will be stored electronically in the	Will be retained and

	project folder on a Division of Enforcement and Compliance Assurance secure, SharePoint site.	disposed per USEPA's disposition schedule.
Field documents (field sheets, field logbook, chain-of-custody forms)	These will be completed on paper or electronically by field personnel at the time the field measurements and sample collection occur. If collected on paper, the project manager will enter them into an electronic field system. After field activities are completed, hard copies will be scanned and placed on a Division of Enforcement and Compliance Assurance secure, SharePoint site.	Will be retained and disposed per USEPA's disposition schedule.
Laboratory records (raw data, QC results, electronic data deliverable, analytical report)	All laboratory documents, records and reports will be completed, managed, and maintained per the Region 7 SOPs 2410.1K, 2410.02M, and 2410.03I.	Will be retained and disposed per USEPA's disposition schedule.
Final sampling report	Prepared by the Project Manager and, after final approval from the ASB branch manager, placed on a Division of Enforcement and Compliance Assurance secure, SharePoint site.	Will be retained and disposed per USEPA's disposition schedule.

Section B – Implementing Environmental Information Operation

Table 10: List of Guidance, Tools, Templates Used to Develop the QAPP

1	QAPP Standard.pdf
2	Region 7 Basic QAPP Guidance and Template, current version
3	2003 Superfund Lead Sites Handbook
4	2024 Superfund Lead Sites Handbook
5	USEPA's Online Removal Management Level Calculator
6	EPA Region 7 Programmatic QAPP for Superfund Lead Site Assessment

B1. Identification of Project Environmental Information Operations

The sampling approach selected for this investigation is systematic sampling of sampling units with a clustered aliquot sampling pattern. The sampling units were developed in ESRI's ArcPro. Each sampling unit was selected to be approximately 10,000 square feet or less based maximum sampling unit size recommendations described in EPA Region 7's Programmatic QAPP for the Superfund Lead Site Assessment (EPA, 2022). The 2024 Residential Lead Handbook states that composite samples with fewer than 10 generally cannot be used to approximate spatial variance (EPA, 2024); therefore, for this investigation each sampling unit will consist of 13 aliquots. The clustered aliquot locations were generally determined by the project manager based upon Image 1 and best professional judgement. For sampling units with irregular shapes, best professional judgement was used by the project manager for the clustered aliquot locations.

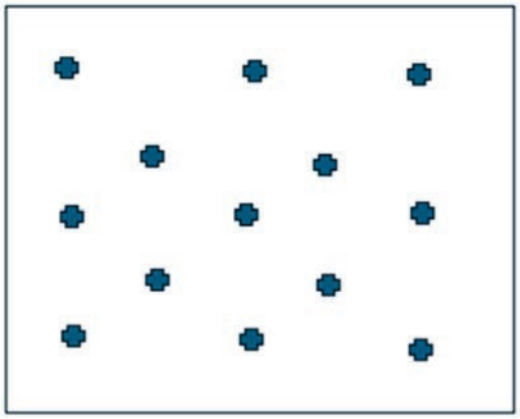


Image 1: Approximate Aliquot Sampling Distribution within a regular sampling unit

The Site has been divided into 13 sampling units of approximately 10,000 square feet or less and the school's running track has been separated as its own sampling unit. See Figures 2 and 3. Each sampling unit will be sub-sampled with 13 aliquots each.

Prior to conducting the composite soil sampling activities, field personnel will utilize a measuring wheel to measure and mark all the grids depicted in Figure 2 with a flags and/or white paint. After the sampling units are marked off and labeled, field personnel will navigate to the centroid location depicted in Figure 2. Utilizing a handheld GPS unit, the field personnel will confirm they are within ±10 of the centroid location. Additionally, field personnel will setup a centralized decontamination area which will consist of plastic sheeting to cover the ground over a paved surface and staging of the decontamination materials (brushes, Alconox®, rinse water, etc.). For each sampling unit (C1-C13), field personnel will collect aliquots based on the sampling pattern depicted in Figure 4. Field personnel collecting soil samples on the track will collect aliquots from the center of the track approximately every 80 feet beginning in the northwest corner of the track (see Figure 5). The distances between each aliquot will be measured with a measuring wheel.

Individual aliquots will be collected by field personnel using a stainless-steel spoon or trowel. Disposable nitrile gloves will be worn during the composite soil sampling activities. The aliquots will be collected from 0-1 inches below ground surface and the aliquots will be approximately 200-300 grams. The aliquots will be added to a new polyethylene bag for homogenization. The bags will not be reused for multiple samples. The homogenization process will consist of removing excess organic material (grass, leaves, etc.) and rocks. Then, field personnel will break down any large soil clumps into similar sized particles and mix thoroughly with hands or sampling equipment. After completing the soil homogenization, the composite sample will be labeled and placed in an iced cooler for transport back to the regional laboratory. After field activities are completed, the project manager will dry and sieve the samples down to a #100 field sieve (150 micrometers [µm]). Once the samples have been sieved, they will be added to a laboratory provided sample container, labeled under chain of custody protocols, and immediately placed into an iced cooler.

