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OU-1/OU-2 FEASIBILITY STUDY REPORT

ANNISTON PCB SITE



RAMBOLL ENVIRON

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APPENDICES

Appendix A Alternative Removal Action Workplan for 510 Legrande Street and 0 and 505 Ashley Street Properties (provided electronically only)

Appendix B Remedial Areas Using a Nonresidential Soil PRG of 9 mg/kg

Appendix C Remedial Areas Using a Sediment PRG of 1 mg/kg

Appendix D Conceptual Soil Management Plan

Appendix E Cost Estimate Tables for a Nonresidential Soil PRG of 9 mg/kg

Appendix F Cost Estimate Tables for a Sediment PRG of 1 mg/kg

ACRONYMS AND ABBREVIATIONS

%	percent
°F	degrees Fahrenheit
95% UCL	95% upper confidence level of the arithmetic mean
ADEM	Alabama Department of Environmental Management
AHWMMA	Alabama Hazardous Waste Management and Minimization Act
AOC	Administrative Order on Consent
APCO	Alabama Power Company
ARAR	Applicable and Relevant and Appropriate Requirement(s)
ASM	adaptive site management
ASTM	American Society for Testing and Materials
ATSDR	Agency for Toxic Substances and Disease Registry
AWQC	Ambient Water Quality Criteria
BaPE	benzo(a)pyrene
BBL	Blasland, Bouck & Lee
BERA	baseline ecological risk assessment
bgs	below ground surface
BMP	best management practice
CDM	CDM Federal Programs Corporation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
C.F.R.	Code of Federal Regulations
cfs	cubic feet per second
CO2e	carbon dioxide equivalents
COC	constituent of concern
COPC	constituent of potential concern
CSF	cancer slope factor
CSM	conceptual site model
CSSMA	central staging and soil management area
DDT	dichlorodiphenyltrichloroethane
EA	evaluation area
EC10	10% effect concentration
EE/CA	engineering evaluation/cost analysis
ENSR	ENSR International
ENVIRON	ENVIRON International Corporation
EPC	exposure point concentration
ESD	explanation of significant differences
EU	exposure unit
FCP	Foothills Community Partnership
FEMA	Federal Emergency Management Agency
FS	feasibility study
FSP	field sampling plan
Golder	Golder Associates
GRA	general response action
GSR	Green and Sustainable Remediation
GSWCC	Georgia Soil and Water Conservation Commission
HDPE	high-density polyethylene
HHRA	human health risk assessment
HI	hazard index
IC	institutional control
ID	identification
IM	interim measure(s)
IROD	Interim Record of Decision
ITRC	Interstate Technology and Regulatory Council
KDWP	Kansas Department of Wildlife and Parks
KP	Kansas Park
KPM	Kansas Parks Method
Lafarge	Lafarge North America

LOAEL	lowest observed adverse effect level
MCL	maximum contaminant level
µg/kg	microgram(s) per kilogram
µg/L	microgram(s) per liter
UWDA	unapproved waste disposal area
mg/kg	milligram(s) per kilogram
mg/kg-day	milligram(s) of constituent per kilogram body weight per day
mg/m^3	milligram(s) per cubic meter
MMBtu	million British thermal units
MNA	monitored natural attenuation
MNR	monitored natural recovery
NAVFAC	Naval Facilities Engineering Command
NCP	National Contingency Plan
ng/m^3	nanogram(s) per cubic meter
NOAEL	no observed adverse effect level
NPDES	National Pollutant Discharge Elimination System
NRC	National Research Council
NTC	non-time-critical
O&M	operations and maintenance
OLN	Oxford Lakes Neighborhood
OSHA	Occupational Safety and Health Administration
OSWER	Office of Solid Wastes and Emergency Response
OU	operable unit
P/S	Pharmacia LLC and Solutia Inc.
PAH	polycyclic aromatic hydrocarbon
parathion	ethyl parathion
PCB	polychlorinated biphenyl
PCD	revised Partial Consent Decree
PCDD/DF	polychlorinated dibenzo-p-dioxin and dibenzofuran
PDI	predesign investigation
pg/m^3	picogram(s) per cubic meter
PNP	paranitrophenol
POTW	publicly owned treatment works
PRG	preliminary remedial goals
PTW	principal threat waste
RAO	remedial action objective
RBP	rapid bioassessment protocols
RCRA	Resource Conservation and Recovery Act
RFC	reference concentration
RfD	reference dose
RFI	RCRA facility investigation
RFI/CS	RCRA facility investigation/confirmatory sampling
RGO	remedial goal option
RI	remedial investigation
RI/FS	remedial investigation/feasibility study
ROD	Record of Decision
Roux	Roux Associates, Inc.
SERA	streamlined ecological risk assessment
SAIC	Science Applications International Corporation
SLERA	screening level ecological risk assessment
SSSMA	south staging and soil management area
Swann	Swann Chemical Company
SWMU	solid waste management unit
TBC	to be considered
TCLP	toxicity characteristic leaching procedure
TEQ	toxic equivalents
TOC	total organic carbon
TSCA	Toxic Substance Control Act
TSS	total suspended solids

UCL	upper confidence limit
USACE	United States Army Corps of Engineers
USCB	United States Census Bureau
USEPA	United States Environmental Protection Agency
WMA	waste management area
WWTF	waste water treatment facility

EXECUTIVE SUMMARY

On August 4, 2003, the United States District Court for the Northern District of Alabama (the Court) entered a revised Partial Consent Decree (PCD) requiring, among other things, Pharmacia LLC and Solutia Inc. (together Pharmacia LLC and Solutia Inc. are referred to as P/S) to conduct a remedial investigation and feasibility study (RI/FS) for the Anniston PCB Site (the Site). The Site is not on the National Priorities List (NPL) but is being addressed through the Superfund Alternative Approach. The Site as defined in the PCD includes the following: "Site" shall mean for the purposes of this Consent Decree, the Anniston PCB Site, which consists of the area where hazardous substances, including PCBs associated with releases or discharges as a result of the operations, including waste disposal, of the Anniston plant by Solutia Inc., Monsanto Company, and their predecessors have come to be located. The site includes, but is not limited to, the area covered by the RCRA Permit." The Site is located in portions of Calhoun and Talladega Counties in the north-central part of Alabama, near Anniston and has been investigated for the past 20 years based on the presence of polychlorinated biphenyls (PCBs) and other chemical constituents in various environmental media. The Site encompasses the Solutia Inc. Anniston Plant (the Facility) (formerly owned and operated by Monsanto Company, now known as Pharmacia LLC) and other properties currently owned by Solutia Inc., residential and nonresidential properties owned by third parties, and portions of both Choccolocco Creek and Snow Creek and their 100-year floodplains.

To date, the RI/FS identified four separate operable units (OUs). OU-1 and OU-2 include residential and nonresidential properties, respectively, around and downstream of the Facility along Snow Creek to Highway 78. OU-1 and OU-2 have been combined (OU-1/OU-2) and investigated concurrently and are the focus of this feasibility study (FS). OU-3 includes the Facility and two closed landfills adjoining the Facility. The RI/FS process is complete for OU-3, and P/S are completing the remediation selected by USEPA in the Interim Record of Decision (IROD) under a Consent Decree for Remedial Design/Remedial Action for Operable Unit No. 3, entered by the Court on April 17, 2013. OU-4 includes Snow Creek and its floodplain from Highway 78 to the confluence of Snow and Choccolocco Creeks and Choccolocco Creek and its floodplain from a backwater area immediately upstream of the confluence of Snow Creek and Choccolocco Creek downstream to the embayment of Lake Logan Martin on the Coosa River. The United States Environmental Protection Agency (USEPA) may identify other OUs within the Site after data from the OU-4 remedial investigation (RI) and any other site-related studies are completed and reviewed.

This document presents the FS for the OU-1/OU-2 portion of the Site and was developed consistent with the requirements of the PCD and the RI/FS Work Plan for the Site (BBL 2004). In addition to the requirements identified in the PCD and RI/FS Work Plan, this FS is based on the following:

- Human health risk assessment (HHRA) documents prepared by the USEPA:
  - Anniston PCB Site Operable Units 1 and 2 Baseline Risk Assessment Anniston, Alabama, Final Human Health Baseline Risk Assessment Report (CDM 2010a)
  - Comparison of Dioxin-Like PCB Congener and Total Aroclor Data for OU1/OU2, Anniston PCB Site. Memorandum to USEPA from Jim La Velle (CDM 2010b)
- Ecological risk assessments prepared for Snow Creek and its floodplain:
  - Screening Level Ecological Risk Assessment for Operable Units 1, 2, and 3 of the Anniston PCB Site – Revision 1 (BBL 2005b)

  - Streamlined Ecological Risk Assessment for OU-1/OU-2 Portion of Snow Creek, Anniston PCB Site, Anniston, Alabama (ARCADIS 2013)

- Remedial Investigation Report for Operable Unit 1/Operable Unit 2 of the Anniston PCB Site (RI; ENVIRON 2015a)
- Technical Memorandum on Remedial Action Objectives, and Remedial Technologies, Alternatives and Screening (ENVIRON 2015b) and the associated comments from the USEPA dated June 9, 2015
- Technical Memorandum Summarizing Results of Comparative Analysis of Alternatives (Ramboll Environ 2015) and the associated comments from the USEPA dated October 23, 2015
- Non-Time Critical (NTC) Removal Action Completion Report for Residential Properties in OU-1/OU-2, Revision 1, Anniston, Alabama (Completion Report; Golder 2015)
- Consent Decree for Remedial Design/Remedial Action for Operable Unit No. 3, entered April 17, 2013 (RD/RA Consent Decree)
- OU-1/OU-2 FS Report dated December 18, 2015
- Comments from the USEPA dated February 1, 2016 on the December version of the OU-1/OU-2 FS

In addition to the items listed above, the process to develop the OU-1/OU-2 FS included a meeting between the USEPA and P/S on October 1, 2015. This meeting was convened as a requirement under the PCD for P/S to communicate the contents of the OU-1/OU-2 FS including the remedial action objectives (RAOs) and the results of the detailed and comparative analyses of remedial alternatives.

The OU-1/OU-2 RI and this FS summarize the significant amount of investigation and remediation work previously conducted in OU-3 and OU-1/OU-2. The remedial work previously conducted for OU-3 and OU-1/OU-2, combined with the remedial work that is currently being implemented for OU-3 pursuant to the RD/RA Consent Decree, will eliminate future inputs of constituents of potential concern (COPCs) from OU-3 to OU-1/OU-2 (and OU-4). These previously implemented remediation efforts have also resulted in a significant portion of OU-1/OU-2 already being addressed. This FS documents the effectiveness of these prior remediation efforts in OU-1/OU-2 through the remedial alternative evaluation process, including residential properties, high activity portions of special use properties, and previously implemented interim measures (IMs) and removal actions. A wide range of alternatives is also evaluated for dredge spoil piles, nonresidential soils, sediment and creek banks, and groundwater. This FS includes a conceptual soil management plan that describes the actions to be taken to ensure that PCB-containing residual soils will not pose a threat to human health and the environment. The approach to soil management described in the plan has been developed based on actual experience gained at the Site in addressing these issues over the past 15 years. The final approach to managing soil will be described in the Record of Decision (ROD) for OU-1/OU-2. A final plan will need to be developed as part of the remedial design (RD). Having a soil management plan ensures that if these residual soils are disturbed in the future, the materials will be managed appropriately. The actions in the soil management plan will be conducted as part of long-term residuals management at the Site. The soil management plan appended to this FS contain procedures to follow when notified that a land-disturbing activity is planned in a location where PCB-containing residual soils may be found. Additionally, a long-term operation and maintenance (O&M) program is included as part of the OU-1/OU-2 remedy. The long-term O&M plan and the soil management plan are critical elements to the effectiveness of the remedy for OU-1/OU-2.

Previously Implemented Source Control and Remediation Projects

Significant remedial efforts have been implemented throughout the Site under State and/or Federal oversight. For OU-3, these measures include multiple source control actions taken under the Resource Conservation and Recovery Act (RCRA) and incorporated as part of the OU-3 remedy in the 2013 IROD (USEPA 2013a). Previously implemented remedial efforts include placing multiple caps in portions of OU-3, removing contaminated soil, improving local surface water controls, collecting and treating contaminated groundwater, and monitoring to confirm the effectiveness of these source control and containment measures. The IROD also specified placing additional caps and expanding the groundwater collection system. These additional measures for OU-3 have been designed and approved by the USEPA and are currently under construction. The collective effect of these actions will eliminate OU-3 as a future source of potential contamination to downstream areas.

The previously implemented remediation efforts in OU-1/OU-2 have addressed both residential and nonresidential areas and advanced (and expedited) the remediation of OU-1/OU-2 to minimize the potential for future impacts to OU-4.

Residential and High Activity Special Use Properties

An NTC Removal Agreement (PCD, Exhibit G) was issued to address residential properties with surface soil PCB concentrations greater than or equal to 1 milligram per kilogram (mg/kg). The NTC Removal Agreement required an engineering evaluation/cost analysis (EE/CA) to evaluate removing soils in residential areas of the Site with PCB concentrations greater than or equal to 1 mg/kg in the upper 12 inches of soil and soils containing PCB concentrations greater than or equal to 10 mg/kg from depths below 12 inches. The EE/CA Report (Solutia 2003b) was subsequently approved by the USEPA on September 24, 2003. NTC sampling and soil removals were focused on residential properties in the Anniston area. The NTC Removal Agreement was later clarified by the issuance of a Stipulation and Agreement (Stipulation) between the USEPA and P/S on July 18, 2006 (USEPA 2006). The primary purpose of the Stipulation was to address the phasing and extent of the residential property removal actions to be completed by P/S.

Residential removal actions are a significant component of the overall remedy for OU-1/OU-2 as approximately one-third of OU-1/OU-2 is considered residential. Essentially all of the residential areas in OU-1/OU-2 have been sampled. Sampling on residential properties identified 627 properties within OU-1/OU-2 with PCBs greater than or equal to 1 mg/kg where P/S were required to complete a removal action. Removal actions have been completed at 565 (greater than 90 percent [%] of these properties). Removal actions have not been completed at the remaining 62 properties, because these properties are either currently unsuitable for removal or access has not been provided. Approximately 129,000 cubic yards of impacted soil have been excavated from OU-1/OU-2 and taken to facilities approved for final disposal, and approximately 77 acres of land have been restored. The residential removal efforts also included addressing the high activity portions of special use properties such as churches, schools, playgrounds, and daycare centers. These high activity areas were also remediated to the residential standard of 1 mg/kg. Details of the removals conducted for residential properties and the high activity portions of special use properties through December 31, 2014, are presented in the Completion Report (Golder 2015). Removals to address residential properties that may become suitable for removal activity in the future or when access is provided will be addressed as part of the long-term O&M program for OU-1/OU-2. This includes addressing land use changes where nonresidential properties may be converted to a residential or high activity special use property or where a low activity portion a special use property is converted to a high activity special use property.

The conceptual soil management plan (Appendix D) describes the actions to be taken to ensure that residual PCB-containing soils will not pose a threat to human health and the environment, and if these residual soils are disturbed in the future, the materials will be managed appropriately. The soil management plan specifically addresses the potential disturbance of residual PCBs at depth on the residential properties and the high activity portions of the special use properties that were previously remediated or beneath structures that may be removed in the future.

Nonresidential Areas

Significant remediation efforts have also been implemented for the nonresidential portions of OU-1/OU-2 under State and/or Federal oversight. These remediation efforts were implemented as IMs and designed to minimize the potential for the migration of PCBs. IMs implemented in the OU-1/OU-2 portion of the Site include the following:

- Northside Area
- Eastside Area
- Eastside Drainage Way
- Hall Street
- Quintard Mall

The construction details for the IMs are documented in the OU-1/OU-2 RI, and their protectiveness is evaluated and confirmed as part of this FS. These IMs include a combination of soil removals, caps, and covers (including the placement of impermeable membranes), fencing, and deed restrictions. In a limited number of cases, small expansions of the IM are proposed in this FS to provide complete spatial coverage using the same remedial approach used to initially implement the IM. Long-term O&M will also be performed in these IM areas to provide continued effectiveness of the measures in the future. In some cases, institutional controls (ICs) or deed restrictions will be used or expanded to limit the future use of these nonresidential properties.

Other previously implemented remedial efforts were conducted under State and/or Federal oversight. These include removing approximately 1,000 tons of sediments from the 11th Street Ditch and a portion of Snow Creek in 1989. This remediation project was completed as part of an investigation conducted in cooperation with the USEPA, the Alabama Attorney General, and Alabama Department of Environmental Management (ADEM). The excavated sediments were transported and disposed of at an off-site landfill. In 2004, the 11th Street Ditch was lined with concrete in accordance with the requirements of the Administrative Order on Consent (AOC) for removal actions. Prior to lining the ditch, soils with PCB concentrations greater than or equal to 10 mg/kg were removed. These 11th Street Ditch activities were conducted between August 2004 and December 2004, in accordance with the AOC (PCD, Appendix C) and the USEPA-approved RD dated May 2003. Additionally, four dredge spoil piles located adjacent to Snow Creek were removed. In 2009, one of the four dredge spoil piles (SC-3) was removed as part of a residential removal action conducted under USEPA oversight, and three other dredge spoil piles (dredge spoils SC-4, SC-5, and SC-6) were removed at the request of the City of Anniston. In conjunction with the removal of dredge spoils SC-4, SC-5, and SC-6, the City of Anniston conducted sediment removal activities in 2009 along a portion of Snow Creek.

The combined effect of the previously implemented IMs, removal actions in nonresidential areas, and residential removals conducted for residential and high activity special use properties has effectively remediated over 40% of OU-1/OU-2. This 400-acre footprint also includes residential and high activity special use properties where sampling concluded that PCBs were present at concentrations below

1 mg/kg. These previously implemented remedial efforts combined with focused enhancements, long-term O&M, ICs for select nonresidential properties, and a comprehensive approach to soil management form a significant portion of the final remedy for OU-1/OU-2. The remaining portions of OU-1/OU-2 are addressed in this FS. These remaining areas/media include nonresidential soils, sediment, surface water, air, and groundwater and will be supported by soil management and the long-term O&M program.

Remedial Investigation and Risk Assessment Findings

The completeness of the data collected for OU-1/OU-2 and its ability to support the human health and ecological risks assessments and this FS are summarized below.

The significant findings from the human health and ecological risk assessments are also summarized below.

- **OU-1/OU-2 – Adequacy of Data:** The OU-1/OU-2 portion of the Site has been characterized through multiple residential and nonresidential investigations conducted over the past 20 years. The resulting dataset adequately defines the nature and extent of PCBs and other constituents in soil, sediment, groundwater, surface water, and air with the possible exception of the unapproved waste disposal areas (UWDAs). These data, in combination with land use and habitat data, were used to prepare the human health and ecological risk assessments for the creek and floodplain and this FS. The RI describes the multiple IMs and removal actions that were previously implemented in OU-1/OU-2. These descriptions were used in this FS to evaluate the effectiveness of the previously implemented actions. A significant amount of data was also collected for residential soils. These residential data and a description of previously implemented removal actions for residential properties and the high activity portions of special use properties are provided in the Completion Report and are incorporated into this FS.
- **Characterization of Human Health Risks:** The HHRA identified COPCs regardless of their potential origin, calculated the concentrations of the COPCs in the various media, evaluated potential ways people may come into contact with COPCs (exposure pathways), identified toxicity criteria to quantify potential risks, and characterized potential cancer risks and noncancer health hazards associated with possible current and future exposure to COPCs. The HHRA identified uncertainties and developed concentration-based remedial goal option (RGO) values. The HHRA found that the most prevalent and widespread risks to human health in OU-1/OU-2 are associated with the presence of PCBs in surface soil. The HHRA also identified constituents other than PCBs as COPCs that exceed the risk thresholds in soils. Those constituents are arsenic, PAHs (as benzo(a)pyrene [BaPE] equivalents), chromium, and polychlorinated dibenzo-p-dioxin and dibenzofurans (PCDD/DFs, as 2,3,7,8-tetrachlorodibenzo-p-dioxin equivalent [TEQ]). The risk exceedances are limited to surface soils; COPCs in other Site media (subsurface soils, surface water, sediment, and air) result in low levels of risk. Risks associated with PCBs in groundwater were also elevated in the T-11 portion of Exposure Unit 5 (EU5). PCB concentrations in groundwater at this location exceeded the maximum contaminant level (MCL) value.

  To develop a detailed understanding of the risks associated with OU-1/OU-2, the OU was divided into 30 geographical areas known as EUs. Evaluating risks associated with soils using an EU basis is important because both the nonresidential land uses and PCB concentrations in soil vary across OU-1/OU-2. Each EU was evaluated based on land use and exposure point concentrations (EPCs) to estimate risks to different possible receptors (e.g., recreational users or construction workers). The HHRA found that risks associated with PCBs in soil were

negligible to low in 24 of the 30 EUs. Of the 6 EUs that pose potential risks, the 2 EUs with some of the highest levels of risk are EU5 and EU19N. EU5 is located in the northern portion of OU-1/OU-2 near the confluence of the 11th Street Ditch and Snow Creek, and EU19N is located next to Snow Creek midway between the 11th Street Ditch-Snow Creek confluence and Highway 78. The HHRA calculated concentration-based RGOs for soils based on the different land uses (and potential receptors) that may be present in each EU. These RGOs were used to develop preliminary remedial goals (PRGs) for OU-1/OU-2. The HHRA also confirmed that the residential cleanup PCB concentration for surface soils previously selected for residential use properties (1 mg/kg) is protective of human health. The risk assessment also determined that risks associated with exposures to sediment, surface water, and air were not significant contributors to the overall human health risks associated with OU-1/OU-2. The three EUs where subsurface risks exceeded the PCB PRG (EU5, EU10, and EU19N) were also associated with the highest surface soil PCB concentrations. All three of these EUs are addressed in the OU-1/OU-2 FS. The actions proposed will reduce the risks associated with surface and subsurface soils to acceptable levels. As noted above, there was one isolated location in OU-1/OU-2 (groundwater well T-11 in EU5) where the PCB concentrations in groundwater exceeded the MCL.

- **Characterization of Ecological Risks:** The ecological risk assessment conducted for the OU-1/OU-2 portion of Snow Creek indicated that there are some risks to benthic invertebrates from exposure to PCBs and some metals in localized areas. For benthic invertebrates as well as the avian and mammalian receptors, several sediment samples exceeded the site-specific risk-based concentrations for PCBs and several metals. The highest sediment exceedances are generally located near the confluence of the 11th Street Ditch and Snow Creek and near the culverts at the Highway 202 underpass. There is uncertainty regarding potential risks to populations of avian and mammalian species that could reside or forage within this area, as habitat constraints may limit exposure to large numbers of receptors for extended periods of time. Some level of risk to birds is possible from exposure to PCBs, chromium, lead, manganese, mercury, nickel, and vanadium. Some level of risk to mammals is possible from exposure to PCBs, chromium, manganese, and nickel. The chronic ambient water quality criteria (AWQC) for the protection of wildlife was also exceeded at times in the surface water of Snow Creek. These exceedances were typically during periods of high flow.

The FS Process

The FS used sequential steps to assemble and evaluate a range of standalone remedial alternatives capable of meeting the preliminary RAOs for OU-1/OU-2. The FS process began by developing preliminary RAOs to address soil, sediment/creek banks, groundwater, and surface water. The preliminary RAOs are narrative goals that address specific constituents of concern (COCs) on a medium-specific basis and describe exposure routes and receptors. The acceptable concentration value is numerical and is identified as the PRG. The PRG values were based on applicable or relevant and appropriate requirement (ARARs), if available. In the cases where ARARs were not available, the PRGs were selected from a range of potential values developed as RGOs in the human health and ecological risk assessments. This process concluded with numerical PRGs for surface and subsurface soils, sediment and creek banks, groundwater and surface water. A PRG value was not developed for air as the HHRA concluded that risks associated with exposure to air were low. PRGs were used for the detailed and comparative analysis of remedial alternatives. Alternative PRG values for nonresidential soil and sediment were also evaluated in the OU-1/OU-2 FS to understand the differences in area, volume, and cost associated with these alternative PRGs. The final remedial goals for OU-1/OU-2 will

be selected in the ROD and if the final remedial goals differ from those used for the detailed and comparative analysis, they will be evaluated in detail and on a comparative basis as part of the ROD process.

The surface soil PRGs include both residential and nonresidential receptors. The PRG for contact with PCBs in surface soils is 1 mg/kg for both residential properties and the high activity portions of special use properties. The PRG selected for the nonresidential receptor (the industrial/commercial worker) who may contact PCBs in surface soils on an EU-wide basis is 21 mg/kg. A not-to-exceed surface soil PCB concentration of 50 mg/kg was also used to identify candidate remedial areas for surface soils. The alternative PRG for PCBs in surface soils is 9 mg/kg for nonresidential receptors. The surface soil PRGs for the non-PCB constituents are 382 mg/kg for arsenic, 568 mg/kg for chromium, 21 mg/kg for PAHs as BaPE, and 0.6 micrograms per kilogram (µg/kg) for PCDD/DF. The OU-1/OU-2 FS also addresses a limited number of small isolated areas where concentrations of non-PCB constituents exceed their respective PRGs in surface soils. This includes two locations where three sample results exceed the PAH (as BaPE) PRG of 21 mg/kg; two locations where one sample result in each of these areas exceeds the chromium PRG of 568 mg/kg; and one location where one sample result exceeds the PCDD/DF PRG of 0.6 µg/kg.

The three EUs where elevated risks for subsurface soils are present are addressed through a combination of approaches in the OU-1/OU-2 FS. Elevated subsurface PCB concentrations in EU5 are addressed through actions that also address groundwater in the T-11 portion of the EU. Elevated PCB concentrations in the subsurface soils of EU10 are addressed by actions targeting the UWDA portion of the EU. The subsurface soil risks in EU19N are driven by the results of a sample collected in surface soils (the 0- to 1-foot horizon). Results on this upper most soil layer are also used to evaluate subsurface risks as the exposure assessment includes the entire 0- to 4-foot interval. Based on the range of remedial approaches to address surface soils in EU19N, the subsurface soil PCB concentrations in this EU will be below the PCB PRG of 97 mg/kg. Since the OU-1/OU-2 FS uses an EU-wide PRG of 21 mg/kg and a not-to-exceed PCB concentration of 50 mg/kg, there are no locations outside of the surface soil candidate remedial areas where the presence of PCBs in surface soils results in an exceedance of the subsurface PRG.

Soils in OU-1/OU-2 with PCB concentrations greater than or equal to 500 mg/kg were further evaluated as potential principal threat waste (PTW), or source material, based on mobility and toxicity. The results of this evaluation indicate that PTW is only present at the T-11 portion of EU5. In this portion of OU-1/OU-2 the MCL for PCBs in groundwater is exceeded. The PCB PRGs for groundwater and surface water are 0.5 micrograms per liter (µg/L) and 0.014 µg/L, respectively. These two PRG values were identified as potential ARARs. The PCB PRG selected by the USEPA for sediment and creek bank areas is 3 mg/kg. This PRG is based on the protection of benthic species and is considered to be protective for OU-1/OU-2 because benthic habitat in this portion of Snow Creek is very limited. Habitat quality in Snow Creek is further limited by multiple point discharges and nonpoint surface water runoff from the surrounding urbanized watershed.

The next step in the FS process was to identify candidate remedial areas based on an overlay of the media-specific PRGs with the corresponding COC results from the RI. After identifying candidate remedial areas, a series of general response actions (GRAs) were developed that could be used alone or in combination with other GRAs to form complete remedial alternatives. Individual remedial technologies and process options were identified and evaluated under each GRA. These technologies and process options were screened in a two-step process to identify a subset that could be used to develop standalone remedial alternatives. The initial screening was based on technical implementability (i.e., would the technology/process option work based on the conditions at the Site). After the first screening step (technical implementability), the technologies and process options

retained were further evaluated based on effectiveness, implementability, and cost. The technologies and process options retained through this second screening step were then used to develop complete remedial alternatives for the following eight categories of impacted media:

- Residential soils
- Special use properties
- IMs
- Dredge spoil piles
- UWDAs
- Nonresidential soils
- Groundwater at T-11
- Sediment and creek bank

The initial ranges of remedial alternatives for these eight categories were developed and screened. The screening process eliminated those alternatives that would not effectively address the RAOs. The remedial alternatives that remained following this screening were subject to a detailed analysis using seven of the nine detailed evaluation criteria included in the National Contingency Plan (NCP). The two criteria not evaluated were State and community acceptance. These two criteria will be evaluated by the USEPA in the development of the ROD for OU-1/OU-2. Following the detailed analysis of alternatives, a comparative analysis was conducted for all of the remedial alternatives. The comparative analysis evaluated all of the alternatives for a given category as a group against the seven individual criteria from the NCP.

Detailed and Comparative Evaluation of Alternatives Summary

The process to evaluate remedial alternatives in the FS follows the NCP and the USEPA RI/FS guidance (USEPA 1988). This evaluation provides the information necessary for the USEPA to select a remedy or remedies for OU-1/OU-2. Additional input will be provided to the USEPA separately by the State and the public. The selection of a remedy requires evaluating two threshold criteria that must be met in order for USEPA to select the alternative as a final remedy, five balancing criteria, and two modifying criteria as defined in the NCP:

- **Threshold Criteria**
  - Overall protection of human health and the environment
  - Compliance with ARARs (can also include obtaining a waiver for the ARAR)
- **Balancing Criteria**
  - Long-term effectiveness and permanence
  - Reduction of toxicity, mobility, or volume through treatment
  - Short-term effectiveness
  - Implementability
  - Cost

- **Modifying Criteria**
  - State acceptance
  - Community acceptance

The evaluation from the detailed analysis of each category is used to compare the alternatives under each specific evaluation criterion. Overall protection of human health and the environment and compliance with ARARs are used as threshold determinations and must be met by any alternative in order for it to be eligible for selection. Complying with an ARAR can also be achieved by having the ARAR waived. The next five criteria (long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost) are the primary focus of the comparative evaluation because the major differences, benefits, and disadvantages among alternatives usually relate to one or more of these five criteria (USEPA 1988).

Of the eight categories of impacted media, significant progress has already been made in terms of implementing the final remedy for three of the categories—residential properties, high activity special use properties, and IMs. The range of remedial alternatives for the remaining five categories is robust and provides the USEPA with different approaches to achieve the PRGs. Consistent with guidance from the USEPA, the remedial alternatives consider the environmental footprints of each approach including energy consumption and greenhouse gas emissions. In two cases, the remedial alternatives include an adaptive site management (ASM) approach to implementation. The ASM approach includes collecting and evaluating data to focus the remedy implementation strategy over time. The two alternatives that use ASM are GW-4 for groundwater at T-11 and SED-4 for sediment and creek bank soils along Snow Creek.

Residential Soil Alternatives

A majority of RS-1, RS-2, and RS-3 have already been implemented through the residential removal program under the NTC. Under RS-1, no additional activities would occur. RS-2 includes implementing residential removals for properties where previously denied access is provided and where overgrown properties become suitable for removal in the future. Additional efforts under RS-2 include managing residuals at depth with PCB concentrations between 1 and 10 mg/kg through a soil management plan. Soil management would also be used to monitor locations where structures may be removed at a later date. RS-3 includes removing surface and subsurface soils from residential properties with PCB concentrations greater than or equal to 1 mg/kg. In contrast to RS-2, RS-3 considers returning to residential properties where removals were previously conducted and conducting additional excavation activities to remove subsurface soils with PCB concentrations between 1 mg/kg and 10 mg/kg. Under RS-2, these subsurface soils with residual PCBs are addressed through soil management.

High Activity Special Use Properties Alternatives

The four special use property alternatives—SU-1 through SU-4— recognize that special use removals are largely complete for the high activity areas under the NTC and the Stipulation. SU-1 is the no further action alternative. SU-2 has been mostly implemented, and the remaining activities under SU-2 are focused on soil management for the PCB residuals at depth with concentrations between 1 and 10 mg/kg. Under SU-2, the low activity portions of the special use areas are addressed as nonresidential soils. SU-3 applies the NTC approach (1 mg/kg for surface soils and 10 mg/kg for subsurface soils) to the low activity portions of the special use areas. SU-4 includes removing surface and subsurface soils with PCB concentrations greater than or equal to 1 mg/kg from both the high and low activity portions of the special use areas. Soil management would also be used for PCB residuals

under SU-3. Under all three active alternatives, soil management would also be used to monitor locations where structures may be removed at a later date.

SU-1 and SU-2 provide similar levels of effectiveness immediately following implementation. SU-2 provides additional long-term effectiveness through soil management to address PCB residuals at depth and beneath structures if removed in the future. SU-3 is consistent with SU-2 but is applied to a larger geographic area through the inclusion of the low activity portions of the special use areas. The additional areas addressed under SU-3 are also addressed under SU-4. SU-3 uses soil management to address PCB residuals at depth with concentrations between 1 mg/kg and 10 mg/kg versus SU-4 that removes these PCB residuals at depth to concentrations less than 1 mg/kg. Under all three active alternatives (SU-2, SU-3, and SU-4), changes in land use would be tracked and identified under the long-term O&M program.

The impacts associated with implementing SU-1 and SU-2 are essentially the same, because the NTC approach has already been implemented for the high activity portions of all of the special use areas. There are some impacts associated with implementing soil management under SU-2, but these are limited. The impacts increase with alternatives SU-3 and SU-4 based on the expansion of removal activities into the low activity areas. These low activity areas were evaluated under SU-2 as nonresidential portions of OU-1/OU-2. The level of disruption increases significantly under SU-4 for two reasons. First, removals at depth would be required for some of high activity special use areas that have already undergone removals. Second, surface and subsurface removals would be conducted to 1 mg/kg for the low activity portions of the special use areas that under SU-1 and SU-2, are addressed as nonresidential areas. The environmental footprints increase from SU-2 to SU-4 based on the increasing volume of soil being removed under this span of remedial alternatives.

Interim Measures Alternatives

Four alternatives—IM-1 through IM-4—were evaluated for IMs. These include no further action (IM-1) and expanding soil and liner caps over portions of the IM areas consistent with the prior regulatory agreements with the overseeing State and Federal agencies (IM-2 and IM-3). The expansions would result in the IM areas meeting the nonresidential PRG of 21 mg/kg and would address surface soil locations with PCB concentrations greater than or equal to 50 mg/kg that are currently not covered by previous IMs. IM-3 is similar to IM-2 with one difference—soils in the PB-RR-37 portion of the Eastside Area would be removed rather than capped. IM-4 includes excavating soils, disposing of them off-site, and then backfilling the excavated area. All three active IM alternatives include evaluating PTW in the Eastside Area and using long-term O&M and ICs, where applicable.

All three active IM alternatives effectively address the current gaps in spatial coverage for the previously implemented IMs. These actions—investigating PTW in the Eastside Area and implementing long-term O&M activities and ICs—would provide long-term effectiveness and permanence for any of the alternatives. IM-2 is the easiest of the three active alternatives to implement and would provide long-term effectiveness and permanence through capping the PB-RR-37 area. Soils in the area of PB-RR-37 would be removed under IM-3. This soil removal would require additional means to control surface water runoff during construction and additional truck traffic associated with off-site disposal. IM-4 has the most impacts due to the nature of the activities including excavation, off-site transportation and importing backfill. The environmental footprints between IM-2 and IM-3 are similar with a slight increase associated with the off-site transport of the material associated with the PB-RR-37 soils. The environmental footprint for IM-4 is approximately five time larger than the footprints for IM-2 and IM-3.

Dredge Spoil Pile Alternatives

The dredge spoil pile alternatives—DSP-1 through DSP-5—include one no action alternative (DSP-1), two active alternatives that remove dredge spoil pile SC-8 (DSP-2 and DSP-3), and two active alternatives that remove all four dredge spoil piles (SC-1, SC-2, SC-7, and SC-8). The dredge spoil piles not removed under DSP-2 and DSP-3 will be assessed for stability and stabilized with vegetation as needed.

For planning and costing purposes, DSP-2 and DSP-3 do not include removing dredge spoil pile SC-2. A predesign investigation for dredge spoil pile SC-2 would be conducted under these two alternatives. If the PCB concentration in SC-2 is determined to be above the PRG of 21 mg/kg, SC-2 would be removed and the materials would be disposed of in the same manner as selected for SC-8. Alternatives DSP-2 and DSP-3 are the same with the exception of the disposal alternative. The same holds true for alternatives DSP-4 and DSP-5. For DSP-2 and DSP-4, the excavated materials would be transported to an off-site disposal facility. Under DSP-3 and DSP-5, the excavated materials would be transported to an on-site soil management area for disposal (the SSSMA) provided that the PCB concentrations are less than 50 mg/kg. Off-site disposal would be used for the portion of materials with PCB concentrations greater than or equal to 50 mg/kg. All four of the active alternatives would include removing a 12-inch layer of floodplain soils under any dredge spoil piles that are removed.

The use of an existing on-site soil management area is being proposed in this FS for materials from the nonresidential portion of OU-1/OU-2 including nonresidential soils, soils from the dredge spoil piles, and sediment from Snow Creek with PCB concentrations less than 50 mg/kg. Materials with PCB concentrations below 50 mg/kg are not considered to be hazardous by the State of Alabama. The on-site soil management area being proposed is the south staging and soil management area (SSSMA). This on-site soil management area was previously approved for the disposal of residential and special use soils with PCB concentrations up to 10 mg/kg based on the analysis of five-point composite samples. The concentration of 10 mg/kg considered the possibility that one of the five soil aliquots used to create the overall composite sample could have PCB concentrations up to 50 mg/kg. This approach prevented soils with PCB concentrations greater than or equal to 50 mg/kg from being placed in the SSSMA.

Approval of the SSSMA on-site soil management for residential (and special use) soils is provided under the May 4, 2006, Explanation of Significant Differences (ESD; USEPA 2006c). Recognizing that the prior approval does not extend to the remedial actions identified and evaluated in this FS, use of this on-site soil management area is being proposed in this FS. The potential for future use of the SSSMA for the disposal of other soil (i.e., nonresidential or non-special use soils) is discussed in the USEPA's response to comment number 5 on the 2006 ESD:

> "The capacity of the proposed soil management area was developed in more detail so that a better estimate of capacity could be determined. The capacity of the area is not related to the total amount of soil remaining to be removed from residential properties. EPA expects that only a fraction of the capacity will be required to manage residential soil with PCB concentrations, based on five-point composite samples, less than 10 ppm. Use of the remaining capacity would need to be approved as part of a remedy selected in future decision documents. The excess capacity could be considered as part of an institutional control program or some other containment remedy for non-hazardous PCB contaminated soils. Any proposal to use the soil management area for other than residential soils will be proposed to the community in a proposed plan and a comment period will follow. No action will be taken without input from the community."

All of the active alternatives are similarly effective and have comparable risks during construction. The highest level of impact and risks is associated with DSP-4, which includes removing all four dredge spoil piles and using an off-site disposal facility.

Unapproved Waste Disposal Areas

There are three active alternatives to address the UWDAs. The first two active alternatives, UWDA-2 and UWDA-3, are similar in that they use capping to minimize the infiltration of groundwater and isolate surface soils from direct contact. The cap under UWDA-2 includes a combination of a geotextile layer and soil. The cap used for UWDA-3 includes a low permeability layer. UWDA-4 includes excavation and off-site disposal of the materials that are removed. A portion of these materials may have to be pretreated prior to off-site disposal in order to address lead–related materials that have been detected at high concentrations in the UWDAs. Alternative UWDA-4 is a much larger construction project than UWDA-2 and UWDA-3 and involves excavating, handling, and transporting materials to an off-site landfill. These activities would generate more dust and emissions and include significantly more truck traffic to transport excavated waste and backfill materials. There are also short-term effectiveness impacts to the local community, the surrounding creeks/drainage way areas, and local infrastructure including bridges, railway lines, and pipelines.

The environmental footprints for UWDA-2 and UWDA-3 are similar and approximately 50 times smaller than the environmental footprint for UWDA-4.

Nonresidential Floodplain Soil Alternatives

Six alternatives—NRS-1 through NRS-6—were developed for nonresidential soils. As with each of the categories, the first alternative (NRS-1) would be no further action. The other five alternatives address the same nonresidential surface soil footprints; the differences are in how each alternative addresses those soils. NRS-2 involves placing clean cover (soil) in areas where impacts to flooding are expected to be minimal and excavating the 12-inch surface soil layer in areas where placing a soil cover directly over the current grade may cause unacceptable flooding risk. Excavated areas would be backfilled with a 12-inch layer of clean soil to return the areas to grade. Alternatives NRS-3, NRS-4, NRS-5, and NRS-6 involve excavating 12 inches of surface soils and replacing with clean backfill materials. NRS-3 involves disposing the excavated materials using a combination of on-site disposal in the SSSMA and off-site disposal. NRS-4 uses an off-site landfill for the disposal of the excavated materials. NRS-5 and NRS-6 are essentially the same as NRS-3 and NRS-4 for the on-site work, but they include treatment of the excavated soils. NRS-5 uses off-site incineration to treat the soils, and NRS-6 uses a combination of on-site thermal desorption to separate the PCBs from the soils and then off-site incineration to treat the smaller volume of high-concentration PCB oils resulting from the thermal desorption process. Each active alternative includes soil management to be effective over the long term.

The first three active NRS alternatives are effective and are similar with respect to most of the evaluation criteria. NRS-2 has less impact as a smaller amount of soil is excavated and transported to an off-site disposal facility. NRS-2, NRS-3, and NRS-4 are similar regarding the on-site implementation and the resulting effectiveness. NRS-5 and NRS-6 are treatment alternatives that would reduce the toxicity, mobility, and volume of the material through treatment. However, this small advantage is disproportionate to the significantly higher costs and environmental impacts associated with on-site and off-site treatment operations. The environmental footprints for NRS-6 is four to five times larger than the next closest alternative (NRS-3). NRS-5, off-site incineration, has an environmental footprint that is more than 10 times larger than NRS-6 and 100 times larger than the other NRS alternatives.

Groundwater and Principal Threat Waste (PTW) at T-11 Alternatives

Four alternatives—GW-1 through GW-4—were developed for groundwater and PTW in a portion of EU5. GW-1 is the no action alternative, and the other three alternatives sequentially increase in complexity to address PCBs in soil and the associated concentrations in groundwater at the T-11 area. GW-2 excavates and backfills soils immediately around well T-11 to a depth of 4 feet (the vertical extent of high PCB concentrations in soils in this area) and excavates 12 inches of material across the broader area around T-11. GW-3 includes a similar excavation footprint as GW-2 except that an 18-inch layer of soil would be removed rather than the 12-inch layer of soil. GW-3 includes placing a low-permeability cap rather than backfilling only (GW-2) over the broader T-11 area. GW-4 is the same as GW-3 (excavation and capping) with the addition of installing extraction wells, extracting two pore volumes of groundwater from the T-11 area, and treating the groundwater with activated carbon before it is discharged to Snow Creek. The active alternatives for groundwater and PTW near T-11 (GW-2, GW-3, and GW-4) progressively increase in complexity and implementability challenges. However, the removal and treatment of two pore volumes of groundwater under GW-4 is expected to reduce the time to achieve the MCL. Alternative GW-4 includes an ASM approach such that the implementation can be adjusted in response to data collected over time.

The energy use and greenhouse gas emissions are similar among the groundwater alternatives with GW-2 having the lowest values due to a smaller quantity of soil being excavated and transported to an off-site disposal facility. The other two alternatives (GW-3 and GW-4) have equivalent footprints even though GW-4 includes operating extraction/treatment equipment. This equivalency in environmental footprint is achieved by using solar power to operate the equipment.

Sediment and Creek Bank Alternatives

Four sediment and creek bank alternatives—SED-1 through SED-4—were evaluated in the FS. SED-1 is the no action alternative. SED-2, SED-3, and SED-4 all include excavation and disposal. SED-2 has a smaller removal footprint because it targets sediment deposits with average PCB concentrations greater than or equal to 10 mg/kg and uses monitored natural recovery (MNR) to achieve the PRG (3 mg/kg) over time using an ASM process. This ASM process would be used to monitor the effectiveness of the SED-2 over time including the potential to implement additional actions, if necessary. SED-3 and SED-4 have the same removal footprint based on targeting sediment deposits with average PCB concentrations greater than or equal to 3 mg/kg. All three active remedial alternatives (SED-2, SED-3, and SED-4) include removing accumulated sediment from the Highway 202 culverts. SED-2 and SE3-3 use a combination of an on-site soil management area (the SSSMA) and off-site disposal for the excavated sediments. The sediments excavated under SED-4 would be disposed of in an off-site landfill.

The three active SED alternatives are comparable for most of the evaluation criteria. There is a slight increase in impact in moving from SED-2 to SED-3, and then from SED-3 to SED-4. This is due to the smaller removal footprint for SED-2 as compared to SED-3 and SED-4 and that under SED-4, the materials are transported a longer distance for off-site disposal. SED-2 also has less impact on riparian habitat. The amount of riparian buffer zone impacted by SED-2 is 30% less than SED-3 and SED-4. While SED-2 results in less impact, it would still achieve the PRG over time through MNR. All of the active alternatives include natural stabilization techniques for 75% of the creek bank areas. This includes 1,050 linear feet of natural bank stability measures over the 1,400 feet of creek bank identified as needing stabilization measures. The remaining 350 linear feet of creek bank would be stabilized with engineered measures that are less sustainable.

1 INTRODUCTION

On August 4, 2003, the United States District Court for the Northern District of Alabama entered a revised Partial Consent Decree (PCD; USEPA 2003a) requiring, among other things, Pharmacia LLC and Solutia Inc. (together Pharmacia LLC and Solutia Inc. are referred to as P/S) to conduct a remedial investigation/feasibility study (RI/FS) for the Anniston PCB Site (the "Site"). The Site is located in portions of Calhoun and Talladega Counties in the north-central part of Alabama, near Anniston, Alabama (Figure 1-1). The Site has been investigated for the past 20 years based on the presence of polychlorinated biphenyls (PCBs) and other chemical constituents in various environmental media. The Site encompasses the Solutia Inc. Anniston Plant (the "Facility") (formerly owned and operated by Monsanto Company, now known as Pharmacia LLC), other properties currently owned by Solutia Inc., certain residential and nonresidential properties owned by third parties, and portions of both Choccolocco Creek, Snow Creek, and their 100-year floodplains. The Site is not on the Superfund National Priorities List and is being addressed through the Superfund Alternative Approach.

The RI/FS work under the PCD identified four separate operable units (OUs): OU-1, OU-2, OU-3, and OU-4. OU-1 and OU-2 include residential and nonresidential properties, respectively, around and downstream of the Facility along Snow Creek to Highway 78. OU-1 and OU-2 have been combined (OU-1/OU-2) and investigated concurrently. OU-3 includes the Facility and two closed landfills adjoining the Facility. OU-4 includes Snow Creek and its floodplain from Highway 78 to the confluence of Snow and Choccolocco Creeks and Choccolocco Creek and its floodplain from a backwater area immediately upstream of the confluence of Snow Creek and Choccolocco Creek downstream to the embayment of Lake Logan Martin on the Coosa River. The United States Environmental Protection Agency (USEPA) reserved the right to identify other OUs within the Site after data from the OU-4 remedial investigation (RI) and any other site-related studies are completed and reviewed.

This document presents the feasibility study (FS) for OU-1/OU-2. The lateral investigation boundaries used for the nonresidential investigations in OU-1/OU-2 generally include the 100-year floodplain of Snow Creek and drainage areas downstream of the 11th Street Ditch. Snow Creek is a small urban drainage way that flows through Anniston, Alabama, into Oxford, Alabama, before its confluence with Choccolocco Creek just south of Interstate 20 near the Choccolocco Creek Waste Water Treatment Facility (WWTF). Nonresidential properties in two areas outside of the floodplain—one just southwest of the Facility located proximate to former landfills and a second just south of Highway 78 in Zone Oxford Lakes Neighborhood (OLN)—were also investigated as part of OU-1/OU-2. These areas are associated with prior investigations conducted under a 2001 Administrative Order on Consent (AOC) that was incorporated into the PCD; therefore, these areas are included in OU-1/OU-2.

The extent of the residential and special use investigation in OU-1/OU-2 is defined under a Stipulation and Agreement (Stipulation) between the USEPA and P/S (USEPA 2006a). On January 17, 2006, the USEPA entered into an Administrative Agreement and Order on Consent for Removal Action (Administrative Order) with 11 industrial companies (collectively, Foothills Community Partnership [FCP]) to address the performance of time-critical removal activities at the Anniston Lead Site (USEPA 2006b). In some areas, the Anniston Lead Site overlaps a portion of the OU-1/OU-2 footprint. Because of this overlap, the USEPA and P/S entered into a Stipulation to clarify P/S' obligation regarding residential sampling and removal activities in the four zones (Zones A, B, C, and D) delineated in the Administrative Order. Under the Administrative Order and the Non-Time-Critical (NTC) Removal Agreement (PCD, Appendix G) and the Stipulation, the FCP had primary responsibility for sampling activities within Zones A and B, and P/S had primary responsibility for sampling activities within Zones C and D (USEPA 2006b). Evaluation Area (EA) 35, which is outside of Zones C and D, was subsequently added to the residential property sampling program by agreement of P/S and the USEPA to characterize potential PCB concentrations in this area.

1.1 Purpose of this Report

This report satisfies the PCD and the *Remedial Investigation/Feasibility Study Work Plan for the Anniston PCB Site*- Revision 2 (RI/FS work plan; BBL 2004a) to provide an FS that evaluates remedial alternatives for OU-1/OU-2. Based on the data collected for the *Remedial Investigation Report for Operable Unit 1/Operable Unit 2 of the Anniston PCB Site* (RI; ENVIRON 2015a) and on the human health risk assessment (HHRA) and ecological risk assessments, this FS discusses the process for identifying and screening remedial technologies and remedial alternatives and presents a detailed comparative analysis of the remedial alternatives. The FS process begins with the range of remedial goal options (RGOs) developed in the risk assessments and continues with developing remedial action objectives (RAOs) that are protective of human health and the environment, identifying potential applicable and relevant requirements (ARARs), and developing preliminary remedial goals (PRGs). Based on preliminary ARARs, RAOs, and PRGs, candidate areas for remediation were developed for several areas and media in OU-1/OU-2. Remedial alternatives were developed, screened, evaluated, and compared in this FS. This FS incorporates the findings and the USEPA comments on two technical memoranda (*Technical Memorandum on Remedial Action Objectives, and Remedial Technologies, Alternatives and Screening Operable Unit 1/Operable Unit 2 of the Anniston PCB Site* [ENVIRON 2015b], and the *Technical Memorandum Summarizing Results of Comparative Analysis of Alternatives* [Ramboll Environ 2015]) into this single FS for OU-1/OU-2.

1.2 Report Organization

To facilitate review of the available information on OU-1/OU-2, the remainder of this FS is organized as follows:

- Section 2 summarizes the investigations and findings from the RI. This section provides a description of OU-1/OU-2, history and regulatory background, the characteristics of the Site including climate, geology, surface water hydrology, hydrogeology, demography, and land use. Section 2 also describes the multiple investigations conducted for OU-1/OU-2 and summarizes the findings from these studies in the nature and extent of contamination, fate and transport, and human health and ecological risk assessment subsections of this FS.
- Section 3 discusses and presents potential ARARs and to be considered (TBC) requirements, both of which are threshold criteria to further evaluate remedial alternatives. This section also compiles the nature and extent of contamination and risk assessment findings to present potential RAOs and PRGs. These RAOs and PRGs form the basis for selecting candidate remedial areas presented in Section 4.
- Section 4 develops the candidate remediation areas based on RAOs, PRGs, media of concern, and land use.
- Section 5 presents the general response actions (GRAs) and remedial technologies developed for OU-1/OU-2. This section screens the remedial technologies in preparation for developing specific alternatives for screening and evaluation.
- Section 6 presents the remedial alternative screening process and those alternatives chosen for more detailed evaluation in Section 7. Both Sections 5 and 6 build on the discussions and findings presented in the *Technical Memorandum on Remedial Action Objectives, and Remedial Technologies, Alternatives and Screening,* Revision 1, dated April 6, 2015.
- Sections 7 and 8 present a detailed evaluation of each remedial alternative and a comparative analysis of the alternatives, respectively. These sections build on the *Technical Memorandum Summarizing Results of Comparative Analysis of Alternatives*, dated

September 2015, with updates to reflect USEPA comments (dated October 2015) on that memorandum.

- Section 9 provides references used while preparing this report.

The information in this report is presented in a series of tables and figures referenced throughout the report. Tables are included in their own section following the references at the end of this volume.

Figures and appendices are included in the second volume of this report. Additional detail and supporting evaluations are provided in appendices to this FS:

- Appendix A: Alternative Removal Action Workplan for 510 Legrande Street and 0 and 505 Ashley Street Properties (provided electronically only)
- Appendix B Remedial Areas Using a Nonresidential Soil PRG of 9 mg/kg
- Appendix C Remedial Areas Using a Sediment PRG of 1 mg/kg
- Appendix D Conceptual Soil Management Plan
- Appendix E Cost Estimate Tables for a Nonresidential Soil PRG of 9 mg/kg
- Appendix F Cost Estimate Tables for a Sediment PRG of 1 mg/kg

2 BACKGROUND

This section summarizes available information regarding the Site and surrounding area. Section 2.1 describes the Site and OU-1/OU-2. Section 2.2 provides a history of the Facility (OU-3). Section 2.3 describes the physical characteristics of the Site and OU-1/OU-2. Section 2.4 summarizes historical Site investigations. Section 2.5 summarizes the nature and extent of contamination findings. Section 2.6 summarizes the conceptual site model (CSM) and fate and transport mechanisms. Section 2.7 summarizes the findings from the HHRA and the ecological risk assessment. Details of the various investigations and detailed figures and tables are provided in full in the RI.

2.1 Site Description

The subject of this FS is OU-1/OU-2 of the Anniston PCB Site (Figure 2-1). OU-1/OU-2 consists of both residential and nonresidential properties upstream of Highway 78 up to and surrounding the Facility (OU-3), and includes certain properties in the USEPA-designated Zone OLN. The lateral study bounds for the nonresidential portions of OU-1/OU-2 were established based on the limits of the Snow Creek 100-year floodplain and drainage areas downstream of the 11th Street Ditch. Snow Creek is a small urban drainage way that flows through Anniston, Alabama, into the city of Oxford, Alabama, before its confluence with Choccolocco Creek just south of Interstate 20, near the Choccolocco Creek WWTF. Two areas outside of the floodplain are also included in OU-1/OU-2—one just southwest of the Facility located proximate to a former landfill and a second just south of Highway 78 in Zone OLN. Although these areas are outside of the 100-year floodplain, they are associated with prior investigations conducted under the AOC and are, therefore, included in OU-1/OU-2. Other nonresidential areas, including the 11th Street Ditch and the West 9th Street Creek (Solutia 2003a), that were historically addressed under the AOC (USEPA 2001) are also located in the OU-1/OU-2 study area.

The geographic footprint for the studies in OU-1/OU-2 was generally guided by the potential source, release mechanism, and migration pathway for PCBs from OU-3. With PCB-containing materials as the primary source of the off-site migration of PCBs from OU-3, the associated release mechanism was overland surface water runoff during and following periods of heavy precipitation. Overland surface water runoff and other discharges potentially carried PCB-containing materials from OU-3 to the 11th Street Ditch. Surface water flow along the 11th Street Ditch could transport these sediment-bound PCBs downstream along Snow Creek. During periods of high flow, out-of-bank flooding carried PCB-containing materials into the adjoining floodplain areas (Figure 2-2). During these out-of-bank flow conditions, the materials suspended in the water column settled onto floodplain soils as surface water velocities decreased to a point where the heavier particles would no longer stay suspended. For the nonresidential investigations, the lateral extent of significant overbank flooding was conservatively estimated to be the footprint of the 100-year floodplain. The contaminant source, release mechanism, and migration pathway described above are also presented in the CSM discussion for OU-1/OU-2 in Section 2.6.

The study area for the nonresidential portions of OU-1/OU-2 was initially presented In the *Field Sampling Plan for the Non-Residential Properties of the Operable Unit 1/Operable Unit 2 Area of the Anniston PCB Site* (Nonresidential Properties FSP; BBL 2004b) and associated addenda (BBL 2005a and 2006).

The exposure units (EUs) shown on Figure 2-3. These EUs were developed during the Site investigations and risk assessments to segregate OU-1/OU-2 into manageable land units that could reasonably categorize potential exposures for human receptors that access and use these areas. The boundaries of each EU were established based on the following:

- The limits of the drainage areas and 100-year floodplain for Snow Creek

- Natural and man-made physical features that could impact transport patterns (ridges, valleys, elevated highways, bridges, culverts, railroad beds)
- Land use
- Continuity (e.g., if a park is divided by a road or railroad, the entire park would still be grouped into one EU)
- Similarity of location with respect to suspected transport and deposition characteristics (i.e., PCBs transported via surface water are contained in the 100-year floodplain and generally decrease with downstream distance from the Facility)

The data collected for the nonresidential properties were used to evaluate the nature and extent of contamination and baseline risks, including an HHRA.

A series of interim measures (IMs) have been conducted in different areas of OU-1/OU-2. These IMs are shown on Figure 2-4 and discussed in more detail in Section 4.3. PCBs in soils on residential and special use properties in OU-1/OU-2 were investigated, and soils were removed in accordance with the NTC Removal Agreement. These properties were identified based on the specific land use classifications defined by the NTC Removal Agreement and the unique and specific requirements identified in that agreement that are separate and distinct from the broader requirements of the PCD. Residential areas outside of the 100-year floodplain were also evaluated under the Stipulation between the USEPA and P/S (USEPA 2006a), and some of these residential areas were found to have PCBs in soil. The affected properties evaluated under the Stipulation have been remediated in accordance with the NTC Removal Agreement and Stipulation.

2.2 Facility History

This section presents a summary of the Facility's manufacturing and regulatory histories. Additional historical manufacturing information is presented in the *Supplemental Resource Conservation and Recovery Act (RCRA) Facility Investigation/Confirmatory Sampling Report* (RFI/CS; Golder 2002) and the *Remedial Investigation Report for Operable Unit 3, Anniston PCB Site, Anniston, Alabama*, Revision 2.0 (OU-3 RI; Golder 2010a). A detailed history of regulatory activities for the Facility is provided in the RI/FS work plan (BBL 2004a). Summaries of previously completed response efforts including removal actions and IMs conducted under RCRA are discussed in Section 2.2.2.1.

2.2.1 Manufacturing History

In approximately 1917, Southern Manganese Corporation began manufacturing ferro-manganese, ferro-silicon, and ferro-phosphorous compounds and, later, phosphoric acid at the Facility. In 1927, Southern Manganese Corporation began producing organic chemicals with the introduction of biphenyl, which remains a major product of the Facility. In 1930, Southern Manganese Corporation became Swann Chemical Company (Swann). Monsanto Chemical Company (now known as Pharmacia LLC) purchased Swann in May 1935. In 1997, Monsanto Company spun-off Solutia Inc. as an independent company. In 2012, Solutia Inc. was merged into Eastman Chemical Company. Solutia Inc. is a wholly owned subsidiary of Eastman Chemical Company.

A variety of organic and inorganic chemicals have been produced at the Facility during its history, including PCBs, ethyl parathion (parathion), paranitrophenol (PNP), and phosphorus pentasulfide. The Facility currently manufactures polyphenyl compounds, which are used in a variety of heat-transfer fluid, plasticizer, and lubricant applications. PCBs were produced at the Facility from the late 1920s to 1971 by reacting chlorine and biphenyl. Chlorine was also produced at the Facility between the 1950s and 1969 for the sole purpose of supporting PCB manufacturing.

2.2.2 Regulatory History

Extensive investigative and response activities have been carried out at the Site over the past 20 years. Historically, activities were conducted under the guidance of the Alabama Department of Environmental Management (ADEM), RCRA, the AOC (USEPA 2001), and more recently, the PCD. The regulatory history for the Site is summarized below based on the RCRA, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and Clean Water Act programs.

2.2.2.1 A Summary of Site Investigations and Responses under RCRA

The Facility is operated in accordance with a variety of permits issued under provisions of the Clean Air Act, Clean Water Act, RCRA, and their state counterparts. Two hazardous waste management areas, or WMAs (WMA I and WMA II), were previously permitted under RCRA and operated at the Facility. These WMAs were closed in compliance with provisions contained in the Facility's permit issued under the Alabama Hazardous Waste Management and Minimization Act (AHWMMA) and RCRA. In 1991, under provisions of the Hazardous and Solid Waste Amendments of 1984, a USEPA contractor conducted a RCRA Facility Assessment to identify solid waste management units (SWMUs) and areas of concern that might be subject to potential corrective action. An application for reissuance of the AHWMMA Permit with modifications was submitted in December 1994 and was amended in July 1995 and May 1996. In October 1996, ADEM issued a Draft Hazardous Waste Post-Closure Permit to regulate post-closure responsibilities of the Facility for WMA I and WMA II and to address corrective action for SWMUs and potential areas of concern located both on and off the Facility. This permit was finalized and issued on January 7, 1997, (Permit No. ALD004019048) and was subsequently modified on November 13, 1997; May 3, 2001; December 11, 2003; and May 5, 2006. P/S submitted a permit renewal application on July 10, 2006, which was ultimately approved by ADEM on October 31, 2008.

On April 5, 1995, P/S entered into a Consent Order with ADEM's Water Division to develop and implement a sampling plan for sediments in the Facility's storm water drainage system and certain drainage features downstream of the former south landfill. Sediment samples were collected throughout the reach of the drainage ditches, and soil samples were collected extending outward on both sides of the ditches on the Facility property and nearby areas. PCBs were detected at varying concentrations in the sediments of drainage ditches that flow from the area of the former South Landfill and from the production area to an area east of the Facility. PCBs were also detected at various concentrations in soil samples outside of the drainage ditches, but within areas potentially flooded by the drainage ditches during heavy rains.

On March 8, 1996, P/S entered into a Consent Order with ADEM's Land Division that expanded and defined the scope of the ongoing investigation and response activities close to the Facility. Under this Consent Order, four additional areas were sampled for the presence of PCBs, and other areas potentially affected by PCBs were to be identified and sampled pursuant to the terms of this order.

The obligations under the terms of both Consent Orders have been completed, and results of these activities have been reported to ADEM and the USEPA. These results confirm that, generally, PCBs are detected in drainage ditches, areas directly adjacent to these ditches, or in areas affected by storm water flooding from these ditches. The drainage ditches in which PCBs have been detected ultimately flow toward Snow Creek and join Snow Creek just south of West 11th Street, Anniston, Alabama. Sediment samples have also been collected from Snow Creek and other drainage ditches and analyzed for the presence of PCBs. The results of these analyses have been reported to the USEPA and ADEM.

2.2.2.2 A Summary of Site Investigations and Responses under CERCLA

Pursuant to an AOC between the USEPA and Solutia effective October 27, 2000, rescinded and replaced by a Removal Order effective October, 2001 (PCD, Exhibit C), investigation and removal work were also conducted in the vicinity of the Facility under CERCLA. The Removal Order provides for the

performance of time-critical removal actions to address PCB-impacted residential properties that had concentrations of PCBs in excess of 10 milligrams per kilogram (mg/kg). The Removal Order also required a removal response for a portion of the 11th Street Ditch, sampling of a portion of the West 9th Street Creek and Eulaton Road Creek (West 9th Street Creek), and a removal response at the Quintard Mall and the Oxford Lake Softball Complex in Oxford, Alabama.

An NTC Removal Agreement (PCD, Exhibit G) was issued to address residential properties with surface soil PCB concentrations at or above 1 mg/kg. The NTC Removal Agreement required an engineering evaluation/cost analysis (EE/CA) to evaluate the potential removal of PCB-containing soils in residential areas of the Site equal to or exceeding 1 mg/kg in the upper 12 inches of soil and the removal of soils containing PCB concentrations equal to or exceeding 10 mg/kg from depths below 12 inches. The EE/CA Report (Solutia 2003b) was subsequently approved by the USEPA on September 24, 2003. NTC removal actions, including sampling and soil removal, were focused on residential properties in the Anniston area. P/S has implemented these activities under USEPA oversight. The NTC Removal Agreement was later clarified by the issuance of a Stipulation between the USEPA and P/S (USEPA 2006a) on July 18, 2006. The primary purpose of the Stipulation was to address the phasing and extent of the residential property removal actions to be completed by P/S. The details of these removal actions (Residential Removal Program) are provided in the *NTC Removal Action Completion Report for Residential Properties in OU-1/OU-2*, Revision 1, Anniston, Alabama (Completion Report; Golder 2015). Additional sampling and removal actions that occur under the NTC Removal Agreement or the Removal Order after December 31, 2014, will be summarized in yearly addenda to the Completion Report, as necessary.

In addition to the Removal Order and the NTC Removal Agreement, an RI/FS for the Site is required as part of the PCD. The requirements for the RI/FS are identified in the RI/FS agreement (PCD, Exhibit A) and in the statement of work (PCD, Exhibit B). The USEPA approved the OU-1/OU-2 RI (ENVIRON 2015a) on January 21, 2015, and the report was reissued as final on February 18, 2015. In accordance with the PCD, this FS incorporates the content of two technical memoranda (*Technical Memorandum on Remedial Action Objectives, and Remedial Technologies, Alternatives and Screening* [ENVIRON 2015b] and the *Technical Memorandum Summarizing Results of Comparative Analysis of Alternatives* [Ramboll Environ 2015]).

2.2.2.3 A Summary of Site Investigations and Responses under the Clean Water Act

The Facility also has a National Pollutant Discharge Elimination System (NPDES) Permit (AL0001201) under the Clean Water Act. This permit, which has a current effective date of January 1, 2012, regulates the discharge of storm water run-off from storm water outfall DSN 012. The Facility's NPDES Permit previously allowed the discharge of noncontact cooling water and condensate through the on-site storm water sewer system. However, in 1996, all of this process-related water was repiped to discharge to the Facility's former WWTF. Consequently, only storm water is discharged by the storm water outfalls. Analytical sampling data for the Facility storm water outfalls is presented in the OU-3 RI (Golder 2010a).

All process water from the Facility and all groundwater recovered through the on-Facility groundwater extraction systems discharge from the Facility's former WWTF to Anniston's publicly owned treatment works (POTW) under provisions of the Facility's State Indirect Discharge Permit (Permit No. IU 35-08-00048). The biological treatment component of the WWTF was decommissioned in conjunction with the PNP plant shutdown in 2004. Extracted PCB-impacted groundwater is treated with carbon prior to discharging the water into the former WWTF. The former WWTF currently consists of only an equalization basin with pH adjustment capabilities. The plant effluent discharged to the Anniston POTW is sampled and analyzed for the list of constituents included in the discharge permit. Sampling for these constituents is conducted every six months. Select constituents of potential concern (COPCs)

are evaluated periodically to determine the constituent concentrations in the effluent. Of the COPCs evaluated in the HHRA (CDM 2010a) and the streamlined ecological risk assessment (SERA; ARCADIS 2013), only lead and select polycyclic aromatic hydrocarbons (PAHs) are evaluated in the plant effluent.

Treated water from the Anniston POTW is discharged to Choccolocco Creek through NPDES Permit No. AL0022195. This is a State-regulated outfall under Alabama's NPDES program. The permitted discharge from the P/S outfall to the Anniston POTW does not impact OU-1/OU-2.

2.3 Site Characteristics

This section describes the general characteristics of OU-1/OU-2, including climate, geology, surface water hydrology, hydrogeology, demographics, land use, and habitat.

2.3.1 Climate

Calhoun County is characterized as humid and subtropical with hot summers, mild winters, and some precipitation during all months of the year. Rainfall is the primary form of precipitation with an average of 54 inches per year, the majority of which occurs during winter. Droughts are infrequent, and the average annual evapotranspiration rate in the area is approximately 42 inches. The mean annual temperature is 62 degrees Fahrenheit (°F) and ranges from approximately 43°F in January to 80°F in July.

Based on data collected in Anniston from April 1, 2003, to March 31, 2004 (ENSR International [ENSR] 2004), the atmosphere is generally thermally stable (category D through F during most of the year). The prevailing winds generally blow from the southeast approximately 11 percent (%) of the year and from the west-southwest approximately 8% of the year. Additionally, the winds are calm (i.e., 0–1 miles per hour) 17% of the year.

2.3.2 Geology

Approximately 90% of Calhoun County lies within the Valley and Ridge physiographic province. The geology of this area is characterized by folding and thrust faulting. Thrust faults are the dominant structural features in this province. The upward folding of rocks and cutting to streams has formed a series of sharp ridges and valleys. The remaining area of Calhoun County, which is located in the extreme southeastern part of the county, lies within the Piedmont physiographic province consisting of well-dissected uplands developed on metamorphic rocks. Upstream of Snow Creek, Choccolocco Creek runs along the Talladega-Cartersville fault, which separates these two physiographic provinces. Various tributaries in the eastern and southern portions of the basin originate in the Piedmont province.

Snow Creek and its floodplain are defining features for OU-1/OU-2. Snow Creek, which generally runs down the centerline of its 100-year floodplain, has a wide range of bed materials. The native materials in the Snow Creek basin include solids ranging from clays to gravels and bedrock contact areas—each of which play a role in determining sediment transport of hydrophobic organic compounds such as PCBs.

Snow Creek flows through recently deposited alluvium belonging to the Philo series (upper two-thirds of the basin) or Pope series (lower one-third of the basin). Both alluvial soils are similar in their classification as fine sandy loam, their origin from sandstone and shale with possible limestone parent material, and their frequency of flooding. The dominant soil types outside the immediate channel area are identified as an undifferentiated mixture of Anniston and Allen soils. In the area of Snow Creek, sandstone and quartzite gravel, as well as cobbles up to 8 inches in diameter, are common in these soils, comprising 10% to 20%. With increasing elevation, the soil grades to the Muskingum series, a coarse, stony residuum of sandstone and shale 1 to 2 feet thick over bedrock. In the upper Snow

Creek basin, extensive rough mountainous areas with many outcrops of sandstone and quartzite bedrock, loose rock fragments, and scattered patches of sandy soil material are present. Slopes are generally greater than 25%, and runoff is rapid.

2.3.3 Surface Water Hydrology

Snow Creek is a high-gradient stream, with a typical slope of 20 to 30 feet per mile (Figure 2-5), flowing through an urbanized corridor of Anniston and Oxford. The mean flow within Snow Creek increases from approximately 5 cubic feet per second (cfs) at the confluence with the 11th Street Ditch to 28 cfs at the confluence with Choccolocco Creek. The steep basin terrain produces sharp peak flows. The estimated 10-year and 100-year recurrence interval floods for Snow Creek at the point it discharges to Choccolocco Creek are 4,030 cfs and 6,900 cfs, respectively (Federal Emergency Management Agency [FEMA] 1993).

In some sections, the Snow Creek channel has been substantially modified (e.g., paved, relocated), which causes the velocity profile of the stream to be somewhat erratic near bridge and culvert restrictions. At its confluence with Choccolocco Creek, the drainage area of Snow Creek is 19 square miles. Because of the steeply sloped basins, floodwaters tend to rise and fall quickly, and flooding occurs at numerous locations (often associated with backwater pooling caused by bridges and culverts affecting the natural course of the stream). To date, flood protection measures have been limited to relatively minor, localized efforts including widening and/or paving the channel. Additional flooding is caused by debris that collects at the bridges or culverts, which further restricts event flows. The final 500 to 900 feet of Snow Creek before it joins Choccolocco Creek can be influenced by backwater conditions from Choccolocco Creek during periods of high flow (Figure 2-2).

During low-flow conditions (dry weather flow), groundwater provides base flow for streams and creeks in the area (Scott et al. 1987). During periods of high precipitation and correspondingly high surface water flows, gradients reverse and floodwaters from streams provide groundwater recharge.

2.3.4 Hydrogeology

The stratigraphic and structural relationships of the rocks throughout most of Calhoun County are typical of the Valley and Ridge physiographic province of the southern Appalachian Highlands. Rocks that range in age from the Cambrian Period to the Pennsylvanian Period have been sharply folded into northeast trending anticlines and synclines that are complicated by thrust faults. The thrust faults are the dominant structural features of the Valley and Ridge province and cause the repetition of the geologic units on the surface. Secondary stresses caused numerous high-angle faults of more limited extent. This faulting, folding, and crushing of rock units has caused the sometimes chaotic surficial distribution of formations in the county, including portions underlying OU-1/OU-2.

Nine consolidated units (bedrock units, including the Shady Dolomite) and the overlying residuum are considered significant water-bearing units in Calhoun County. Although the vertical conductivity in these units varies, there is no readily identifiable regional confining layer or layers to isolate the units into separate systems. Groundwater occurs in a variety of hydrogeologic environments in the consolidated (bedrock) units in Calhoun County. The majority of the water-bearing units in the area are carbonate rocks, which typically yield only enough water for individual domestic use.

The Shady Dolomite Formation is present along the lower slopes of Coldwater Mountain and Choccolocco Mountain. This formation is approximately 500 feet thick and consists of bluish-gray or pale-yellowish gray, thick-bedded dolomite with chert. The Shady Dolomite Formation is considered a good aquifer in Calhoun County, and wells developed in this aquifer can supply enough water for municipal or industrial uses. Identified wells in the area are shown on Figure 2-6.

Regional groundwater flow is controlled by topography and the transmissivity and geologic structure of the underlying formations. As groundwater flow is controlled by topography, local flow direction is generally to the north in the vicinity of the Facility. However, as groundwater approaches the 11th Street Ditch, flow becomes northeast, following the slope of the 11th Street Ditch. Ground surface elevations drop over 100 feet from the Facility to the area where OU-1/OU-2 crosses into OU-4 along Snow Creek. Depths to the surficial water table along the 11th Street Ditch and Snow Creek are shallow, generally ranging from approximately 6 to 13 feet below ground surface (bgs).

Lesser quantities of groundwater are obtained from sandstone, shale, mudstone, and quartzite units present in the county. These groundwater sources can be sufficient for domestic uses; however, it is difficult to obtain sufficient groundwater from these sources for municipal or industrial uses. The groundwater yield from these rocks is controlled by fracture orientation, grain size, grain distribution, and secondary permeability.

Approximately 150 springs have been identified and located in the county, and the discharge of these springs is variable, ranging from less than 1 gallon per minute to over 17,000 gallons per minute. Many of these springs are found along the trace of thrust faults and produce enough water for domestic uses and, in some instances, for municipal supply. It is estimated that 80% of these springs are used for domestic, farm, stock, municipal, industrial, or recreational water supplies. The two most significant springs located nearest to the Facility are Collateral Spring and Coldwater Spring. Both springs are located approximately five miles from the Facility. Collateral Spring is to the south of the Facility near Interstate 20. Coldwater Spring is approximately five miles southwest of the Facility.

Coldwater Spring is the primary water source for Anniston, Fort McClellan, Anniston Ordinance Depot, and other municipalities and communities within Calhoun County (Scott et al. 1987). During an observation period from 1957 to 1983, the average discharge of Coldwater Spring was approximately 31 million gallons per day, and the minimum discharge was 23.5 million gallons per day (Scott et al. 1987). The City of Oxford currently relies on groundwater as its primary source of water. The city operates five production wells (each approximately 300 feet deep) that draw water from the Knox Group, Shady Dolomite Aquifer. The water from each well is tested regularly and meets all drinking water regulations without any treatment required (Oxford 2011).

As part of the investigations for OU-3, P/S contacted the local water utility who confirmed that they provide service to the area surrounding the Facility. Additionally, during the RI Program for OU-3, a door-to-door survey of private wells within a one-mile radius around the Facility was conducted. The field team surveyed 2,545 properties. Four commercial properties (11 parcels) were identified during the survey with active wells. One of the wells on these properties was permitted for drinking water use but was currently used only for process water (Golder 2010a).

2.3.5 Demography and Land Use

The area land use for the Site ranges from heavy industry and manufacturing to largely agricultural or forested. As discussed further below, the majority of OU-1/OU-2 is a highly variable mixture of residential and nonresidential properties with the nonresidential areas including a range of industrial and commercial uses. The southern portion of OU-1/OU-2 is located in the city of Oxford and includes residential, commercial, and some manufacturing. The agricultural and forested areas are primarily limited to the OU-4 portion of the Site with some forested area along the outer borders of OU-1/OU-2 and OU-3.

Based on data from the United States Census Bureau (USCB 2013), in 2010, the total population of Anniston was 23,106, with 21.7% of the population under age 18, 78.3% over age 18, and 17.7% over the age of 65. Anniston is mostly populated by African Americans and Caucasians, comprising over 96% of the total population (51.5% and 44.7%, respectively).

In 2010, Calhoun County, Alabama, had a population of 118,572, with 22.8% of the population under the age of 18, 77.2% over the age of 18, and 14.6% over the age of 65. In 2011, the majority of the population (76.2%) was Caucasian (USCB 2013).

Land use within the Snow Creek floodplain is variable with small areas often supporting multiple land uses and property owners. This area is approximately one-third residential and two-thirds nonresidential. A graphical depiction of the residential and nonresidential areas is shown in Figure 2-7. The range of land uses reflects the urbanized nature of Snow Creek and includes heavy industry, manufacturing, residential, light commercial, and public recreation, all within close proximity to each other. Similarly, results of a parcel-by-parcel land use inventory conducted during the initial phase of the AOC-related work indicated that land use was highly variable (Golder 2010a).

2.4 Investigation Activities

The RI discusses the phased nature of the investigations and details the individual objectives from each program. The RI also provides the details of how the individual investigations were conducted. The sampling programs and the resulting data set relevant to this FS evaluation are summarized in this section. Detailed tables and figures presenting the different investigation programs and the resulting data are included in the RI. The data are also included in Appendix B of the RI as an electronic file. The investigations for floodplain soil, sediment, surface water, groundwater, and air are summarized in Section 2.4. Key findings regarding the nature and extent of contamination are discussed in Section 2.5 including references to figures that present the results of the sampling efforts.

2.4.1 Floodplain Soil Sampling

The floodplain soil data for OU-1/OU-2 were generated under several investigation programs including residential and nonresidential sampling programs. The residential sampling efforts were focused on assessing if PCB concentrations in surface soils in the residential use or high activity portions of special use properties were above or below 1 mg/kg. The nonresidential sampling programs were focused on documenting the nature and extent of PCBs in OU-1/OU-2 and supporting the human health and ecological risk assessments. The nature and extent of constituents other than PCBs were also evaluated during some of these investigations.

The floodplain soil dataset for OU-1/OU-2 has been updated from the dataset that was initially used to prepare the HHRA in 2010. Since that time, additional sampling results have become available and a range of removal actions and other IMs have been conducted. The data set included in the OU-1/OU-2 RI represents current conditions and provides the bases for the potential remedial alternatives evaluated in this FS.

2.4.1.1 Residential Soil Sampling Program

A total of 1,651 residential properties were identified in areas that required sampling by P/S (Zones C and D and EA 35) both within and outside of the Snow Creek floodplain. Surface soil sampling was completed at all of these residential properties. The results of this sampling and the associated removal actions conducted through December 31, 2014, are reported in the residential Completion Report (Golder 2015). Remedial alternatives for the residential and special use areas are identified and evaluated in subsequent sections of this FS. The *Final Report Anniston Lead Site* summarizes that the FCP sampled surface soil at 4,620 properties in Zones A and B (Newfields 2011). Additionally, the USEPA sampled surface soil at 1,978 properties throughout Zones A through D. Some properties were sampled by both parties.

2.4.1.2 Nonresidential Floodplain Soil Sampling

There are five general sources of floodplain soil data for the nonresidential properties in OU-1/OU-2. The largest nonresidential floodplain soil sample collection program was implemented under the OU-1/OU-2 Nonresidential Properties FSP (BBL 2004b) and associated addenda (BBL 2005a and 2006) and included both surface and subsurface soil sampling. Samples were collected from surface soils and subsurface soils to provide data that could be used to develop exposure point concentrations (EPCs) for the HHRA. Samples were initially collected from surface locations, and 10% of those locations with the highest concentrations of PCBs were selected for subsurface sampling and to determine whether monitoring wells were needed to further assess groundwater impacts.

A total of 470 soil locations were sampled as part of this program. A total of 496 surface soil samples (0- to 6-inch horizon) were collected and analyzed for PCBs and total organic carbon (TOC), and 91 of these samples were also analyzed for the list of wider constituents. In addition, 99 surface samples were submitted for grain-size distribution analysis. Evidence of foundry fill was observed at 32 locations, and samples from these locations were analyzed for lead.

Subsurface soil sampling was targeted at the 10% of the locations with the highest PCB concentrations. Samples were analyzed using a combination of field screening and laboratory analyses to identify the depth where PCB concentrations were less than 1 mg/kg and to provide quantitative PCB concentrations for the more shallow intervals where PCBs were greater than 1 mg/kg. Subsurface samples were successfully obtained from 53 of the targeted 55 sample locations. After field screening, 170 samples were analyzed for quantitative PCB and TOC, and 26 of these samples were analyzed for the wider list of constituents. In addition, 32 samples were submitted for grain-size distribution analysis. Evidence of foundry debris or fill was identified in 14 subsurface samples. These samples were also analyzed for lead.

The other four sources of nonresidential floodplain soil sampling data are listed below:

- USEPA data collected over an extended time period and provided electronically to P/S by the USEPA (201 samples from 194 locations)
- Data for the West 9th Street Creek collected by P/S (8 samples from 7 locations)
- Data collected for low activity portions of special use properties as part of sampling conducted by P/S under the Stipulation (65 samples from 62 locations)
- Miscellaneous programs (477 samples from 364 locations); these miscellaneous samples were collected by both P/S and the USEPA and include a range of sampling programs targeted at specific locations/situations. These miscellaneous sampling efforts include sampling the dredge spoil piles along Snow Creek, the West 10th Street Ditch, the First Missionary Baptist Church, areas on the eastside and northside properties outside of the implemented IMs, nonresidential properties, and the Alabama Power Company (APCO) property located west of OU-3.

The soil samples collected under these programs were primarily focused on PCBs in surface soils. Some subsurface soil samples were collected. Many of the samples were analyzed for lead. A limited number of samples were also analyzed for a range of other constituents.

2.4.2 Sediment Investigations

There are three discrete sampling programs that provide data to evaluate sediment conditions in the OU-1/OU-2 portion of Snow Creek. These include sediment samples collected during the RCRA Program (73 sediment samples collected from 34 locations), samples collected under the Nonresidential Properties FSP and associated addenda (4 samples including a field duplicate), and

sample results from the USEPA (7 samples from 7 locations) that were provided to P/S via electronic data transfer.

The majority of sediment data was generated under the RCRA Program. The initial steps for this program included a geomorphological mapping of the creek (BBL 1999) to identify the individual sediment deposits in the creek bed. There are portions of the creek bed where sediments were not present due to localized hydraulic conditions. The mapping of sediment deposits included the physical dimensions of the deposit including length, width, and thickness and provides the bases for this FS evaluation of the sediment deposits (Section 4.8). The creek-mapping results were used to develop the sampling strategy to characterize the Snow Creek sediment deposits. The data for that sampling program were reported in the *Off-Site RCRA Facility Investigation Report* (off-site RFI report; BBL 2000). The RCRA Program investigations for Snow Creek included 34 individual sample locations within the OU-1/OU-2 portion of Snow Creek. In total, 73 sediment samples were collected from the 34 sampling locations downstream of the Snow Creek–11th Street Ditch confluence. All of the samples were analyzed for PCBs, TOC, and grain-size distribution. Approximately 10% of the samples, with a bias toward the fine-grained sediment, were analyzed for several metals at the request of ADEM. The list of metals analyzed includes arsenic, barium, beryllium, cadmium, chromium, cobalt, lead, manganese, mercury, nickel, and vanadium.