Prior to beginning the sampling effort and after completion of composite sampling at a sampling unit, the sampling equipment will be brought to the decontamination area for cleaning. Field personnel will doff the nitrile gloves used for sampling, new nitrile gloves will be donned, and the stainless-steel spoon/trowel and stain-less steel bowl will then be decontaminated. Field personnel will use single-use paper towels to wipe excessive material from the sampling equipment. Then an Alconox® solution (or equivalent) will be applied to the sampling equipment with a spray bottle and scrubbed with a cleaning brush. Next field personnel will rinse Alconox solution off the sampling equipment with a spray bottle of potable water and then rinse again with spray bottle of deionized water. After the rinses are completed, the sampling equipment will be dried with a single-use paper towel. Field personnel should take care to generate limited amounts of investigative derived wastes (IDW) during the decontamination process. The field sieves will be decontaminated in a similar manner as described at the laboratory after each sample is processed.

For rinsate sample collection, field personnel will complete the decontamination process as described above prior to sample collection. To collect the rinsate sample, field personnel will doff nitrile gloves used for decontamination, don new nitrile gloves, and then pour laboratory provided ultra-pure water down the sampling spoon or trowel and into a laboratory provided sample container. After the rinsate sample has been collected it will be labeled under chain of custody protocols and immediately placed into an iced cooler. The rinsate sample will be collected after the composite soil sample collection of the final sampling unit. For this sampling effort, rinsate samples will not be evaluated for hexavalent chromium due to short holding time of EPA Method 7199.

Minimal investigative derived waste (IDW) is anticipated to be generated during this sampling investigation. The IDW which is anticipated to be generated consists of plastic sheeting, single-use paper towels, nitrile gloves, polyethylene bags, and decontamination water. The plastic sheeting, gloves, paper towels, and polyethylene bags will be placed in double-lined trash bags and disposed of as municipal solid waste in an EPA Region 7 Laboratory's dumpster. The decontamination water generated will be collected onto the plastic sheeting in the decontamination area and allowed to evaporate. Any excess decontamination water will be dried with paper towels and placed into double-lined trash bags along with the other IDW materials. Excess soil collected during the composite sampling will be returned to the sampling units, near the aliquot locations, from which it was collected.

Performing the sampling as described in this section, including the collection of field quality control samples and in conjunction with analysis via the selected analytical methods, will achieve the performance criteria specified in section A of this QAPP.

Table 11: Soil Sampling Design and Strategy

Sampling Location/ID Number	Depth (inches)	Analytical Parameter	Rationale*
C1-C13	0-1	Metals via Method 6010/200.7 Hexavalent chromium via Method 3060/7196/7199	Depth selected for comparison to EPA Removal Management levels to assess for potential human health risk exposure to COPCs. Sampling units selected to be less than 10,000 ft^2 and areas with potential soil contamination where school children may have access. COPCs (metals) analysis selected based on previous investigations.
Track	0-1	Metals via Method 6010/200.7 Hexavalent chromium via Method 3060/7196/7199	Depth selected for comparison to EPA Removal Management levels to assess for potential human health risk exposure to COPCs. Sampling units selected to be less than 10,000 ft^2 and areas with potential soil contamination where school children may have access. COPCs (metals) analysis selected based on previous investigations.

*Includes rationale for location, depth, and analysis.

B2. Methods for Environmental Information Acquisition

Field Methods and Procedures

The field methods and procedures listed in Table 12 below will be utilized for this project.

Table 12: List of SOPs

SOP Number	Title	Date	Modified for Project (Y/N)	SOP Option	Who Maintains
1740.03A	Laboratory Services and Applied Sciences Division (LSASD) Field Activity Reports	11/18/2021	N	None	Region 7's quality assurance program
2420.02I	STC Environmental Samples Storage, Security, and the Element LIMS Internal Sample Custody Procedures	1/27/2023	N	None	Region 7's quality assurance program
2420.04J	Electronic Field Chain of Custody for Environmental Samples	11/1/2022	N	None	Region 7's Quality Assurance Program
4230.19D	Soil Sampling at Lead-Contaminated Residential Sites	10/20/2017	N	Surface soil sampling as described in section 3.1 of 4230.19D	Region 7's Quality Assurance Program

4321.2012	ERT #2012 – Soil Sampling	2/18/2000	N	None	OSWER Emergency Response Team

Integrity of Environmental Information

To ensure the integrity of environmental information/data, sample handling and custody procedures will be in compliance with Region 7 SOP 1720.03B. Samples will be uniquely labeled and packaged on ice in coolers. Samples will be transported to the Region 7 laboratory directly by USEPA personnel. Chain of custody forms will be completed per Region 7 SOP 2420.04J, as required by the Region 7 laboratory. Samples will be received and properly stored at the Region 7 laboratory per SOP 2420.01 and SOP 2420.02. The Region 7 laboratory, and contracted laboratories, are International Organization for Standardization (ISO) accredited until June 2026 for the analytical methods listed in Table 13 below. The Region 7 laboratory also complies with Region 7's Quality Management Plan and ISO accreditation requirements as outlined in the document "*U.S. EPA Region 7 Laboratory Quality Manual, Laboratory Technology and Analysis Branch and Field Services Branch*."