An additional round of sediment sampling in the OU-1/OU-2 portion of Snow Creek was conducted under the Nonresidential Properties FSP and associated addenda. During this program, three sediment samples were collected from locations designed to reflect low, medium, and high PCB concentrations. The primary goal of this sampling program was to generate data to evaluate the wider list of constituents over the range of PCB concentrations typically present in Snow Creek. These samples were analyzed for the wider list of constituents in addition to PCBs and TOC. Data from this sampling program were reported in the *Preliminary Site Characterization Summary Report for OU-1/OU-2. Anniston PCB Site, Anniston, Alabama* (ARCADIS BBL 2007).

2.4.3 Surface Water Investigations

Surface water samples were collected during two sampling programs. The first sampling was conducted as part of the RCRA Program, and the second was conducted under the Nonresidential Properties FSP and associated addenda. Under the RCRA program, samples were collected from four locations, selected to reflect the downstream movement of PCBs and materials from Snow Creek (OU-1/OU-2) to Choccolocco Creek (OU-4). Two of the sampling stations were located approximately 2,000 feet (14th Street) and 3,000 feet (16th Street) upstream of the 11th Street Ditch–Snow Creek confluence to understand potential PCB and materials loadings coming into Snow Creek from upstream of OU-3. The other sampling stations were located at the downstream end of OU-1/OU-2 at Snow Street and Oxford Lake Park. The samples were collected and filtered to collect particulate during base- and high-flow events and provided data to develop preliminary estimates of PCB transport along Snow Creek. A total of 6 base-flow and 19 high-flow events were sampled at the downstream sampling stations. A single round of base-flow samples was collected at each of the upstream locations.

The second surface water sampling program was conducted under the Nonresidential Properties FSP and associated addenda. This program included collecting four whole-water samples during three different high-flow events. The samples were collected using an automated in-water ISCO sampler that was triggered by a flow gauge mounted on the bank near the sampling location. The sampling station was located in the downstream area of Snow Creek (Oxford Lake Park) and slightly downstream of the southern boundary of OU-1/OU-2 (Highway 78). This location is just downstream of OU-1/OU-2 and was chosen to be representative of conditions at the downstream end of the OU. The samples collected during high-flow conditions were analyzed for the wider list of constituents.

2.4.4 Groundwater Investigations

Groundwater investigations in OU-1/OU-2 were included as part of the activities conducted at and adjacent to OU-3 and under the NTC residential removal program. Additional sampling was conducted as part of the RI under the Nonresidential Properties FSP. Investigations focused on evaluating whether constituents were migrating to groundwater from OU-3 or from areas with elevated concentrations of PCBs in soils. Groundwater investigations were conducted for the Eastside Area; the central staging and soil management area (CSSMA); the Northside Area; EUs 10, 12, and 17; Hall Street and Oxford Lake Park properties; and at well T-11 in EU5.

There are also two small areas in OU-1/OU-2 where groundwater concentrations are being addressed under the USEPA-selected remedy for OU-3. One of these areas is located just north of the geographic boundary between the two OUs, and the second area is located at the northeast perimeter of OU-3. Groundwater in these two small areas has been, and will continue to be, addressed as part of OU-3. Conditions at these areas will be addressed through implementing the selected remedy for OU-3 identified in the *Interim Record of Decision Summary of Remedial Alternative Selection Operable Unit 3* (OU-3 IROD; USEPA 2013a).

2.4.5 Air

P/S and the USEPA have conducted four sampling programs for PCBs in ambient air in OU-1/OU-2 over the past 12 years. The majority of sampling locations for these programs were positioned in the northern portion of OU-1/OU-2 near the Facility (OU-3). These four sampling programs are summarized below.

In June 2000, the USEPA collected 54 air samples from 9 locations. The samples were analyzed for PCB Aroclors. Because PCBs were not detected in any samples, the USEPA collected an additional 18 samples (including 2 duplicates) from 8 locations. These 18 samples were analyzed for both Aroclors and 29 PCB congeners.

P/S conducted an air sampling program during 2003 and 2004 as part of the RCRA Facility Investigation Confirmatory Sampling Air Monitoring Report (ENSR 2004). P/S sample locations 1, 4, 5, 7, and 8 were collected near the boundary between the Facility (OU-3) and OU-1/OU-2. Samples were initially collected to represent day and night conditions—there were no discernible trends in terms of higher concentrations between the day and night—and the remainder of the samples were collected over a 24-hour sample period.

In 2006, an air sampling program was conducted under the Nonresidential Properties FSP (BBL 2004b) and associated addenda (BBL 2005a and 2006). This program was designed to confirm the prior air data collected from near the Facility and that PCB concentrations within 0.25 to 1.0 mile from the plant are consistent with background concentrations in other urban areas. The OU-1/OU-2 investigation plan called for samples to be taken from paved areas on a hot summer day to represent a potential worst-case scenario. Four air samples were collected from two locations using high-volume samplers operating over a 24-hour period. The samples were collected in the middle of the summer when the air temperature was approximately 80 degrees.

The USEPA collected air samples at three locations in OU-1/OU-2 during October 2012 (USEPA 2013a). The overall goal of this study was to:

> *"collect data of sufficient quality and quantity to determine if Anniston residents in the study area are being exposed to PCB concentrations in the ambient air at levels that may pose a potential health hazard. The PCB data collected will be summarized into homolog concentrations at the request of USEPA Region 4*

Human Health Risk Assessors to compare the data collected in this study with data from previous studies."

The study design included sampling from three locations (locations F, I, and J) that were positioned relatively close to OU-3. A collocated sampling device was deployed at location J for quality assurance/quality control purposes. The air samples were collected as 24-hour high-volume samples over a two-successive-day period starting on October 23, 2012, and ending on October 25, 2012.

2.4.6 Ecological Habitat

The size of Snow Creek, the disturbed nature of the creek bed, and the surrounding upland land uses contribute to overall low quality aquatic and terrestrial ecological habitats in OU-1/OU-2. Although the SERA (ARCADIS 2013, included as Appendix E2 in the RI) evaluated ecological conditions in Snow Creek, the majority of the creek was found to be of low habitat quality and not likely to support a healthy ecological community. Snow Creek is a small urban drainage way that flows through Anniston into Oxford, before its confluence with Choccolocco Creek just south of Interstate 20 near the Choccolocco Creek POTW. Much of the creek is highly disturbed (e.g., culverted, lined with riprap), and the terrestrial areas that surround the creek include industry, manufacturing, scrap yards, recycling facilities, roadways, railroad lines, and residential properties. Drainage ditches along residential roads flow into the creek, and the creek is channelized in some locations through dense areas of residential, commercial, and industrial land use. In areas where concrete sluiceways channelize the creek, substrate, aquatic vegetation, and bank features are lacking or are insufficient as habitat for aquatic organisms or wildlife. Although other areas of Snow Creek have not been altered to the same degree, specifically the portion of the creek between Noble Street and U.S. Highway 78, much of the creek is adjacent to roadways with limited vegetated buffer zones. Some areas of the creek have more expansive banks with riparian vegetation, a sandy-silt mix of substrate and depositional bars, and occasional riffle-run-pools. At the southern limit of Snow Creek in OU-1/OU-2, surface waters flow into a long underground culvert beneath the Quintard Mall, which is an area devoid of any quality ecological habitat. The fragmented and changing nature of land use in the surrounding floodplain areas further limit the habitat value of these degraded areas. The portion of Snow Creek downstream of Highway 78 is part of OU-4 and not OU-1/OU-2.

Habitat data to support the ecological risk assessments for OU-1/OU-2 were collected through four field reconnaissance efforts: October 2001, May 2002, October 2003, and June 2005. The 2001, 2002, and 2003 work was used to inform the detailed quantitative and qualitative survey work conducted in 2005 to support the preparation of the *Screening Level Ecological Risk Assessment for Operable Units 1, 2, and 3 of the Anniston PCB Site* (SLERA; BBL 2005b). The 2005 survey included two approaches for evaluating the habitat quality in and along Snow Creek where aquatic and riparian (creek bank) habitats are the primary habitat types. The USEPA Rapid Bioassessment Protocols (RBP) for Use in Wadeable Streams and Rivers (Barbour et al. 1999) was used to evaluate aquatic habitat within Snow Creek. The method scores a number of stream parameters from 0 to 20 with a total possible score for ideal stream habitat of 200. The terrestrial environment (primarily the riparian corridor along Snow Creek) was assessed using the Kansas Department of Wildlife and Parks (KDWP) method for the quantitative evaluation of terrestrial wildlife habitat quality (KDWP 2004). The Kansas Parks Method (KPM) is a terrestrial analog used in the RBP. The method is used to assign a value from 0 to 10 (a Kansas Park [KP] Value Score) to represent the quality of an evaluated habitat compared to an optimum habitat, which is represented by a score of 10.

Five survey locations were selected along Snow Creek: one upstream of the confluence with the 11th Street Ditch and four within the OU-1/OU-2 portion of Snow Creek. Work done prior to 2005 indicated that habitat components of OU-1/OU-2 are isolated patches within intensely developed, urbanized, and managed landscapes. Much of the terrestrial habitat that exists in OU-1/OU-2 is confined to

narrow and sometimes fragmented bands of habitat along Snow Creek that are surrounded by a well-established urban setting of commercial, industrial, and residential land uses. Based on this information and reconnaissance work done for the 2005 survey work, the five survey locations were selected to be biased toward the highest quality habitat locations.

2.4.7 Creek Bank Assessments

The physical configuration and condition of the creek bank areas along Snow Creek were assessed through several field reconnaissance trips. The resulting classifications included lined channel, culvert, natural, and natural bottom with a concrete-lined wall. The reconnaissance efforts also included an assessment of bank stability conditions. The results from the field reconnaissance efforts were integrated with an evaluation of high-resolution aerial photographs to classify bank areas as stable, relatively stable, minor erosion, moderate erosion, or severe erosion. The combined bank stability classifications along with sediment are reported in Section 2.5.5.3. This is consistent with the approach used in this FS to evaluate the creek banks with sediment.

2.5 Nature and Extent of Contamination

Based on Site knowledge, the CSM, data presented in the RI, and the findings from the risk assessments, PCBs are the primary constituent of concern for OU-1/OU-2. The nature and extent of PCBs in floodplain soils, sediment, surface water, groundwater, and air are summarized in this section including references to figures that present the results. In addition to PCBs, the nature and extent of several non-PCB constituents were evaluated in the human health and ecological risks assessments and are presented in this section.

The HHRA identified constituents other than PCBs as COPCs, including arsenic, PAHs (as benzo(a)pyrene [BaPE] equivalents), chromium, and polychlorinated dibenzo-p-dioxin and dibenzofurans (PCDD/DFs, as 2,3,7,8-tetrachlorodibenzo-p-dioxin equivalent [toxic equivalent or TEQ]). The HHRA identified these constituents as of interest in floodplain soils as their presence in other Site media (surface water, sediment, and air) resulted in low levels of risk. PCBs and non-PCB constituents in groundwater were not specifically addressed in the HHRA as these constituents were evaluated based on a comparison to maximum contaminant level (MCL) values.

The ecological risk assessment concluded that the terrestrial habitat in the OU was fragmented and of a low quality, such that ecological risks from exposure to soils are not of concern. The SERA focused on the OU-1/OU-2 portion of Snow Creek and identified PCBs, barium, chromium, cobalt, lead, manganese, mercury, nickel, vanadium, and PCDD/DF TEQ as COPCs in sediment.

Both the HHRA and the SERA were performed based on the data set available at that time. Since then, the data set has been changed to address land use (residential or nonresidential), IMs, and some additional sampling results. Although, for the most part, the differences in the data set are minor, in some cases the differences change the conclusions regarding risk. In the discussion below, calculations (e.g., averages, upper confidence limits [UCLs]) are performed in the same manner as used for the risk assessments and use the current data set. Detailed tables and figures with the entire current data set are included in the RI (ENVIRON 2015a).

2.5.1 PCBs in Soils on Residential and Special Use Properties

The residential and special use property removal actions in OU-1/OU-2 are essentially complete. Residential and high activity special use areas in OU-1/OU-2 with surface soil PCB concentrations greater than or equal to 1 mg/kg have already undergone removal actions if access was granted and the property was suitable for removal (discussed in more detail below). Removal actions were also conducted for residential and special use areas with subsurface soil PCB concentrations above 10 mg/kg. The residential removal work was conducted under several agreements with the USEPA,

including a Removal Order entered into by P/S and the USEPA in 2000, a 2003 NTC Removal Agreement that became part of the PCD, and the Stipulation.

Additional details for the residential removal actions are provided in the Completion Report (Golder 2015). Potential efforts to complete actions for the residential and special use properties are also addressed in this FS as two separate categories of remedial alternatives. The Completion Report was submitted under the Removal Order and the NTC Removal Agreement to meet the requirements of CERCLA and Section 300.165 of the National Contingency Plan (NCP). As stated in this report, the completed residential removal actions were conducted in accordance with the requirements of the Removal Order, NTC Removal Agreement, and the Stipulation. The report included a status of residential removal activities through December 31, 2014. Additional sampling and removal actions that occur under the NTC Removal Agreement or the Removal Order after December 31, 2014, will be summarized in addenda to the Completion Report, as necessary. A list of the properties sampled and removal actions completed, the quantities and types of materials disposed of, disposal locations of these materials, sample analysis results, and relevant documentation generated during the removal actions are included in the Completion Report.

2.5.2 PCBs in Nonresidential Surface Soils

The assessment of the nature and extent of PCBs in floodplain soils in OU-1/OU-2 was conducted using the nonresidential dataset and the area footprints for the residential and special use sampling and removals that have been completed to date. For the most part, the concentrations of PCB concentrations in soil in the majority of the nonresidential portions of OU-1/OU-2 are low. The limited locations with elevated PCB concentrations are usually associated with current or former industrial areas. The overall distribution of PCBs in nonresidential floodplain soils is shown on Figures 2-8 through 2-40. Figure 2-39 shows an overview of nonresidential surface soil PCB data for the OU as a whole. Figures 2-8 through 2-38 show PCB results for each EU (EU1 through EU30), respectively.

In addition to the EUs, there are four general areas where samples were collected some distance from the EU border and were closer to an interior IM or OU-3. Given that these samples were not specifically associated with the IM or OU-3, the results were evaluated separately for the four areas including (1) just north of an APCO substation and west of OU-3; (2) the median of Highway 202; (3) south of Highway 202 near the northeast corner of the South Landfill portion of OU-3; and (4) a former industrial property located just west of EU1. The distribution of PCBs for these four areas is shown on Figure 2-40. For locations with PCB concentrations above 1 mg/kg, the PCB concentrations are also included in a table that is embedded on the figure. PCB results from these four separate areas are evaluated in a manner similar to the EUs.

Surface soil PCB EPCs for each EU were calculated from the current data set and in the same way as the HHRA (Table 2-1). The PCB dataset for surface (and subsurface) soils presented in the RI were generated by multiple parties through multiple sampling programs. For the purposes of evaluating the nature and extent of PCBs in surface soils, data from samples collected in the upper 12 inches of the soil column were included. These data are presented as the average of the available results for samples collected from within the upper 12 inches of soil to be consistent with the HHRA (CDM 2010a).

2.5.3 Other Constituents in Surface Soils

In addition to PCBs, approximately 10% of the samples from OU-1/OU-2 were also analyzed for the wider list of constituents. These data were used in the HHRA to evaluate the risks from constituents other than PCBs. Following the HHRA COPC screening process, the HHRA calculated risks to human health from multiple non-PCB constituents in soils. These constituents included 4,4'-dichlorodiphenyltrichloroethane (DDT), aldrin, benzene, bis(2-ethylhexyl)phthalate, dieldrin, PAHs

(BaPE), PCDD/DFs, antimony, arsenic, cadmium, chromium, cobalt, iron, lead, manganese, mercury, and thallium. For the most part, these constituents were only detected above screening levels or above naturally occurring background levels (for metals) occasionally or in limited geographic areas; none represents an OU-wide constituent of concern. Background metals concentrations were taken from upgradient locations and from the *Background Metals Survey Report, Fort McClellan* (Science Applications International Corporation [SAIC] 1998). The HHRA also concluded that the majority of these other constituents did not contribute significantly to risk. The non-PCB constituents that the HHRA found contributing to risk in OU-1/OU-2 included arsenic, chromium, PAHs, and PCDD/DFs. The nature and extent of these constituents in soils are discussed below.

- **Arsenic:** Concentrations of arsenic in soil are shown on Figure 2-41. The distribution of arsenic concentrations is similar over the entire OU. Most of the sample results are consistent with background conditions described in the COPC evaluation included as Appendix G to the RI (ENVIRON 2015a). The background arsenic concentration from the Fort McClellan study is 8 mg/kg, and the mean arsenic concentration for the OU is 11 mg/kg.
- **Chromium:** Chromium concentrations in soil are shown on Figure 2-42. The OU-1/OU-2 average chromium concentration of 90 mg/kg is driven by two elevated sample results of 14,000 and 850 mg/kg from samples collected from EU22 and EU24, respectively. Both of these samples were collected from former industrial areas, near railroad tracks in EU22 and a junkyard in EU24. Both of these EUs also have relatively low PCB concentrations with a PCB EPC of 7.3 mg/kg in EU22 and a PCB EPC of 12 mg/kg in EU24. If these two high chromium values are not included in the calculation, the average surface concentration is 39 mg/kg and the maximum chromium concentration is 550 mg/kg.
- **PAHs:** PAHs were calculated as BaPE for the purposes of assessing risk. The distribution of BaPE concentrations is shown on Figure 2-43. The elevated concentrations of PAHs are randomly distributed and interspersed with lower concentrations. The higher PAH concentrations were found to the north and outside of the OU. Two of the samples (PCWaste 10 and PCWaste 11) were collected from the ditch adjacent to a railroad spur located northwest of EU1. These samples were collected in close proximity to railroad ties and have total PAH concentrations of 15,000 mg/kg and 4,000 mg/kg. The PCB results for these two samples (PCWaste 10 and PCWaste 11) were both nondetect. Although PAHs are present throughout the Anniston area at typical urban background levels, these two samples results are not representative of conditions across the OU.
- **PCDD/DFs:** Because the analytical method is so sensitive, extremely low levels of PCDD/DFs are detectable. The TEQ concentrations are consistent throughout OU-1/OU-2 and generally range from 0.00036 to 0.25 micrograms per kilogram (µg/kg), with the exception of results from a single isolated sample that was collected in EU25. This sample was collected in a former industrial area (US Pipe) and has a PCDD/DF TEQ concentration of 2.2 µg/kg. This sample had a PCB concentration of 0.062 mg/kg. The mean PCB concentration for EU25 as a whole is also low (0.37 mg/kg). The distribution pattern of PCDD/DF TEQ concentrations is shown on Figure 2-44 and is consistent with anthropogenic background sources.

2.5.4 Constituents in Subsurface Soils

PCB results for the nonresidential subsurface soils are presented on Figure 2-45 and were evaluated as a single group for the entire OU. This OU-wide approach is consistent with an exposure scenario for the construction worker who could be exposed over time across the OU as a whole.

The subsurface soil sampling locations targeted areas within the OU with elevated surface soil PCB concentrations as these are the most likely locations to have elevated subsurface concentrations. Therefore, the objectives of the subsurface sampling programs included targeting the higher concentration areas for subsurface characterization. The majority of the subsurface samples collected from nonresidential areas of the OU were collected from 10% of the surface locations and targeted those locations where the highest surface PCB concentrations were measured. The samples with the highest subsurface PCB concentrations, calculated to reflect PCB concentrations in the 0- to 4-foot interval, were located in EU5, EU10, and EU19N. This finding is consistent with the locations where groundwater wells were installed to specifically investigate areas with the highest PCB soil concentrations at depth. Residential subsurface samples were typically only collected in areas where removal actions were conducted (i.e., surface soil PCB concentrations prior to removal were greater than or equal to 1 mg/kg). In locations where high PCB surface soil concentrations were chosen for depth sampling (ARCADIS BBL 2007), fill materials were observed in most of these soil borings. The OU-wide subsurface soil PCB EPC was calculated as 100 mg/kg.

The presence of non-PCB constituents in subsurface soils was also evaluated in the RI. The measured concentrations of these non-PCB constituents were generally lower for the subsurface results with the surface increment (0 to 1 foot) generally driving the subsurface concentration. Based on this distribution, any actions that are targeted to address non-PCB constituents in surface soils or PCBs in subsurface soils, will also mitigate subsurface risks associated with non-PCB constituents, to the extent that they are present.

2.5.5 Constituents in Sediment and Creek Bank Areas

As with soils and other media, PCBs are the primary COPC in sediment. Other constituents were also evaluated based on concentration, prevalence, and distribution. The HHRA did not find unacceptable risks associated with sediment. However, sediment concentrations were found to contribute to ecological risks as detailed in the SERA (Appendix E2 to the RI). In addition to PCBs, the SERA considered exposure to barium, chromium, cobalt, lead, manganese, mercury, nickel, and vanadium in sediment. The following subsections discuss the nature and extent of PCBs, metals, and PCDD/DFs in sediment of OU-1/OU-2.

2.5.5.1 PCBs in Sediment

Sediment sampling locations downstream of Snow Creek's confluence with the 11th Street Ditch are shown on Figure 2-46, and concentrations of PCB in sediment are shown on Figures 2-47a through 2-47j. The total PCB concentrations in Snow Creek sediment range from not detected to 60 mg/kg. For the most part, the highest PCB concentrations are located in the upstream portions of Snow Creek between the 11th Street Ditch and Highway 202, inclusive of the culverts that go under the highway. There is also a small portion of Snow Creek with elevated sediment PCB concentrations near a railroad bridge located just downstream of Highway 202. Sediment concentrations are plotted as a function of distance downstream on Figure 2-48.

The portion of Snow Creek between the railroad bridge and Highway 78 is generally characterized by low PCB concentrations. The average sediment PCB concentration for this reach of the creek is approximately 1.9 mg/kg. Most of the sample results for this reach of the creek were less than 6 mg/kg. A single elevated concentration (approximately 11 mg/kg) was measured in this downstream portion of Snow Creek. This sediment sample was collected adjacent to EU25 and next to a railroad crossing.

2.5.5.2 Other Constituents in Sediment

The concentrations of metals were evaluated in the SERA for the OU-1/OU-2 portion of Snow Creek (ARCADIS 2013; included as Appendix E2 to the RI). The metals evaluated in the SERA include barium, chromium, cobalt, lead, manganese, mercury, nickel, and vanadium. Results for individual metals in surface sediment are shown on Figure 2-49 and are discussed below.

- **Barium:** Barium concentrations in Snow Creek sediment samples collected downstream of the 11th Street Ditch range from approximately 52 mg/kg to 580 mg/kg.
- **Chromium:** Chromium concentrations in Snow Creek sediment samples collected downstream of the 11th Street Ditch range from approximately 30 mg/kg to 670 mg/kg.
- **Cobalt:** Cobalt concentrations in sediment samples collected from Snow Creek downstream of the 11th Street Ditch range from not detected to 110 mg/kg.
- **Lead:** Lead concentrations in sediment samples collected from Snow Creek downstream of the 11th Street Ditch range from approximately 15 mg/kg to approximately 510 mg/kg.
- **Manganese:** Manganese concentrations in sediment samples collected from Snow Creek downstream of the 11th Street Ditch range from approximately 340 mg/kg to approximately 5,200 mg/kg.
- **Mercury:** Mercury concentrations in sediment samples collected from Snow Creek downstream of the 11th Street Ditch range from approximately not detected to approximately 3.2 mg/kg.
- **Nickel:** Nickel concentrations in sediment samples collected from Snow Creek downstream of the 11th Street Ditch range from approximately 12 mg/kg to approximately 110 mg/kg.
- **Vanadium:** Vanadium concentrations in sediment samples collected from Snow Creek downstream of the 11th Street Ditch range from approximately 6 mg/kg to 64 mg/kg.

In addition to the metals listed above, PCDD/DFs as TEQ were found to be a contributor to ecological risk. TEQs were calculated for PCDD/DFs alone and with PCB congeners and using different toxicity equivalent factors for the different ecological receptors (avian, mammalian) and including nondetects as zero and including PCDD/DF nondetects at full value and PCB nondetects at half the reporting limit. The ranges of calculated TEQ concentrations in sediment are shown on Figure 2-50. PCDD/DF TEQs with nondetects treated as zero range from 0.002 to 0.09 µg/kg.

2.5.5.3 Creek Bank Areas

The process of evaluating creek bank stability relative to the banks acting as a potential source of PCBs included two steps. The first step included an overlay of the PCB results with the physical classifications of the banks (e.g., lined channel, culvert, natural) and the erosion classifications (e.g., stable, minor, erosion, severe erosion). The resulting overlay figures are included as Figures 2-51a through 2-51j. The next step was a systematic review of the information presented on these figures to identify PCB-containing creek banks that could act as a potential source of PCBs to Snow Creek and OU-4.

The overlays were developed to identify the subset of EUs that directly border the creek downstream of the 11th Street Ditch to Snow Street. Downstream of Snow Street, the creek is a concrete-lined channel located underneath an asphalt parking lot until it becomes part of OU-4 at the Highway 78 Bridge. There are 14 EUs that directly border Snow Creek: EU5, EU10, EU12, EU13, EU14N, EU15/16, EU17, EU19N, EU19S, EU22, EU 24, EU25, EU26 and EU27. The list of EUs to evaluate for potential bank stability concerns was further narrowed to 11 EUs by eliminating the 3 EUs with average PCB

concentrations below 1 mg/kg. This screening step eliminated EU15/16, EU25, and EU27. The conditions at the remaining 11 EUs were reviewed in detail and creek bank areas with stability-related concerns were identified based on the potential for contributing PCBs to Snow Creek and OU-4.

- **EU5:** Both the east and west banks of EU5 include a range from relatively stable to severe erosion conditions (Figure 2-51a). Based on PCB concentrations along EU5, creek bank stability is a concern. This includes the high-energy setting in the area of the confluence of Snow Creek with the 11th Street Ditch and at the 90-degree transition in creek flow that occurs at the border between EU5 and EU10. There may be portions along the lower section of EU5, before the transition to EU10, where natural forms of bank stabilization may be effective due to the wider creek cross section and the lower surface water velocities.
- **EU10:** Conditions are unique in EU10. After the transition from EU5, the floodplain is approximately 20 to 25 feet higher in elevation than the creek (Figure 2-51b). This difference in elevation is due to filling of the area. The average PCB concentration for floodplain soils in EU10 is 8.5 mg/kg, and the concentration is driven by several samples collected in a former auto fluff dump site. The difference in elevation between the creek and floodplain is also important in that the floodplain soil PCB data do not reflect creek bank conditions. The creek banks are steep, but are covered with a heavy vegetation layer that limits erosion. At creek level, the erosion classifications range from minor erosion to relatively stable with one exception. The single exception is the severe erosion at the 10th Street Bridge. Erosion at this bridge does not contribute PCBs to the creek as the materials are base type fill materials associated with the initial construction of the bridge. The primary bank stability concern for EU10 is the transition from EU5 that is discussed above.
- **EU12 and EU13 and EU14N:** Bank conditions for EU12, EU13, and EU14N are discussed together as they border opposite sides of the same reach of the creek. This portion of the creek begins at the outlet of the Highway 202 culvert structure and continues downstream to the railroad tracks (Figure 2-51c). EU12 is on the east to northern side of Snow Creek; EU13 is on the west to southern side of the creek; and EU14N is on the south side of the creek. Bank conditions in the initial portion of EU12 and EU13 are relatively stable and reflect prior bank stabilization work conducted as part of removal projects. The bank conditions then transition to minor erosion including a turn in creek flow to the east. Soils in the adjoining floodplain of EU14N and EU12 have average PCB concentration of 12 mg/kg and 4.3 mg/kg, respectively. The average PCB concentrations in EU13 are 3 mg/kg. The vegetation on the banks in EU12 and EU13 appears to be cut on a regular basis. If the vegetation on the banks continues to be regularly trimmed, there is some possibility that bank erosion of PCB-containing materials could occur.
- **EU17:** There are no bank stability concerns along EU17 as a large portion of the area is characterized by a lined channel, including the vertical concrete walls (Figure 2-51d). The creek bank conditions along the unlined portion of the creek are also stable. The average soil PCB concentration in the adjoining floodplain is 2.4 mg/kg, with the highest concentration samples collected well away from the creek banks.
- **EU19N:** There are no bank stability concerns in EU19N. While the PCB concentrations in some portion of the adjoining floodplain are elevated (average of 77 mg/kg), the east bank of the creek is a concrete wall that is stable (Figure 2-51e).
- **EU19S:** There is one location in EU19S with significant bank erosion. This area has been field inspected on multiple occasions. The significant erosion area is located on the western portion of the creek bank where Snow Creek turns quickly to the east and then back to the south (Figure 2-51f). While the average surface soil PCB concentration for EU19S is

13 mg/kg, this average is driven by two sample results with PCB concentrations greater than 50 mg/kg that were collected in the eastern portion of the EU. One sample was collected in a heavily wooded area, and the second sample was collected near the railroad tracks (Figure 2-51f). There were eight surface soil samples collected from the western side of Snow Creek for this EU, and all the PCB results were below 1 mg/kg. There are no bank stability concerns for this portion of EU19S. This finding is based on the PCB results for the samples collected near the creek banks areas.

- **EU22:** There are no bank stability concerns along EU22 (Figure 2-51g). The creek banks are relatively stable and the average PCB for the EU is 1.5 mg/kg.
- **EU24 –** There are no bank stability concerns for EU24. The creek banks were classified as stable and relatively stable, and based on the floodplain soil data presented on Figure 2-51h, there are no soils with elevated PCB concentrations near the creek bank.
- **EU26:** Most of the creek banks in EU 26 are stable and transition to relatively stable at the southern end of the EU where the Highway 21 Bridge crosses over Snow Creek (Figure 2-51i). The average PCB concentration in this EU is 12 mg/kg and is driven by high concentration samples that were collected in the upland portion of the EU.

2.5.5.4 Bank Stability Summary

The results of a systematic review of bank stability conditions along the OU-1/OU-2 portion of Snow Creek indicate two reach locations where unstable creek banks could be potential sources of PCBs to Snow Creek and OU-4. These areas include the creek banks along EU5 including the area around the 11th Street Ditch confluence and downstream near the transition to EU10 where the creek turns sharply to the east. The second reach of creek with potential bank stability concerns is located where EU12 and EU13 border the creek. These areas may not present a bank stability concern if the vegetation along the creek banks is maintained and a vegetated buffer strip is allowed to form.

2.5.6 Constituents in Surface Water

Surface water sampling points are shown on Figure 2-52. The samples collected during the RCRA Program were analyzed for particulate-phase PCBs and total suspended solids (TSS). The samples were collected over a range of base- and high-flow conditions, and the resulting data were collected to assess the downstream transport of PCBs and suspended solids. These data were also used to calculate estimated whole-water PCB concentrations. These data indicate that for base-flow conditions at the downstream end of OU-1/OU-2, the chronic Ambient Water Quality Criteria (AWQC) of 0.014 micrograms per liter (µg/L) was exceeded in three of six sampling events. Also of note was the presence of PCBs in the surface waters of Snow Creek at sampling stations located 2,000 feet and 3,000 feet upstream of where the 11th Street Ditch enters Snow Creek. The highest calculated whole-water PCB concentration was also for an upstream sampling location (0.772 µg/L at 14th Street). This surface water sample was collected during base-flow conditions, and the calculated whole-water PCB concentration was a factor of approximately five times higher than the highest calculated downstream whole-water concentration for base-flow conditions (0.168 µg/L at Snow Street). The AWQC for PCBs was exceeded during all high-flow events using the calculated whole-water PCB concentrations. This is not unexpected, as during periods of high-flow, elevated TSS concentrations that are present in the surface water can influence the calculated whole-water PCB concentrations.

Whole-water samples were also collected in OU-4 just downstream of OU-1/OU-2 under the PCD and were collected during three separate high-flow events. PCB Aroclors were not detected (at a reporting limit of approximately 0.5 µg/L) in any of the whole-water samples. Total PCBs as the sum of homolog groups were also determined using a more sensitive method than the 8082 Aroclor method and the

concentrations ranged from 0.2 µg/L to 0.6 µg/L. While PCBs were present at concentrations above the AWQC during these high-flow conditions, this was not unexpected as the samples were analyzed as whole-water samples and included suspended sediment. While the data indicate that during periods of high flow the chronic AWQC for PCBs was exceeded, an acute AWQC value for comparison with high-flow conditions is not available.

The surface water data for Snow Creek indicate that during base-flow conditions the downstream PCB contributions from Snow Creek to OU-4 are small and that TSS and PCB transport in Snow Creek are extremely responsive to high-flow events. The majority of annual sediment transport occurs infrequently and over short periods of time during high-flow events. Given the low concentration of solids generally present in the creek during periods of low flow, the surface water PCB concentrations are expected to be quite low. This is important as base-flow conditions for the creek occur approximately 90% of the time.

The surface water data collected also show a reduction in the quantity of PCBs being transported down Snow Creek over the period of sample collection (2002 to 2006). This observation is based on the average calculated surface water concentrations during 2002 of approximately 1 µg/L as compared to the average high-flow PCB concentration of 0.40 µg/L measured in 2007.

2.5.7 Constituents in Groundwater

Groundwater concentrations are above MCLs in only one location outside of the areas that are being addressed under OU-3. This one instance—groundwater well T-11—is located in the eastern portion of EU5 (Figure 2-12) and has a maximum reported PCB concentration of 30 µg/L. Two small areas adjacent to OU-3—one just to the north of the geographic boundary between the two OUs (near groundwater well OW-21A) and a second area at the northeast perimeter of OU-3 (near groundwater well OW-10)—have groundwater conditions exceeding the MCLs for PCBs and other Site-related constituents. Groundwater in these two small areas has been, and will continue to be, addressed through implementing the selected remedy for OU-3 identified in the IROD (USEPA 2013a). Groundwater also exceeded the MCL at well T-09 (1.04 µg/L). Conditions at T-09 are believed to be associated with groundwater impacts at well OW-21A and will be addressed under the OU-3 remedy.

2.5.8 Constituents in Air

Ambient air data for OU-1/OU-2 have been collected under separate sampling programs spanning a 12-year period. Sampling locations are shown on Figure 2-53. All of the air results have been similar and characterized by low (nanograms per cubic meter [ng/m^3]) PCB concentrations in air. Total PCB concentrations for the air samples collected by the USEPA in 2000 (based on the sum of PCB Aroclors) ranged from not detected to 45 ng/m^3. This is consistent with the results of air sampling conducted by P/S in 2003 and 2004 where the average total PCB concentration at each sampling location ranged from 2.9 ng/m^3 to 24.4 ng/m^3. Additional air sampling conducted during the summer of 2006 at two locations with elevated PCB concentrations in soil had total PCB concentrations in air ranging from 1.4 ng/m^3 to 14.5 ng/m^3. The PCB air data collected by the USEPA in 2012 are consistent with previously collected data for OU-1/OU-2, and the concentrations ranged from 1.7 ng/m^3 to 26 ng/m^3 (USEPA 2013b), with an average of 9 ng/m^3. Air samples collected in 2006 were also analyzed for PCDD/DFs, and these data were used along with individual PCB congener data to calculate total TEQs for each sample. Total TEQs ranged from 0.001 picograms per cubic meter (pg/m^3) to 0.028 pg/m^3.

Air samples collected in OU-1/OU-2 are consistent with a report prepared by the Agency for Toxic Substances and Disease Registry (ATSDR) titled *Health Consultation: Anniston PCB Air Sampling* (ATSDR 2003) that concluded mean concentrations from the USEPA air sampling stations located 0.25 to 1.0 miles from the Facility were generally below 10 ng/m^3 (ATSDR 2003). These data are consistent with the atmospheric concentrations reported by ATSDR for urban areas in the US (ATSDR 2003).

2.5.9 Ecological Habitat Findings

The data collected during the ecological habitat field surveys documented that the terrestrial exposure pathways in OU-1/OU-2 are, in many cases, truncated and incomplete. Habitat in the area is disturbed and dominated by mowed and maintained lands with little quality habitat plant cover, impervious surfaces, and transportation infrastructure. Development pressure is present in the area, which will likely lead to even more fragmented and disturbed ecological habitat over time as more urban infrastructure is constructed. A more complete ecological risk assessment is being performed in OU-4 where the terrestrial habitat is of higher quality. The USEPA determined that further assessment of ecological risk to terrestrial receptors would be better suited to downstream rural areas along Snow Creek and Choccolocco Creek located in OU-4 and is not needed for OU-1/OU-2.

The aquatic ecosystems in Snow Creek are also disturbed and generally of low ecological habitat quality, however, potentially complete exposure pathways were identified. Potential ecological risks for the OU-1/OU-2 portion of Snow Creek are evaluated in the SERA (ARCADIS 2013; included as Appendix E2 in the RI). The SERA evaluated potential ecological risks in the reach of Snow Creek downstream of the 11th Street Ditch to the location where the creek intersects Highway 78 in Oxford. A summary of the OU-1/OU-2 ecological risk assessment findings is presented in Section 2.7.2.

The results of the RBP and the KPM indicate that the quality of the riparian corridor habitat bordering Snow Creek is poor and the creek habitat is considered fair. Snow Creek channel types are shown on Figure 2-54 and show how much of the creek has been disturbed and is influenced by localized urban development.

In addition to the RBP and KPM, plant, macroinvertebrate, fish, and wildlife species observations were made during the 2005 biological survey work. With the exception of Station 1 (the upstream station), no aquatic vegetation was observed in any of the survey locations. However, some aquatic plants were observed during previous survey work. The benthic macroinvertebrate survey showed the greatest diversity. An abundance of species was found in Station 1 (located upstream of the confluence with the 11th Street Ditch) and Station 2 (located just downstream of the Highway 202 underpass), with lower values by comparison in Stations 3, 4, and 5. The fish observed primarily consisted of small minnow-like fish such as mosquitofish (*Gambusia holbrooki*) and stonerollers (*Campostoma oligolepis*). Station 4 had the highest number of fish (177) and the highest diversity of species (8 taxa).

A number of wildlife species were observed during the 2005 survey and in previous survey work. Specifically, 11 bird species were observed feeding or foraging within at least 1 of the survey areas in 2005, and 9 other species were seen resting or identified by call. The tree swallow (*Tachycineta bicolor*) was the only bird species observed nesting in the area. Only two mammal species were observed, and four mammals were identified based on tracks. The muskrat (*Ondatra zibethica*) was the only mammal for which a den, hut, or burrow was observed. Several frog species were heard calling, but the American toad (*Bufo americanus*) and the southern two-lined salamander (*Eurycea cirrigera*) were the only amphibians observed. Two turtles and two snakes were observed and/or seen foraging. A detailed description of the methods and results of the 2005 survey as well as the results of area observations from previous work are provided in the SLERA (BBL 2005b, included as Appendix E1 in the RI).

2.6 Contaminant Fate and Transport

This section summarizes the data for OU-1/OU-2 for the purposes of describing the fate and transport of contaminants. This includes a discussion of potential sources, potential release mechanisms, and potential migration pathways, and a review of data collected for OU-1/OU-2 to expand the initial CSM evaluation conducted as part of the *Phase 1 Conceptual Site Model Report for the Anniston PCB Site*,

Anniston, Alabama (Phase 1 CSM Report; BBL 2003). The assessment also considers contaminant persistence and migration. While PCBs are the primary focus of this assessment, the non-PCB constituents evaluated in the HHRA and SERA have a similar affinity for solids and are expected to have similar fate and transport properties. To assist in evaluating fate and transport, the elements of a typical CSM—sources, release mechanisms, and transport pathways—were considered.

2.6.1 Source Areas

The Facility (OU-3) has documented elevated concentrations of PCBs in soil and groundwater and is considered a historical source to OU-1/OU-2. The OU-3 IROD details the source control measures that have been conducted thus far in OU-3 and discusses the remaining soil areas that will be capped and the additional groundwater containment and treatment actions that will be implemented through the remedial design/remedial action process. Once these additional remedial actions are completed, it is expected that OU-3 will no longer be an active source to OU-1/OU-2. In addition to past and future efforts to control sources at the Facility (OU-3), removal actions and IMs have been implemented in OU-1/OU-2. A combination of surface water data collected under the NPDES permit for the Facility and monitoring data collected under the OU-3 IROD will be used to evaluate the effectiveness of eliminating OU-3 as an active source to OU-1/OU-2. These data will be evaluated during a five-year review process for OU-3 that is required due to waste material being contained as part of the OU-3 remedy.

2.6.2 Release Mechanisms and Migration Pathways

Data collected over the past 20 years in OU-1/OU-2 support the CSM developed for the Site (BBL 2003) and are discussed here with a focus on OU-1/OU-2. The primary release mechanism of PCBs to OU-1/OU-2 from OU-3 was through surface water runoff from OU-3 via the 11th Street Ditch and subsequent downstream flow into Snow Creek. Surface water migration pathways are illustrated on Figure 2-2. Migration from the creek to floodplain soils occurred during periodic flood events and the deposition of fine-grained particles with PCBs. Several potential release mechanisms are discussed below including surface water runoff, volatilization/dust, human activity, and leaching.

2.6.2.1 Surface Water Runoff

The primary direct migration pathway from OU-3 to OU-1/OU-2 was surface water runoff. This pathway was the historical route for PCB-containing materials to migrate from OU-3 into OU-1/OU-2. The movement of these PCB-containing materials within OU-1/OU-2 occurred during and immediately following significant precipitation events. Surface water discharges and runoff from the Facility followed a series of drainage ditches that, in combination with overland flow, led to the 11th Street Ditch. From there, PCB-containing materials were conveyed via surface water to and down Snow Creek. During the highest flows, the waters of Snow Creek would flow in an out of bank condition. During these events, PCB-containing materials were transported outside of the banks of the 11th Street Ditch and Snow Creek into the broader portions of the Snow Creek floodplain. Once the surface waters were outside of the creek bank, the surface water velocities would drop dramatically due to the increased cross-sectional area for flow, and fine-grained sediments with PCBs were deposited within the footprint of the floodplain.

The secondary release mechanisms associated with surface water runoff include mobilization and downstream release of sediments that have settled out in Snow Creek. These secondary release mechanisms do not appear to be significant for Snow Creek under current conditions. This finding is based on the PCB mass for Snow Creek being primarily contained within the sediments sequestered in the Highway 202 culvert. Based on physical observations and creek flow patterns through the Highway 202 culvert, these sediments do not appear to be eroding. Observations of the culvert show that surface water is normally conveyed through only one of the five culvert sections, and the majority of

sediments are associated with the other four culvert sections. These other four culvert sections likely receive surface water flow during and following periods of high precipitation. Even when surface water flow is conveyed through these other four culvert sections, increased surface water velocities and erosion of the sediment does not appear to be occurring. Rather, the increased cross-sectional area for flow provided by the additional culvert sections appears to serve as a mechanism for upstream sediments to deposit rather than erode. This process has been enhanced over time by the growth of vegetation in these four culvert sections. The vegetation on the upstream and downstream ends of the culverts is consistent with sediment stability.

2.6.2.2 Leaching from Soils to Groundwater

PCBs are leaching to groundwater on a limited basis in OU-1/OU-2. Groundwater investigations identified two locations where PCB concentrations in groundwater are above MCLs (groundwater wells OW-21A/T-09 and T-11). The concentrations in wells OW-21A and T-09 are being addressed under the OU-3 remedial design/remedial action process. Groundwater and the area around T-11 are evaluated further in this FS.

2.6.2.3 Volatilization/Fugitive Dust

Although considered a semivolatile material, PCBs may migrate in air from volatilization and as fugitive dusts. If constituents are mobilized into air, atmospheric dispersion may transport them and allow them to deposit at other locations. The air samples collected for OU-3 and OU-1/OU-2 provide data that show that air is not a current concern regarding concentration or as a potential migration pathway. Although air concentrations were not the reason for selecting the chosen OU-3 remedy or the reason for the OU-1/OU-2 IMs or removal actions, the capping or removal of soils completed to date further reduced the potential for volatilization and fugitive dust. Additional actions to be taken in OU-3 and OU-1/OU-2 may further reduce or eliminate the long-term potential for volatilization or fugitive dust even though current concentrations of PCBs in air are currently considered a low risk to human health or the environment. Any construction activities that include moving OU-1/OU-2 soils will need to incorporate best management practices (BMPs) to minimize generating fugitive dust that may contain PCBs.

2.6.2.4 Human Activity

Human activity is a release and transport mechanism that may relocate PCBs originally distributed by one or more of the release mechanisms and sources described above. An example of human activity is relocating sediments from the creek to nearby dredge spoil piles. Another example of human activity as a release and transport mechanism for PCBs includes activities that involve the use of PCB-containing products (as opposed to the manufacture of PCBs at the Facility) or the generation of waste (and the disposal of such wastes) containing PCBs. These are difficult release mechanisms to evaluate because direct information regarding the relocation of PCB-containing materials by human activity and the use and disposal of PCBs by human activities are often not available. These are, however, reasonable explanations for the somewhat sporadic occurrences of elevated PCB concentrations in soils outside of the Snow Creek 100-year floodplain boundary. The potential for fugitive dust to be generated during remedial activities is a concern that will be addressed during the design and construction of the remedy selected for OU-1/OU-2.

2.6.3 Exposure Pathways

The pathways for potential exposure are consistent with the release mechanisms. These include surface and subsurface soils, sediment, surface water, groundwater, and air (vapor and particulate phases). The HHRA prepared by CDM on behalf of the USEPA (CDM 2010a) evaluated these pathways for potential human health risks in OU-1/OU-2. These pathways were also evaluated from an

ecological perspective in the SLERA (BBL 2005b) and SERA (ARCADIS 2013). The human health and ecological risks assessments for OU-1/OU-2 are summarized in Sections 2.7.1 and 2.7.2, respectively.

2.6.4 Contaminant Persistence

PCBs are persistent organic chemicals. They were manufactured to be stable over a wide range of conditions. Although some small amount of weathering and attenuation will occur, chemical degradation, substantial reduction in concentrations, or changes in distribution patterns are not expected over the near term. Similarly, PCBs are most likely to be tightly bound to particulates, and the potential to migrate in dissolved phase via surface or groundwater is limited.

2.7 Summary of Risks

This section summarizes the findings from the OU-1/OU-2 human health and ecological risk assessments. These baseline risk assessments identify and quantify the risks in OU-1/OU-2 to human health and the environment and provide a basis for the contaminants and exposure pathways to be addressed in this FS. CDM prepared the HHRA on behalf of the USEPA, and P/S prepared the SLERA and SERA to evaluate ecological risks in the OU-1/OU-2 portion of Snow Creek. The details of the risk assessments and their findings are provided in the RI (ENVIRON 2015a) and its appendices (D and E, respectively). The following subsections provide summaries of the findings from the risk assessments for the purposes of developing RAOs and PRGs and evaluating the effectiveness of potential remedial alternatives.

2.7.1 Human Health Risk Assessment

CDM prepared the HHRA on behalf of the USEPA. The USEPA approved the 2010 version of the HHRA on November 15, 2012 (USEPA 2012a). The USEPA's approval also included a companion technical memorandum prepared by CDM evaluating risks associated with dioxin-like PCBs (CDM 2010b). These HHRA-related documents were later supplemented with updated soil RGO values that the USEPA provided to P/S on July 28, 2014 (USEPA 2014a). On September 9, 2014, the USEPA provided P/S with updated risk tables (for cancer and noncancer risks) for the reasonable maximum exposure scenario (USEPA 2014b). The HHRA for OU-1/OU-2 evaluated and quantified potential risks to human health from exposure to chemical constituents in OU-1/OU-2. The HHRA included the following steps:

- Identified COPCs
- Calculated EPCs of the COPCs in the various media
- Evaluated potential ways people may come into contact with COPCs (exposure pathways)
- Identified toxicity criteria to quantify potential risks
- Characterized potential cancer risks and noncancer health hazards associated with possible current and future exposure to COPCs

The process also identified uncertainties in the data and in the process and finishes with the development of concentration-based RGOs. The process and the risk assessment findings are discussed in the following subsections.

2.7.1.1 Hazard Identification

The hazard identification process includes defining the data set for risk evaluation, identifying COPCs based on prevalence and concentration, and calculating the EPCs of the COPCs in the various exposure media. Available data for surface and subsurface soil, sediment, surface water, and air were used to evaluate risks. Sufficient data were available to characterize surface soils for PCBs on an EU basis (Section 2.1, Figure 2-3). Other non-PCB constituents in surface soil and subsurface soil, and PCBs in subsurface soils were evaluated on an OU-wide basis. The risk to human health from exposure to

sediment is limited because sediments are submerged and not easily accessed. In accordance with USEPA Region 4 policy (USEPA 2000a), sediment data were evaluated qualitatively as a means to assess possible exposures to unsubmerged sediments that may occur along the creek banks.

2.7.1.2 Identification of Chemicals of Potential Concern

Each constituent detected in samples collected from the OU was evaluated for the potential to contribute to risk. Chemicals were quantitatively evaluated for risk if they exceeded native background levels and risk-based screening levels. The HHRA evaluated detected concentrations of constituents that were above preliminary screening levels.

2.7.1.3 Determination of Exposure Point Concentrations

EPCs represent concentrations to which receptors may be exposed. PCB data for surface soils were sufficient to develop a PCB EPC for each EU. EPCs for constituents other than PCBs were calculated on an OU-wide basis. EPCs are an input factor to calculations of chemical exposure and, for the reasonable maximum exposure, are typically estimated as the upper one-sided 95% upper confidence level of the arithmetic mean (95% UCL). This conservative process is used to help reduce the chance that the actual average concentration is underestimated by the available data.

The USEPA calculated the EPC values for the reasonable maximum exposure scenario in the HHRA (CDM 2010a) as the 95% UCL using ProUCL version 4.00.02 (USEPA 2007). For the central tendency exposure scenario, the arithmetic mean was used as the EPC to calculate risks and hazards.

2.7.1.4 Exposure Assessment

Exposure refers to the potential for an individual to come in contact with the constituents of concern. The exposure assessment considers the CSM and the different ways that people may be exposed to COPCs in the various media. The exposure assessment considers exposure to COPCs through contact with surface and subsurface soils, sediment, surface water, and air. The people that might be exposed are referred to as receptors. In OU-1/OU-2, several possible residential and nonresidential receptors were considered. For each media, contact may be through direct dermal contact, incidental ingestion, or inhalation. The amount of exposure is a function of the type of receptor, route of exposure, the concentration of the COPC in the media, and frequency and duration of exposure. For each exposure pathway, both current and potential future land uses were considered.

The most significant exposure pathways in OU-1/OU-2 are in association with PCB-containing soils, primarily surface soils with some exposure to subsurface soils for some receptors (industrial/commercial and intrusive workers). The HHRA qualitatively considered risks from exposure to groundwater recognizing that Site-related constituents in groundwater are in localized areas and that the evaluation of groundwater conditions in OU-1/OU-2 includes a comparison with ARARs. In the case of PCBs in groundwater, this is a comparison with the PCB MCL of 0.5 µg/L.

Risks from exposure to air were assessed by comparing the ambient air concentrations in OU-1/OU-2 to the EPCs that were used to calculate exposures in the OU-3 HHRA. This assessment was based on a conservative residential exposure scenario that assumed continuous exposure over a 30-year duration. Therefore, the risks generated for OU-1/OU-2 are a conservative representation of all people that both live and work in Anniston. Using this approach, ambient air inhalation risks were found to be de minimis or at insignificant risk levels (CDM 2010a).

To ensure that all potential human receptor classes were considered in the HHRA, and in accordance with the USEPA risk assessment guidance, current and future residential scenarios were evaluated, and the following six exposure scenarios were evaluated for nonresidential uses of the OU:

1. Industrial/commercial workers (adult)
2. Intrusive workers (adult)

3. Commercial visitors (adult, young child 1 to 6 years old)
4. School/daycare occupants (adult, young child 1 to 6 years old)
5. Recreational users (young child 1 to 6 years, adolescent 7 to 16 years old)
6. Trespassers (adolescent 7 to 16 years old)

To evaluate exposure and risk within OU-1/OU-2, the OU is subdivided into EUs (Section 2.1). The types of receptors that may be exposed in any given EU are largely driven by land use. Numerous Site visits and reviews of aerial photography were used to determine the types of land use in each EU and which receptors might be present in current and future scenarios. Land use and the associated human activities in OU-1/OU-2 are diverse and discontinuous, and the concentrations and distribution of PCBs and other constituents are also varied depending on localized fate and transport mechanisms. A summary of the different nonresidential land uses and potential receptors for each EU is shown on Table 2-2.

Subsequent risk assessment calculations were performed using the EPCs and the receptor-specific exposure parameters. It was assumed that each of the receptor populations was exposed to surface soil (via ingestion, dermal contact, and/or inhalation), based on an exposure within the individual EUs. The intrusive worker was assumed to contact subsurface soil (ingestion/dermal contact/inhalation) based on an OU-wide exposure. For the recreational user and trespasser, exposure to surface water and sediment (ingestion/dermal contact/inhalation) was assumed to happen on an OU-wide basis. Risks for each receptor and pathway were evaluated on an OU-wide basis for constituents other than PCBs.

2.7.1.5 Toxicity Assessment

A toxicity assessment identifies chemical-specific parameters that quantify the toxicity of COPCs. These parameters are used, along with estimates of exposure, to estimate potential cancer risks and noncancer hazards. Toxicity parameters used in the HHRA were obtained from a variety of sources according to a hierarchy established in the Office of Solid Waste and Emergency Response (OSWER) Directive 9285.7-53 (USEPA 2003b).

The toxicity value used to estimate cancer risks is the cancer slope factor (CSF) in units of milligrams of constituent per kilogram body weight per day (mg/kg-day), which estimates the risk of cancer per unit dose. When a slope factor is multiplied by an estimate of lifetime average daily dose of a potential carcinogen (in mg/kg-day), the result is an estimate of the excess lifetime cancer risk associated with exposure at that dose. The USEPA develops CSFs in a conservative manner, and risk estimates using slope factors are considered to be upper-bound estimates of those possible. Risks estimated using CSFs are considered unlikely to underestimate actual risks and may substantially overestimate risks for a given exposure.

For noncancer effects, hazards are estimated using the oral reference dose (RfD) or, in the case of inhalation exposures, the reference concentration (RfC) in air. The USEPA defines the RfD and RfC as "an estimate of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime" (USEPA 1989). The RfD is expressed in units of mg/kg-day, while the RfC is expressed in units of milligrams per cubic meter of air (mg/m^3).

2.7.1.6 Risk Characterization

Risks and hazards are a function of an estimated dose (based on the EPCs), the exposure pathway reasonable maximum exposure and central tendency exposure parameters, and the chemical-specific

toxicity value (either the CSF or RfD). For cancer, the USEPA has defined the acceptable risk range from 1 additional cancer in 1,000,000 exposed individuals ($1x10^{-6}$) to 1 in 10,000 ($1x10^{-4}$).

The hazard quotient is the ratio of the estimated exposure to the RfD or RfC. Where multiple hazard quotients are calculated for different pathways and/or chemicals, the quotients are added to calculate a total hazard index (HI). HIs are calculated to evaluate noncancer effects. If the hazard quotient is calculated to be equal to or less than 1 (i.e., the estimated dose is equal to the RfD), then no adverse health effects are expected as a result of exposure. If the hazard quotient is above 1, then adverse health effects are possible.

The HHRA concluded that the most significant risks to human health were from PCB concentrations in surface soils. PCBs were identified as the primary COPC for the Site and were the focus of most of the sampling investigations; therefore, the data set for PCBs in soil is much larger than for the other constituents. With the larger data set available for PCBs, it was appropriate to evaluate PCB (soil) risks on an individual EU basis. In addition to PCBs, other COPCs were evaluated in the HHRA. Cancer and noncancer risks health hazards from constituents other than PCBs were evaluated under current and future land use conditions using an OU-wide data set.

HHRA Results on an EU Basis

For the HHRA, hazard quotients for exposure to PCBs in soils for each EU and receptor were calculated for ingestion, direct dermal contact, and inhalation. These three hazard quotients were summed to create the total PCB HI for each EU and receptor. The concentrations of PCBs that result in HIs of greater than 1 are lower than those PCB concentrations that trigger cancer risks at $1x10^{-4}$ threshold. Therefore, the EUs with PCB cancer risks greater than $1x10^{-4}$ are a subset of the EUs where PCB HIs are greater than 1.

HHRA Results on an OU-Wide Basis

In addition to the risks from PCBs in surface soil, the HHRA qualitatively and quantitatively evaluated risks in other media and from constituents other than PCBs. These risks were evaluated on an OU-wide basis. The HHRA evaluated risks from subsurface soils, sediment, and air. The HHRA found that some constituents other than PCBs contributed to the OU-wide risks to human health.

Constituents other than PCBs in soil: Cancer risks and HI values for the non-PCB COPCs in surface soil exceed the USEPA target cancer and noncancer risk thresholds for the young child at a school/daycare scenario that was previously addressed through the Stipulation. In addition to the school/daycare scenario, the cancer risk threshold for non-PCB COPCs was exceeded for the industrial worker adult and recreational young child. The non-PCB cancer risks are largely driven by the EPC values for BaPE equivalents, chromium, and PCDD/DFs. Arsenic concentrations also contribute to the OU-wide risks.

Lead in soil: Risks were not calculated for lead in soils, rather the results were compared with the residential and nonresidential cleanup goals for lead. Surface soil concentrations were below the residential cleanup goal for lead (400 mg/kg).

PCBs in subsurface soils: PCBs in subsurface soils were evaluated on an OU-wide basis assuming a construction worker exposure scenario. The subsurface EPC for PCBs was calculated as 100 mg/kg and found to be within the USEPA's acceptable range of risk for the construction worker exposure scenario.

PCBs in groundwater: Some localized areas of groundwater with concentrations of PCBs have been identified in association with overlying soils containing PCBs. The HHRA qualitatively considered risks from exposure to groundwater recognizing that site-related constituents in groundwater are in localized areas and that the evaluation of groundwater conditions in OU-1/OU-2 includes a comparison to ARARs. In the case of PCBs, this is a comparison to the PCB MCL of 0.5 µg/L. One isolated area (well T-11) has groundwater concentrations above the MCL. Well T-11 is located in the easternmost portion of EU5 bounded by Snow Creek to the west and south and railroad tracks to the north and

east. In addition, two small areas with groundwater-related issues that are technically located in OU-1/OU-2 near the border of OU-3, are being addressed under the USEPA-selected remedy for OU-3.

PCBs in sediment: Sediment was evaluated qualitatively only in the HHRA, as a means to assess possible exposures to unsubmerged sediments that may occur along the creek banks. This is consistent with USEPA Region 4 guidance (USEPA 2000a). The risk to human health from exposure to sediment is limited because sediments are submerged and not easily accessed.

PCBs in air: Risks from exposure to air were based on a residential exposure scenario that assumed continuous exposure over a 30-year duration. In that regard, the risks generated for OU-1/OU-2 are representative of all people that both live and work in Anniston. Using this approach, ambient air inhalation risks were found to be de minimis or at insignificant risk levels (CDM 2010a).

2.7.1.7 Human Health RGOs

The risk assessment process and the different exposure scenarios in the different EUs and in the OU as a whole were used to develop RGOs for the range of COPCs, receptors, and risk levels. The HHRA confirmed the protectiveness of the 1 mg/kg total PCB surface soil residential and special use (high activity areas) cleanup concentration that the USEPA used under the NTC Removal Actions. The HHRA also confirmed the protectiveness of the USEPA's residential cleanup level of 400 mg/kg for lead. These cleanup levels were identified in the PCD (USEPA 2003a) and were used to implement the OU-1/OU-2 residential removal actions. The USEPA provided human health RGOs for nonresidential soils, and those RGOs are included in Table 2-3 (PCBs in soil) and in Table 2-4 (other constituents in soil) (USEPA 2014a).

Although the process and the resulting RGOs remain applicable to this FS process, the data set that was used for the risk assessment in 2010 is no longer applicable for all portions of the OU. Since the 2010 risk assessment, the data set has been updated to include new sample points, adjust land usage (especially for residential, special use, and nonresidential uses), and address the reduction in potential exposure following the implementation of IMs. Using these revisions to the data set, the risks for the different EUs differ slightly when compared to the 2010 data set. To capture the risks from current conditions, this FS evaluates the current data set using the RGOs developed in the HHRA. These results and the identification of candidate remediation areas based on these results are discussed further in Section 4.

2.7.1.8 Uncertainties in the HHRA

Uncertainties are introduced in each step of the data collection and risk assessment processes. Because of these uncertainties and the nature of the risk assessment methodology and assumptions, the risk assessment provides a conservative (upper-end) measure of the potential risks and hazards from chemicals in the OU. The use of conservative assumptions throughout the risk assessment process is intended to result in overestimating rather than underestimating human health risk. Therefore, actual risk may be lower than estimated and are unlikely to be greater.

2.7.2 Ecological Risk Assessment

Ecological risk assessments for the OU-1/OU-2 portion of the Site were developed in two reports. Potential ecological risks for OU-1/OU-2 were initially evaluated in the SLERA (BBL 2005b; included as Appendix E1 to the RI).

A key finding from the 2005 SLERA was that the terrestrial exposure pathways in OU-1/OU-2 are fragmented, habitat is disturbed (dominated by mowed and maintained lands with little habitat-quality plant cover, impervious surfaces, and transportation infrastructure), and development pressure is strong, which will likely lead to additional fragmented and disturbed ecological habitat over time. Due to habitat constraints, potential risk to terrestrial receptors is expected to be within an acceptable

level and does not warrant further ecological risk evaluation. The USEPA approved the terrestrial component of the SLERA for OU-1/OU-2 based on the 2005 SLERA on November 8, 2007, and acknowledged the low quality and fragmented nature of terrestrial habitat in OU-1/OU-2 due to the disturbed nature of the area resulting from development and other human activity. The USEPA approved the SLERA with the exception of the OU-1/OU-2 portion of Snow Creek. The primary ecological values requiring more quantitative evaluation were the ecological receptors associated with the aquatic environment that were found in Snow Creek.

Following the USEPA's partial approval of the SLERA, the USEPA required that the OU-1/OU-2 portion of Snow Creek be evaluated as part of the baseline ecological risk assessment (BERA) activities planned for OU-4. The initial plan for evaluating ecological risks in Snow Creek as part of the OU-4 BERA was revised to facilitate the potential inclusion of sediment in the OU-1/OU-2 portion of Snow Creek as an environmental media for evaluation in this FS. The process and schedule for conducting the SERA are presented in a letter from P/S dated November 14, 2012 (P/S 2012), which the USEPA subsequently approved in a letter dated November 16, 2012 (USEPA 2012a). It was determined that a SERA would be appropriate for the Snow Creek portion of OU-1/OU-2 since the ecological receptor use of this portion of the creek is likely limited because of the highly disturbed nature of the habitat. Following USEPA approval of this approach, P/S prepared the SERA (ARCADIS 2013; included as Appendix E2 to the RI) to evaluate ecological risks in the OU-1/OU-2 portion of Snow Creek. The USEPA approved the SERA and the RI for OU-1/OU-2 (ENVIRON 2015a) on January 21, 2015 (USEPA 2015).

The SERA for the OU-1/OU-2 portion of Snow Creek found that there are some risks to benthic invertebrates, avian, and mammalian receptors from exposure to PCBs and some metals (barium, chromium, cobalt, lead, manganese, mercury, nickel, and vanadium) in sediment in localized areas. A summary of the no observed adverse effects levels (NOAELs) and the lowest observed adverse effects levels (LOAELs) for the various receptors are provided in Table 2-5. The highest sediment concentrations are generally located near the confluence of the 11th Street Ditch and Snow Creek and near the culverts at the Highway 202 underpass.

3 POTENTIAL ARARS, PRELIMINARY RAOS, AND PRGS

This section presents potential ARARs, TBC requirements, preliminary RAOs, and PRGs for OU-1/OU-2. In some cases, potential ARARs and TBCs provide the basis for preliminary RAOs and PRGs. At a minimum, compliance with ARARs during remediation and achieving ARARs upon completion of remediation are threshold criteria that must be met in order for a remedial alternative to be considered for implementation. This section begins with a summary of the key findings from the nature and extent of contamination (Section 2.5) and from the risk assessments (Section 2.7) regarding media and chemicals of concern. Section 3.2 discusses the compilation of potential ARARs, and lists of potential ARARs are presented in Tables 3-1 through 3-3. Section 3.3 discusses the development of potential RAOs and PRGs presented in Table 3-4. The potential RAOs and PRGs are used to develop candidate remedial areas (Section 4) and to develop the range of remedial alternatives that are screened, evaluated, and compared in the subsequent sections of this FS.

To focus the evaluation of ARARs in the detailed and comparative analysis sections of this FS, the primary potential ARARs are identified and discussed under each of the alternatives. While there will be a larger number of ARARs that will apply to the remedy that is selected for OU-1/OU-2, the intent was to identify the potential ARARs that influence the evaluation of remedial alternatives. The term "potential" is applied to the ARARs as they will become final through the ROD process. It is also recognized that at the FS level, identifying every ARAR is not possible. The potential exists for an additional ARAR to be identified during the remedial design. The ARARs included in this FS are considered to be comprehensive from the perspective of evaluating remedial alternatives under the NCP and the USEPA selecting the remedy for OU-1/OU-2 as part of the ROD process.

3.1 Media and Chemicals of Concern

The media of concern for OU-1/OU-2 include soil, sediment, groundwater and surface water. The media and constituents of concern for OU-1/OU-2 are as follows:

- Surface and subsurface soils on residential and special use properties with PCB concentrations that may contribute to human health risks
- Surface and subsurface soils on nonresidential properties with concentrations of PCBs, metals, PAHs and PCDD/DFs that may contribute to human health risks
- Surface soils that may erode and run off and contribute to surface water concentrations
- Surface and subsurface soils that may contribute to groundwater concentrations through precipitation and infiltration
- Sediment concentrations of PCBs, metals and PCDD/DFs that may contribute to ecological risks
- Sediment that may pose a secondary pathway by contributing to surface water concentrations
- Surface water concentrations of PCBs and metals that may contribute to ecological risks
- Groundwater concentrations of PCBs above the MCL

Federal standards (ARARs) are applicable to both groundwater and surface water. As discussed in Section 2.5.7, groundwater concentrations above MCLs are localized and appear to be a function of overburden soil concentrations and not from migration from an upgradient source. Therefore, achieving the PRG (MCL) for groundwater will depend on addressing localized soil concentrations. Similarly, surface water concentrations are related to sediment and surface soil concentrations.

3.2 Identification of Potential ARARs and To Be Considered Requirements

Section 121(d) of the CERCLA, as amended, specifies, in part, that remedial actions for cleanup of hazardous substances must comply with requirements and standards under Federal or more-stringent State environmental laws and regulations that are considered ARARs regarding either a particular hazardous substance or particular circumstances at a site or obtain a waiver (see also 40 Code of Federal Regulations [C.F.R.] 300.430(f)(1)(ii)(B)). ARARs include only Federal and State environmental or facility siting laws/regulations. Compliance with Occupational Safety and Health Administration (OSHA) standards is required by 40 C.F.R. 300.150, and therefore, the CERCLA requirement for compliance with or wavier of ARARs does not apply to OSHA standards.

Under CERCLA Section 121(e)(1), Federal, State, or local permits are not required for the portion of any removal or remedial action conducted entirely on-site as defined in 40 C.F.R. 300.5 (see also 40 C.F.R. 300.400(e)(1) & (2)). Also, CERCLA actions must only comply with the "substantive requirements," not the administrative requirements of a regulation. Administrative requirements include permit applications, reporting, record keeping, and consultation with administrative bodies. Although consultation with State and Federal agencies responsible for issuing permits is not required, it is recommended for determining compliance with certain requirements, such as those typically identified as location-specific ARARs.

Applicable requirements, as defined in 40 C.F.R. 300.5, mean those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal or State environmental or facility siting laws that specifically address a hazardous substance, pollutant, or contaminant, remedial action, location, or other circumstance at a CERCLA site. Only those State standards that are identified by the State in a timely manner and are more stringent than Federal requirements may be applicable. Relevant and appropriate requirements, as defined in 40 C.F.R. 300.5, mean those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal or State environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, or contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at a CERCLA site that their use is well suited to the particular site.

Pursuant to 40 C.F.R. 300.400(g)(5), only those State standards which are promulgated, are identified in a timely manner, and are more stringent than Federal requirements may be applicable or relevant and appropriate. For the purposes of identification and notification of promulgated State standards, the term "promulgated" means that the standards are of general applicability and are legally enforceable. State ARARs are considered more stringent where there is no corresponding Federal ARAR, where the State ARAR provides a more stringent concentration of a contaminant, or where a State ARAR is broader in scope than a Federal requirement.

In addition to ARARs, the lead and support agencies may, as appropriate, identify other advisories, criteria, or guidance to be considered for a particular release. The TBC category consists of advisories, criteria, or guidance that were developed by the USEPA, other Federal agencies, or States that may be useful in developing CERCLA remedies (see 40 C.F.R. 300.400(g)(3)). TBCs can be used in the absence of ARARs, when ARARs are insufficient to develop cleanup goals, or when multiple contaminants may pose cumulative risks (see USEPA 1987).

Identifying potential ARARs included several steps. The first step was assembling the ARAR information developed by the USEPA for the OU-3 portion of the Site. This information was updated to reflect regulatory updates, where applicable, and to include additional requirements, where needed, to reflect the differences between OU-1/OU-2 and OU-3. Because OU-3 does not include surface water and sediment as media of concern, many of the additions were the result of Snow Creek being part of OU-1/OU-2. As part of the overall FS process for OU-1/OU-2, the USEPA received a list of potential

ARARs from the state of Alabama (ADEM 2015). P/S conducted an initial review of these State ARARs in preparing this FS. The results of this initial review indicated that the State ARAR-related information presented in the OU-3 FS and IROD was consistent with this recent list from the State.

3.2.1 ARAR Categories

For purposes of ease of identification, the USEPA has created three categories of ARARs: chemical-, location- and action-specific. Under 40 C.F.R. 300.400(g)(5), the lead and support agencies shall identify their specific ARARs for a particular site and notify each other in a timely manner as described in 40 C.F.R. 300.515(d). Chemical- and location-specific ARARs should be identified as early as possible in the RI/FS process, while the action-specific ARARs are identified as part of the FS for each remedial alternative (see 40 C.F.R. 300.430(b)(9) & 300.430(d)(3)).

As part of the FS process, all of the remedial alternatives evaluated in the detailed and comparative analysis of alternatives will be assessed as to whether or not they comply with identified chemical-, location-, and action-specific ARARs. Compliance with ARARs is a threshold requirement of CERCLA that every remedy must meet. The alternative evaluation process identifies the more significant ARARs that must be addressed for each alternative. These are described in Section 7.0. The final evaluation of ARARs will be completed during the remedial design phase once it is determined how the selected alternatives will be implemented.

3.2.2 Chemical-Specific ARARs/TBC Guidance

Chemical-specific ARARs are usually health- or risk-based numerical values limiting the amount or concentration of a chemical that may be found in, or discharged to, the environment. The Safe Drinking Water Act MCLs at 40 C.F.R. Part 141 and the State or Federal AWQC established under Section 303 or 304 of the Clean Water Act are examples of chemical-specific ARARs that are used to establish remediation levels for restoration of groundwater and surface water that are current or potential sources of drinking water (see 40 C.F.R. 300.430(e)(2)(i)(B), (C), & (E)). Table 3-1 lists chemical-specific ARARs/TBCs for OU-1/OU-2.

3.2.3 Location-Specific ARARs/TBC Guidance

Location-specific requirements establish restrictions on permissible concentrations of hazardous substances or establish requirements for how activities will be conducted because they are in special locations (e.g., wetlands, floodplains, critical habitats, streams). The location-specific ARARs/TBCs are listed in Table 3-2.

3.2.4 Action-Specific ARARs/TBC Guidance

Action-specific ARARs are usually technology-based or activity-based requirements or limitations that control actions taken at hazardous waste sites. Action-Specific requirements often include performance, design and controls, or restrictions on particular kinds of activities related to managing hazardous substances. Action-specific ARARs are triggered by the types of remedial activities and types of wastes that are generated, stored, treated, disposed, emitted, discharged, or otherwise managed.

Any remediation wastes that are generated and subsequently transferred off-site or transported in commerce along public rights-of-way must meet any applicable requirements such as those for packaging, labeling, marking, manifesting, and placarding requirements for hazardous materials. In addition, CERCLA Section 121(d)(3) provides that the off-site transfer of any hazardous substance, pollutant, or contaminant generated during CERCLA response actions be sent to a treatment, storage, or disposal facility that is in compliance with applicable Federal and State laws and has been approved by the USEPA for acceptance of CERCLA waste (see also 40 C.F.R. 300.440 [Off-Site Rule]). Table 3-3

lists potential action-specific ARARs/TBCs for the range of remedial alternatives that are anticipated for OU-1/OU-2.

3.3 Preliminary RAOs and PRGs

The preliminary RAOs and PRGs were developed based on the following:

- An evaluation of potential Federal and State ARARs
- The preliminary RAOs presented in the RI/FS work plan
- The nature and extent of constituents presented in the OU-1/OU-2 RI and the risks and associated RGOs calculated in the human and ecological risk assessments

Based on the results of the risk assessments and the potential ARARs, a set of preliminary RAOs and PRGs were developed for four environmental media: soil, sediment, groundwater, and surface water. These preliminary RAOs and PRGs are presented in Table 3-4 and include the preliminary RAOs and associated PRG values by environmental media. These preliminary RAOs are also applicable to the removal actions for residential and special use properties under the Removal Order entered into by P/S and the USEPA in 2000, the 2003 NTC Removal Agreement that became part of the PCD, and the Stipulation entered into by the USEPA and P/S (USEPA 2006a).

The USEPA developed the RGOs for human health for OU-1/OU-2 based on the findings in the HHRA. Those RGOs were presented in the 2010 version of the HHRA (CDM 2010a) and were updated by the USEPA on July 28, 2014 (USEPA 2014a). P/S developed the ecological RGO values as part of the overall SERA process. The development of PRGs begins with the identification of preliminary RAOs including identifying media and potential receptors. Based on these media and receptors, applicable PRGs were selected from the range of RGOs and are summarized on Table 3-4.

3.3.1 Establishment of Preliminary Remedial Action Objectives

Preliminary RAOs for soil, sediment, surface water, and groundwater were developed using the preliminary RAOs from the RI/FS work plan; information presented in the OU-1/OU-2 RI, the HHRA and the SERA; discussions with the USEPA; and an evaluation of potential Federal and State ARARs.

3.3.1.1 Preliminary RAOs for Soils

The following are the preliminary RAOs for soils:

- Reduce risks to residents, school children, and other users from direct contact with, inhalation of, or incidental ingestion of constituents of concern (COCs) in surface soil above levels that are protective.
- Reduce risks to industrial and commercial workers, commercial visitors, trespassers, and recreational activities associated with direct contact with, inhalation of, or incidental ingestion of COCs in surface soil above levels that are protective.
- Reduce migration of COCs in surface soils to surface water.
- Reduce risks to construction and utility workers from direct contact with, inhalation of, or incidental ingestion of COCs in subsurface soil above levels that are protective.
- Prevent migration and leaching of PCBs in surface and subsurface soils to groundwater above levels that are protective of beneficial use (i.e., attain drinking water standards).

3.3.1.2 Preliminary RAOs for Sediment

The following are the preliminary RAOs for Snow Creek sediments:

- Reduce risks to ecological receptors from exposures to sediments in Snow Creek.
- Minimize creek bank soils as a potential source of PCBs to Snow Creek and OU-4.

3.3.1.3 Preliminary RAOs for Surface Water

The following is the preliminary RAO for surface water:

- Reduce exceedances of AWQC for sediment COCs.

3.3.1.4 Preliminary RAOs for Groundwater

The following are the preliminary RAOs for groundwater:

- Prevent exposure to groundwater from direct contact with, inhalation of, or ingestion of PCBs in groundwater above acceptable levels that are protective of beneficial use (i.e., attain drinking water standards).
- Restore contaminated groundwater throughout the plume or at and beyond the edge of designated area to levels that are protective of beneficial use (i.e., attain drinking water standards).

3.3.2 Human Health PRG Values

The human health PRG values were identified based on a range of RGOs developed in the HHRA for contact with floodplain soils, including residential and special use properties, and for soils involved in IMs and in dredge spoil piles. HHRA RGO values for surface water, sediment, or biota were not developed in the HHRA because exposure to these media did not exceed a human health risk threshold.

The PCB RGO values for a range of nonresidential surface soil exposure scenarios are presented in Table 2-3 and include values for cancer and noncancer endpoints. The PCB RGO values presented on Table 2-3 are from the HHRA prepared by the USEPA (USEPA 2014a). The range of exposure scenarios is important, and not all exposure scenarios are anticipated to occur in each EU (Table 2-2). The PRG for nonresidential surface soils selected by the USEPA was 21 mg/kg. This PRG corresponds to a cancer risk of $1x10^{-5}$ and is protective of noncancer risks for this receptor (Table 2-3).

The HHRA also confirmed that the 1 mg/kg action level established in the NTC Removal Agreement is protective of residential receptors and for receptors on high activity portions of special use properties. The PCB value of 1 mg/kg was selected as the PCB PRG for residential receptors as it is protective of noncancer risks below the HI value of 1 and corresponds to a cancer risk of $1 X 10^{-6}$.

The HHRA also presents the PCB RGO value of 97 mg/kg for subsurface soil based on the construction worker and an HI value of 1 for noncancer risks. Based on the subsurface soil EPC for PCBs (100 mg/kg), current conditions are protective of subsurface exposures. The HI value is essentially 1 for noncancer risks, and the cancer risks are considerably less (almost $1x10^{-6}$) than $1x10^{-5}$ for this construction worker pathway.

The range of RGO values for arsenic, chromium, and PAHs (as BaPE) that were used to identify the respective PRGs are presented in Table 2-4. The range of RGO values presented in Table 2-4 for these constituents was developed by the USEPA (USEPA 2014a). For each of these three chemicals the nonresidential PRGs were set for the industrial/commercial worker equivalent to a cancer risk of $1x10^{-4}$. The PRGs for arsenic, chromium, and PAHs (as BaPE) are also protective of noncancer risks as

the HI values are all below 1. The PRGs did not consider noncancer risks for PAHs (as BaPE). Based on the HHRA and data from OU-1/OU-2, the default industrial value (0.6 µg/kg) was used as the PRG for PCDD/DFs TEQ.

For PCBs in groundwater, the MCL of 0.5 µg/L, was selected as the RGO.

3.3.3 Ecological PRG Values

The ecological PRG values were selected from a range of RGO values developed for sediment in the OU-1/OU-2 SERA. The range of ecological RGOs used to select the PRGs are presented in the OU-1/OU-2 RI (ENVIRON 2015a) and are summarized in Table 2-5. The potential receptors included benthic organisms, mallard (*Anas platyrhynchos*), tree swallow, spotted sandpiper (*Actitis macularius*), pied-billed grebe (*Podilymbus podiceps*), muskrat, little brown bat (*Myotis lucifugus*), and raccoon (*Procyon lotor*).

For PCBs in sediment, an ecologically based PRG for PCBs of 3 mg/kg was selected, based on the benthic reproduction (10% effect concentration [EC10*]) values developed as part of the toxicity testing bench scale study. Creek bank soils were also evaluated relative to the PCB PRG value of 3 mg/kg based on the potential for that material to erode into the creek. This PRG value is very conservative in that it was selected to protect a benthic invertebrate community that is largely not present in Snow Creek due to habitat limitations (sections of concrete lined creek). As such, it is very precautionary in application. Other stream quality limitations include non-site-related impacts to Snow Creek from point discharges and nonpoint surface water runoff from the parking lots/streets. Additionally, the 3 mg/kg PRG is based on the most sensitive endpoint from the sediment toxicity testing program (the reproductive endpoint of 42-day young/female) and a relatively low level of effect (10%). Given the large degree of among batch control variability for the reproductive endpoint upon which the EC10* is based (i.e., 135%) it is expected that the concentration at which PCB-related effects are observed in benthic organisms would be much higher. By comparison, the EC10* value for the most sensitive survival endpoint, for which the among batch control variability was more acceptable (i.e., 4.4%), is 76 mg/kg and the concentration at which there is no difference from reference sediments (EC0*) is 14 mg/kg. Uncertainties associated with the sediment toxicity testing are described in Appendix B to the OU-1/OU-2 SERA (ARCADIS 2013).

While the 3 mg/kg PRG is derived from the sediment toxicity testing program (i.e., for benthic organisms), it is also considered protective of birds and mammals that may use the OU-1/OU-2 portion of Snow Creek. Based on the most likely and relevant ecological exposure within OU-1/OU-2, mammals appear to be more representative than birds. Birds are transient along OU-1/OU-2 portion of Snow Creek and are thus, unlikely to be the best representation of actual ecological exposures. Of the mammals considered in the OU-1/OU-2 SERA, the raccoon is an opportunistic receptor that is most likely present and foraging along the OU-1/OU-2 portion of Snow Creek. Likewise, the muskrat has been observed and is known to inhabit urbanized areas. While the bat is the third mammalian receptor evaluated in the OU-1/OU-2 SERA, this receptor (and other aerial insectivores) have limited applicability as insect production is low within the OU-1/OU-2 portion of Snow Creek. This is largely driven by habitat conditions and supported by benthic sampling results for the portion of Snow Creek located downstream of the 11th Street Ditch (Tables 11 through 14 of the SLERA [BBL 2005b). Low insect production not only lowers the density of bats, but also decreases attraction of bats to the creek because bats focus on areas with high insect concentrations (Kunz et al. 2011). Based on this information, the raccoon and muskrat are considered to be representative of the ecological exposure scenarios in the OU-1/OU-2 portion of Snow Creek. Even the overly conservative no-effect-based RGOs for these two receptors are 3 and 4 mg/kg, respectively, while the lowest-effect-based RGOs are 8 and 12 mg/kg, respectively.

For metals, PRGs were developed based on the NOAEL- and LOAEL-based RGOs from the SERA. PRG values for sediment were developed for several metals: barium, chromium, cobalt, lead, manganese, mercury, nickel, lead, and vanadium. These PRG values and their basis are presented in Table 3-4.

PRGs for PCBs in surface water are based on the USEPA AWQC for chronic exposure of 0.014 µg/L This AWQC value is based on the protection of wildlife. Using a lower AWQC value to provide protection for the ingestion of surface water and the consumption of biota (i.e., 0.000064 µg/L) is not appropriate for Snow Creek. This is based on the lack of consumable-sized fish in the OU-1/OU-2 portion of Snow Creek and that Snow Creek is not a capable water supply source.

4 CANDIDATE REMEDIAL AREAS

Defining the areas and volumes to be addressed in the remedial process is an important step in the FS. The information generated during this step assists in quantifying the amount and nature of materials to be addressed in combination with the site-specific attributes that are critical to evaluating candidate remedial technologies. This section identifies the candidate remedial areas and volumes (where applicable) for the eight categories of remedial alternatives being addressed in the FS. These categories reflect a range in environmental media and settings and were based on a combination of the preliminary RAOs, PRGs, potential receptors, associated environmental media, and previous removal actions and IMs that have been implemented for OU-1/OU-2. The following are the resulting categories of remedial alternatives:

- Residential soils
- Special use properties
- IMs
- Dredge spoil piles
- Unapproved waste disposal areas (UWDAs)
- Nonresidential soils
- Groundwater at T-11
- Sediment and creek bank

The remedial candidate areas for each of the categories are described below. In some cases, the categories of remedial alternatives for residential, special use, IM, and dredge spoil piles include actions that have already been implemented. In these cases, the previously implemented actions are discussed, but much of the discussion is focused on potential future activities.