Table 13: Sample Management

Matrix	Analyte/Group	Containers/Volumes	Preservation	Analytical Holding time
Surface Soils (<1" bgs)	Metals per SW-846 6010/EPA 200.7	4 or 8 oz jar	4°C	180 days
Surface Soils (<1" bgs)	Hexavalent chromium per EPA method 3060/7196/7199	4 or 8 oz jar	4°C	30 days
Rinsate Water	Metals per SW-846 Method 6020/EPA-200.8	1-Liter plastic container	4°C HNO_3 (3 mL of [1+1] acid per liter)	180 days

*Due to short hold time, rinsate samples will not be collected for hexavalent chromium analysis.

Laboratory Analyses:

Table 14: Laboratory Analyses

SOP #	Title, Revision, and Date	Modified for project? (Y/N)	SOP Option or Equipment Type	Data Package Turnaround
SOP 3123.01	Analysis of Metals via EPA Method SW-846 6010/200.8	N	None	14 days
SOP 3123.01	Analysis of Metals per SW-846 Method 6020/EPA-200.8	N	None	14 days
USEPA CLP or ESSC	Analysis of hexavalent chromium by EPA method 3060/7196/7199	N	None	14 days

Table 15: Comparison of Analytical Method Reporting Limits (MRLs) with the Residential Soil Removal Management Levels (RMLs) for each Contaminant of Potential Concern (COPC)

Analyte	CAS #	Method	MRL (mg/kg)	RML (mg/kg)
Arsenic	7440-38-2	SW-846 Method 6010/200.7	5	34.9
Chromium (Total)	7440-47-3	SW-846 Method 6010/200.7	2	Not Applicable
Chromium (VI)	18540-29-9	EPA 3060/7196/7199	Lab-determined	70.3
Cobalt	7440-48-4	SW-846 Method 6010/200.7	1	23.4

Samples analyzed via Method 6010/200.7 and 6020/200.8 will be performed by the USEPA Region 7 laboratory located at 300 Minnesota Avenue Kansas City, Kansas 66101. Samples analyzed via Method 3060/7196/7199 will be analyzed through the USEPA Region IV laboratory, EPA's contract laboratory program (CLP) or through an Environmental Services Assistance Team (ESAT) Sub-Contract (ESSC) laboratory.

Existing Information

See Table 5 above for a list of existing information and its sources. At least three environmental investigations have been conducted in the last year that included soil and/or water sampling at the Davis R-XII school and/or surrounding community. These results were reviewed as preparation for this project and are considered background information but will not be used to inform the final conclusions or recommendations of this project. Since the sampling results summarized from these reports/events are not being utilized for this project beyond background information, the data quality and usability of these data are not being assessed at this time. If these data are needed in the future as part of the conclusions or recommendations for this project, a data usability methodology will be developed and submitted for review and approval as an addendum to this QAPP.

The USGS Soil Geochemical Database for Henry County, MO will be accessed to develop a BTV value for each COPC for qualitative purposes only. These BTV may be used to get a sense of the concentrations of metals in the soils within Henry County, MO. The dataset will be reviewed to identify data that has been qualified by USGS as not usable and to remove any negative integers. The dataset includes qualifiers to the analytical results (L, N, G, <, or >) for censored data. Any censored data will be replaced with one half the reporting limit for BTV analysis (EPA, 2006). Values that are reported as negative are the lower limit of determination and values reported with suffix .1111 are above the upper limit of determination. These negative and .1111 suffix values will be removed from the dataset for BTV analysis. EPA will consider this data valid and usable for the development of a BTV because data was collected by USGS personnel or their contractors under the SOPs and QAPP procedures.