4.1 Residential Removal Areas

This section provides a summary of the removal actions that have been completed at residential properties within OU-1/OU-2. A large number of residential properties within the USEPA Zones A through D and EA 35 were already completed under the residential removal program. These removal actions were completed under the Removal Order, the NTC Removal Agreement, and the Stipulation.

4.1.1 Regulatory Background

P/S entered into the Removal Order in 2000. The Removal Order provided for time-critical removal action at residential properties if the PCB concentration in surface soil was 10 mg/kg or greater in a five-point composite sample. P/S began sampling surface soil in May 2001 and completed the first removal action in July 2001.

In August 2003, P/S entered into the NTC Removal Agreement, and in September of the same year, the USEPA approved the EE/CA (Solutia 2003b). The EE/CA identified and analyzed removal action alternatives and presented the recommended removal action alternative. The EE/CA documented the most appropriate removal action alternative to be soil removal with disposal remote from the affected residential properties. The EE/CA documented the effectiveness of the completed residential removal actions including the removal of surface soils with PCB concentrations greater than or equal to 1 mg/kg and the removal of soils below a depth of 12 inches with PCB concentrations greater than or equal to 10 mg/kg. The NTC Removal Action Approval Memorandum (USEPA 2004a) concurred with the findings in the EE/CA. In the NTC Removal Action Approval Memorandum, the residential soil

action level for PCBs was set at or above 1 mg/kg in surface soils and at or above 10 mg/kg below a depth of 12 inches.

In November 2015, P/S issued the Completion Report (Golder 2015) under the Removal Order and the NTC Removal Agreement to meet the requirements of CERCLA and Section 300.165 of the NCP. The completed residential removal actions were conducted in accordance with the requirements of the Removal Order, NTC Removal Agreement, and the Stipulation. The report included a status of residential removal activities through December 31, 2014. A list of the properties sampled and removal actions completed; the quantities, types, and disposal locations of materials; sample analysis results; and relevant documentation generated during the removal actions are included in the Completion Report.

4.1.2 Summary of Residential Removal Actions Completed

Where PCB concentrations in surface soil samples were reported at or above 1 mg/kg, the NTC Removal Agreement and the Stipulation required the removal of the top 12 inches of soil from the impacted area (front, back, and/or side yard or portion thereof). Depending on the results of the depth sampling, soils below a depth of 12 inches were removed until the reported PCB concentrations were below 10 mg/kg. This removal response was completed at all removal properties except 1520 McDaniel Avenue as discussed below. In areas where the surface soil PCB concentrations were reported at or above 1 mg/kg and the surface soil lead concentrations exceeded the action level of 400 mg/kg, soil between a depth of 12 inches and 24 inches was sampled. If the lead concentration was at or above 400 mg/kg, the soil was removed to a maximum depth of 24 inches.

The property located at 1520 McDaniel Avenue required an alternative removal response action due to elevated PCB concentrations at depth. At this property, PCB concentrations were detected above 10 mg/kg in a composite sample collected from 10 feet to 11 feet bgs. Based on the proximity of the impacted area to the existing on-site structure, P/S and the USEPA agreed to complete a removal to a depth of 3 feet in one portion of the yard and to a depth of 5 feet in an adjacent portion of the same yard area. A geotextile fabric was placed at the bottom of the excavation as a marker layer to indicate the depth of the removal prior to placing backfill material.

Removal actions were conducted in areas where residents had unrestricted access to soil that had PCB concentrations at or above 1 mg/kg. This primarily included open yards, play areas, and gardens. The removal actions did not include improved areas covered with pavement or concrete. Partially improved areas, such as gravel-covered areas used for parking, were evaluated on a case-by-case basis to determine if they provided adequate exposure protection. The removal actions did not extend beyond the staked boundary of each selected property and were not conducted in densely wooded areas, wetland areas, or other areas that were not readily accessible. Also, removal actions were not conducted in areas around trees with a 2-inch or larger caliper, nor around bushes and shrubs unless the owner agreed that the bushes and shrubs could be removed. Where feasible, surface soil was scraped from under the canopy of trees and shrubs to within 2 to 3 feet of the trunk where the feeder roots surfaced; the removed soil was replaced with sod. Large stationary objects such as storage sheds, animal shelters, etc., were not moved, and setbacks around these objects were established. Hand tools and labor were used to minimize setback requirements where such additional activities did not jeopardize the integrity of the subject structures and improvements.

P/S, the USEPA, and the FCP identified 627 residential properties within OU-1/OU-2 with PCB sampling results greater than or equal to 1 mg/kg. P/S were required to complete a removal actions at those 627 properties. Removal actions have been completed at 565 of these properties. Removal actions have not been fully completed at the remaining 62 properties because the properties are currently unsuitable for removal or access has not been provided.

Approximately 129,000 cubic yards of impacted soil were excavated and removed from these properties, and approximately 77 acres of land were restored. Soils excavated as part of the residential removal program with PCB concentrations less than 10 mg/kg based on five-point composite sampling results were disposed of at permitted solid waste management facilities or at either of the on-site disposal facilities located near the Facility—the CSSMA or the south staging and soil management area (SSSMA). Soils with PCB concentrations of 10 mg/kg or greater, but less than 50 mg/kg were disposed of at the Three Corners Regional Landfill in Piedmont, Alabama. Soils with PCB concentrations greater than 50 mg/kg were disposed of at Chemical Waste Management, Inc.'s Toxic Substance Control Act- (TSCA-) permitted disposal facility located in Emelle, Alabama.

The Completion Report (Golder 2015) provides additional details regarding the removal actions performed through December 31, 2014. Additional sampling and removal actions that occur under the NTC Removal Agreement or the Removal Order after December 31, 2014, will be summarized in future addenda to the Completion Report, as necessary.

4.1.3 Remaining Residential Actions

The remaining remedial activities for the residential properties include removals that have yet to be conducted and any activities that may be required for the long-term management of residual constituents at depth or beneath structures.

Properties with PCBs in surface soils at concentrations greater than or equal to 1 mg/kg that have not been addressed under the NTC Removal Agreement will be addressed under the ROD for OU-1/OU-2. However, even under the ROD, completing the removal actions at these properties will be constrained because areas are wooded and not readily accessible or access has not been provided. The candidate remedial areas and long-term soil management areas for the residential properties are shown on Figure 4-1. These areas are not just those areas for soil excavation but in many cases, may utilize long-term management controls as part of the remedy to address residuals following completion of removal actions. The residential properties shown on Figure 4-1 are based on the status of residential removal actions conducted through December 31, 2014, and are color coded to reflect their status. There are five categories of residential properties that comprise the candidate remedial areas and long-term soil management areas. These categories along with the number of properties per category are listed below:

- No access (19 properties) – surface soils with PCBs greater than or equal to 1 mg/kg
- Unsuitable for removal (43 properties)
- Completed removal property with structure(s) remaining (313 properties)
- Completed removal property with PCBs at depth (28 properties)
- Completed removal property with structure(s) remaining and PCBs at depth (67 properties)

4.2 Special Use Properties

As defined in the Stipulation, P/S addressed 54 special use properties in Zones A through D which include those properties located within and outside of the OU-1/OU-2 floodplain. Special use properties include schools, churches, day-care centers, community centers, playgrounds, and parks where persons, primarily children, are likely to spend considerable time. Of these special use properties, 15 required removal in areas defined as high activity; all of those removals have been completed. Details of the previously implemented removal actions on the special use properties are presented in the Completion Report (Golder 2015).

The candidate remedial areas and long-term soil management areas for the special use properties are shown on Figure 4-2. The candidate remedial areas are not just for excavation; in some cases, these areas may utilize long-term management controls as part of the remedy for residuals that remain in place. The special use properties shown on Figure 4-2 are based on the status of removal actions conducted through December 31, 2014, and are color coded to reflect their status. There are four categories of properties that comprise the candidate remedial areas and long-term soil management areas. These categories and the number of properties per category are listed below:

- Completed removal on high activity area and structures remain (7 properties)
- Completed removal property with structures and low activity areas with PCBs in surface soils greater than or equal to 1 mg/kg (3 properties)
- Completed removal property with structures, PCB residuals at depth and low activity areas with PCBs in surface soils greater than or equal to 1 mg/kg (2 properties)
- Completed removal property with PCB residuals at depth and low activity areas with PCBs in surface soils greater than or equal to 1 mg/kg (1 property)
- Low activity areas with PCBs in surface soils greater than or equal to 1 mg/kg (13 properties)

4.3 Interim Measures

This section of the FS identifies candidate remedial areas for previously implemented actions. As described in the OU-1/OU-2 RI, a significant number of IMs have been implemented under regulatory oversight and approvals to reduce the migration of PCBs. These IMs and interim actions are removal actions implemented under the jurisdiction of the RCRA Program and under the PCD. Locations in OU-1/OU-2 where the IMs listed below have been implemented are shown on Figure 2-4:

- Northside Area
- Eastside Area
- Eastside Drainage Way
- Hall Street
- Quintard Mall

The OU-1/OU-2 RI presents detailed summaries of these IMs along with various reference documents (in an electronic appendix). Brief summaries of each of the IMs are presented in the following subsections along with an evaluation of the effectiveness for each IM. A discussion of removal actions conducted for sediment from Snow Creek and four dredge spoil piles that were removed from the banks of Snow Creek are also discussed below.

The overall approach used in evaluating these previously implemented projects is to identify additional actions that may be necessary to integrate the completed projects into the overall remedy for OU-1/OU-2. To that end, this FS includes a separate category of remedial alternatives for these previously implemented projects that focuses on the additional actions that may be necessary for the remedial alternative to be effective over the long term. These additional activities may include physical enhancements to the actions that have already been taken, inspection and long-term operation and maintenance (O&M) activities, and/or deed restrictions. While sediment removal activities from Snow Creek and the removal of dredge spoil piles are discussed below, the potential for additional remediation of these materials is separately addressed under separate categories of remedial alternatives. The candidate remedial areas for dredge spoil piles are identified in Section 4.4, and the

candidate remedial areas for Snow Creek sediment and the associated creek bank areas are identified in Section 4.8.

4.3.1 Northside Area

The Northside Area is located directly north of the Facility (OU-3) and consists of eight Solutia-owned parcels and four parcels owned by others. The Northside Area is bounded to the north by West 10th Street, to the east by Clydesdale Avenue, to the west by West 9th Street, and to the south by the Facility. Norfolk Southern railroad tracks cross through the southern portion of the Northside Area immediately north of the Facility.

In 1995, a program was initiated to purchase property in select areas north (the Northside Area properties) and east (the Eastside Area properties [see Section 4.3.2]) of the Facility. Between 1998 and 2003, IMs were implemented to address PCB-containing soil at the Northside Area. The majority of structures on the properties purchased by Solutia were demolished, storm water management features were installed, and multilayer isolation covers were placed over areas with PCB-containing soils.

Figure 4-3a shows the overall Northside Area along with the extent of the IMs implemented, soil sample locations beneath and immediately surrounding the IM covers, the maximum PCB results associated with each soil sample location, and the locations of groundwater monitoring wells installed in the overall Northside Area. Additional detail is shown on Figures 4-4b through 4-4d including the sample identifications (IDs) for the soil sample locations. Figure 4-3b shows the eastern portion of the Northside Area, Figure 4-3c shows the central portion of the Northside Area, and Figure 4-3d shows the western portion of the Northside Area. The data for the soil sample locations beneath the IM covers and the surrounding areas are presented in the OU-1/OU-2 RI.

4.3.1.1 Summary of IM Activities Completed

The IMs for the Northside Area were conducted in three stages between 1998 and 2003:

- In 1998, IMs were completed with the goal of isolating PCB-containing soils and sediments in the Northside Area. The 1998 IMs consisted of covering and containing PCB-containing soils on Solutia-owned properties and constructing a comprehensive storm water management system. Soil isolation covers were installed over approximately 7.5 acres of the Northside Area and included placing a geotextile demarcation layer and a minimum 14-inch vegetated soil cover layer. The new storm water management system included constructing multiple storm water management structures (i.e., inlet manholes, a 42-inch high-density polyethylene [HDPE] pipeline, a concrete box culvert), drainage swales between Solutia-owned property and adjacent properties, and a containment berm. A chain-link security fence was also installed/replaced around the IM area.
- Following Solutia's purchase of properties in the eastern portions of the Northside Area in 2000, additional IM construction activities were undertaken to extend the IMs completed during 1998. The 2000 IM extension work included constructing vegetated soil isolation covers and asphalt isolation covers as well as installing/replacing chain-link security fence around the newly acquired Solutia-owned properties. The isolation covers included placing a nonwoven geotextile fabric in areas with PCB concentrations less than 500 mg/kg and an HDPE geomembrane liner in areas with PCB concentrations greater than 500 mg/kg prior to constructing the covers. A minimum 14-inch-thick vegetated soil isolation cover was installed in non-traffic areas, and an asphalt isolation cover was installed in traffic areas. As shown on Figures 4-3b and 4-3c, all areas with PCB concentrations in excess of 500 mg/kg were covered with HDPE prior to constructing the soil cover with the exception of sample NPSL 51. An HDPE cover was not placed at this location. NPSL 51 represents a single, isolated location

on the south side of the Northside Area adjacent to the Norfolk Southern Railroad tracks that is isolated with soil and a vegetative cover and surrounded by soil samples with PCB concentrations less than 500 mg/kg.

- In 2003, additional IM activities were implemented at the Northside Area as a result of siting a Lafarge North America (Lafarge) concrete plant within the boundaries of the Northside Area on property Solutia leased to Lafarge. The work was initiated to preserve the integrity of the existing IMs by constructing additional engineering controls and infrastructure elements to accommodate the changed use of the property. This new IM work included constructing a concrete cover over the majority of the leased plant footprint, a water-recycling pond and wash bins, a new access road, and a concrete arch culvert to allow adequate drainage through the existing drainage swale.

The OU-1/OU-2 RI provides additional information regarding each stage of the IMs constructed at the Northside Area.

4.3.1.2 Monitoring and Maintenance

Long-term monitoring of the Northside Area IMs is conducted in accordance with the *Comprehensive Operations and Maintenance Plan for Remedial/Corrective Action Projects* (Comprehensive O&M Plan, Revision 3.1; Solutia 2014). The monitoring consists of quarterly inspections of the Northside Area IMs including visual inspections of the installed isolation covers (i.e., vegetated soil covers, asphalt covers, and concrete covers), storm water management features (i.e., berms, manholes, pipes, culverts, drainage ditches), and security features (i.e., fences, gates, and locks). Additional inspections are conducted following storm events with more than 3 inches of precipitation in a 24-hour period. The vegetative soil covers are inspected quarterly to document the condition of the cover system by identifying poorly vegetated areas, whether mowing and/or seeding/fertilizing are needed, differential settlement producing areas of ponding, significant surface erosion, exposure of underlying geosynthetic layers, significant surface soil cracking, or other disturbances. Similarly, the asphalt and concrete covers are inspected to document their condition by identifying the presence of cracks in the surface, growth of vegetation in the cracks, presence of potholes, and areas of subsidence that may allow surface water ponding.

Routine maintenance of the vegetative soil covers includes mowing the grass as needed. Additionally, repairs and maintenance of the installed isolation covers, storm water management features, and security features are performed, as needed, based on the findings of the quarterly inspections.

The results of the monitoring/inspection activities and associated maintenance/repair activities are recorded on area-specific inspection forms and maintenance/repair logs presented with the Comprehensive O&M Plan. These forms/logs serve to document the findings of the quarterly inspections and track necessary maintenance and repairs. Copies of the quarterly inspection and maintenance logs are maintained at the Facility.

4.3.1.3 Groundwater Monitoring

Groundwater monitoring has been performed to evaluate potential impacts to groundwater at the Northside Area. During the OU-3 investigations, impacted groundwater was identified on the western end of the Northside Area at monitoring well OW-21A (shown on Figures 4-3a and 4-3c). As reported in the *Report on Operable Unit 1/Operable Unit 2 Non-Residential Groundwater Investigations* (Solutia 2008), the presence of constituents at this well are attributed to releases from OU-3 and are being addressed under the remedial action for that OU.

Additional monitoring wells T-08, T-09, T-10, and T-12 were installed within the limits of the Northside Area to investigate potential groundwater impacts farther downgradient of OW-21A (monitoring wells

T-09 and T-10) and potential impacts associated with higher concentration PCBs underlying the existing covers at the Northside Area (monitoring wells T-08 and T-12). Temporary monitoring wells T-08 and T-12 were installed downgradient of the Former Anniston Iron Works Building and Brown's Auto Repair, an area that includes higher concentrations of PCBs in soil overlain by a geomembrane cover. The locations of these four monitoring wells are shown on Figures 4-3b and 4-3c. These temporary wells were installed and sampled in April 2008, and the groundwater sampling results were reported to the USEPA in June 2008 (Solutia 2008). The analytical results for the groundwater samples collected from monitoring wells T-08, T-09, T-10, and T-12 were nondetect for all PCB Aroclor analyses and nondetect for all PCB homolog analyses, with the exception of monitoring well T-09 where the total PCB homolog result was an estimated concentration of 1.04 µg/L.

The groundwater monitoring results indicate that the PCB-containing soils under the isolation covers (including the geomembrane isolation covers installed in areas that showed higher concentrations of PCBs in soil) are not causing impacts to the groundwater at the Northside Area and that the installed IM isolation covers on the Northside Area properties are effective at protecting against impacts to groundwater. Additionally, the groundwater results for monitoring wells T-09 and T-10 indicate that concentrations detected in monitoring well OW-21A do not extend to the northern property boundary (West 9th Street) and extend less than 180 feet downgradient from monitoring well OW-21A.

4.3.1.4 Data Evaluation

The existing soil data for the Northside Area were evaluated to assess the adequacy of the existing IMs and to determine whether additional IM activities should be implemented (e.g., to extend isolation covers or conduct removal actions). Specifically, soils with PCBs concentrations greater than or equal to 50 mg/kg and not covered were identified as candidate remedial areas. Addressing these soils also lowered the EPC for the Northside Area to below the nonresidential PRG of 21 mg/kg. The review also assessed locations where soils had PCB concentrations greater than or equal to 500 mg/kg (potential principal threat waste [PTW]) from the perspectives of mobility and toxicity.

The two individual sample locations with PCB concentrations greater than or equal to 50 mg/kg that were not covered during the previous IM activities include sample ESL93 (156 mg/kg; Figure 4-3b) and sample PB-ASP-08 (93 mg/kg; Figure 4-3c). Sample ESL93 was collected on the eastern side of the Northside Area near Brown's Auto Repair and adjacent to Clydesdale Avenue from a small area in the parking lot of the repair shop that was not paved due to the existing utility pole. Sample PB-ASP-08 was collected just north of the fence line along West 9th Street, east of Bancroft Avenue.

There are two areas in the Northside Area with PCB concentrations above 500 mg/kg. One area is in the south-central portion of the Northside Area (sample NPSL51; Figure 4-3c) with a PCB concentration of 1,850 mg/kg. As part of the Northside Area IMs, a soil-geotextile cover was installed to reduce the exposure of potential receptors to contaminants in soil and reduce the potential for migration of contaminants to surface water. Additionally, security fences, gates, and locks were installed to prevent unauthorized access to the Northside Area. Groundwater impacts in this area are currently being addressed as part of the OU-3 remedy. Based on these findings, the area is not considered a PTW for OU-1/OU-2.

The second area with concentrations above 500 mg/kg in the Northside Area is in the northeast portion of the area. Nine sample locations within this general area were identified with PCB concentrations above 500 mg/kg. The PCB concentration results ranged from 502 mg/kg to 2,810 mg/kg (Figure 4-3b). A combination of soil, asphalt, and HDPE multilayer covers have been constructed over this area to reduce the exposure of potential receptors to contaminants in soil, reduce the potential for migration of contaminants to surface water, and reduce infiltration and the potential migration of constituents to groundwater. Security fences, gates, and locks were installed around the area to limit unauthorized entry. Two groundwater wells were installed as part of the

OU-1/OU-2 groundwater investigations to monitor groundwater conditions immediately downgradient of this area. Results from these wells (T-08 and T-12) indicated no impacts to groundwater; these wells were abandoned in 2013. Soils in this portion of the Northside Area are not considered to be a PTW. This finding is based on the lack of groundwater impacts and the access control that have been implemented to prevent contact with and to control the potential migration of PCB-containing soils.

4.3.1.5 Effectiveness Evaluation

The IMs previously constructed over the Northside Area effectively reduce the exposure of PCBs to potential receptors and prevent the potential migration of contaminants over most of the area. The isolation covers effectively impede contact with the underlying PCB-containing soils and reduce the potential for erosion and migration of these soils to surface water. The installed storm water management features convey storm water in a controlled manner and are effective at reducing the potential for erosion and transport of PCB-containing soils via surface water. Additionally, the installed security features (i.e., fencing) and the fact that the majority of the Northside Area properties are vacant and owned by Solutia further limit potential exposure to PCB-containing soils underlying the IM covers.

The ongoing quarterly inspection and maintenance program at the Northside Area is effective at documenting the condition of the constructed IMs and at identifying when and where repairs are needed to maintain the integrity of the Northside Area IMs.

The PCB-containing soils under the isolation covers are not considered a mobile source material and are not impacting groundwater, and the soils with high concentrations of PCBs under the isolation covers are not considered a PTW.

Expansion of the existing IM as proposed at locations of samples ESL93 and PB-ASP-08 (Figure 4-4) would complete the geographic coverage of the Northside Area IMs, reduce the exposure of potential receptors to PCB-containing soils, and prevent the potential migration of contaminants to surface water.

Following the completion of the final remedy, an O&M manual would be prepared for OU-1/OU-2 detailing the monitoring and maintenance requirements for the Northside Area IMs. The OU-1/OU-2 O&M manual would build upon the existing Comprehensive O&M Plan.

The IMs installed at the Northside Area, with the expansion described above, would reduce exposure of potential receptors to PCB-containing soils and reduce the potential for migration of contaminants to surface water. Following the expansion of the IMs, surface soils in the Northside Area would have a PCB EPC value that is below the nonresidential PRG of 21 mg/kg. The IMs, through a combination of previously implemented IMs and the IM expansion shown on Figure 4-4, and implementation of the long-term inspection/maintenance program would provide an effective remedy for the PCB-containing soils identified at the Northside Area over the long term.

Remedial alternatives for the IM areas are evaluated in Section 7.4 of this FS. Other than the no action alternative, these alternatives incorporate the previously implemented IMs including the Northside Area, actions in the proposed enhancement areas including the Northside Area, long-term O&M for all the IMs, and the use of deed restrictions. The remedial alternatives for the IMs as a whole, inclusive of the Northside Area, are evaluated on a comparative basis in Section 8 of this FS.

4.3.2 Eastside Area

The Eastside Area is located directly east of the Facility (OU-3) and consists of 20 Solutia-owned parcels and 14 parcels owned by others. The Eastside Area is bounded by West 10th Street to the north, Clydesdale Avenue to the west, Highway 202 to the south, and Montrose Avenue to the east. Figure 4-5a shows the overall Eastside Area. Additional detail is provided on Figures 4-5b through

4-5d to highlight PCB concentrations that are isolated by the IMs and where the concentration of PCBs is outside of the IM's geographic coverage. There are six abandoned residential properties located within the bounds of the Eastside Area with structures that have either been removed or are uninhabitable. These six properties are being addressed under the NTC Removal Program because the area was once used for residential purposes and is still zoned residential.

Between 1995 and 2012, multiple IMs were implemented to address PCB-containing soil. In general, the IMs at the Eastside Area included demolishing structures on the Solutia-owned properties, constructing multilayer soil covers over PCB-containing soils, installing perimeter fencing, and constructing storm water management features.

Figure 4-5a shows the overall Eastside Area along with the extent of the IMs implemented, soil sample locations beneath and surrounding the IM covers, the maximum PCB results associated with these soil samples, and the locations of groundwater monitoring wells installed in the overall Eastside Area. Figures 4-5b through 4-5d show subset areas of these properties along with the sample IDs for the soil sample locations in the Eastside Area. The data for the soil sample locations beneath the IM covers and the surrounding areas are presented in the OU-1/OU-2 RI.

4.3.2.1 Summary of IM Activities Completed

The IMs for the Eastside Area were conducted in five stages between 1995 and 2012:

- In 1995, IMs were implemented at the Eastside Area to address the highest concentration PCBs encountered as shown on Figure 4-5d. Soil was removed and a geomembrane liner was placed over the area in a topographic low point that collected surface water runoff from portions of OU-3. This topographic low point was the area where a sample had a PCB concentration of 203,000 mg/kg. The soils in this area were excavated and shipped to the Chemical Waste Management facility located in Emelle, Alabama, for disposal.
- In 1997, IMs were implemented at the Eastside Area to contain PCB-containing soils and sediments on Solutia-owned properties and to manage storm water flow. Soil isolation covers were constructed over approximately 14.5 acres in the Eastside Area. The soil isolation cover construction included a geotextile demarcation layer and a minimum 14-inch vegetated soil cover layer. Along portions of an existing drainage ditch where the highest concentrations of PCBs were detected (i.e., PCB concentrations greater than 500 mg/kg), the isolation cover included a geotextile demarcation layer, soil backfill material, an HDPE geomembrane liner or a composite HDPE/bentonite liner, and a minimum 14-inch vegetated soil cover layer. Several storm water management features on the south side of the Eastside Area were constructed to collect and convey storm water runoff to the permitted NPDES discharge point on the south side of West 10th Street. The IM also included constructing storm water management features to collect and convey storm water beneath West 10th Street and across the Eastside Drainage Way. In addition, security fencing, gates, and locks were installed around areas where the isolation covers were constructed.
- In 1998, IM work was implemented at the location of the former Bethel Missionary Baptist Church as a continuation of the 1997 IM construction work. The 1998 IM activities included demolishing the former church structure and constructing a soil cover over the area consistent with the cover installed during the 1997 IM work (i.e., geotextile marker layer and a minimum 14-inch-thick vegetated soil isolation cover).
- In 1999, IM construction activities were conducted at the Mars Hill Missionary Baptist Church property. The 1999 IM activities included constructing a vegetated soil isolation cover over areas south and west of the church structure.

- In 2001, IMs were completed at two newly acquired Solutia properties (referred to as the Icehouse property). The IMs included constructing a vegetated soil isolation cover over portions of the property without asphalt and installing a perimeter fence around the property.
- In 2012, the former Mars Hill Missionary Baptist Church structure was demolished and a soil isolation cover was constructed over approximately 0.84 acres at the property in the footprint of the former structure.

Additional information regarding each stage of the IMs constructed at the Eastside Area is provided in the OU-1/OU-2 RI.

4.3.2.2 Monitoring and Maintenance

Long-term monitoring of the Eastside Area IMs is conducted in accordance with the Comprehensive O&M Plan. The monitoring consists of quarterly inspections of the Eastside Area IMs as well as inspections following storm events with more than 3 inches of precipitation in a 24-hour period. Similar to the Northside Area, the Eastside Area monitoring program includes visual inspections of the installed isolation covers, storm water management features (i.e., detention pond, berms, piping, culverts, emergency spillways), and security features (i.e., fences, gates, and locks). The vegetative soil covers are inspected to document the condition of the covers by identifying poorly vegetated areas, whether mowing and/or seeding/fertilizing are needed, differential settlement producing areas of ponding, significant surface erosion, exposure of underlying geosynthetic layers, significant surface soil cracking, or other disturbances.

Routine maintenance of the vegetative soil covers includes mowing the grass. Additionally, repairs and maintenance of the installed isolation covers, storm water management features, and security features are performed as needed based on the inspections.

The results of the monitoring/inspection activities and associated maintenance/repair activities are recorded on area-specific inspection forms and maintenance/repair logs presented in the Comprehensive O&M Plan. These forms serve to document the findings of the inspections and track necessary maintenance and repairs. Copies of the inspection and maintenance logs are maintained at the Facility.

4.3.2.3 Groundwater Monitoring

Groundwater monitoring has been performed to evaluate potential impacts to groundwater at the Eastside Area. Groundwater monitoring was conducted on the southern portion of the Eastside Area as part of earlier OU-3 investigations. The locations of groundwater monitoring wells installed in the vicinity of the Eastside Area are shown on Figures 4-5a through 4-5d.

Monitoring well OW-09 and temporary monitoring well T-03 are located along the western (upgradient) boundary of the Eastside Area and serve as sentinel wells for groundwater migrating from the west beyond the Facility (OU-3) property. Analytical results for groundwater samples collected in June and July 2005 indicated that all COPCs, including PCBs, were below MCLs or USEPA Region 9 PRGs in these wells (Golder 2010a.). Monitoring well OWR-09S (Figure 4-5c) represents groundwater conditions in the central-eastern portion of the Eastside Area. This monitoring well was sampled in 1998; no COPCs (including PCBs) were detected above MCLs or the PRGs.

The groundwater data associated with monitoring well OW-10, located at the eastern perimeter of the Facility (OU-3) indicated that groundwater with PCB detections was potentially migrating to the Eastside Area. However, in 2013, as part of the remedial design investigation for OU-3, a temporary monitoring well (T-20) was installed along the western boundary of the Eastside Area downgradient

from well OW-10, and the results showed no detection of PCBs above the MCL. Any impacts associated with well OW-10 are being addressed under the remedial action for OU-3.

For locations monitored on the Eastside Area, the groundwater results indicate that the PCB-containing soils under the isolation covers (including the geomembrane isolation covers installed in areas that showed higher concentrations of PCBs in soil) are not causing impacts to groundwater and that the installed IM isolation covers on the Eastside Area properties are effective at protecting against impacts to groundwater.

4.3.2.4 Data Evaluation

The existing soil data for the Eastside Area were evaluated to assess the adequacy of the existing IMs and determine whether additional IM activities should be implemented (e.g., to extend IM covers or conduct removal actions). Specifically, soil data with elevated levels of PCBs located outside of the limits of the Eastside Area IM covers with concentrations greater than or equal to 50 mg/kg were reviewed. The PCB EPC for the Eastside Area is already less than the nonresidential PRG of 21 mg/kg and so the evaluation focused on samples with PCB concentrations greater than or equal to 50 mg/kg that were not isolated by an IM cover. The review also assessed locations where soils had PCB concentrations greater than or equal to 500 mg/kg (potential PTW) from the perspectives of mobility and toxicity. A summary of these candidate remedial areas for the Eastside Area are described below:

- There are two sample locations in the northern portion of the Eastside Area adjacent to the south side of 10th Street including: WEL042 (82 mg/kg) and GASCOSL07 (57 mg/kg). These two sample locations are immediately adjacent to the limits of the existing cover shown on Figure 4-6a. In the area where these samples were collected adjacent to existing roads, the cover limits taper off to match existing grades. Sample GASCOSL07 is located inside the fenced portion of the Eastside Area, and sample WEL042 is located outside the fence.
- There is one sample is located in the central portion of the Eastside Area properties inside the existing fence with a concentration greater than or equal to 50 mg/kg (Figure 4-6b). The previously constructed cover does not extend over this sample location that has a PCB concentration of 261 mg/kg (SED1430R225).
- There are two samples are located in the southern portion of the Eastside Area that are just north of Highway 202. The area where the samples were collected is heavily wooded and inaccessible. These two sample locations (SED0010R25 [95 mg/kg] and SED0010R50 [72 mg/kg]) are shown on Figure 4-6c.

As shown on Figure 4-5a through 4-5d, there are four general locations in the Eastside Area with PCB concentrations above 500 mg/kg. One of the general locations is in the northern portion of the Eastside Area and is shown on Figure 4-5b. Four sample results for this general area (SED1750, SED1800L100, SED1800L50, and WELPP-005) were above 500 mg/kg, and the PCB concentrations ranged from 510 mg/kg to 2,482 mg/kg. As part of previously implemented IMs, engineered covers (soil-geotextile and soil-HDPE) were constructed in this area to reduce the exposure of potential receptors to contaminants in soil and reduce the potential for migration of contaminants to surface water and groundwater. Security fences, gates, and locks were installed around the Eastside Area and are maintained to limit unauthorized entry. While no monitoring wells are located immediately downgradient of this location, the monitoring wells on the northern portion of the Eastside Area are both downgradient and physically proximate. Groundwater monitoring results from these three wells indicated no groundwater impacts from PCBs. Based on a combination of the access controls that are already in place and the lack of groundwater impacts, soils in this portion of the Eastside Area are not considered to be a PTW for OU-1/OU-2.

The second general location with potential PTW is the central portion of the Eastside Area (Figure 4-5c). Five sample results (SED1300, SED-5, SED1000, SED0805, and SED-C3) from this portion of the Eastside Area were above 500 mg/kg, and the PCB concentrations ranged from 605 mg/kg to 3,130 mg/kg. The cover constructed over these five sample locations is a soil-HDPE geomembrane liner. This area is also protected by security fences, gates, and locks that prevent unauthorized entry. Monitoring well OWR-09S is located downgradient of this area, and the results of samples collected from this well and analyzed for PCBs indicated no groundwater impacts. Based on the access controls that are already in place to prevent contact and erosion with the underlying PCB-containing soil, and the lack of groundwater impacts, soils in this portion of the Eastside Area are not considered to be a PTW for OU-1/OU-2.

The third general location in the Eastside Area with potential PTW is in the south-central portion of the Eastside Area (Figure 4-5d). There were 20 samples collected from this portion of the Eastside Area with PCB concentrations above 500 mg/kg and the concentrations ranged from 550 mg/kg to 203,000 mg/kg. These PCB results represent conditions prior to the implementation of the Eastside Area IM that included a combination of removal action activities and placement of a geomembrane liner over the excavation area. The removal action activities included excavation of the area where the soil sample with a PCB concentration of 203,000 mg/kg that was shown in the OU-1/OU-2 RI was collected. The PCB data associated with the soils that were removed has also been deleted from the figure, and the PCB concentrations following the removal activities (40,000 mg/kg) are now used to represent conditions in this area. The soils that were removed were shipped to the Chemical Waste Management facility located in Emelle, Alabama, for disposal.

The area where the soils were removed is a topographic low point that collected surface water runoff from portions of OU-3, including the South Landfill. The low-lying nature of this area and the collection of surface water runoff were eliminated by implementing the Eastside Area IMs. The cover constructed over these sample locations is a soil-HDPE geomembrane liner. The overall area is also protected by security fences, gates, and locks that prevent unauthorized entry. Although no groundwater monitoring wells are located immediately adjacent to this area, monitoring well OWR-09S is located downgradient; the results from this well indicate that there are no groundwater impacts. While access controls are in place, no impacts to groundwater have been observed and removal actions were implemented; these materials are not considered to be a PTW for OU-1/OU-2.

The fourth potential PTW area is in the southern portion of the Eastside Area (Figure 4-5d). Only one sample was collected at this location (SED0010) with a PCB concentration above 500 mg/kg (1,340 mg/kg). The area from where the sample was collected is covered with a soil-HDPE geomembrane liner. Although the area is not inside the fenced portion of the Eastside Area, the sample location is currently covered to prevent contact and migration, and the area is difficult to access due to the embankment slope for Highway 202 and dense vegetation present. Well OWR-09S is located downgradient, and no groundwater impacts have been observed. Based on the engineering cover that is already in place and the lack of groundwater impacts, soils in this portion of the Eastside Area are not considered to be PTW for OU-1/OU-2.

As described above, groundwater impacts have not been encountered at the wells installed within the Eastside Area. This is consistent with the Aroclor distribution of the soil samples collected at the Eastside Area, which do not include lower-weight Aroclors (Aroclor 1016, 1221, and 1232) typically associated with groundwater impacts. Additionally, groundwater migration is controlled by natural conditions in the area. Migration is limited because the rate of groundwater flow is very low (typically around 0.5 feet/year to 5 feet/year measured within OU-3) and there are natural processes (natural adsorption) that further slow the rate of PCB movement. These conditions limit the rate of migration of constituents from the Eastside Area.

4.3.2.5 Institutional Controls

As part of the RFI, deed restrictions were placed on the Solutia Facility and certain properties owned by Solutia surrounding the Facility, including within a portion of the Eastside Area. A notation was recorded on the deed restricting future use of the property for industrial purposes only and restricting the use of groundwater underlying the area.

4.3.2.6 Effectiveness Evaluation

The IMs previously constructed over the Eastside Area effectively reduce the exposure of PCBs to potential receptors and prevent the potential migration of contaminants over most of the area. The isolation covers effectively impede contact with the underlying PCB-containing soils and reduce the potential for erosion and migration of these soils to surface water. The installed storm water management features act to convey storm water in a controlled manner and are effective at reducing the potential for erosion and transport of PCB-containing soils via surface water. Additionally, the installed security features (i.e., fencing) and the fact that the majority of the Eastside Area properties are vacant and owned by Solutia further limit potential exposure to PCB-containing soils underlying the IM covers.

The ongoing inspection and maintenance program at the Eastside Area is effective at documenting the conditions of the constructed IMs and at identifying when and where repairs are needed to maintain the integrity of the Eastside Area IMs. This program or a similar program would be required over the long term to maintain the effectiveness of the IMs as part of a final remedy. Following the completion of the final remedy, an O&M manual would be prepared for OU-1/OU-2 to detail the long-term monitoring and maintenance requirements for the Eastside Area. The OU-1/OU-2 O&M manual will be based upon the existing Comprehensive O&M Plan. Expansion of the existing IM is proposed at locations of samples WEL042, GASCOSL07, SED1430R225, SED0010R25, and SED0010R50, which are shown on Figure 4-6a, 4-6b, and 4-6c, would complete the geographic coverage of the Eastside Area IMs and reduce the exposure of potential receptors to PCB-containing soils and prevent the potential migration of contaminants to surface water.

The PCB-containing soils under the isolation covers in the Eastside Area are not considered a mobile source material and are not causing impacts to the groundwater (described above in Sections 4.3.2.3 and 4.3.2.4) or surface water. The materials are also isolated from direct contact by covers and from the perspectives of mobility and toxicity, are not considered a PTW. Following implementation of the enhancements shown on Figures 4-6a through 4-6c, the IMs installed at the Eastside Area, in combination with inspections, long-term O&M, and land use restrictions, would constitute permanent remedies that effectively reduce potential exposure to and migration of PCB-containing soils.

Remedial alternatives for the IM areas are evaluated in detail in Section 7.4 of this FS and on a comparative basis in Section 8 of this FS.

4.3.3 Eastside Drainage Way (through the former Miller Property)

IMs were implemented to address PCB-containing soil at the Eastside Drainage Way located on the Former Miller Property prior to its use as a soil management area under the residential removal program. The approximately 9-acre property includes two property parcels—both owned by Solutia. The Eastside Drainage Way property is located north of West 10th Street, east of Clydesdale Avenue, west of McDaniel Avenue, and south of the Norfolk Southern railroad tracks.

The Eastside Drainage Way includes areas approved by the USEPA for final disposition of soil removed under the NTC Residential Removal program. Prior to construction of the CSSMA, an IM was implemented on the property in 1997 to address existing PCB-containing soils on the property and manage storm water. Figure 4-7 shows the extent of the IM implemented in 1997 at the Eastside Drainage Way property along with the closed CSSMA cells.

4.3.3.1 Summary of IM Activities Completed

The 1997 IM at the Eastside Drainage Way property was completed in conjunction with the IM construction at the Eastside Area. The IM at the Eastside Drainage Way property included a soil isolation cover over approximately 3.1 acres. The soil isolation cover consisted of a geotextile demarcation layer and a minimum 14-inch vegetated soil cover layer. Along portions of an existing drainage ditch, the isolation cover included a geotextile demarcation layer, soil backfill material, a HDPE geomembrane liner or a composite HDPE/bentonite liner, and a minimum 14-inch vegetated soil cover layer. The IM also included construction of storm water management features to collect and convey storm water across the property and underneath the Norfolk Southern railway tracks to the 11th Street Ditch. These storm water management features included a precast concrete box culvert conveying flow under West 10th Street, a concrete headwall at the downstream end of the box culvert, and an open channel (portions of which are lined with riprap) conveying storm water to an existing concrete box culvert under the railroad tracks. In addition, security fencing, gates, and locks were installed around areas where the isolation covers were constructed.

The isolation covers included placing an HDPE geomembrane liner in areas with higher PCB concentrations (i.e., areas with PCB concentrations greater than 500 mg/kg). As shown on Figure 4-7 almost all areas with PCB concentrations in excess of 500 mg/kg were covered with an HDPE geomembrane liner prior to constructing the soil cover. The one exception was the area where sample ASED450R25 was located on the north end of the property near the Norfolk Southern Railroad.

Additional information related to the Eastside Drainage Way/Former Miller Property IM work is provided in the OU-1/OU-2 RI.

4.3.3.2 Monitoring and Maintenance

Long-term monitoring of the Eastside Drainage Way property IMs is conducted in accordance with the Comprehensive O&M Plan (Solutia 2014). The monitoring consists of monthly inspections as well as inspections following significant storm events (i.e., more than 3 inches of precipitation in a 24-hour period). The monitoring program includes visual inspections of the installed isolation covers, drainage ditches/channels, and security features (i.e., fences, gates, and locks). The vegetative soil cover is inspected to document the condition of the cover by identifying poorly vegetated areas, whether mowing and/or seeding/fertilizing are needed, differential settlement producing areas of ponding, significant surface erosion, exposure of underlying geosynthetic layers, significant surface soil cracking, or other disturbances.

Routine maintenance of the vegetative soil covers includes mowing the grass. Additionally, repairs and maintenance of the installed isolation covers, drainage channels, and security features are performed based on the findings of the inspections.

The results of the quarterly monitoring/inspection activities and associated maintenance/repair activities are recorded on area-specific inspection forms and maintenance/repair logs presented in the Comprehensive O&M Plan. These forms serve to document the findings of the inspections and track necessary maintenance and repairs. Copies of the inspection and maintenance logs are maintained at the Facility.