B4. Quality Control

Table 16: Field and Laboratory Quality Control Samples, Analyses, and Procedures

QC Type	Frequency	Acceptance Criteria	Corrective Action	Effectiveness Evaluation
Blind field duplicates	One duplicate	Relative Percent Difference (RPD) is calculated per Equation 1 in section D2 ±30%	Assess reported concentrations for all sampling units. Calculate an RPD for each sampling unit for the reported concentration and EPA RML of each COPC. If these RPD values are less than the RPD calculated from the primary and duplicate, no corrective action. If these values are above RPD, EPA project manager and ASB Branch Supervisor will evaluate the data for usability and potentially consider resampling.	Next set of field duplicates meet criteria or verify potential matrix issues and document
Rinsate Blanks	One per day	All COPCs results below reporting limits	Analyze the root cause of the detections and determine a corrective action plan; the exact nature of the response needed cannot be prescribed without knowing the root cause	If resampling is necessary, subsequent results will need to be below the method reporting limitS for all COPCs
Method blanks	Per SOP 2430.12J	Per SOP 2430.12J	Per SOP 2430.16F	Per SOP 2430.16F
Laboratory Fortified Blanks	Per SOP 2430.12J	Per SOP 2430.12J	Per SOP 2430.16F	Per SOP 2430.16F
MS/MSDs	Per SOP 2430.12J	Per SOP 2430.12J	Per SOP 2430.16F	Per SOP 2430.16F
Method-specific QC checks	Per SOP 2430.12J	Per SOP 2430.12J	Per SOP 2430.16F	Per SOP 2430.16F

Quality control will be ensured through the collection and analysis of field quality control samples and the analysis of laboratory quality control samples. Field duplicates will be collected as described in Table 16 to assess the precision and repeatability of the field methodology. Rinsate blanks will be collected as described in Table 16 to determine if field decontamination procedures were adequate to prevent the cross-contamination of samples from reusable field equipment. Locations and times of field quality control samples will be documented in the field notebook and final report. Procedures for collecting rinsate blanks are described in section B1. Laboratory quality control samples and analyses will be conducted according to the Region 7 laboratory's key operational and quality control SOPs.

B5. Instrument/Equipment Calibration, Testing, Inspection, and Maintenance

The equipment and calibration/maintenance schedules specified in Table 17 are critical for project

success. Spare parts are not anticipated to be needed in the field, but spare sampling equipment will be taken into the field and stored in the field vehicles until needed.

Table 17: Equipment/Instrument Testing, Inspection, Maintenance, and Calibration Activities

Instrument or Equipment	SOP Reference or Procedures	Individual Responsible	Calibration Activities and Frequency	Testing, Inspection, Maintenance Activities and Frequency	Acceptance Criteria	Corrective Action	Documentation and Traceability
ICP-AES	Per SOP 2430.12J	Laboratory Analyst	Per SOP 2430.12J	Per SOP 2430.12J	Per SOP 2430.12J	Per SOP 2430.16F	Per SOP 2430.12J
ICP	Per SOP 3122.03K	Laboratory Analyst	Per SOP 2430.12J	Per SOP 2430.12J	Per SOP 2430.12J	Per SOP 2430.16F	Per SOP 2430.12J
ICP-MS	Per SOP 3123.01H	Laboratory Analyst	Per SOP 2430.12J	Per SOP 2430.12J	Per SOP 2430.12J	Per SOP 2430.16F	Per SOP 2430.12J
Hexavalent Chromium Analysis	All activities will follow contract laboratory's SOP, calibration, and other activities listed above.						
Measuring wheel	No	Project Manager	Compare measuring wheel to tape measure to ensure accuracy	Beginning of day	± 12 inches	Adjust measurements to account for any disparity between wheel and tape	Field notes by project manager
ArcGIS Field Maps	No SOP exists, but all manufacturer instructions will be followed	Project Manager or ASB Branch Supervisor	NA	NA	NA	NA	Information will be documented and stored in ArcGIS field map application. The data will be downloaded daily after field activities are completed.

B6. Inspection/Acceptance of Supplies and Services

All supplies necessary to complete the project shall be provided by the Region 7's laboratory, Field Services Branch (FSB), or by another Region 7 division/branch. It shall be the responsibility of each individual field team member to confirm the integrity and usability of supplies before they are utilized in the field. An initial check of field supplies shall be completed by the project manager before field activities begin. All sampling containers and equipment shall be inspected for cleanliness and defects. Any sampling containers that are found to be in unacceptable condition shall be returned to the laboratory, not utilized for sampling, and be replaced if necessary. All field equipment shall be investigated for defects prior to initial decontamination prior to use. Any acceptability issues identified

with sampling equipment or containers in the field will be recorded by the project manager in the field notes. Spare sampling equipment will be taken into the field and stored in the field vehicles until needed; spare parts are not anticipated to be needed for any field equipment. Services from organizations or individuals outside of Region 7 are not anticipated to be required to complete this project. If services from outside organizations or individuals becomes necessary procedures for ensuring their adequacy will be submitted for review and approval as an addendum to this QAPP.

B7. Environmental Information Management

Field notes shall be hand-written in the field by the project manager in a project-dedicated field logbook. For each day of field work the field notes shall include information on the weather conditions, all on-site personnel, sample collection information (name, sampling unit, time, etc.), mobilization/demobilization times, and any other occurrences relevant to the field activities. Any corrections needed in the field notes shall be made by crossing out the erroneous entry with a single line, adding in the correct information adjacent to the crossed-out entry, and then the project manager (or field personnel if on data sheets) will initial and date the correction. The electronic field chain of custody will be downloaded and saved as a PDF as a backup to the electronic chain of custody required to be submitted to the Region 7 laboratory. Field activities will also be recorded through images taken using a digital camera. The geographic positioning system (GPS) coordinates for the sampling unit centroids will be verified with ArcGIS Field Maps. Field personnel will ensure that field centroids are within ±10 feet of the preplanned centroids at all sampling units. This information will be documented in the project Field Maps application by the project manager. All electronic data collected in the field shall be backed up to a USEPA computer at the end of each day of field work. At the end of sampling activities all hand-written field information shall be scanned into an electronic file and stored in the project folder on the Enforcement and Compliance Assurance Division's secure, SharePoint. In addition, all electronic data collected in the field, the laboratory's analytical data report(s), and the laboratory's electronic data deliverable(s) shall also be stored in the location described above. The analytical data will be converted into a format compatible with Scribe, Region 7's environmental information management system, for long-term storage and management in that system. After data has been added to a Scribe format, the project manager will review the data for completeness and accuracy. Any errors or discrepancies will be noted and discussed between the project manager and ASB Branch Supervisor to determine corrective action.

Data processing shall be accomplished primarily in Microsoft Excel and EPA's ProUCL v.5.2, but potentially also in other Microsoft Office applications (word, etc.). Specifically, Microsoft Excel will be used to generate the tables for the final report and to complete the data validation review described in section D2. All the software needed to complete the project and data analysis are available on the laptop computers issued to Region 7 staff.

Section C – Assessment and Oversight

C1. Assessments and Response Actions

Assessments
There are no routine assessments or field audits planned as part of this project since the fieldwork will be completed in one sampling event in a relatively short timeframe (less than one week). However, the project manager and all field personnel will be vigilant for QAPP discrepancies during field work and data analysis. Any observed deviations from the QAPP will be communicated to the project manager and addressed immediately in the field. Assessments will be conducted as described in other sections of this QAPP, such as the inspection of sampling equipment prior to use or data useability reviews.

EPA Region 7 laboratory follows SOP 2430.06 and 2430.14 for periodic internal assessment and technical methods review.

Response Actions
No routine field audits or assessments are planned, and as a result no routine response actions are planned. As stated above, if unapproved discrepancies or deviations from the QAPP are observed in the field they will be addressed by the project manager immediately.

While following SOP 2430.06 and 2430.14, if corrective action is needed the EPA Region 7 laboratory will follow SOP 2430.16.

C2. Oversight and Reports to Management

The project manager shall have full oversight authority in the field and there will not be any prescribed reports to management during field work. The project manager shall communicate any issues experienced in the field to the ASB supervisor or RQAM as appropriate. The project manager has the responsibility of ensuring that oversight activities, response actions, and reporting mechanisms are in place.

Table 20: Reports

Type of Report	Content of Report	Who transmits the report	How the report is transmitted	Recipients of the report
Field Activity Report	Per SOP 1740.03A	Project manager	Email or shared drive	ASB supervisor
Final Sampling Report	Project introduction & background, summary of activities completed, data summary, QAPP deviations, data usability summary, conclusions & recommendations, analytical report, maps & tables as appropriate	Project manager	Email or shared drive	ASB supervisor & other stakeholders as appropriate

Section D – Environmental Information Review and Usability Determination

D1. Environmental Information Review

Table 21: Information/Data Verification Activities

Item reviewed	Responsible individual(s)	Description of Procedure
Chain-of-custody (COC) forms	Project manager and Laboratory Sample Custodian	The project manager will check all COC forms before samples are submitted to the lab to ensure they are complete and accurately reflect the samples collected. The Laboratory Sample Custodian will verify the samples received are listed on the COC form and match the work order. Any needed corrections will be made in consultation with the project manager.
Field data sheets and field logbook	Project manager	The project manager will review each field COC and the field logbook at the end of each day samples are collected to ensure they are complete and record the needed information. Any needed corrections will be made, or deviations documented at the time they are identified. The project manager will then initial and date the field data sheet or logbook to document their review.
Laboratory data verification	Laboratory staff	All laboratory data will be verified by the laboratory according to SOP 2430.12J before the analytical report is transmitted.
QAPP deviations and project completeness	Project manager	Compare the field documentation and laboratory data transmittals to ensure all identified locations were sampled as planned and that valid data for the submitted samples were received. Compare the results to the qualitative and quantitative quality indicators found in section A6. Make note of any nonconformance with the QAPP and any deficiencies in meeting the project criteria
Laboratory data validation review	Project manager	Will be completed as described in section D2.

D2. Useability Determination

A data usability summary shall be included in the final sampling report that declares the data to be either fit for the purposes stated in this QAPP or not based upon the results of the data validation review. Data validation is described below. Any other pertinent information, such as deviations from this QAPP, shall also be considered when making the final data usability determination. Any issues identified with the data's usability will be addressed in the report's data useability section and discussed in the conclusions and recommendations section as appropriate (e.g., resampling is necessary). Any qualifiers in the analytical data such as estimated values, etc. will be discussed in the data usability summary portion of the sampling report.