4.3.3.3 Groundwater Monitoring

Monitoring wells installed and sampled as part of the Eastside Drainage Way property represent groundwater conditions at the northern downgradient portion of this area and confirm that there are no groundwater impacts originating from these areas. Three groundwater monitoring wells (CMW-1, CMW-2, and CMW-3) were installed around the perimeter of the property, as shown on Figure 4-7. The installation, development, and sampling of these wells are documented in the *Central Staging and Soil Management Area (Former Miller Property) Baseline Monitoring Well Installation and Sampling*

Report (Solutia 2004). Groundwater was sampled and analyzed from these three monitoring wells in August 2004. The analytical results from this sampling event indicated that only one parameter (thallium) was detected in one well (CMW-3) above the detection limits and the associated MCLs or USEPA Region 9 PRGs (thallium was detected at an estimated concentration of 5 µg/L [compared to the MCL of 2 µg/L], but the duplicate sample collected from the same monitoring well was less than the reporting limit). The results show that PCB-containing soils present on the Eastside Drainage Way have not resulted in groundwater impacts.

4.3.3.4 Data Evaluation

The existing soil data for the Eastside Drainage Way property were evaluated to assess the adequacy of the existing IMs and determine whether additional IM activities should be implemented (e.g., extend IM covers or conduct removal actions). Specifically, soil with levels of PCBs greater than or equal to 50 mg/kg located outside of the limits of the Eastside Drainage Way IM covers and achieving an EPC for the IM area that is below the nonresidential PRG of 21 mg/kg. Locations with soil PCB concentrations greater than or equal to 500 mg/kg (potential PTW) were also reviewed as part of this evaluation. A summary of these sample locations is presented below:

- There is one sample location on the IM cover (Figure 4-7) with PCB concentrations greater than or equal to 500 mg/kg (i.e., the 0.5- to 1-foot horizon from sample CA-05-1782-05 [610 mg/kg]). The PCB concentration for the 0- to 0.5-foot portion of this sample was 170 mg/kg with the resulting surface soil PCB concentration for the 0- to 1-foot horizon being 390 mg/kg. There were three other sample locations for this IM where PCBs were detected in the IM cover. These three sample locations and the associated PCB concentrations for the 0- to 6- and 6- to 12-inch intervals include CA-05-1782-03 (15 and 33 mg/kg), CA-05-1782-04 (22 and 46 mg/kg), and CA-05-1782-06 (14 and 28 mg/kg). As described in the RI, various construction activities including the construction of the east and west cells of the CSSMA occurred at this property after construction of the IM. Based on these data, it appears that the previously constructed IM was disturbed during these construction efforts and the cover system needs to be reestablished.
- There are seven sample locations just to the north of the Eastside Drainage Way (Figure 4-7) with elevated concentrations of PCBs that were not covered as part of the previous IMs or as part of the 11th Street Ditch project (described in Section 4.3.6.1). The PCB concentrations for these samples range from 39 mg/kg to 279 mg/kg and include ASED300 (130 mg/kg), ASED350 (39 mg/kg), ASED400 (77 mg/kg), ASED450 (106 mg/kg), ASED500 (82 mg/kg), ASED550 (279 mg/kg), and SED C-1 (41 mg/kg). These samples are located within the ditch adjacent to the Norfolk Southern railroad that drains to the north beneath the railroad into the 11th Street Ditch.
- There is one sample in a low-lying area located to the northeast that is considered to be part of the Eastside Drainage Way area (PB-RR-37) with a PCB concentration greater than or equal to 500 mg/kg. This surface soil sample has a PCB concentration of 3,700 mg/kg and is located near the intersection of McDaniel Avenue and the railroad tracks (Figure 4-8).

The Eastside Drainage Way includes four sample locations (ASED250, ASED400R25, ASED100R50, CA-05-1782-05) in the central portion of the property with PCB concentrations above 500 mg/kg (PCB concentrations ranging from 610 mg/kg to 1,200 mg/kg) and one sample located to the northeast (PB-RR-37) with a PCB concentration of 3,700 mg/kg. These five sample locations are shown on Figure 4-8. As part of previous IMs, isolation covers were constructed in the area to reduce the exposure of potential receptors and reduce the potential for migration of contaminants to groundwater and surface water. Security fences, gates, and locks were installed around the area and are

maintained to prevent unauthorized entry into the area. The property is also under formal deed restrictions. While two of the five locations with a PCB concentration greater than or equal to 500 mg/kg are not currently under a cover (CA-05-1782-05 and PB-RR-37), impacts to groundwater were assessed and are not present. Groundwater at the property was evaluated with data collected from three wells including well CMW-3, located approximately 250 feet downgradient of soil sample CA-05-1782-05. The soils within the Eastside Drainage Way property are not considered to be a PTW from a mobility perspective or from a toxicity perspective since the highest concentration soils at location CA-05-1782-05 are not exposed to direct contact, the surface soil PCB concentration for sample CA-05-1782-05 is 390 mg/kg, and the soils at locations PB-RR-37 are in a railroad right-of-way and thus not readily accessible.

4.3.3.5 Institutional Controls

Following the completion of the IM and construction of the final closure cover system at the CSSMA, deed restrictions were placed on the two parcels where the Eastside Drainage Way is located. A notation was recorded on the deed identifying the locations and dimensions of the CSSMA cells, restricting future use of the property for only commercial and/or industrial purposes, restricting the installation of groundwater supply wells, and identifying requirements associated with the long-term maintenance of the final cover.

4.3.3.6 Effectiveness Evaluation

Expansion of the existing IM is proposed as shown on Figure 4-8. Once the enhancements to the IM area are completed, the IM implemented at the Eastside Drainage Way property will reduce exposure of potential receptors to underlying PCB-containing soils and reduce the potential for migration of contaminants to surface water. The isolation covers or removal will effectively impede contact with the underlying PCB-containing soils and reduce the potential for erosion and migration of these soils. The constructed storm water management features (i.e., ditches and drainage channels), which channel storm water through the property, reduce the potential for erosion of the soil covers at the property and reduce the potential for migration of contaminants from the soil to surface water. The deed restrictions implemented on the property limit the potential exposure, restricting future land use, and protecting the integrity of the IM. Additionally, the installed security features (i.e., fencing over much of the area) and the fact that the properties are vacant further limit potential exposure to PCB-containing soils under the cover system.

The inspection and maintenance program at the Eastside Drainage Way is effective at documenting the conditions of the installed IM and at identifying when and where repairs are needed to maintain the integrity of the IM.

The PCB-containing soils at the Eastside Drainage Way property are not PTW based on the lack of groundwater impacts and that the high concentration materials are not readily accessible.

Following the completion of the final remedy, an O&M Manual for OU-1/OU-2 will be prepared that will detail the long-term monitoring and maintenance requirements for the Eastside Drainage Way. The OU-1/OU-2 O&M Manual will build off of the existing Comprehensive O&M Plan (Solutia 2014).

4.3.4 Hall Street Properties

Between 2004 and 2006, an interim cap was constructed to address PCB-containing soil at three adjacent property parcels located along Hall Street (collectively referred to as the Hall Street properties) in Oxford, Alabama. The Hall Street properties are owned by the Oxford Water and Sewer Board. The properties were originally sampled as part of the Removal Order. However, the properties were limited to nonresidential use after completion of the interim cap. A deed restriction was placed preventing future residential use of the properties, and the properties were rezoned as a flood control zone.

4.3.4.1 Summary of Interim Activities Completed

The cap implemented at the Hall Street properties consisted of a soil isolation cover (geotextile marker layer, 12-inch soil cover, and vegetative cover) over approximately 1.3 acres to isolate PCB-containing soil at these properties.

Figure 4-9 shows the extent of the interim cap installed at the Hall Street properties, the soil sample locations beneath the cover, the maximum PCB results associated with these soil sample locations, and the location of groundwater monitoring well T-16 installed at the Hall Street properties. The data for the soil sample locations beneath the cover are presented in the OU-1/OU-2 RI.

Additional information related to the interim cap work completed at the Hall Street properties is provided in the OU-1/OU-2 RI.

4.3.4.2 Monitoring and Maintenance

No formal monitoring program is established for the Hall Street properties. However, in January 2012, while installing the groundwater monitoring well T-16, the cap was observed to be intact and vegetated with no erosion or significant bare spots. Subsequent field observations in December 2012 verified that the cap was intact and vegetated with no signs of erosion.

To ensure the long-term effectiveness of the Hall Street properties, a long-term monitoring and maintenance program will need to be implemented.

4.3.4.3 Groundwater Monitoring

In early 2012, groundwater monitoring well T-16 was installed in the central portion of the Hall Street properties (Figure 4-9). The analytical results for groundwater samples collected from monitoring well T-16 indicated that PCBs were nondetect (Golder 2012).

The groundwater monitoring results indicate that the PCB-containing soils under the interim cap are not causing impacts to groundwater at the Hall Street properties.

4.3.4.4 Institutional Controls

In January 2008, following implementation of the interim cap, a deed restriction was established for the Hall Street properties preventing future residential use of the properties and preventing disturbance of the interim cap. Additionally, the properties have been included within the city's flood control district further restricting future use of the properties.

4.3.4.5 Effectiveness Evaluation

The interim cap implemented at the Hall Street properties effectively reduces exposure of potential receptors to underlying PCB-containing soils resulting in surface soil concentrations less than the nonresidential PRG of 21 mg/kg. The cap also prevents the contaminants in underlying soils to migrate to surface water. The properties are currently vacant, which further limits exposure of potential receptors to PCB-containing soil under the cover. The deed restriction implemented for the Hall Street properties and the current zoning further enhance the effectiveness of the interim cap by limiting potential exposure, restricting future land use, and protecting the integrity of the constructed isolation cover.

As indicated by the groundwater monitoring results, the PCB-containing soils under the interim cap are not impacting the groundwater, which further demonstrates the effectiveness of the cap.

To ensure the long-term effectiveness of the Hall Street properties interim cap, a long-term monitoring and maintenance program would be needed. The long-term monitoring and maintenance requirements would be detailed in an O&M manual for the OU that would be prepared following the completion of the final remedy at OU-1/OU-2. The monitoring and maintenance program would

include routine inspections (i.e., at least annually) of the cap system to document its condition and maintenance and repairs on an as-needed basis to maintain the integrity of the cap.

The remedial alternatives presented and evaluated in Sections 7 and 8 of this FS do not include additional physical construction activities to enhance the Hall Street interim cap as none are necessary.

4.3.5 Quintard Mall

Between September 1998 and May 2001, IMs were implemented at the Quintard Mall located on South Quintard Avenue in Oxford, Alabama. The IMs were implemented in conjunction with expansion activities at the mall that included constructing additional retail space, a cinema complex, and a parking lot on the eastern side of the previously existing development. Solutia, in cooperation with Quintard Mall, Ltd., implemented the IMs to address sediments and soils that were excavated from the main channel of Snow Creek and its adjacent floodplain.

4.3.5.1 Summary of IM Activities Completed

As part of the IM activities, the reach of Snow Creek that passes through the mall property was widened, lined with concrete, and channeled beneath the parking lot and mall. To facilitate the Snow Creek channel construction, a temporary channel was excavated to divert Snow Creek around the work area.

Based on sampling conducted as part of the mall expansion, all excavated soils and sediments with PCB concentrations greater than or equal to 50 mg/kg were transported for off-site disposal at the Chemical Waste Management TSCA-approved landfill in Emelle, Alabama. Excavated soils and sediments containing total PCBs at concentrations less than 50 mg/kg were placed beneath the parking lot at the mall property, and multilayer asphalt covers were constructed to isolate the PCB-containing soils/sediment and provide property improvements. Excavated soils/sediments with total PCB concentrations less than 50 mg/kg were also used to backfill the sidewalls along the creek channel beneath the parking lot and to increase the elevation of the ground surface to accommodate the mall foundation. Following material placement in these areas, multilayer cover systems consisting of crushed aggregate base material and concrete were constructed to isolate PCB-containing soils/sediments from Snow Creek and provide infrastructure for the mall expansion project.

The locations where the excavated soils/sediments were consolidated and covered at the mall property were designated as Area #1 through Area #5 (as shown on Figure 4-10).

Additional information related to the IM work at the Quintard Mall is provided in the OU-1/OU-2 RI.

4.3.5.2 Monitoring and Maintenance

No formal monitoring program has been established for the Quintard Mall property. To ensure the long-term effectiveness of the Quintard Mall IM, a regular long-term monitoring and maintenance program would need to be implemented (e.g., once every five years).

4.3.5.3 Institutional Controls

Land use restrictions would be implemented for the Quintard Mall property where engineering controls (i.e., IM cover systems) have been constructed. The land use restrictions would include deed restrictions where the IMs have been implemented to protect the integrity of the constructed engineering controls and to restrict future use of the property.

4.3.5.4 Effectiveness Evaluation

The interim actions implemented at the Quintard Mall reduce potential exposure to and migration of PCB-containing soils/sediments at the property. The areas where asphalt and concrete covers have been placed isolate underlying PCB-containing soils, prevent contact with the soils, and mitigate

potential for migration of the soils. The concrete channel installed to direct Snow Creek under the property eliminates the potential for erosion and transport of PCB-containing soils and sediment into Snow Creek. In addition, the disposal of construction-generated soils with PCB concentrations greater than 50 mg/kg at an appropriately licensed and secure landfill is an effective and permanent remedy for those soils.

To ensure the long-term effectiveness of the Quintard Mall IM, a long-term monitoring and maintenance program would need to be implemented. The long-term monitoring and maintenance requirements would be detailed in the OU-1/OU-2 O&M manual that would be prepared following the completion of the final remedy at OU-1/OU-2. The monitoring and maintenance program would include routine inspections of the cover system to document its condition and implementation of maintenance and repairs on an as-needed basis to maintain the integrity of the cover system. In addition, land use restrictions would be implemented to restrict future land use on the Quintard Mall property (where the IMs have been implemented) and to ensure the long-term integrity of the constructed IM covers.

The IMs implemented at the Quintard Mall property (i.e., off-site disposal of soil containing PCBs greater than 50 mg/kg, lining of Snow Creek, isolation of excavated soils containing PCBs less than 50 mg/kg, and construction of asphalt/concrete covers) are considered a permanent remedy that effectively isolates underlying PCB-containing soils and reduces potential exposure to and erosion/migration of those soils. A long-term monitoring and maintenance program and land use restrictions would ensure the permanence and long-term integrity of the constructed IM covers.

The remedial alternatives presented and evaluated in Sections 7 and 8 of this FS do not include additional physical construction activities to enhance the IMs at Quintard Mall as none are necessary.

4.3.6 Other Removal Actions

Other removal actions were completed in OU-1/OU-2 that were not classified as formal IMs or as part of the residential removal program. These removal actions included the 11th Street Ditch project and the Snow Creek Sediment Removal and Dredge Spoil Area project. The OU-1/OU-2 RI presents detailed summaries of these removal actions along with various reference documents (in an electronic appendix). Brief summaries of these removal actions are presented in the following subsections.

4.3.6.1 11th Street Ditch Project

As described in the OU-1/OU-2 RI, removal and containment actions were performed along the 11th Street Ditch between 1989 and 2004.

In 1989, approximately 1,000 tons of sediments were removed from the 11th Street Ditch and a portion of Snow Creek. This remediation project was completed as part of an investigation conducted in cooperation with the USEPA, the Alabama Attorney General, and ADEM. The excavated sediments were transported for off-site disposal at Chemical Waste Management, Inc.'s TSCA-permitted disposal Facility located in Emelle, Alabama.

The 11th Street Ditch was subsequently lined with concrete under the PCD in accordance with the requirements of the AOC for Removal Actions. These 11th Street Ditch removal activities were conducted between August and December 2004 in accordance with the AOC that is Appendix C to the PCD and the USEPA-approved Remedial Design dated May 2003.

The 11th Street Ditch project was implemented as described in the *Completion Report 11th Street Ditch Removal Response Action* (Roux 2005a), which was approved by the USEPA in a September 27, 2005, letter to Solutia.

The 2004 removal activities along the 11th Street Ditch included removing sediments and soils and disposing of them off-site and installing a liner within the ditch. Excavation was generally conducted in

portions of the ditch where samples indicated PCB concentrations above 10 mg/kg. The ditch sidewalls were excavated to a depth of 6 inches. The ditch bottom was excavated to a depth of 6 inches or 12 inches, depending upon the observed sediment depth (determined during predesign studies). Approximately 4,060 tons of soils and sediments with PCB concentrations less than 50 mg/kg (non-TSCA) were transported for off-site disposal at the Three Corners Landfill in Piedmont, Alabama. In addition, approximately 550 tons of soils and sediments with PCB concentrations greater than or equal to 50 mg/kg were transported for off-site disposal at the Chemical Waste Management TSCA-approved facility in Emelle, Alabama. An additional 440 tons of debris (non-PCB railroad ties, plates, and miscellaneous construction debris) were also removed and disposed of.

Subsequent to excavation, the ditch was lined as follows:

- Approximately 6,700 linear feet of the drainage ditch were lined with a geomembrane and a minimum of 6 inches wire mesh-reinforced concrete. The concrete was poured in some sections and pneumatically applied (shotcrete) in other sections, depending on the shape of the ditch (i.e., steepness of the side slopes).
- A vegetated swale north of a portion of the ditch (ditch segment B4) was lined with a nonwoven geotextile and an approximate 12-inch layer of riprap to attenuate post-construction flow velocity.
- The banks of Snow Creek at the terminus of the 11th Street Ditch were lined with a nonwoven geotextile, shotcrete, and a 12-inch layer of riprap to prevent erosion.
- The bottom of Snow Creek at the terminus of the 11th Street Ditch was lined with riprap. As noted above, concrete was applied to the riprap directly adjacent to the side slopes of the ditch to further stabilize the area and attenuate the higher anticipated exit velocity of ditch flow.
- Approximately 420 linear feet of the APCO ditch adjacent to the APCO switchyard (ditch segment A1) were lined with concrete directly above existing riprap.

Figure 4-11a shows the overall 11th Street Ditch area, including the portions of the APCO ditch that have been lined with concrete. Figures 4-11b through 4-11e show subset areas of the 11th Street Ditch project area along with the extent of the cover systems, soil sample locations beneath the covers, and the maximum PCB results associated with these soil samples. These figures extend from the western portion of the 11th Street Ditch and the APCO ditch (Figure 4-11b) to the eastern portion of the 11th Street Ditch (Figure 4-11e). Additional information (including reference documents) and soil sample data associated with the 11th Street Ditch project are presented in the OU-1/OU-2 RI. Two samples (PECON-009 and 11SD22-2) located at the confluence of the 11th Street Ditch IM and Snow Creek were reported in the OU-1/OU-2 RI as being covered with riprap (Figure 4-11e). In conducting a field review to support this effectiveness evaluation, the portion of the 11th Street Ditch where samples PECON-009 and 11SD22-2 were collected was inspected. It was observed that this area is isolated with a combination of shotcrete and riprap. These two measures collectively limit the potential for exposure, erosion, or migration into surface water.

Long-term monitoring of the 11th Street Ditch is conducted in accordance with the *Operations and Maintenance Plan – 11th Street Ditch Removal Response Action* (Roux 2005b) and the Comprehensive O&M Plan. This monitoring consists of quarterly inspections of the concrete liner cover, energy dissipation curbs, riprap and concrete cover, geotextile and riprap cover, geotextile and gravel cover, riprap cover, and notification signs. Repairs and maintenance of the ditch lining and channel are performed based on the findings of the inspections.

The results of the quarterly monitoring/inspection activities and associated maintenance/repair activities are recorded on area-specific inspection forms and maintenance/repair logs. These forms serve to document the findings of the inspections and track necessary maintenance and repairs. Copies of the inspection and maintenance logs are maintained at the Facility.

The 11th Street Ditch removal and containment actions reduce potential exposure to and migration of PCB-containing soils. The excavation of PCB-containing soils and sediments as part of the 11th Street Ditch and the off-site disposal of those soils and sediments at an appropriately licensed and secure landfill is an effective and permanent remedy for those soils. The concrete and riprap lining isolate underlying PCB-containing soils, prevent contact with the soils, and mitigate potential for erosion and migration of the soils.

The 11th Street Ditch removal and containment actions implemented (i.e., excavation and off-site disposal of PCB-containing soils and construction of concrete-lined and riprap-lined covers) are considered a permanent remedy that effectively isolates underlying PCB-containing soils and reduces potential exposure to and erosion/migration of those soils. No physical enhancements are being proposed as part of the remedial alternatives for previously implemented IM/removal action projects. The remedial alternatives discussed, other than no action, incorporate the previously approved actions for this portion of the Site as part of the overall remedy for OU-1/OU-2. From an administrative convenience perspective, the long-term inspection and O&M activities have been incorporated into the Comprehensive O&M Plan.

4.3.6.2 Snow Creek Sediment Removal and Dredge Spoil Areas

Historically, sediment removal activities were performed by the City of Anniston in Snow Creek to address specific construction or flooding concerns. The dredged sediment removed from Snow Creek was reportedly placed along the nearby banks of the creek. Eight dredge spoil piles (SC-1 through SC-8) from the dredging of Snow Creek were located, mapped, and sampled as described in the 1998 Dredge Spoil Evaluation Report (Roux 1998), the Dredge Spoil Area RFI/CS Phase I Report (Roux 1999), and the 2012 Dredge Spoil Evaluation Report (Roux 2012). The locations of the dredge spoil piles from Snow Creek are shown on Figures 4-12a and 4-12b including those locations where the dredge spoil piles have been removed. Additional information (including reference documents) and soil sample data associated with the dredge spoil piles are presented in the OU-1/OU-2 RI.

In June and July 2009, dredge spoil area SC-3 was incorporated into the residential removal action completed at 710 Pine Street (Parcel 2609). Dredge spoil area SC-3 was removed during the residential removal action, and approximately 144 tons of soil/sediment with PCB concentrations of less than 50 mg/kg were loaded into roll-off box containers and subsequently transported to the Three Corners Landfill in Piedmont, Alabama, for off-site disposal. After removal of the dredge spoil pile, the area was restored with clean vegetated soil covers consistent with the 710 Pine Street property (Genesis 2012).

In November 2009, in accordance with an USEPA-approved scope of work, additional sediment removal activities were conducted by the City of Anniston in a portion of Snow Creek between Pine Street and Glen Addie Avenue as part of efforts to improve stream flow and reduce flooding potential in this area of the city (Solutia 2010). Approximately 250 to 500 cubic yards of sediment along the north and south sides of Snow Creek were targeted for removal. The excavated sediments were transported to the Three Corners Landfill in Piedmont, Alabama, for off-site disposal. Following the sediment removal activities, disturbed areas were restored with seed and mulch.

In conjunction with the 2009 sediment removal activities, dredge spoil areas SC-4, SC-5, and SC-6 were removed and transported off-site for disposal. Approximately 405 tons of soil/sediment containing less than 50 mg/kg of PCBs were transported to Three Corners Landfill in Piedmont,

Alabama, for off-site disposal, and approximately 12 tons of soil/sediment containing PCBs at concentrations greater than 50 mg/kg were disposed of at the Chemical Waste Management TSCA-approved landfill in Emelle, Alabama. Following completion of the removal activities, disturbed areas were either seeded and mulched or covered with gravel.

The excavation of PCB-containing soils and sediments as part of the sediment and dredge spoil area removal actions and the off-site disposal of those soils and sediments at an appropriately licensed and secure landfill is an effective and permanent remedy for those soils/sediments.

The remaining dredge spoil piles (SC-1, SC-2, SC-7, and SC-8) are being evaluated as a separate category of remedial alternatives. Candidate remedial areas for these remaining dredge spoil piles are discussed in Section 4.4, and the detailed evaluation of remedial alternatives is presented in Section 7.4. A comparative analysis for remedial alternatives to address the dredge spoil piles is presented in Section 8 of the FS.

4.4 Dredge Spoil Piles

There are four dredge spoil piles—SC-1, SC-2, SC-7, and SC-8—currently located in nonresidential portions of the OU-1/OU-2 floodplain. Dredge spoil piles SC-1 and SC-2 are shown on Figure 4-12a, and dredge spoil piles SC-7 and SC-8 are shown on Figure 4-12b. The PCB results for the soil samples collected from these four dredge spoil piles are shown on Figures 4-12a and 4-12b using PCB concentration ranges. The numerical results for PCBs and mercury (where available) are presented on these two figures for the four dredge spoil piles that remain in place. These data are also provided in Table 3 of the Dredge Spoil Area RFI/CS Phase 1 Report (Roux 1999) along with the data for the dredge spoil piles that were already removed (SC-3, SC-4, SC-5 and SC-6). The Dredge Spoil Area RFI/CS Report is Appendix B to Dredge Spoil Evaluation Report that is included as Appendix A-36 to the RI (ENVIRON 2015). The locations of the four dredge spoil piles that were previously removed—SC-3, SC-4, SC-5, and SC-6—are also shown on Figure 4-12a.

Only one of the dredge spoil piles (SC-8) has a PCB EPC that exceeds the nonresidential surface soil PRG of 21 mg/kg. This dredge spoil pile is located along the eastern edge of Snow Creek in EU24 (Figure 4-13) and has a PCB EPC of 29 mg/kg. The PCB concentrations for dredge spoil pile SC-7 ranged from 0.5 mg/kg to 19 mg/kg, and the EPC was 13 mg/kg. Based on these concentrations, dredge spoil pile SC-7 is not a candidate for remediation. There was only one sample collected from dredge spoil pile SC-1, thus, an EPC could not be calculated. The PCB concentration for this sample was 19.6 mg/kg, and based on a comparison with the nonresidential PRG, this dredge spoil pile SC-1 is not a candidate remedial area. Dredge spoil pile SC-2 is also shown on Figure 4-13 and may be a candidate remedial area. There are currently no PCB data for dredge spoil pile SC-2, and thus, its candidacy as a remedial area will be determined through sampling and analysis conducted after the Record of Decision (ROD) as part of a predesign investigation (PDI) program. If the resulting PCB EPC for dredge spoil pile SC-2 is greater than or equal to 21 mg/kg, the pile will be subject to the same remedial approach that the USEPA selects for dredge spoil pile SC-8 as part of the ROD process. A 12-inch layer of floodplain soil would also be removed from the footprint of SC-8 to alleviate any concerns for materials that may be left behind or were present in the surface soils. The stability of the four dredge spoil piles would be evaluated during the PDI. If a dredge spoil pile is deemed unstable, it would be stabilized as part of the remedy.

4.5 Unapproved Waste Disposal Areas

Two UWDAs have been identified in the Anniston area. These UWDAs are shown on Figure 4-14. One of the UWDAs is located in EU1 and the second UWDA is located in EU10. The specific locations include the following:

- The Ashley Street and Legrande site is part of the residential program and includes 510 Legrande Street (PPIN: 32324), 0 Ashley Street (PPIN: 32325), and 505 Ashley Street (PPIN: 32326). This site is located approximately 0.25 miles to the west of the Facility outside of the 100-year floodplain of Snow Creek. A portion of these properties where elevated levels of PCBs and lead were identified is a fill area containing auto fluff and other debris. A review of historical aerial photographs showed a machine used to segregate ferrous and nonferrous materials located on the property. Analytical chemistry results indicated elevated lead concentrations to depths of 6 feet bgs. The estimated depth of the waste material based on sampling logs and analytical results ranges from 2 to 6 feet bgs.

  Since the Ashley Street and Legrande site is categorized as a residential property, an Alternative Removal Action Work Plan was prepared and submitted to the USEPA in accordance with the requirements of the Stipulation. The Stipulation clarified the requirements for sampling and removal activities for residential properties and included a provision (Section II, paragraph 7) for an alternative removal response action for properties that are more appropriately addressed through such an action. For the Ashley Street and Legrande Site, P/S submitted a work plan proposing the removal of surface soils (upper 12 inches) for areas where composite surface samples show PCB concentrations greater than or equal to 1 mg/kg (Solutia 2013). The work plan includes backfilling the removal areas with clean fill whose upper portion shall be capable of supporting vegetative growth, and reestablishing vegetation in disturbed areas. Additional information, including photographs, for these properties is provided in Alternative Removal Action Work Plan (Solutia 2013), included in electronic form in Appendix A to this FS. The USEPA approval of the Alternative Removal Action Work Plan is pending. The candidate remedial areas for the Ashley Street and Legrande site based on the requirements of the Stipulation and approach presented in the 2013 work plan are presented on Figure 4-15.

- The Wilborn Property I site (Figure 4-16). This area includes 830 W 10th Street (PPIN: 18533) and 0 9th & Mulberry Avenue (PPIN: 18812). This nonresidential property is located approximately one mile east of the Solutia facility with a portion of the property located inside the lateral limits of the historical 100-year floodplain. Although a portion of the property is located inside of this historical floodplain boundary, significant filling of the property has elevated the ground surface approximately 20 feet above Snow Creek. A very limited investigation was conducted at this property, including the installation of monitoring well T-13. Prior to performing any action, a more detailed investigation would be required to delineate the full nature and extent of the waste material present at the site. Based on a review of the limited available data, P/S have estimated that the waste limits are approximately 3.2 acres. The depth of waste material was estimated to be an average of 18 feet thick, based on the boring log and analytical data collected for well T-13.

4.6 Nonresidential Soils

This section identifies the candidate remedial areas for nonresidential soils in OU-1/OU-2. The process considered subsurface and surface soils and evaluated four constituents in addition to PCBs. These additional constituents included arsenic, chromium, PAHs, and PCDD/DFs. The evaluation of nonresidential soils also includes areas with potential PTW based on the presence of soils with PCB concentrations greater than or equal to 500 mg/kg. The evaluation of potential PTW is addressed under surface soils for those EUs and areas where the potential PTW was identified in the surficial layer (EU19N and west of EU1).

Potential PTW in the IM areas and around groundwater well T-11 are discussed separately in Sections 4.3 and 4.7, respectively. While there are no candidate remedial areas for subsurface soils, potential PTW in the subsurface soils of EU10 is evaluated below in Section 4.6.2.

4.6.1 Surface Soil

The approach for identifying candidate remedial areas for surface soils included comparing the EPC for an EU or area (e.g., the Highway 202 area) to the nonresidential PRGs. For PCBs, this comparison was made between the PCB EPC for the EU and the PRG. Locations with maximum PCB concentrations greater than or equal to 50 mg/kg were also included in the candidate remedial areas. For the non-PCB constituents, the sample results were compared to the applicable PRG on a location basis. The surface soil PRGs and the methods of comparison (EU or the OU as a whole) are presented below:

- PCB PRG = 21 mg/kg: Compare the EPC for the EU with the PRG and identify locations with maximum PCB concentrations greater than or equal to 50 mg/kg
- Arsenic PRG = 382 mg/kg: Compare the sample results with the PRG
- Chromium PRG = 568 mg/kg: Compare the sample results with the PRG
- PAHs (BaPE) PRG = 21 mg/kg: Compare the sample results with the PRG
- PCDD/DFs (TEQ) PRG = 0.6 µg/kg: Compare the sample results with the PRG

There are total of eight EUs with candidate remedial areas including six EUs where the surface soil EPC exceeds the PCB PRG of 21 mg/kg (EU5, EU7, EU14N, EU19N, EU19S, and EU26). The two EUs with EPCs below the 21 mg/kg nonresidential PRG for PCBs and sample results greater than or equal to 50 mg/kg are EU10 and EU24. These eight EUs are highlighted on Figure 4-17a. Within each of the EUs, the PCB results were evaluated to identify candidate areas that when addressed through some form of remediation, would lower the EPC for the EU below the PRG and address the locations with PCB concentrations greater than or equal to 50 mg/kg. The candidate remedial areas for surface soils in these eight EUs are shown on Figure 4-17b through 4-17i. The surface soil PRG for PCBs was also exceeded in two areas near where Highway 202 bisects OU-3. One area is located in the median between the east- and westbound lanes of Highway 202, and the other area is located south of Highway 202, near the border of OU-3. Both of these areas are shown on Figure 4-17j. Another area where the EPC exceeds the PRG is located immediately west of EU1. This area is shown on Figure 4-17k. The final area where the EPC exceeds the PRG is located north of APCO and is shown on Figure 4-17l.

None of the individual subsurface sample results exceeded the subsurface PRGs for the non-PCB constituents. None of the surface soil samples exceeded the PRG for arsenic. The three individual samples where PAHs (as BaPE) exceed the PRG were also identified as candidate remedial areas. Two of the three sample locations are addressed by a single candidate remedial area given their close proximity (Figure 4-18a). The other candidate remedial area for PAHs (as BaPE) is located in EU14N (Figure 4-18b). The two locations in EU24 where chromium exceeds the surface soil PRG have been identified as candidate remedial areas in the OU-1/OU-2 FS. One candidate remedial area is located in EU22 (Figure 4-19a), and the other is located in EU25 (Figure 4-19b). There was one exceedance of the PCDD/DF PRG in EU24 that is also addressed as a candidate remedial area (Figure 4-20).

Additional information for each of these candidate remedial areas is provided below. This includes the eight areas where the PCB PRG is exceeded and the one location where the PRG for PAHs is exceeded. Information relevant to each of the candidate remedial areas is also presented in Table 4-1. This information includes the size of the candidate remedial area, the volume of soil associated with placing a 12-inch-thick layer of cover soil or removing the 12-inch surface soil layer over the area, the

constituent driving remediation at this location (PCBs versus PAHs), the pre- and post-remediation EPC values for the EUs/areas, and land ownership.

The areas exceeding an alternative surface soil PCB PRG of 9 mg/kg are also identified in Appendix B of this FS. The appendix includes figures similar to the Figure 4-17 series for the alternative PRG of 9 mg/kg. The lower PRG increases the number of affected EUs from 8 to 14 including the addition of EU3, EU6, EU12, and EU13. The volume of surface soil under the 9 mg/kg PRG scenario increases by approximately a factor of 3 from 9,100 cubic yards to 26,300 cubic yards.

4.6.1.1 EU5

EU5 runs parallel to the 11th Street Ditch and is located to the south of the ditch. A large portion of the EU is a former industrial area. An IM was implemented for the west half of the EU including construction of the CSSMA. Groundwater well T-11 is also located in the easternmost portion of EU5. The overall T-11 area is bounded by Snow Creek to the west and south and railroad tracks to the north and east (Figure 4-17b). Several residential removals have been conducted in EU5. The EPC value for EU5 is 350 mg/kg, and addressing the candidate remedial area identified would lower the EPC for the EU to 18 mg/kg. This post-remediation EPC is based on the assumption that remedial actions would also be implemented in EU5 to enhance a previously implemented IM for the portion of EU5 east of Snow Creek (Eastside Area) and to address groundwater at T-11. The candidate remedial area identified for EU5 (absent those areas associated with the IM and T-11 remedial alternatives) is approximately 0.8 acres. This area is located on the west side of Snow Creek.

The floodway zone as defined by FEMA is also shown on Figure 4-17b. The FEMA floodway zone is shown on the figure as it needs to be considered for remedial approaches that include filling activities in the floodway. These activities would raise the local ground surface elevations and potentially make the area more prone to flooding. Additional details regarding land ownership for the candidate remedial area are provided in Table 4-1.

4.6.1.2 EU7

EU7 is located to the north of EU5 (Figure 4-17c). Several residential removals were conducted in the western portion of this EU, and the elevated EPC value (160 mg/kg) for the EU is heavily influenced by the presence of PCBs at one location. This location was initially evaluated as part of the residential program and includes the entirety of parcel PPIN 19312. Addressing this small candidate remedial area (0.2 acres) reduces the EPC for EU7 to approximately 4 mg/kg. The candidate remedial area is not located in the FEMA floodway, and additional details regarding land ownership are provided in Table 4-1.

4.6.1.3 EU10

The location of EU10 is presented on Figure 4-17d and includes an UWDA in the southeastern portion of the EU and an active automobile repair shop and scrap yard in the northern portion of the EU. While EU10 has an EU-wide EPC below the nonresidential PRG of 21 mg/kg (19 mg/kg), there is one location in the northern portion of the EU where the PCB concentration is greater than or equal to 50 mg/kg. The sample collected from the 0- to 0.5-foot horizon at this location (ABS-15) has a PCB concentration of 130 mg/kg. The sample collected from the 0.5- to 1-foot horizon at this location was 5.7 mg/kg, and thus, the resulting surface soil concentration for the 0- to 1-foot horizon is 68 mg/kg. Based on the single exceedance of 50 mg/kg, the candidate remedial area for this EU10 is relative small (Figure 4-17d) and located out of the floodway.

4.6.1.4 EU14N

The location of EU14N is shown on Figure 4-17e. EU14N includes a number of properties where residential removals were implemented. Similar numbers of residential use areas were also sampled but did not require removals because the PCB concentrations were below 1 mg/kg. The candidate

remedial area to lower the EPC below the PRG is part of a former industrial property located adjacent to Snow Creek (Figure 4-17e). The candidate remedial area is relatively small (0.3 acres) because the EPC for this EU is equal to the PRG (21 mg/kg). The calculated post-remediation EPC for EU14N is 19 mg/kg. The candidate remedial area is also located in the FEMA floodway, and additional details regarding land ownership are provided in Table 4-1. The candidate remedial area for PAHs (as BaPE) in EU14N is shown on Figure 4-18b.

4.6.1.5 EU19N

The entirety of EU19N is a former junkyard operation located on the east side of Snow Creek (Figure 4-17f). The EPC value for EU19N (660 mg/kg) is largely driven by samples collected along the edge of the property bordering the creek. The PCB results for surface soil samples collected throughout the remainder of the EU are generally below 10 mg/kg. The candidate remedial area for EU19N is a small (0.2 acre) narrow strip bordering Snow Creek (Figure 4-17f) that is located in the FEMA floodway. The calculated post-remediation EPC value for EU19N is 9.5 mg/kg. Additional details regarding land ownership for EU19N are provided in Table 4-1.

EU19N includes a single sample with a PCB concentration above 500 mg/kg (sample CA-19-8560-15). The PCB concentration for this sample was 1,530 mg/kg (Figure 2-26) and included Aroclors 1254 and 1260. PCBs associated with these Aroclor mixtures are less mobile than the lower chlorinated Aroclor mixtures that were not detected at this location. Groundwater in nearby EU17 was investigated by installing and sampling monitoring well T-15 (Figure 2-24). This monitoring well location was selected as being representative of conditions along this portion of the Snow Creek floodplain. The PCB results for well T-15 indicated that there were no impacts to groundwater. T-15 was abandoned in 2013. Soils in this portion of EU19N are not considered to be a PTW.

4.6.1.6 EU19S

EU19S is located adjacent to Snow Creek (Figure 4-17g). Public access to EU19S is limited by the presence of railroad tracks to the east, the creek to the west and south, and private industrial lands to the north. Portions of EU19S are heavily overgrown. The EPC value for this EU (68 mg/kg) is heavily influenced by the results of two samples: one sample that was collected in an overgrown area near the railroad tracks and a second sample that was collected in the heavily wooded portion of EU19S. The candidate remedial area to lower the EPC for this EU below the PRG is 0.6 acres and is located midway along the north-south axis of the EU (Figure 4-17g). The calculated post-remediation EPC value for EU19S is 0.22 mg/kg, and the candidate remedial area is located in the FEMA floodway. Additional details regarding land ownership for EU19S are provided in Table 4-1.

4.6.1.7 EU22

EU22 is located adjacent to Snow Creek and has a candidate remedial area for chromium (Figure 4-19a). Public access to EU19S is limited by ongoing industrial activities at this property and the railroad tracks to the west. Details for the candidate remedial area. including size and land ownership, are provided in Table 4-1.

4.6.1.8 EU24

The surface soil EPC for EU24 (Figure 4-17h) is below the nonresidential PRG of 21 mg/kg (12 mg/kg) but one sample location (CA-24-6098-15) has an individual PCB result that is greater than or equal to 50 mg/kg. This sample was collected from the 0.5- to 1-foot horizon and the PCB concentration is 61 mg/kg. The representative surface soil PCB concentration for the 0- to 1-foot horizon is 38.5 mg/kg based on the PCB concentration for the 0- to 0.5-horizon (16 mg/kg). This sample location and most of EU24 are located in an active metals recycling facility/scrap yard. Based on this single exceedance of 50 mg/kg, the resulting candidate remedial area presented on Figure 4-17h is relatively small and

is located out of the floodway. A candidate remedial area for chromium is also located in EU24 and is shown on Figure 4-19b.

4.6.1.9 EU25

The single candidate remedial area for PCDD/DF is located in EU25 (Figure 4-20). This EU is mostly comprised of a former pipe manufacturing facility that has been decommissioned and is now abandoned. Details for the candidate remedial area, including size and land ownership, are provided in Table 4-1.

4.6.1.10 EU26

The location of EU26 is presented on Figure 4-17i. Several residential removal actions were conducted in EU26, but a significantly larger number of residential properties were sampled and found to have PCB concentrations below 1 mg/kg. The location of an IM constructed in the eastern portion of EU26 is also shown on Figure 4-17i. EU26 is also characterized by the presence of an operating chemical manufacturing facility (Tull Chemical) located in the southeastern portion of the EU. This facility is located on a parcel immediately bordering the creek (PPIN 67788) adjacent to where elevated PCB concentrations in this EU have been measured. There was also a documented release of PCBs from this facility (ADEM 1989). The candidate remedial area for this EU is small (0.2 acres) and is located directly between the Tull Chemical facility and the creek. The pre-remediation EPC value for surface soils in EU26 is 34 mg/kg, and the calculated post-remediation EPC is 9.5 mg/kg. A portion of the target remedial area is located in the FEMA floodway, and additional details regarding land ownership for EU26 are provided in Table 4-1.

4.6.1.11 Highway 202

The Highway 202 area includes two separate candidate remedial areas. One area is located in the median strip between the eastbound and westbound traffic lanes (Figure 4-17j). This candidate remedial area is approximately 1.4 acres, and while a sufficient number of sample results were not available to calculate an EPC, all of the sample locations with PCB concentrations equal to or exceeding 21 mg/kg are within the footprint of the candidate remedial area. The second candidate remedial area is located on the south side of Highway 202 near the northeastern corner of OU-3 (Figure 4-17j). The candidate remedial area is approximately 0.5 acres and heavily wooded with limited access. The pre-remediation EPC for this candidate remedial area is 100 mg/kg, and the post-remediation EPC is 19 mg/kg. The two candidate remedial areas associated with Highway 202 are located outside of the FEMA floodway, and additional details regarding land ownership are provided in Table 4-1.