Data validation is the process of confirming that the collected data is fit for purpose (usable) after it has been generated. Data validation for this project shall consist of reviewing the analytical data included in the laboratory's analytical report(s) and shall be completed by the project manager. It shall be confirmed if all the reporting limits listed in the analytical report(s) for each COPC were below their

respective RMLs. All flags assigned to the analytical data shall be reviewed. If necessary, the results of matrix spike and matrix spike duplicate samples shall be reviewed to determine the potential direction of bias if data flags are assigned to critical sampling locations (e.g., flagged data just below the RML). The results of field duplicate sample shall be reviewed, the relative percent difference (RPD) calculated using equation 1, and the results compared to the criteria listed in Table 16. Rinsate blank results shall be reviewed to ensure that no COPCs were detected above analytical reporting limits.

Equation 1:

$$RPD = \frac{|R_1 - R_2|}{\frac{R_1 - R_2}{2}} * 100$$

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U.S. Environmental Protection Agency, 2003, Superfund Lead-Contaminated Residential Sites Handbook, Office of Superfund Remediation and Technology Innovation, OSWER 9285.7-50, August.

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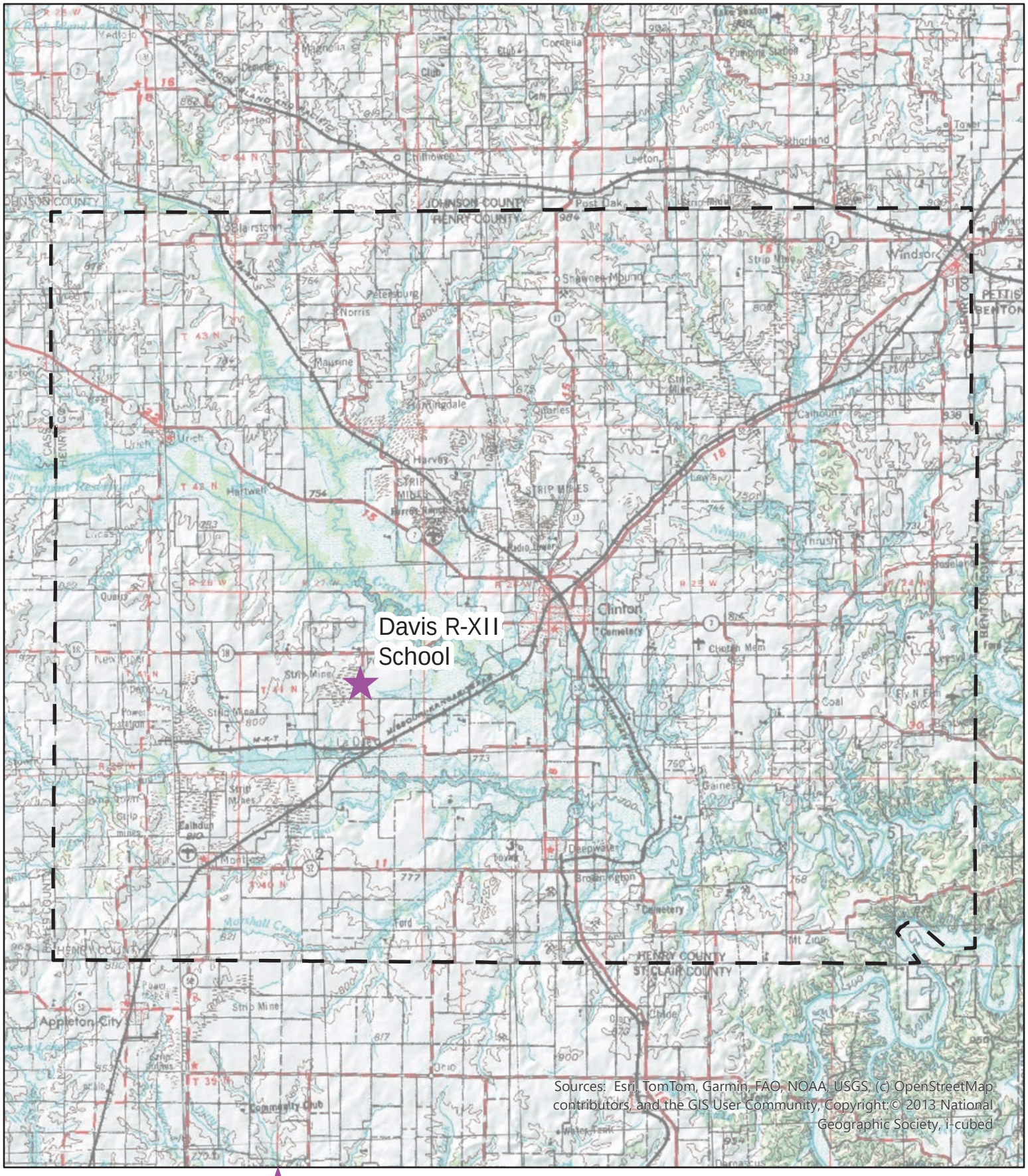
U.S. Environmental Protection Agency, 2024, Removal Management Level Calculator, November. https://www.epa.gov/risk/regional-removal-management-levels-rmls-chemical-contaminants