4.6.1.12 West of EU1

The area west of EU1 is a former industrial property that for the most part, has surface soil PCB concentrations that are not detected or less than 1 mg/kg. The candidate remedial area is located in the eastern portion of the property (Figure 4-17k) and is driven by two samples with elevated PCB concentrations (200 mg/kg and 690 mg/kg). The candidate remedial area is approximately 0.4 acres and located outside of the FEMA floodway. Additional details regarding land ownership are provided in Table 4-1.

One surface soil sample from the area west of EU1 had a PCB concentration exceeding 500 mg/kg and was evaluated as potential PTW. The location of this sample (GP-TP1-D) is shown on Figure 2-40. The PCB Aroclor mixture for this sample was not consistent with the CSM for leaching to groundwater at the Site. For leaching to groundwater to exceed the MCL, a high proportion of the overall mass of PCBs for the sample would need to be associated with the lower chlorinated PCB Aroclor mixtures. This is not the case for sample GP-TP1-D, and thus the soils are not considered to be PTW.

4.6.1.13 West of Northside Area

The candidate remedial area located west of the Northside is shown on Figure 4-18a. This area has been identified as a candidate for remediation due to the presence of elevated PAHs in two samples (PCWaste-10 and PCWaste-11). Given the proximity to the railroad tracks and historical use of PAH-containing materials as a preservative in railroad ties, the elevated PAH results are not unexpected. These samples were also analyzed for PCBs and the results were nondetect. This candidate remedial area is located outside of the FEMA floodway, and additional details regarding land ownership are provided in Table 4-1.

4.6.1.14 North of APCO

The candidate remedial area located north of APCO is shown on Figure 4-17l. This area has been identified as a candidate for remediation based on a single sample (SED-A2) with a PCB result greater than or equal to 50 mg/kg (100 mg/kg). Sample SED-A2 was collected from a low lying area adjacent to an active electric company facility. The surrounding samples all had PCB concentrations less than 1 mg/kg (Figure 4-17l). Additional details regarding land ownership for this candidate remedial are provided in Table 4-1.

4.6.2 Subsurface Soil

There are no candidate remedial areas for subsurface soils. This is because locations below the 12-inch interval only exceed the PCB EPC in EU5 and EU10. The subsurface soils in these two EUs are being addressed under groundwater for T-11 (EU5) and as a UWDA (EU10). Locations such as EU19N where surface soil sample results cause the subsurface soil concentration to exceed the PRG are addressed as nonresidential surface soils. This is because the subsurface soil layer includes all results within the 0- to 4-foot interval. Since the OU-1/OU-2 FS uses an EU-wide PRG of 21 mg/kg and a not-to-exceed PCB concentration of 50 mg/kg, there are no locations outside of the candidate remedial areas for surface soils where the presence of PCBs in surface soils results in an exceedance of the subsurface PRG.

The EPC values for all of non-PCB constituents (arsenic, chromium, PAH, and PCDD/DFs) were below their respective subsurface soil PRG values. In addition, the maximum measured subsurface concentrations for all four non-PCB constituents were lower than their respective PRGs.

In terms of potential PTW in the nonresidential portions of OU-1/OU-2, EU10 includes one subsurface soil sample location (CA-10-2049-12) with a PCB concentration (562 mg/kg) above 500 mg/kg (Figure 2-17). This sample was collected from 2 to 3 feet bgs in this UWDA and groundwater was evaluated in this area including installing and sampling monitoring well T-13. The PCB results for T-13 indicated that groundwater was not impacted, and the well was abandoned in 2013. Materials in this area are not considered to be PTW.

4.7 Groundwater at T-11

There is one isolated area in EU5 with groundwater concerns. This groundwater well (T-11) is located in the easternmost portion of EU5 and is completely bounded by Snow Creek to the west and south and railroad tracks to the north and east. Measured groundwater PCB concentrations at groundwater well T-11 exceed the MCL for PCBs of 0.5 µg/L, (PCB concentration by the Aroclor method was 12 µg/L, estimated) and thus, PCB is the chemical of concern for OU-1/OU-2 in groundwater. The candidate remedial area is shown on Figure 4-21 and includes the PTW area immediately surrounding T-11 and the broader T-11 area that is triangular-shaped. The overall size of the broader T-11 area is approximately 1.7 acres in size, and the PTW area surrounding well T-11 has a diameter of 40 feet.

4.8 Sediment and Creek Banks

Candidate remedial areas for sediment and creek banks are presented on Figures 4-22a through 4-22j. These figures also show the PCB concentrations associated with the individual sediment deposits. There are no candidate remedial areas for sediment or creek banks in the portions of Snow Creek shown on Figures 4-22f and 4-22g; these two figures are included in the overall Figure 4-22 series to provide complete spatial coverage of the OU-1/OU-2 portion of Snow Creek. The candidate remedial areas are based on sediment deposits with mean PCB concentrations greater than or equal to the PCB PRG of 3 mg/kg, and the non-PCB PRGs for sediment listed in Table 3-4. These non-PCB PRGs include values for: barium, chromium, cobalt, mercury, manganese, nickel, lead, and vanadium.

There were only two sediment deposits identified as candidate remedial areas based on the exceedance of non-PCB PRGs. Sediment deposit S-5-04 (Figure 4-22h) is a candidate remedial area as the PRG for manganese is exceeded. The sediment deposit associated with sample PECON-020 (Figure 4-22i) is also a candidate remedial area for sediment as the PRGs for chromium, lead, manganese, and nickel are exceeded. Details regarding the individual sediment deposits for Snow Creek are provided in Table 4-2 including the size, thickness, number of cores collected, number of samples analyzed for PCBs, and the mean and maximum PCB concentrations.

The candidate remedial areas for sediment and the creek bank areas are focused on the upstream reach of Snow Creek where the PCB concentrations are the highest. This includes the area near Snow Creek's confluence with the 11th Street Ditch and the Highway 202 culvert structure. This finding is consistent with the nature and extent of contamination of sediment presented in Section 2.5.5. Creek bank areas adjacent to the creek that are not stable or may become unstable and have PCB concentrations that are equal to or exceed the PCB PRG (3 mg/kg) were also identified as candidate remedial areas. These creek bank areas are included with the sediment alternatives in Sections 6 and 7 to address materials with PCB concentrations above the PRG that could enter the aquatic system. Areas where bank stability measures are anticipated are shown on the Figure 4-22 series and include the bank areas along EU5 and EU10, especially at the upstream end of EU5 near the confluence of the 11th Street Ditch and the downstream end of EU5 where it merges with EU10 (Figure 4-22a). The potential for the creek banks between EU12 and EU13 to become unstable exists, and thus, this area has been identified on Figure 4-22c as a candidate remedial area.

In addition to the PCB PRG of 3 mg/kg, figures showing locations that would exceed an alternative PCB PRG value of 1 mg/kg were developed and included in Appendix C to this FS. The sediment removal volume associated with the lower PRG increases from 2,500 cubic yards to 4,000 cubic yards, and the impacted areas associated with shoreline clearing and grubbing increases by approximately 100% from 1.9 acres to 3.7 acres.

5 GENERAL RESPONSE ACTIONS AND REMEDIAL TECHNOLOGIES

This section identifies GRAs for OU-1/OU-2 and evaluates remedial technologies and associated process options. The remedial technology evaluation process is consistent with USEPA *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA* (USEPA 1988a). Remedial technologies for sediment are also evaluated and are consistent with applicable sediment remediation guidance from the USEPA (USEPA 2005a). The technology evaluation process includes two steps. The first step is an initial evaluation of technical implementability for each technology. This initial screening step is designed to answer the threshold question as to whether a technology is capable of being implemented at the Site to achieve the RAOs. The second step in the screening process evaluates individual remedial technology process options. Those remedial technologies and associated process options that survive this second screening step are used to evaluate the remedial alternatives in Section 6.

This section provides a listing of the applicable GRAs in Section 5.1 followed by a summary of the technology evaluation process in Section 5.2 recognizing that the details of the technology evaluation process are included in Tables 5-1 and 5-2. The remaining portions of this section were developed to summarize the technology evaluation process on a media basis as a bridge to the eight separate categories of remedial alternatives evaluated in this FS. These includes technology summaries on a media basis including soil materials (floodplain soil, dredge spoil pile soils, and UWDAs) in Section 5.3, sediment and creek banks in Section 5.4, and groundwater in Section 5.5.

5.1 General Response Actions

The GRAs for the OU-1/OU-2 portion of the Site are listed below and in some cases may apply to more than one environmental medium—for instance, institutional controls (ICs) could apply to soil, sediment, and groundwater.

- No action
- Source control
- Institutional/access controls and monitoring
- Monitored natural attenuation (MNA) for groundwater and monitored natural recovery (MNR) for sediment
- In-place containment and control for soil or sediment
- In situ groundwater or soil/sediment treatment
- Ex situ soil/sediment treatment
- Ex situ water treatment
- Soil/sediment removal
- Creek bank stabilization
- Soil/sediment transport
- Soil/sediment disposal
- Residuals management for soil/sediment and water treatment processes
- Extraction and discharge of treated waters

5.2 Identification and Screening of Remedial Technologies

The inventory of remedial technologies brought through the screening process is provided in Table 5-1 and is grouped by GRA. This inventory was based on the initial list of remedial technologies presented in the RI/FS work plan for the Site (BBL 2004a) and has been updated based on the OU-3 FS (Golder 2010b) and available information regarding the applicability and performance of remedial technologies. The initial step in the screening process focused on identifying technologies that alone or in combination with other technologies were technically implementable, meaning that the technologies are both effective and reliable in addressing PCBs in a given media. The technologies retained through the initial screening step are evaluated in Table 5-2 on the basis of effectiveness, implementability, and cost. The evaluations are qualitative and have rankings of high, moderate, or low. The definitions of these three rankings for the three evaluation criteria used in the Table 5-2 evaluation are as follows:

- Effectiveness
  - High – Standalone technology is highly effective at meeting RAOs for all chemicals of concern under site-specific conditions.
  - Moderate – Technology is moderately effective at meeting RAOs for most chemicals of concern under site-specific conditions. May require combining other technologies to meet RAOs.
  - Low – Technology is ineffective at meeting RAOs for any chemicals of concerns under site-specific conditions. Would require a complex array of other technologies to meet RAOs.
- Implementability
  - High – No difficulties with implementing technology under site-specific conditions. Technology is readily available, proven, and reliable.
  - Moderate – Some difficulties with implementing technology under site-specific conditions but no fatal flaws. Technology is available, proven, and of average reliability.
  - Low – Major difficulties with implementing technology under site-specific conditions. Fatal flaws identified. Technology is not readily available or is unproven and has low reliability.
- Cost
  - High – The technology requires a high degree of capital investment and O&M intensity.
  - Moderate – The technology requires a moderate degree of capital investment and O&M intensity.
  - Low – The technology requires a low degree of capital investment and O&M intensity.

While the details of the technology identification and screening process are provided in Tables 5-1 and 5-2, the technologies carried through the secondary evaluation process presented in Table 5-2 are described below.

5.2.1 Source Control

Efforts to eliminate or reduce source(s) of contamination span a wide range of remedial approaches and can include addressing materials already present in OU-1/OU-2 that are viewed as a source, or sources located away from OU-1/OU-2 but that may act as a source to the OU. Example source control activities include soil removal and/or cap placement to prevent direct exposure, limit migration, or prevent impacts to surface water and groundwater. An example of source control outside

of OU-1/OU-2 includes the work conducted for the Facility under the RCRA program and under the OU-3 IROD to limit the movement of PCBs into the OU-1/OU-2 portion of the Site.

5.2.2 Monitored Natural Attenuation and Monitored Natural Recovery

Using natural processes to reduce exposure concentrations of a given contaminant over time is referred to as MNA for groundwater and MNR for sediment. For PCBs in groundwater, the primary MNA processes include dispersion, dilution, adsorption, abiotic transformation (e.g., hydrolysis), volatilization, and biodegradation. For PCBs in sediment, the primary MNR mechanism is introducing and mixing clean sediments that are brought into the aquatic system through upstream flows. Other processes for sediment such as biodegradation, volatilization, dispersion, adsorption, and dissolution play a lesser role in MNR.

5.2.3 Institutional and Access Controls

ICs generally refer to measures intended to affect human activities in order to prevent or reduce exposure to media that have chemical concentrations exceeding risk thresholds or ARARs. These controls can also include land use limitations set forth through deed notices. An example deed notice may specify (1) a restriction for use of land for industrial purposes only; (2) a restriction on groundwater use so that it may not be used or consumed for potable, industrial, agricultural, or other supply purposes; or (3) a restriction on excavation activities. Other ICs could include governmental controls, zoning ordinances, covenants, or overlay districts.

Example access controls may include fencing, signage, or the use of security personnel or procedures to control access.

5.2.4 Containment - Capping

Containment remedies are often performed to prevent, or significantly reduce, the exposure of potential receptors to contaminated soil or sediment and to prevent or significantly reduce the migration of contaminants to groundwater or surface water. Containment is often used when contaminated soils or sediments are left in place. Caps can be constructed with a range of materials (e.g., sand, geotextiles). Active caps for isolating sediment can include materials such as organo clay or granulated activated carbon to assist in isolating the contaminated sediment from the overlying surface water. Caps require long-term periodic inspections and maintenance.

5.2.5 Excavation

Excavation is the process of removing soils and sediments. Mechanical equipment, such as backhoes or bulldozers, is often used to remove these materials. The equipment is routinely available.

Although water-based dredging equipment (such as, crane-mounted dragline buckets and hydraulic dredges) is often used for sediment removal, a long-reach excavator (which is more traditionally used for soil removal) is more appropriate for sediment in Snow Creek. The excavator would be staged on the creek bank and would reach into the creek to remove the sediment. When a long-reach excavator is used for removing wet sediment from a waterway it is considered dredging. Long-reach excavators are often used to dredge sediment from small waterways similar to Snow Creek. Dredging sediment involves different challenges than excavating soils. For instance, sediment concentrations after dredging are affected by the resuspension of sediment during dredging and residuals remaining after dredging. These residuals are largely due to the constraints of working in an aquatic environment.

5.2.6 Creek Bank Stabilization

There are two general approaches to creek bank stabilization. These include an engineered approach, or hardening of the shoreline, and a natural approach (Georgia Soil and Water Conservation Commission [GSWCC] 2000). Common engineered approaches include placing riprap armor stone,

reinforced mats, and sheet piling. Riprap is very common and has been used extensively along Snow Creek. The reinforced mats can be constructed with a wide range of materials that are focused on the particular application. Mats constructed with articulating concrete blocks are common for steep sloped areas with high surface water velocities. Other mats include a reinforced geotextile material and a growing medium. Sheet piling is often used for vertical bank areas with high value assets located close to the edge of the waterway.

Naturalized approaches to creek bank stabilization are becoming more common as the tendency of creeks and streams to resist the engineered approaches over time is gaining acceptance (FEMA 2009). A cost-effective approach to natural creek bank stabilization is not maintaining a riparian buffer zone and limiting access. These actions (or inactions) allow the terrestrial plant succession to naturally stabilize a creek bank area that was previously unstable due to shoreline activities. In some cases, all that may be needed is to prevent regular maintenance activities such as cutting the grass all the way to the edge of the creek. Natural approaches to creek bank stabilization can also include live planting, or repurposing felled trees, brush that has been cut, and/or root balls. These materials can be configured along the creek banks to reduce surface water erosion and provide a substrate for additional vegetative growth. There are also settings where the engineered and natural approaches can be combined. An example is placing live tree stakes within the spaces between riprap armor stone. This technique stabilizes the shoreline but softens the approach by providing habitat and an opportunity for naturalized vegetative growth.

5.2.7 Off-Site Disposal and On-Site Soil/Sediment Management

Disposal and management of soil and sediment includes using an off-site landfill or an on-site management area. Different off-site disposal facilities are typically used for materials with PCB concentrations equal to or greater than 50 mg/kg than those used for materials with PCB concentrations less than 50 mg/kg. There are more disposal facilities located in the Anniston area permitted to accept materials with PCB concentrations of less than 50 mg/kg than facilities located in the State of Alabama that are permitted to accept materials with PCB concentrations greater than or equal to 50 mg/kg.

The use of an on-site soil management area is being proposed in this FS for materials from the nonresidential portion of OU-1/OU-2 including nonresidential soils, soils from the dredge spoil piles, and sediment from Snow Creek. The SSSMA is the proposed on-site soil management area for dredge spoil materials, nonresidential soils, and sediment with PCB concentrations less than 50 mg/kg. While an on-site soil management area has already been used at this Site for soils generated during removals conducted under the NTC Removal Action Agreement and the Stipulation, the approvals provided under the May 4, 2006, Explanation of Significant Differences (ESD; USEPA 2006c) do not automatically extend to remedial actions identified and evaluated in this FS. Based on this, use of the SSSMA as an on-site soil management area is being proposed as one of the disposal options in this FS for soil/sediment from the nonresidential portions of OU-1/OU-2. The information provided below regarding the prior site-specific approval for an on-site soil management area is included in this section of the FS to provide content for the proposed approach. In the ESD, the SSSMA was approved for the placement of materials with PCB concentrations less than 10 mg/kg based on a five-point composite sample, and soils that are confirmed to be nonhazardous (i.e., PCB concentrations less than 50 mg/kg and lead concentrations below Toxicity Characteristic Leaching Procedure [TCLP] limits) based on grab testing. Using an on-site soil management facility for soil/sediment from the nonresidential portions of OU-1/OU-2 would follow the same approach, in that the materials would not be hazardous (for PCBs or other constituents), the materials would be placed in the facility and managed such that adverse impacts to groundwater or surface water would not occur, and the materials would be inaccessible to potential receptors.

In accordance with solid waste management regulations in Alabama and other states, the SSSMA was designed so that the bottom elevation of the unit is a minimum of five feet above the highest measured groundwater level. This includes the use of an underdrain system to ensure that the 5-foot minimum separation is maintained. The underdrain is a permanent system, and its effectiveness has been demonstrated by measuring water levels within the SSSMA since its construction in 2006. Additionally, the soil below the on-site soil management area has naturally low hydraulic conductivity and, therefore, would not be expected to allow contaminant migration even without the underdrain. PCB-containing materials placed within the SSSMA are not expected to leach adversely impacting groundwater. The PCB concentrations of soil currently being placed in the SSSMA and proposed in this FS are below concentrations regulated under the TSCA (i.e., concentrations less than 50 mg/kg). Additionally, when lead is co-located with PCBs, a TCLP test is required to ensure that no leaching of metals will occur. Once the SSSMA is no longer necessary or the capacity has been used, the facility will be closed. This will include placing a non-woven geotextile (marker layer) and 12 inches of clean cover soil capable of sustaining plant growth (vegetative soil layer) over the area. This cap will prevent exposure to the PCB-containing soil, limit the potential for the soils to migrate to surface water, and further limit the potential for leaching to groundwater. This cover design is equivalent to the design previously used for capping properties located on the north and east of the Solutia facility, and is designed to support vegetation and to promote run-off of surface water from the on-site soil management area to limit infiltration.

Recognizing that the prior approval under the 2006 ESD does not extend to the remedial actions identified and evaluated in this FS, the potential for future use of the SSSMA for the disposal of other soil (i.e., nonresidential or non-special use soils) is discussed in the USEPA's response to comment number 5 on the 2006 ESD…

> "The capacity of the proposed soil management area was developed in more detail so that a better estimate of capacity could be determined. The capacity of the area is not related to the total amount of soil remaining to be removed from residential properties. EPA expects that only a fraction of the capacity will be required to manage residential soil with PCB concentrations, based on five-point composite samples, less than 10 ppm. Use of the remaining capacity would need to be approved as part of a remedy selected in future decision documents. The excess capacity could be considered as part of an institutional control program or some other containment remedy for non-hazardous PCB contaminated soils. Any proposal to use the soil management area for other than residential soils will be proposed to the community in a proposed plan and a comment period will follow. No action will be taken without input from the community."

Following closure, the SSSMA will be inspected periodically to confirm the integrity of the final cover and storm water drainage routes. The final cap will be inspected regularly for signs of erosion, loss of cover soil, and loss of vegetation. The adjacent storm water ditches will also be inspected for evidence of siltation and/or blockage, and security gates will be inspected to confirm their effectiveness in limiting access to the property.

5.2.8 Groundwater Extraction, Treatment, and Discharge

The technologies retained for groundwater extraction, treatment, and discharge are well proven in terms of their technical implementability. The ability to extract groundwater with a vertical well, treat the extracted PCB-containing groundwater with a combination of filtration and granulated activated carbon, and then discharge the treated water to a surface water body or a POTW is well documented. The ability of such a system to achieve the remedial goals for a site over a timeframe that is both

reasonable and predictable is less reliable. Nonetheless, these can be used as part of the process of developing a remedial alternative for the T-11 area.

5.2.9 Support Technologies

Remedial technologies were also retained to support other GRAs and technologies. These support technologies include transportation of excavated soil and sediment via truck. These trucks would transport the excavated materials to an off-site disposal facility or an on-site soil management area. Other support technologies include the management of waste residuals associated with a groundwater treatment process or generated during the handling of PCB-containing soil and sediment. These waste residuals would be disposed of using the same options available for the soil and sediment.

The discussion below organizes the retained technologies by media—soil, sediment, and groundwater. For each of these media, all of the technologies for multiple GRAs have been retained and thus are not repeated in the sections below. These technologies and process options are associated with the following GRAs: no action, source control, ICs/access controls, and MNA.

5.3 Evaluation of Remedial Technologies for Soil Materials

A range of technologies and process options have been retained for use in developing remedial alternatives for soil materials including floodplain soils, dredge spoil pile materials, and the UWDAs. These technologies and process options can be used to prevent direct contact with and the migration of COCs from the candidate remedial areas. Raising the local ground surface elevations by placing caps and covers can be limiting due to the potential for increased flooding for some of the candidate remedial areas, based on their proximity to the creek. This potential increase in flooding is evaluated for those areas as a part of this FS (Section 6).

Remedial technologies and process options for in-place containment using vertical barriers such as sheet piling and slurry wall have been eliminated based on the limited application to the large quantity of fill materials in the local area that can impede installation and the presence of local infrastructure. In terms of potential application for source control of soils in the T-11 area, these technologies were screened out due to the implementability concerns of working next to the railroad tracks and Snow Creek.

The representative process option for removal is mechanical excavation. Mechanical excavation could be combined with transportation to an on-site soil management area or an off-site disposal facility, or in the case of nonresidential soil, treatment (either on-site or off-site). If materials can be excavated directly into trucks for immediate transport to the disposal area (either off-site or on-site), no additional support facilities would be needed. For those technologies that involve temporary storage or process of materials, a materials handling pad and water treatment system would be needed.

The range of remedial treatment technologies to address PCBs in soils is limited for this Site. The ability to place a treatment system in the local community is limited by the amount of land area available to support treatment system operations. This would include the space necessary to store the materials prior to treatment, facilitate treatment system operations, and store the treated residuals prior to shipment to an off-site landfill. Two additional constraining factors include the limited number of technologies that can reliably treat PCB-containing materials and the relatively high cost of constructing a treatment system for the volume of materials anticipated to require treatment. An additional consideration is potential community impacts. These factors, combined with the close proximity of area residents and the potential for emissions during treatment operations provide further rationale for limiting the evaluation of treatment options. For OU-1/OU-2, there were two treatment approaches retained through the remedial technology evaluation process. Both treatment approaches were applied to nonresidential soils as the removal volumes associated with the other categories of media/remedial alternatives was either too small (e.g., sediment and dredge spoil piles) or the

technical feasibility of treatment operations for the waste matrix (e.g., materials from the UWDAs) was highly uncertain.

The first treatment approach destroys the PCBs in a high-temperature incinerator that is located several hundred miles from the Site. All of the untreated soils must be transported to the incineration facility by truck, and the treated ash residue resulting from the incineration process is disposed of in an off-site landfill. The second treatment approach also uses an off-site incinerator to destroy the PCBs. The initial part of the treatment process occurs at the Site and uses an indirect heat source to desorb the PCBs from the soil matrix. The treated residuals (soil) are generally transported to a disposal facility for disposal as they are typically not suitable for use as backfill materials. This is due to the lack of organic matter and the possibility that some residual contaminants may be present in the residuals. For this application, it is assumed that disposal of the treated residuals in the on-site soil management area (SSSMA) would be acceptable. During the thermal desorption process, the PCBs move from being attached to the soil particles to be present in a vapor phase. This vapor is then condensed and the PCBs are concentrated into an oily waste product. The PCB-containing oils are then placed in a drum and transported to an-off-site incineration facility for destruction. Emissions from the thermal desorption unit are treated to limit the release of particulate and volatile metals such as lead and arsenic that will transfer from the soils to the vapor during the desorption process. It is also possible that materials excavated from the UWDAs would require stabilization for metals prior to disposal in an off-site landfill.

While not an explicit part of the remedial technology and process evaluation, all remedial alternatives that address soil will include soil management activities. These activities will be conducted under a long-term O&M plan for the OU, and ultimately, for the Site as a whole.

5.4 Evaluation of Remedial Technologies for Sediment and Creek Banks

The remedial technologies and process options retained for sediment are similar to those retained for the floodplain soils, including in-place capping, removal using mechanical excavation, and creek bank stabilization. The in-place capping technologies are subject to the same flooding concerns as constructing elevated areas in the floodway portion of the floodplain. Additionally, in-place capping includes concerns for maintaining the effectiveness of the isolation structures during periods when high surface water velocities are present. In situ treatment of the sediment using activated carbon or another amendment was eliminated due to concerns that the amendments would be washed downstream during high-flow conditions as opposed to being mixed into the sediment through the action of benthic invertebrates. Technologies and process options for a sediment staging and dewatering pad have been retained as they may be needed to dewater sediment before it is transported to an on-site management area or an off-site disposal facility. If a dewatering pad is necessary, it may be equipped with a water collection and treatment system. The common technologies and process options to treat accumulated waters from staging pads include gravity settling, filtration, and granulated activated carbon. Dewatering agents such as fly ash may also be used at times instead of dewatering the sediment. If a water treatment system is used, the treated waters are typically released to the water body from which the sediments were removed, but the treated waters could also be sent to a publicly or privately owned treatment works. Based on the remote nature of the sediment deposits, discharge of treated water back to Snow Creek is the logical option. The range of engineered and natural creek bank stabilization approaches identified and retained are highly applicable to OU-1/OU-2.

As noted above in Section 5.3, the ex situ treatment of sediment is not included in the development and screening of remedial alternatives for OU-1/OU-2. This is based on the relatively small volume of sediment for OU-1/OU-2 and the significant efforts to engage treatment approaches. This constraint,

combined with the low PCB concentration profile of the sediments form the technical rationale for not carrying forward treatment of sediment in the development and screening of remedial alternatives.

5.5 Evaluation of Remedial Technologies for Groundwater

The remedial technologies and process options retained to address groundwater at T-11 include capping and extracting, treating, and discharging groundwater. These technologies and process options are in addition to those listed under the GRAs of no action, source control, ICs/access controls, and MNA. In-place containment would include constructing a low-permeability cap to limit infiltration of precipitation through the PCB-containing soils in the T-11 area and reducing the hydraulic gradient between the upland area and Snow Creek. An evaluation may also be necessary to determine if the cap materials could be placed without having to first remove 18 inches of soil from the area to alleviate concerns for increased flooding. If a combined approach of groundwater extraction, treatment, and discharge were used, the process option for groundwater extraction is the use of one or more vertical groundwater wells in the T-11 area, treat the extracted groundwater with filtration and granulated activated carbon, and discharge the treated waters to Snow Creek.

Remedial technologies and process options for in-place containment using vertical barriers such as sheet piling and a slurry wall were eliminated based on the implementability concerns associated with the area around T-11. This area is currently inaccessible by equipment, and while it may be possible to build a temporary bridge across Snow Creek to transport equipment to grade surface soils, place a cap, or install a groundwater well, the structure that would be needed to convey the large equipment necessary to install vertical in-place containment technologies is not readily implementable. These implementability concerns combined with the availability of other effective in-place containment approaches support eliminating these technologies. The in-place treatment technologies for groundwater were eliminated during the initial screening step based on concerns for effectiveness and implementability. The in-place soil treatment technologies were not retained through screening due to effectiveness and implementability concerns. These technologies were viewed as being moderately effective and have implementability concerns relating to the small volume of soil to be addressed in OU-1/OU-2. These implementability concerns are associated with the large amount of equipment and community disruptions associated with using these technologies.

6 SCREENING OF REMEDIAL ALTERNATIVES

This section presents the development and screening of remedial alternatives for OU-1/OU-2. The first step in the screening process was to develop a range of remedial alternatives to address the seven types or categories of candidate remedial areas that were presented in Section 4. The alternatives developed under each of the seven categories were assembled with one or more of the remedial technology process options retained after the technology screening presented in Section 5. The resulting remedial alternatives include a series of process options that collectively are capable of meeting the RAOs. An example remedial alternative using this process is the excavation of soils, transportation via truck to an off-site disposal facility, and final disposal at an off-site facility. Once the range of remedial alternatives was complete for a given category, these alternatives were screened on the basis of effectiveness, implementability, and cost. The performance of each alternative against these criteria was ranked on the basis of high (H), moderate (M), or low (L). These qualitative rankings were based on the criteria definitions as described below:

Effectiveness

High – Standalone technology is highly effective at meeting RAOs for all chemicals of concern under site-specific conditions.

Moderate – Technology is moderately effective at meeting RAOs for most chemicals of concern under site-specific conditions. May require a combination of other technologies to meet RAOs.

Low – Technology is ineffective at meeting RAOs for any chemicals of concern under site-specific conditions. Would require a complex array of other technologies to meet RAOs.

Implementability

High – No difficulties with implementing technology under site-specific conditions. Technology is readily available, proven, and reliable.

Moderate – Some difficulties with implementing technology under site-specific conditions but no fatal flaws. Technology is available, proven, and of average reliability.

Low – Major difficulties with implementing technology under site-specific conditions. Fatal flaws identified. Technology is not readily available or proven and has low reliability.

Cost

High – The technology requires a high degree of capital investment and O&M intensity.

Moderate – The technology requires a moderate degree of capital investment and O&M intensity.

Low – The technology requires a low degree of capital investment and O&M intensity.

A description of the remedial alternatives and the screening results are provided in the Table 6-1 series as presented below:

1. Residential soils (Table 6-1a)
2. Special use properties (Table 6-1b)
3. IMs (Table 6-1c)
4. Dredge spoil piles (Table 6-1d)
5. UWDA (Table 6-1e)

6. Nonresidential soils (Table 6-1f)
7. Groundwater at T-11 (Table 6-1g)
8. Sediment and creek bank (Table 6-1h)

A summary of the remedial alternative screening process for the eight categories of alternatives is provided below. Those remedial alternatives retained through the screening process are also highlighted in green on the Table 6-1 series and are brought forward into Sections 7 and 8 for detailed and comparative evaluation.

6.1 Residential Soils

The remedial alternatives developed for soils on residential properties are inclusive of the removal actions already completed under the Removal Order, the NTC Removal Action Agreement, and the Stipulation. Details of the previously implemented removal actions are presented in the Completion Report (Golder 2015). The status of residential removals is discussed in Section 4.1 and shown on Figure 4-1. The no action alternative would be a no further action alternative, recognizing that most of the removals have already been conducted. One of the active remedial alternatives for the residential properties would complete the residential removals that have yet to be implemented under the NTC Removal Action Agreement. This alternative would also address residuals remaining at depth with PCB concentrations between 1 mg/kg and 10 mg/kg or beneath structures by implementing a soil management plan. The second active remedial alternative would complete residential removals for all surface and subsurface soils with PCB concentrations greater than or equal to 1 mg/kg. This would require addressing PCBs remaining in subsurface soil at concentrations between 1 mg/kg and 10 mg/kg in areas that were previously remediated. This alternative would also implement a soil management plan to address residuals remaining beneath structures. These PCB residuals would be managed in perpetuity. A conceptual soil management plan is provided in Appendix D to this FS. This plan describes the actions to be taken to ensure that PCB-containing residual soils will not pose a threat to human health and the environment, and if these residual soils are disturbed, how the materials will be managed appropriately. The soil management plan includes procedures for situations where a land-disturbing activity is planned for a location where PCB-containing residual soils may be found. The active remedial alternatives would address situations following the ROD where property access that was previously denied is granted or overgrown vegetation is no longer present and the property becomes suitable for removal. The efforts to monitor and manage these properties would be guided under a long-term O&M plan for OU-1/OU-2. The remedial alternatives developed for the residential properties presented in Table 6-1a were retained through the screening process and will be evaluated in detail in Section 7 and on a comparative basis in Section 8.

6.2 Special Use Properties

The remedial alternatives for the special use properties include the removal actions in high activity areas that have already been completed under the Stipulation. Locations where removal actions have already been implemented are discussed in Section 4.2, and candidate removal areas and long-term soil management areas for the special use properties are shown on Figure 4-2. Details of the previously implemented removal actions for the high activity portions of the special use properties are presented in the Completion Report (Golder 2015). In addition to the no further action alternative, remedial alternatives were developed that address subsurface soils in high and low activity areas with PCB concentrations between 1 and 10 mg/kg. PCB residuals that may remain beneath structures would be managed in perpetuity under the soil management plan. These alternatives would either remediate PCBs at the low activity portion of special use properties or would address situations where land use changes from low activity to high activity. The potential for this change to occur would be

monitored and managed under a long-term O&M plan for OU-1/OU-2. These remedial alternatives developed for the special use properties were retained through the screening process (Table 6-1b).

6.3 Interim Measures

The remedial alternatives to address IMs are focused on specific portions of the previously implemented IMs and removal actions where the effectiveness evaluation (Section 4.3) indicates that additional spatial coverage may be necessary for the action to be considered effective over the long term (Figure 4-4, Figures 4-6a-c, and Figure 4-8). The specific areas that would require additional remediation under the active remedial alternatives include two small areas in the Northside Area, isolated sample locations around the Eastside Area, and several locations in the Eastside Drainage Way. Locations in the Eastside Drainage Way include the area just north of 10th Street, an adjoining drainage area that runs parallel to the 11th Street Ditch, and a small drainage area just east of McDaniel Street before it crosses the 11 Street Ditch (Figure 4-8). The active remedial alternatives (capping or excavation) would include ICs, where needed, and O&M would be continued for both the previously completed IM areas and the additional candidate areas identified in Section 4.3 and included under the active IM alternatives. The active remedial alternatives for the Northside, Eastside, and Eastside Drainage Way are consistent with the previously implemented IMs in terms of spatial coverage and remedial approach. A total of four remedial alternatives were developed for the IM areas, including a no action alternative. These alternatives provide different approaches to complete the spatial coverage of the IMs.

The first active alternative would involve capping and covering the additional area in the same manner as done for other IM areas to address any areas with PCB concentrations greater than or equal to 50 mg/kg and to meet the nonresidential preliminary PRG of 21 mg/kg. The second active alternative would combine the first active alternative with the excavation and off-site disposal of soils at PR-RR-37. The third active alternative would include excavation and off-site disposal of surface soils in the IM expansion areas to meet the nonresidential preliminary PRG of 21 mg/kg. The three active alternatives include the evaluation of PTW in the Eastside IM during the remedial design with excavation required if PTW is found to be present. ICs and long-term O&M would be included with each of these active alternatives and would extend in perpetuity as residuals would remain. All four of the remedial alternatives presented in Table 6-1c were carried through the screening process.

6.4 Dredge Spoil Piles

There are four dredge spoil piles (SC-1, SC-2, SC-7, and SC-8) currently located outside the banks of Snow Creek (Figures 4-12a and 4-12b); other dredge spoil piles—SC-3, SC-4, SC-5 and SC-6—were previously removed. Only one of the remaining dredge spoil piles is known to exceed the PRG of 21 mg/kg (SC-8). This dredge spoil pile is located along the eastern edge of the creek in EU24 and has a PCB EPC of 29 mg/kg. Dredge spoil pile SC-2 was not sampled during the RI. However, SC-2 will be sampled as part of the design process to confirm PCB concentrations are lower than the nonresidential PRG of 21 mg/kg.

In addition to the no action alternative, four removal and disposal options were carried through the screening process for the dredge spoil pile(s). The technical approach of in-place capping for dredge spoil pile SC-8 was screened out. The technical basis for screening out this approach was the thick layer of armor stone needed for the cap to resist erosion. The resulting cap would have extended into the creek. The presence of the cap in the creek would reduce the available cross-sectional flow area for the creek and increase localized flooding. The retained alternatives include two for removing those piles characterized as having concentrations greater than or equal to 21 mg/kg and stabilizing the piles that remain, and to alternatives for removing all four remaining dredge spoil piles, regardless of PCB concentration. For the material removed, alternatives for both off-site disposal and on-site

disposal were retained. The five remedial alternatives retained for dredge spoil pile(s) following the screening process (including no action) are highlighted in green in Table 6-1d.

The floodplain areas remaining from beneath the dredge spoil pile(s) after removal would be considered nonresidential soils and managed based on the remedial alternative selected for nonresidential soils. Long-term soil management or O&M activities are not associated with the dredge spoil piles that are removed but if the dredge spoil piles that remain require stabilization, they will be inspected on a periodic basis.

6.5 Unapproved Waste Disposal Areas

Two UWDAs have been identified (Section 4.5) for the purposes of developing remedial alternatives. These UWDAs areas are shown on Figure 4-14: one UWDA is located in and adjacent to EU1, and the second UWDA area is located in EU10. In addition to the no action alternative, there were three remedial approaches identified for these UWDAs including two for capping and one for removing all of the unapproved materials and disposing of these materials at an off-site landfill. All four of the remedial alternatives were retained through the remedial alternative screening process and are highlighted in green in Table 6-1e. Long-term O&M would be necessary for the remedial alternatives that include containment, and ICs may be necessary for the alternatives that leave waste materials in place and/or to restrict groundwater use. For these capping alternatives, O&M would extend in perpetuity.

6.6 Nonresidential Soils

Candidate remedial areas for the nonresidential soils were developed to address PCBs, PAHs as BaPE, chromium, and PCDD/DF in surface soils. Each of the remedial alternatives developed for the nonresidential soils would address the same geographic footprint, as shown on the Figure 4-17 series for PCBs, Figures 4-18a and 4-18b for PAHs as BaPE, Figures 4-19a and 4-19b for chromium, and Figure 4-20 for PCDD/DF.

Seven remedial approaches were screened for the nonresidential soils including the no action alternative. Six of these approaches were carried through the screening process (Table 6-1f). The first active approach of placing cover soils over the target remedial areas was screened out due to concerns with increasing localized flooding in EU5, EU14N, and EU19S. To address this concern, the second alternative combines removing soil with placing clean backfill materials in the three EUs where flooding is of concern and directly covering target remedial area soils in the remaining EUs and areas where flooding is less of a concern. The four other remedial approaches include removing the upper 12 inches of soil with different forms of disposal, including off-site disposal, a combination of on-site and off-site disposal, off-site treatment using incineration, and a combination of on-site treatment using thermal desorption combined with off-site incineration of the high-concentration PCB oil from the thermal treatment process. With the exception of the no action alternative, each of the remedial alternatives includes implementing a soil management plan and the possibility if ICs including environmental covenants. The soil management plan would include monitoring for potential changes in property use from nonresidential to residential as part of long-term O&M activities.

6.7 Groundwater at T-11

Five remedial approaches were screened to address groundwater at the T-11 area. The T-11 area is located in the most eastern portion of EU5 and is bounded by Snow Creek to the west and south, and railroad tracks to the north and east (Figure 4-21). The four remedial approaches retained for the T-11 area are highlighted in green in Table 6-1g (including the no action alternative). The one remedial approach eliminated during the screening process was placing cover soils directly over the overall T-11 area. This remedial approach was eliminated due to concerns for increasing local flooding. Placing the cover material directly on the ground surface would raise the elevation and reduce the

cross-sectional flow area in this portion of the floodway. The range of remedial approaches carried through the screening process includes excavating the materials with high PCB concentrations immediately surrounding the T-11 groundwater well and using different cover and cap materials to limit infiltration. The material immediately surrounding groundwater well T-11 is considered to be PTW because it includes the concurrence of soils that are in proximity to the groundwater table with elevated concentrations of the lower molecular weight PCB mixtures.

The most complex remedial alternative includes extracting groundwater from the area where the original T-11 groundwater well is located and treating the extracted groundwater prior to discharging the treated water to Snow Creek. The groundwater extraction and treatment will be conducted to remove two pore volumes of water. This will occur over a period of approximately one year using solar powered equipment to minimize short-term impacts. After the two pore volumes of groundwater are removed, treated, and discharged, system performance and additional actions, if any, will be assessed and implemented using an adaptive site management (ASM) approach. Details of the ASM approach for this remedial alternative are provided in Section 7.9.2. With the exception of the no action alternative, each of the retained remedial alternatives includes long-term O&M, including monitoring of groundwater conditions. The possibility that ICs may be required was also carried forward for the cover or cap to address the potential that groundwater use in the area may need to be restricted. Due to the long-term presence of residuals that will remain on site, O&M activities will be conducted in perpetuity.

6.8 Sediment and Creek Banks

Candidate removal areas for sediments and creek banks and the associated COPCs and PRGs are discussed in Section 4.8. For the purposes of this FS, each of the alternatives developed for the sediment and creek banks would involve a similar geographical footprint, recognizing that, with the exception of the no action alternative, the remedial alternatives carried through the screening process would include a PDI for the sediment deposits that have yet to be characterized. Six remedial approaches (including the no action alternative) for sediment and creek banks were considered during the screening process. Two of the approaches were screened out; the four alternatives being carried into the detailed/comparative analysis are highlighted in green in Table 6-1h. The approaches screened out include MNR and directly capping the in-creek sediment deposits. Both of the alternatives that were screened out included removing sediment accumulated in the Highway 202 culverts. MNR was screened out as a remedial approach due to concerns regarding effectiveness. In-place capping was screened out based on concerns regarding localized flooding as a result of raising the elevation of the creek bed with the cap profile. The elevated cap profile would be associated with the relatively thick layer of riprap armor stone that would be placed over the sediment deposits to protect the underlying capping material (sand or a reactive cap material) from erosion during high-flow conditions. One of the retained alternatives has a slightly smaller remedial footprint as it targets sediment deposits with average PCB concentrations greater than or equal to 10 mg/kg. The PRG of 3 mg/kg would be achieved through a combination of removing these sediment deposits, including the sediments accumulated in the Highway 202 culverts, and MNR. Implementation of this alternative would include an ASM approach as described in Section 7.9.2. Creek bank stabilization would be accomplished using a combination of engineered and natural approaches. The engineered approaches may include using riprap stone to armor the creek bank from erosion during periods of high flow. Reinforced mats could also be used for those creek bank areas where an engineered approach was warranted and there were limitations on the use of riprap (e.g., slope or aesthetics). Natural creek bank stabilization measures could include planting or eliminating access and maintenance of the existing shoreline vegetation and letting a mature riparian buffer develop.