Figure 1: Site Location



Davis R-XII School

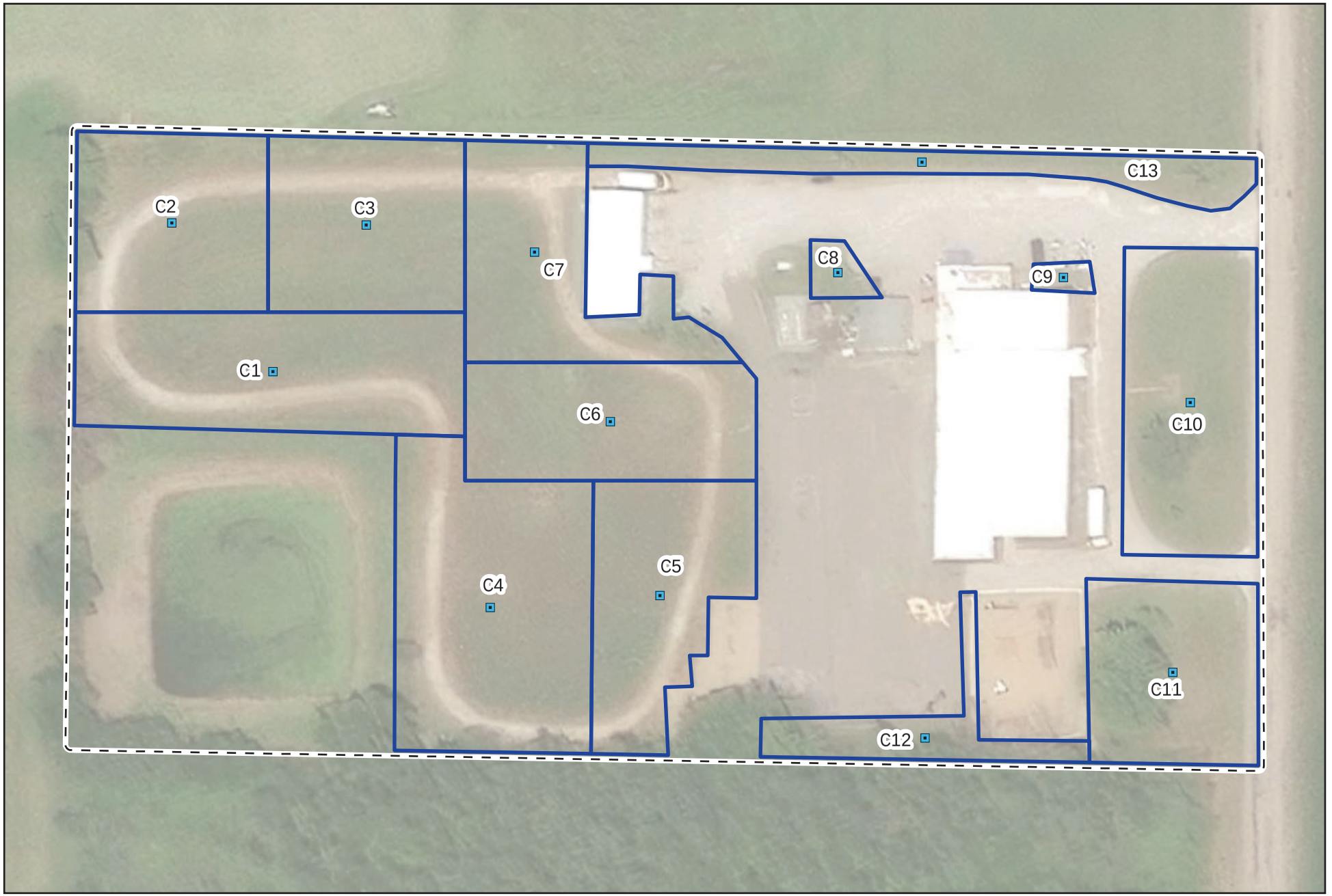
Henry County

EPA United States Environmental Protection Agency

0 25 50 100 Miles

N

Figure 2: Davis R-XII Composite Sampling Units



EPA United States Environmental Protection Agency

SamplingUnitCentroid

Proposed Sample Units (10,000 ft^2)

Approximate Site Boundary

State of Missouri, Maxar, Microsoft, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community, Copyright:© 2013 National Geographic Society, i-cubed

0 25 50 100 Feet

N

Figure 3: Davis R-XII Composite Sampling Track Sampling Area

EPA United States Environmental Protection Agency

Davis R-XII Track

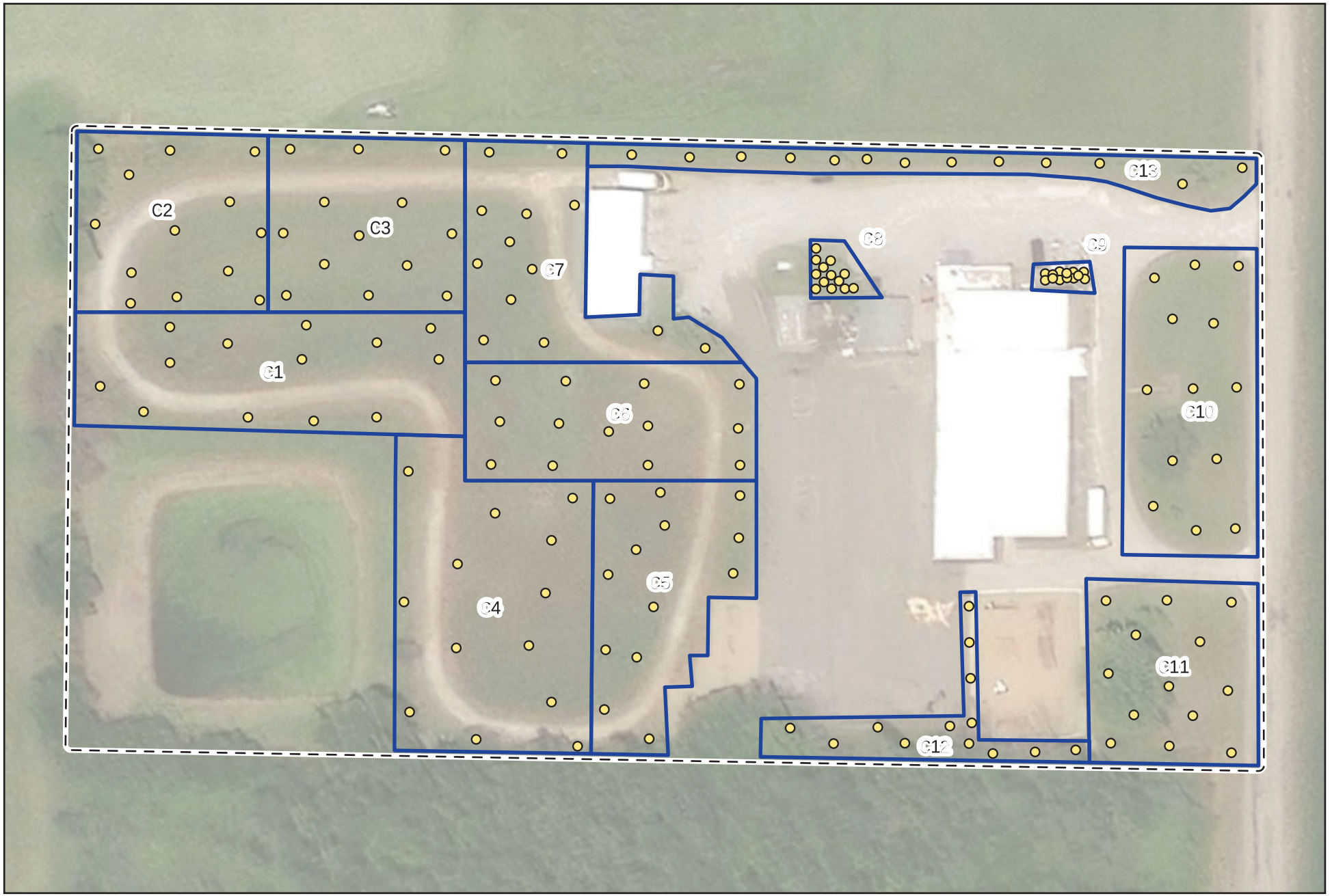
Approximate Site Boundary

State of Missouri, Maxar, Microsoft, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community, Copyright:© 2013 National Geographic Society, i-cubed

0 25 50 100 Feet

N

Figure 4: Approximate Soil Aliquot Locations



EPA United States Environmental Protection Agency

- Approximate Aliquot Locations
- Proposed Sample Units (10,000 ft^2)
- Approximate Site Boundary

State of Missouri, Maxar, Microsoft, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community, Copyright:© 2013 National Geographic Society, i-cubed

0 25 50 100 Feet

N

Figure 5: Approximate Track Soil Aliquot Locations

EPA United States Environmental Protection Agency

Approximate Track Aliquot Locations

Davis R-XII Track

Approximate Site Boundary

State of Missouri, Maxar, Microsoft, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community, Copyright:© 2013 National Geographic Society, i-cubed

0 25 50 100 Feet

N