7 DETAILED ANALYSIS OF ALTERNATIVES

Following the initial screening of alternatives (Section 6), the retained alternatives for each area and media category were evaluated in detail as described in this section. The detailed analysis evaluates each alternative using the evaluation criteria described in the USEPA RI/FS guidance (USEPA 1988a) and the NCP. This evaluation presents the relevant information needed for the USEPA to select remedies for the different areas in OU-1/OU-2. Section 7.1 discusses the evaluation criteria and the remaining subsections provide a detailed analysis for a range of remedial alternatives under each of the seven categories of remedial alternatives introduced in Section 4 and screened in Section 6. The individual subsections include a detailed description of each alternative that is followed by an evaluation of whether and how that alternative would achieve each of the individual evaluation criteria.

7.1 Evaluation Criteria

The selection of a remedy requires the satisfaction of two threshold criteria, an assessment of five balancing criteria, and the consideration of two modifying criteria as defined in the NCP:

- Threshold Criteria
  - Overall protection of human health and the environment
  - Compliance with ARARs
- Balancing Criteria
  - Long-term effectiveness and permanence
  - Reduction of toxicity, mobility, or volume through treatment
  - Short-term effectiveness
  - Implementability
  - Cost
- Modifying Criteria
  - State acceptance
  - Community acceptance

In accordance with USEPA guidance and the PCD, the two modifying criteria (State and community acceptance) are not included in this FS. The USEPA will consider these after the RI and FS have been released for public review and comment. A description of how each of the other criterion is used in the evaluation is provided below.

Threshold Criteria

- Overall Protection of Human Health and the Environment

  Each alternative is evaluated to determine whether it would be protective of human health and the environment in both the short and long term. This criterion is an overall assessment of protection based on the resulting mix of factors assessed under other evaluation criteria, especially long-term effectiveness and permanence and short-term effectiveness. This criterion assesses whether risks would be eliminated, reduced, or controlled by implementing the alternative. This criterion also assesses whether an alternative poses an unacceptable short-term or cross-media impact.

- Compliance with ARARs

This criterion evaluates whether the alternative will comply with ARARs during implementation and whether the alternative is expected to attain ARARs following implementation. Potential Federal, State, and local ARARs and TBCs are organized by chemical constituent, location, and action and are discussed in Section 3 and presented in Tables 3-1, 3-2, and 3-3, respectively. The alternative evaluation process included in this section identifies the more significant ARARs that must be addressed for each alternative. The final evaluation of ARARs will be completed during the remedial design phase once it is determined how the selected alternatives will be implemented.

Balancing Criteria

- Long-Term Effectiveness and Permanence

This criterion is used to evaluate the risk that would remain following implementation of the alternative. This evaluation assesses the extent and effectiveness of the controls that may be required to manage the risk posed by treatment residuals and/or untreated wastes. This criterion also addresses the adequacy and suitability of any engineering and/or ICs that are used to manage treatment residuals or untreated wastes that remain after the alternative is implemented.

- Reduction of Toxicity, Mobility, or Volume through Treatment

This evaluation criterion only applies to alternatives that use treatment technologies to permanently and significantly reduce toxicity, mobility, or volume of the hazardous substances as their principal element.

- Short-Term Effectiveness

This criterion addresses the impacts to human health and the environment while implementing the remedial action. This evaluation will consider impacts to workers, the local community, and the environment during remedial actions. Examples of potential impacts include dust from excavation, truck traffic during transportation of materials, and surface water runoff during rain events. The evaluation will consider the reliability of the available mitigation measures in preventing or reducing the potential impacts. This criterion also considers an estimate of the time required to achieve remedial goals.

- Implementability

This criterion involves the technical and administrative feasibility of implementing the alternative and the availability of required goods and services. Implementability considers the technical difficulties and unknowns associated with a remedial approach, including availability of services, materials, and supplies. This criterion also considers issues that could lead to not achieving remedial objectives, schedule delays, and adverse short-term impacts. It also considers the ease of monitoring the effectiveness of the alternative and administrative considerations, such as coordination with other parties (e.g., obtaining permits for off-site activities or rights-of-way for construction).

- Cost

Costs include capital cost and O&M expenditures to implement the alternative. A discount rate of 7% was applied, and costs are discussed and presented as total present worth costs for each alternative, including 30 years of O&M and contingencies.

An additional consideration was the potential integration of Green and Sustainable Remediation (GSR) strategies into the remedial alternatives (USEPA 2010; Interstate Technology and Regulatory Council [ITRC] 2011a, 2011b; National Research Council [NRC] 2011, 2014; Naval Facilities Engineering Command [NAVFAC] 2012a, 2012b; US Army Corps of Engineers [USACE] 2012, American Society for Testing and Materials [ASTM] 2013). GSR incorporates site-specific use of products, processes, technologies, and procedures that mitigate contaminant risk to receptors while supporting strategies that are cognizant of balancing community goals, economic impacts, and environmental effects. The environmental footprints of proposed remedial alternatives for OU-1/OU-2 were evaluated using methods identified in the *Methodology for Understanding and Reducing a Project's Environmental Footprint* (USEPA 2012b). The evaluation results provide a general framework for assessing which remedy components have the greatest influence on the alternative's environmental footprint. The methodology and associated tools (Spreadsheets for Environmental Footprint Analysis; USEPA 2014c) were used to quantify materials, wastes, water, energy, and air metrics, which represent the environmental footprint for the alternative. The primary focus of this evaluation was energy use and air emissions. This was based on the nature of the remedial alternatives that include the transport of excavated materials to a range of disposal facilities located varying distances from the Site, the use of heavy equipment to excavate soil/sediment and place backfill, and creek bank stabilization materials, off-site incineration of soils, and the operation of a pump-and-treat system to remove, treat, and discharge treated water to Snow Creek.

The environmental footprint for each alternative was calculated by taking a number of factors into account. For the excavation activities, it was assumed an excavator could remove 50 cubic yards of soil per day and that its engine would be working (not idling or shut down) 50% of the time. A similar assumption was used for sediment with the exception that the removal rate was 25 cubic yards per day. The difference in daily removal rates is associated with the comparative ease of work in a floodplain area to remove soils versus excavating sediment located in a creek or culvert structure. The same per-cubic-yard productivity values were included for the placement of backfill and creek bank stabilization materials (riprap armor). The transport of all materials (excavated materials and imported backfill) was based on using trucks with a load capacity of 15 cubic yards. Another primary input was the distance to the various resources (e.g., landfills or imported fill sources) that are used to support each alternative. These resources and the range of distances from the Site are shown below:

- On-site soil management area located 2 miles away from excavation activities (on average)
- Nonhazardous landfill located 28 miles away from the OU
- Off-site hazardous waste landfill located 176 miles from the OU
- Off-site incinerator located 644 miles from the OU
- Imported fill material source (backfill and riprap) located 10 miles from the OU (on average)

All of the distances listed above are considered to be one way. However, the alternatives will typically employ vehicles that complete round-trips to complete the task. The remedial alternative that included a pump system to extract and treat groundwater was operated by solar power and was also accounted for in this evaluation. The specific inputs for each alternative were used to calculate energy use (one million British thermal units; MMBtu), and the generation of air pollutants, which are ultimately converted to total greenhouse gas emissions as tons of carbon dioxide equivalents (CO_2e). The resulting greenhouse gas emissions and energy requirements for each alternative are discussed under the criterion of short-term impacts.

The ASM process is also used in this FS. The ASM approach is scientifically valid and often employed by the USEPA for planning and managing watershed issues (USEPA 2004b), and by governmental

agencies for Federal site restoration, as outlined by the NRC in *Environmental Cleanup at Navy Facilities: Adaptive Site Management* (NRC 2003). The NRC also has recommended the use of ASM for sites with PCB-contaminated sediment (NRC 2001). The ASM approach has previously been used at this Site as a part of the COPC evaluation. This process was described in a data quality objective letter from the USEPA (USEPA 2005b) outlining the use of ASM to evaluate COPCs as part of the Site investigation process. The application of ASM to a groundwater alternative is described in Section 7.8.4, and the application of ASM to a sediment alternative is described in Section 7.9.2.

7.2 Residential Properties

Removal of soils from residential properties in OU-1/OU-2 has been ongoing since 2001. The removal approach used for residential soils was selected as part of an EE/CA prepared by P/S (Solutia 2003b). The EE/CA identified and analyzed removal action alternatives and was supported by the NTC Removal Action Approval Memorandum prepared by the USEPA (USEPA 2004a). The removal actions were conducted under the Removal Order, the NTC Removal Action Agreement, and the Stipulation and included the removal of surface soils with PCB concentrations greater than or equal to 1 mg/kg and the removal of soils below the 0- to 1-foot horizon with PCB concentrations greater than or equal to 10 mg/kg.

As of December 31, 2014, the residential removal actions in OU-1/OU-2 are essentially complete. This includes removal actions that have been fully completed at 565 (including 8 completed by the USEPA) of 627 properties. There are 62 residential removals that have yet to be completed. These remaining removal actions will be implemented once constraints due to access and/or overgrown vegetation are no longer present. Of these properties, access to complete the removals has not been granted for 19 properties (approximately 2,500 cubic yards), and 43 properties (approximately 14,500 cubic yards) are unsuitable for removal due to overgrown vegetation. Removal actions were also conducted for residential use areas with subsurface soil PCB concentrations above 10 mg/kg. In one case, a complete removal of subsurface soils was not conducted due to concerns regarding the structural integrity of a building. This property is located at 1520 McDaniel Avenue, and subsurface soils with PCB concentrations greater than 10 mg/kg remain at depths down to 11 feet bgs. The USEPA approved the actions conducted at this property.

Where removal actions have been completed and a residential exposure scenario is present, 95 properties contain residual PCB concentrations (between 1 mg/kg and 10 mg/kg) in subsurface soil underlying areas that were previously remediated. The remedial alternatives for residential properties address subsurface soils by means of a soil management program or through the excavation and removal of these soils. The remedial alternatives also address the 380 properties where PCB residuals may remain beneath structures adjacent to previously remediated areas. The locations of residential properties being addressed under these alternatives are shown on Figure 4-1.

If the access- and/or unsuitable-related constraints are eliminated prior to the ROD for OU-1/OU-2, the removal actions will be implemented under existing agreements with the USEPA.

7.2.1 RS-1: No Further Action

For this OU, the large majority of residential properties with PCB concentrations above 1 mg/kg and subsurface soils above 10 mg/kg had soils removed under the NTC Removal Action Agreement. Therefore, the no action alternative required under the NCP is, in reality, no further action beyond the residential removal actions that have already been completed under the Removal Order, the NTC Removal Action Agreement, and the Stipulation. This alternative is presented and analyzed as required by the NCP.

7.2.1.1 Overall Protection of Human Health and the Environment

Where removals have been conducted on residential properties in accordance with the Removal Order, NTC Removal Agreement, and Stipulation, no further action is protective of human health and the environment for the short term. PCB-containing soils were removed from the affected areas and were disposed of in an approved manner. Potential direct contact at the affected properties by human or environmental receptors has been eliminated with the removal, as has the potential for transport by storm water.

This alternative would not be protective for remaining residential properties with PCB concentrations exceeding the PRG, and it would not be protective in the long term for removal properties with residual contamination, because such contamination would not be managed.

7.2.1.2 Compliance with ARARs

As all of the removal actions are not complete, RS-1 would not comply with the following key ARAR from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes

7.2.1.3 Short-Term Effectiveness

Risks to residential receptors on properties that have not been addressed would remain. There are no greenhouse gas emissions or consumption of energy associated with this remedial alternative.

7.2.1.4 Long-Term Effectiveness and Permanence

RS-1 is not effective over the long term for those properties where residual PCBs on properties remain and would not be managed. Additionally, the alternative as a whole would not be effective over the long term as some properties in the OU have soils with PCB concentrations exceeding the PRG.

7.2.1.5 Reduction of Toxicity, Mobility, or Volume through Treatment

RS-1 does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.2.1.6 Implementability

RS-1 is straightforward and easy to implement.

7.2.1.7 Cost

There is no cost to implement RS-1.

7.2.2 RS-2: Complete the NTC Removal of Residential Soils and Soil Management

Alternative RS-2 would complete the removal of soils from the residential properties that have not already been addressed under the NTC Removal Action Agreement and the Stipulation. Surface soils with PCB concentrations greater than or equal to 1 mg/kg and subsurface soils with PCB concentrations greater than or equal to 10 mg/kg would be removed and the excavations backfilled with clean material. This alternative is consistent with actions already taken under the NTC Removal Action Agreement and the Stipulation for residential properties where property access was available and the properties were not overgrown with vegetation. For these latter properties, P/S would maintain contact with the owners of these properties to determine if the status of these properties change (access granted, overgrown properties cleared), such that the required removal actions may be completed once all constraints to implementation are removed.

A soil management program, as presented in Appendix D, would be implemented, in perpetuity, as part of this remedial alternative for residential properties where residual PCB concentrations (between 1 mg/kg and 10 mg/kg) remain in subsurface soil underlying areas that were previously remediated.

Additionally, soil management activities would identify when structures are demolished. If a structure on a residential property is removed, soil removal in these areas would be implemented with on-site/off-site disposal where PCB concentrations are greater than or equal to 1 mg/kg. Soil management activities would include interactive outreach with local landowners or local municipalities regarding any plans to disturb these impacted subsurface soils. Additional actions that may be performed would include removing surface soils with PCB concentrations greater than or equal to 1 mg/kg and subsurface soils with PCB concentrations greater than or equal to 10 mg/kg from residential properties where residual PCBs are exposed or disturbed. Soil generated during the additional residential removal activities would be disposed of on-site in the SSSMA provided that the PCB concentrations from the five-point composite samples collected for the property are less than 10 mg/kg. Otherwise, the excavated soil would be disposed of at approved off-site disposal facilities.

Figure 4-1 shows the residential properties that may be addressed under this alternative. Any additional work conducted at these residential properties would be completed in accordance with the previously approved NTC Removal Action work plans.

7.2.2.1 Overall Protection of Human Health and the Environment

Alternative RS-2 would be protective of human health and the environment by removing the PCB-containing soil from residential properties and disposing of it in an appropriate manner, whether at an approved on-site soil management area or at an off-site landfill(s). Potential direct contact with affected soils on these properties by human or environmental receptors would be eliminated with the removal. Removal would also eliminate the potential for off-site transport by storm water.

Future exposure to PCB-containing soil remaining in subsurface soil or potentially beneath structures would be addressed through implementing the soil management program. Should these subsurface soils need to be disturbed or soils beneath a residential structure (included in the program) become accessible, measures would be implemented to manage the excavation and disposal of these soils, as necessary, to address worker exposures and potential recontamination of properties previously addressed. Implementing these programs would provide overall protectiveness of human health and the environment.

7.2.2.2 Compliance with ARARs

RS-2 would comply with the following key ARARs from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. Part 261 for the management and disposal of remediation wastes
- Regulations at 40 C.F.R. Part 761 for the management and disposal of PCB remediation wastes
- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes

7.2.2.3 Short-Term Effectiveness

The activities associated with RS-2 would result in manageable short-term risks to construction workers primarily during excavation of impacted soil. These potential risks will be managed with engineering controls, administrative controls, and appropriate health and safety measures. Short-term impacts to the community would be insignificant and would generally be associated with traffic caused by trucks hauling materials to and from the Site. These impacts can be mitigated by implementing protocols that reduce dust and debris on roadways and by adhering to traffic laws. Construction of the remedial components included in this alternative has largely been implemented recognizing that soil management would be the focus moving forward. The work will likely be completed during normal construction hours (e.g., during daylight).

Workers have additional general risks not related to potential chemical exposure while implementing this remedy, such as accidents related to these activities. These risks are addressed in applicable health and safety plans.

Energy use for RS-2 is approximately 5,200 MMBtu and the greenhouse gas emissions are approximately 420 CO2e.

7.2.2.4 Long-Term Effectiveness and Permanence

RS-2 provides long-term permanent protection of human health and the environment by removing impacted soils above acceptable residential risk levels. Excavating impacted soil would eliminate long-term risk to receptors. Soil management and long-term O&M would prevent risks from subsurface soils at residential properties. This alternative would meet the RAOs for residential soil.

7.2.2.5 Reduction of Toxicity, Mobility, or Volume through Treatment

RS-2 does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.2.2.6 Implementability

As shown through previous work completed under the NTC Removal Action Agreement, the remedial components provided in RS-2 are easily implemented as they utilize well-established practices and the services and materials required are standard within the industry and readily available. The soil management activities under RS-2 can be readily performed, and the personnel and equipment are expected to be readily available.

The construction of this alternative would be relatively straightforward. Soil excavation and backfill would be conducted with common power construction equipment and by manual means. No specialized treatment equipment would be employed. Erosion and sedimentation controls would be necessary during construction. Excavation and disposal is a proven technology that has been shown to be effective in preventing exposure to PCB-containing soil. This technology has been routinely used for remedial actions under CERCLA.

Engineering and administrative functions are not expected to impede implementation. However, based on experience gained under the NTC Removal Action Agreement, obtaining signed access agreements from property owners would be time consuming.

7.2.2.7 Cost

A cost estimate for RS-2 is provided in Table 7-1. The capital cost for this alternative is estimated to be $3.7 million (M). The annual long-term cost is estimated to be $113,000 per year, and the total present worth cost for this alternative over a 30-year period including soil management and contingency costs, is approximately $7.3M. This includes soil management for residential properties with residual PCBs and addressing the 62 residential properties where PCBs are present in surface soils at concentrations greater than or equal to 1 mg/kg. The cost estimate assumes that soil management will be addressed over the 30-year period; however, due to the nature of managing residual PCBs at the site, soil management and O&M would extend in perpetuity. The cost estimate for the disposal of soils generated during these removals and through soil management includes 75% of the excavated soils being placed in the SSSMA and the remaining 25% being disposed of at an off-site nonhazardous waste landfill. Residential properties will remain in the long-term soil management program until all surface and subsurface residuals are removed from a property and PCB residuals beneath on-site structures are addressed in accordance with the soil management plan.

7.2.3 RS-3: Removal of Residential Soils ≥1 mg/kg PCBs and Soil Management

Alternative RS-3 includes removing surface and subsurface soils on residential properties with PCB concentrations greater than or equal to 1 mg/kg. The actions for surface soils are consistent with actions already taken under the NTC Removal Action Agreement and the Stipulation for residential properties where property access was available and the properties were not overgrown with vegetation. In addition, this alternative includes returning to some of the properties (95 properties) that were previously addressed under the NTC Removal Action Agreement, removing the previously placed 12-inch layer of clean backfill material at the surface, excavating deeper to remove subsurface soils with PCB concentrations greater than or equal to 1 mg/kg, and backfilling and restoring the area. Based on data collected for the residential removal program, P/S do not anticipate having to excavate to depths greater than 4 feet bgs. However, should excavation depths greater than 4 feet bgs be required, P/S would evaluate the size of the property and proximity to existing structures to determine whether it was practical to excavate to such a depth. If not, P/S would request that the excavation depth be limited to the upper 4 feet with the expectation that this would be acceptable since the likelihood of exposure or disturbing PCB-containing soil at these depths is low.

P/S would maintain contact with the owners of properties, where access has not been provided or portions of the property are overgrown to determine if the status of these properties change (access granted, overgrown properties cleared), until the required removal actions may be completed once all constraints to implementation are removed.

A soil management program would also be implemented, in perpetuity, as part of this remedial alternative for residential properties where residual PCB concentrations potentially remain in subsurface soil beneath structures. Soil management activities would include interactive outreach with local landowners or local municipalities regarding any plans to disturb these impacted subsurface soils. Activities under RS-3 would also include noting changes in property use in the OU-1/OU-2 footprint (the potential that a nonresidential property could become residential or that a residential property could become nonresidential). Additional actions would include removing surface and subsurface soils with PCB concentrations greater than or equal to 1 mg/kg where residual PCBs are exposed or disturbed. Soil generated during the additional residential removal activities would be disposed of on-site in the SSSMA provided that the PCB concentration results from the five-point composite samples collected for the property are less than 10 mg/kg. Otherwise, the excavated soil would be disposed of at an approved off-site facility.

Figure 4-1 shows the residential properties that would be addressed under RS-3. Any additional work conducted at these residential properties would be completed in accordance with the previously approved NTC Removal Action work plans.

7.2.3.1 Overall Protection of Human Health and the Environment

RS-3 would be protective of human health and the environment by removing the PCB-containing soil from the affected areas and disposing of it in an appropriate manner, whether at the SSSMA or at an off-site landfill(s). This alternative provides permanent removal of the PCB-containing soil from the affected residential properties. Potential direct contact at the affected properties by human or environmental receptors would be eliminated with the removal. The removal would also eliminate the potential for off-site transport by storm water. Workers on the affected properties could be exposed by dermal contact and fugitive dust during implementation. However, these would be mitigated by using administrative controls which will require proper training and soil handling procedures. Air will be monitored during soil disturbance activities to protect Site workers and the community.

Workers have additional risks not related to potential chemical exposure while implementing this remedy, including accidents. These additional risks would include general risks to construction workers

and the potential for traffic accidents. Due to the number of residential properties that would need to be remediated to address PCB residuals at depth (1 to 10 mg/kg), the risks to construction workers and the general public would be higher than the other alternatives.

Future exposure to PCB-containing soil potentially remaining beneath structures would be addressed through implementing the soil management program. Should soils beneath a residential structure (included in the program) become accessible, measures would be taken to manage the excavation and disposal of these soils, as necessary, to address worker exposures and potential recontamination of properties previously addressed. Implementing these programs would provide overall protectiveness of human health and the environment.

7.2.3.2 Compliance with ARARs

RS-3 would comply with the following key ARARs from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. Part 261 for the management and disposal of remediation wastes
- Regulations at 40 C.F.R. Part 761 for the management and disposal of PCB remediation wastes
- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes

7.2.3.3 Short-Term Effectiveness

The activities associated with RS-3 would result in manageable short-term risks to construction workers primarily during excavation of impacted soil. These potential risks will be managed with engineering controls, administrative controls, and appropriate health and safety measures. Short-term impacts to the community would be moderate and would generally be associated with traffic caused by trucks hauling materials to and from the Site. The impacts would be highest at the specific properties where surface soil removal has already occurred under the residential removal program. The activities under RS-3 would include excavating through the previously implemented surface soil remedy to address the residuals at depth. The length of time necessary to remove the soils at depth and the associated level of disturbance to the properties would be much higher than experienced during the surface soil removal program. The frequency of truck traffic would be moderate to high while the initial removals are completed to address the PCB residuals at depth. These impacts can be mitigated by implementing protocols that reduce dust and debris on roadways and by adhering to traffic laws. The work will likely be completed during normal construction hours (e.g., during daylight).

Workers have additional general risks not related to potential chemical exposure while implementing this remedy, such as accidents related to these activities. These risks are addressed in applicable health and safety plans.

Energy use for RS-3 is approximately 15,000 MMBtu and the greenhouse gas emissions are approximately 1,200 CO2e.

7.2.3.4 Long-Term Effectiveness and Permanence

RS-3 provides long-term permanent protection of human health and the environment by removing impacted soils, which would result in acceptable risk levels. Excavation of impacted soil will eliminate long-term risk to receptors. Soil management would prevent risks from subsurface soils beneath structures at residential properties. This alternative would meet the RAOs for soil.

7.2.3.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative RS-3 does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.2.3.6 Implementability

As shown through previous work completed under the NTC Removal Action Agreement, the remedial components provided in RS-3 can be implemented as they utilize well-established practices and the services and materials required are standard within the industry and are readily available. Additionally, the soil management activities under RS-3 can be readily performed, and the personnel and equipment are expected to be readily available.

The construction of this alternative would be relatively straightforward with the exception of the residential properties that would require excavation down to 3 to 4 feet bgs. This would also include returning to 95 properties and completing the subsurface characterization of PCBs. Due to existing structures on many of these properties, removing additional impacted soil in close proximity to these nearby structures would provide challenges and require certain offsets from the structures. Soil excavation and backfill would be accomplished with common power construction equipment and by manual means. No specialized treatment equipment would be employed. Erosion and sedimentation controls would be necessary for the affected areas. Excavation and disposal is a proven technology that has been shown to be effective in preventing exposure to PCB-containing soil. This technology has been routinely used for remedial actions under CERCLA.

Engineering and administrative functions are not expected to impede implementation. However, based on experience gained under the NTC Removal Action Agreement, access agreements from affected property owners would be time consuming to negotiate. Additionally, as P/S would have already performed removal actions at most of these properties, there would likely be resistance from some property owners regarding implementing a second action at the same property. For these properties, the USEPA would need to assist with obtaining access to perform the remedial actions.

7.2.3.7 Cost

A cost estimate for RS-3 is shown in Table 7-2. The estimated capital cost (without contingencies) is $9.9M, and the annual long-term cost for these elements is estimated at $54,000 per year. The total present worth cost for this alternative, including 30 years of soil management and contingency, is approximately $15.7M. This includes addressing the 62 residential properties where PCBs are present in surface soils at concentrations greater than or equal to 1 mg/kg, conducting soil management for all residential properties with structures, and removing subsurface soils at 95 residential properties with PCBs in subsurface soil. The cost estimate assumes that soil management will be addressed over the 30-year period; however, due to the nature of managing residual PCBs at the Site, soil management and O&M would extend in perpetuity. P/S expect that the 95 properties with subsurface removals (over a 10-acre area) would be implemented over a two-to-three-year period following the completion of characterization activities. The cost estimate for the disposal of soils generated during these removals, and through soil management includes 75% of the excavated soils being placed in the SSSMA and the remaining 25% being disposed of at an off-site nonhazardous waste landfill. Residential properties will remain in the long-term soil management program until all surface and subsurface residuals are removed from a property and PCB residuals beneath on-site structures are addressed in accordance with the soil management plan. The subsurface removals to be conducted at the 95 properties also includes removal and disposal of the 12-inch layer of clean backfill that was placed following completion of the previous surface soil removal actions.

7.3 Special Use Properties

In accordance with the Stipulation, the high activity portions of special use properties have been addressed in accordance with the NTC Removal Action Agreement using the same surface and subsurface removal action criteria for soil as required for residential properties. The removal actions for the high activity portions of special use properties in OU-1/OU-2 are complete. No further removal actions are required for these special use properties under the Stipulation and the NTC Removal Action

Agreement. All high activity areas with surface soil PCB concentrations greater than or equal to 1 mg/kg have already undergone removal actions.

Where removal actions have been completed and a residential exposure scenario is present, 3 properties contain residual PCB concentrations (between 1 mg/kg and 10 mg/kg) in subsurface soil underlying areas that were previously remediated. The remedial alternatives for special use properties address subsurface soils by means of a soil management program or through excavating and removing these soils. The remedial alternatives also address the 10 properties where PCB residuals may remain beneath structures adjacent to previously remediated areas. The locations of residential properties being addressed under these alternatives are shown on Figure 4-2.

Additionally, two of the active alternatives address PCB concentrations on the low activity portions of special use properties. There are 18 special use properties with surface soil PCB concentrations greater than or equal to 1 mg/kg that would be addressed under these alternatives.

7.3.1 SU-1: No Further Action

This section of the document describes and evaluates the no action alternative for special use properties. In this case, it is actually a no further action alternative, as removal actions have already been conducted for the high activity portions of the special use properties within OU-1/OU-2.

Under SU-1, no further action would be conducted beyond the cleanups that have already been conducted for the high activity portions of the special use properties under the NTC Removal Action Agreement. This alternative is presented and analyzed as required by the NCP.

7.3.1.1 Overall Protection of Human Health and the Environment

SU-1 is not protective of human health and the environment in the long term. Previous removal activities eliminated the PCB-containing soil from the high activity portions of the special use properties and the excavated materials were disposed of in an appropriate manner. There is a slight risk associated with PCB-containing soil between 1 mg/kg and 10 mg/kg remaining at depth in the high activity portion of a property should the materials be brought to the surface and for locations where PCBs may be present under structures. These materials would not be addressed under SU-1.

This alternative would not be protective in the long term where removals have been conducted because residual contamination on these properties would not be managed.

7.3.1.2 Compliance with ARARs

As PCB residual soil remains beneath structures, SU-1 would not comply with the following key ARAR from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes

7.3.1.3 Short-Term Effectiveness

No additional short-term risks or impacts to the community, workers, or the environment are posed by implementing SU-1. There are no greenhouse gas emissions or consumption of energy associated with this remedial alternative.

7.3.1.4 Long-Term Effectiveness and Permanence

SU-1 does not provide long-term permanent protection of human health and the environment.

7.3.1.5 Reduction of Toxicity, Mobility, or Volume through Treatment

SU-1 does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.3.1.6 Implementability

SU-1 is straightforward and easy to implement.

7.3.1.7 Cost

There is no cost to implement SU-1.

7.3.2 SU-2: NTC Removals in High Activity Areas and Soil Management

Removals have already been conducted for the high activity portions of the special use areas under the Stipulation. Based on this, SU-2 is focused on soil management for three high activity areas that have subsurface soils with PCB concentrations between 1 mg/kg and 10 mg/kg. Low activity areas would be addressed as part of the nonresidential alternatives as described in Section 7.7.

A soil management program would be implemented as part of this remedial alternative for the three properties with subsurface soils with PCB concentrations between 1 mg/kg and 10 mg/kg. Soil management activities would include interactive outreach with property owners or local municipalities regarding any plans to disturb impacted subsurface soils in high activity areas where removal actions were conducted under the Stipulation and would remain in place in perpetuity.

Soil management activities would also identify if an existing structure located within or adjacent to a previously remediated high activity area is demolished, and long-term O&M activities would be implemented to address any low activity areas that transition to high activity area. If a low activity area transitioned to high activity status, actions would include removing surface soils with PCB concentrations greater than or equal to 1 mg/kg and removing subsurface soils with PCB concentrations greater than or equal to 10 mg/kg. Any soils generated during soil management activities would be disposed of in the SSSMA provided that the PCB concentration results from the five-point composite samples collected for the property are less than 10 mg/kg. Otherwise, the excavated soil would be disposed of at approved off-site disposal facilities.

Figure 4-2 shows the high activity portions of special use properties that would be addressed under SU-2. Any additional work conducted at these properties would be completed in accordance with the previously approved work plans.

7.3.2.1 Overall Protection of Human Health and the Environment

SU-2 would be protective of human health and the environment by removing the PCB-containing soil from the high activity areas of the special use properties and disposing of it in an approved manner. Potential direct contact at the affected properties by human or environmental receptors would be eliminated with the removal. The removal would also eliminate the potential for transport by storm water.

Future exposure to PCB-containing soil remaining in subsurface soil or potentially beneath structures would be addressed through soil management that would remain in place in perpetuity. Should these subsurface soils be disturbed, or soils beneath a structure become accessible, measures would be implemented to manage the excavation and disposal of these soils, as necessary, to address worker exposures and potential recontamination of properties previously addressed as part of the Stipulation and the NTC Removal Action Agreement. Implementing these programs would provide an additional level of protectiveness than anticipated under the NTC Removal Action Program and Stipulation and would provide overall protectiveness of human health and the environment.

7.3.2.2 Compliance with ARARs

SU-2 would comply with the following key ARARs from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. Part 261 for the management and disposal of remediation wastes
- Regulations at 40 C.F.R. Part 761 for the management and disposal of PCB remediation wastes
- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes

7.3.2.3 Short-Term Effectiveness

The activities associated with SU-2 would result in manageable short-term risks to construction workers primarily as a result of excavating impacted soil. These risks would be managed by using engineering controls, administrative controls, and appropriate health and safety measures. Short-term impacts to the community would be low and would generally be associated with traffic caused by trucks hauling materials to and from the Site. These risks can be mitigated by requiring protocols that reduce dust and debris on roadways and by adhering to traffic laws. Construction of all the remedial components included in this alternative would likely be completed during normal construction hours (e.g., during daylight). Typical construction equipment (e.g., excavators, backhoes, and dump trucks) would be used.

Energy use for SU-2 is approximately 280 MMBtu and the greenhouse gas emissions are approximately 20 CO2e.

7.3.2.4 Long-Term Effectiveness and Permanence

SU-2 provides long-term permanent protection of human health and the environment by removing soils impacted above acceptable risk levels. Soil management and long-term O&M would prevent risks from subsurface soils remaining at these high activity special use properties. This alternative would meet the RAOs for the high activity portions of special use areas.

7.3.2.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative SU-2 does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.3.2.6 Implementability

As shown through previous work completed under the NTC Removal Action Agreement, the remedial components provided in SU-2 are easily implemented as they use established practices and the services and materials required are standard within the industry and are readily available. The removals from the high activity portions of the special use areas have already been conducted, and soil management can be readily performed as the personnel and equipment are available. There are only three properties with PCB residuals present at depth, and the surface soil removals have already been conducted. Should excavation and disposal be needed to support soil management activities, the equipment, personnel, and facilities are readily available.

7.3.2.7 Cost

A cost estimate for Alternative SU-2 is shown in Table 7-3. The capital cost associated with this alternative is $0.2M. The long-term annual cost is estimated at $22,000 per year. The total present worth cost for this alternative, including 30 years of soil management and contingency, is approximately $0.5M. The cost estimate assumes that soil management will be addressed over the 30-year period; however, due to the nature of managing residual PCBs at the Site, soil management and O&M would extend in perpetuity. The cost estimate for the disposal of soils generated during soil management includes 75% of the excavated soils being placed in the SSSMA, and the remaining 25%

being disposed of at an off-site nonhazardous waste landfill. Special use properties will remain in the long-term soil management program until all surface and subsurface residuals are removed from a property and residuals beneath structures are addressed in accordance with the soil management plan.

7.3.3 SU-3: Complete the NTC Removals in High Activity Areas, Removal of Nonresidential Surface Soil from Low Activity Areas with PCBs ≥ 1 mg/kg and Soil Management

Alternative SU-3 includes removing surface soils from the high activity portions of special use properties with PCB concentrations greater than or equal to 1 mg/kg and the low activity portions of special use properties with PCB concentrations greater than or equal to 1 mg/kg. This alternative also includes removing subsurface soils in both high and low activity portions of special use properties with PCB concentrations greater than or equal to 10 mg/kg. This alternative is consistent with actions already taken under the Stipulation for the high activity portions of special use properties. Removals have already been conducted for the high activity portions of the special use areas under the Stipulation. Based on this, SU-3 is focused on excavating the low activity portions of special use areas with PCB concentrations greater than or equal to 1 mg/kg in surface soil and 10 mg/kg in subsurface soil.

A soil management program would be implemented as part of this remedial alternative for properties with subsurface soil PCB concentrations between 1 mg/kg and 10 mg/kg in high activity and low activity areas. Soil management activities would continue in perpetuity and would include interactive outreach with property owners or local municipalities regarding any plans to disturb impacted subsurface soils in areas where removal actions were conducted under the Stipulation.

Soil management activities would also identify where an existing structure located within or adjacent to a previously remediated area is demolished. Additional actions would include removing surface soils with PCB concentrations greater than or equal to 1 mg/kg in high and low activity areas, and subsurface soils with PCB concentrations greater than or equal to 10 mg/kg on properties where residual PCBs are exposed or disturbed. Any soils generated during soil management activities would be disposed of in the SSSMA provided that the PCB concentration results from the five-point composite samples collected for the property are less than 10 mg/kg. Otherwise, the excavated soil would be disposed of at approved off-site disposal facilities.

Figure 4-2 shows the special use properties that would be addressed under SU-3. Any additional work conducted at these properties would be completed in accordance with the previously approved work plans.

7.3.3.1 Overall Protection of Human Health and the Environment

SU-3 would be protective of human health and the environment by removing the PCB-containing soil from the high and low activity areas of the special use properties and disposing of it in an appropriate manner, whether in an on-site soil management area or at an off-site landfill(s). Potential direct contact at the affected properties by human or environmental receptors would be eliminated with the removal. The removal would also eliminate the potential for transport by storm water.

Future exposure to PCB-containing soil remaining in subsurface soil or potentially beneath structures would be addressed through soil management that would remain in place in perpetuity. Should these subsurface soils be disturbed, or soils beneath a structure become accessible, measures would be implemented to manage the excavation and disposal of these soils, as necessary, to address worker exposures and potential recontamination of properties previously addressed as part of the Stipulation and the NTC Removal Action Agreement. Implementing these programs would provide an additional level of protectiveness than anticipated under the NTC Removal Action Program and Stipulation, and would provide overall protectiveness of human health and the environment.

7.3.3.2 Compliance with ARARs

SU-3 would comply with the following key ARARs from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. Part 261 for the management and disposal of remediation wastes
- Regulations at 40 C.F.R. Part 761 for the management and disposal of PCB remediation wastes
- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes

7.3.3.3 Short-Term Effectiveness

The activities associated with SU-3 would result in manageable short-term risks to construction workers primarily as a result of excavating impacted soil. These risks would be managed by using engineering controls, administrative controls, and appropriate health and safety measures. Short-term impacts to the community would be moderate and would generally be associated with traffic caused by trucks hauling materials to and from the Site. These risks can be mitigated by requiring protocols that reduce dust and debris on roadways and by adhering to traffic laws. Construction of all the remedial components included in this alternative would likely be completed during normal construction hours (e.g., during daylight). Typical construction equipment (e.g., excavators, backhoes, and dump trucks) would be used.

Energy use for SU-3 is approximately 2,800 MMBtu and the greenhouse gas emissions are approximately 225 CO2e.

7.3.3.4 Long-Term Effectiveness and Permanence

SU-3 provides long-term permanent protection of human health and the environment by removing impacted soils from high and low activity portions of special use properties above acceptable risk levels. Soil management and long-term O&M would prevent risks from subsurface soils remaining at these special use properties. This alternative would meet the RAOs for special use areas.

7.3.3.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative SU-3 does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.3.3.6 Implementability

As shown through previous work completed under the NTC Removal Action Agreement, the remedial components provided in SU-3 are easily implemented as they utilize well-established practices and the services and materials required are standard within the industry and are readily available. The soil management activities under SU-3 can be readily performed, and the personnel and equipment are expected to be readily available.

The construction of this alternative would be relatively straightforward. Soil excavation and backfill would be accomplished with common power construction equipment and by manual means. No specialized treatment equipment would be employed. Erosion and sedimentation controls would be necessary for the affected areas. Excavation and disposal is a proven technology that has been shown to be effective in preventing exposure to PCB-containing soil. This technology has been routinely used for remedial actions under CERCLA.

Engineering and administrative functions are not expected to impede implementation. However, based on experience gained under the NTC Removal Action Agreement, access agreements from affected property owners would be time consuming to negotiate.

7.3.3.7 Cost

A cost estimate for SU-3 is provided in Table 7-4. The capital cost for this alternative is estimated to be $1.9M. The annual long-term cost is estimated to be $25,000 per year, and the total present worth cost for this alternative over a 30-year period including soil management and contingency, is approximately $3.1M. This includes soil management for all of the special use properties where PCBs are present in surface or subsurface soils at concentrations greater than or equal to 1 mg/kg. The cost estimate assumes that soil management will be addressed over the 30-year period; however, due to the nature of managing residual PCBs at the Site, soil management and O&M would extend in perpetuity. P/S expect that it would require one to two years to implement the initial portion of this alternative (i.e., conducting removal actions at low activity areas). The cost estimate for the disposal of soils generated through soil management includes 75% of the excavated soils being placed in the SSSMA and the remaining 25% being disposed of at an off-site nonhazardous waste landfill. Special use properties will remain in the long-term soil management program until all surface and subsurface residuals are removed from a property and there is no potential for PCB residuals to remain beneath on-site structures.

7.3.4 SU-4: Removal of Soils with PCBs ≥1 mg/kg from High Activity Areas and Low Activity Areas

Alternative SU-4 would involve excavating and on-site/off-site disposal of surface and subsurface soils with PCB concentrations greater than or equal to 1 mg/kg in high activity portions and low activity portions of special use properties. Excavated materials would be disposed of on-site if PCB concentrations are less than 10 mg/kg and disposed of off-site if PCB concentrations are greater than or equal to 10 mg/kg. On-site disposal of soils with PCB concentrations less 10 mg/kg is provided for in the Stipulation through the NTC Removal Action Agreement that was approved for the Site by the USEPA. The technical approach described in the NTC Removal Action Agreement includes using five-point composite soil samples to characterize PCBs for the purposes of removal and disposal.

Removals have already been conducted for the high activity portions of the special use areas under the Stipulation. Based on this, SU-4 is focused on excavating and removing PCBs at depth in high activity areas and removing PCBs in both surface and subsurface soil for the low activity portions of special use properties. A significant investigation program would be required to delineate the extent of the removal action prior to completing the work.

A soil management program would be implemented as part of this remedial alternative for properties with subsurface soils with PCB concentrations between 1 mg/kg and 10 mg/kg in high activity and low activity areas. Soil management activities would continue in perpetuity and would include interactive outreach with property owners or local municipalities regarding any plans to disturb impacted subsurface soils in areas where removal actions were conducted under the Stipulation. Any soils generated during soil management activities would be disposed of in the SSSMA provided that the PCB concentration results from the five-point composite samples collected for the property are less than 10 mg/kg. Otherwise, the excavated soil would be disposed of at approved off-site disposal facilities.

Figure 4-2 shows the special use properties that would be addressed under SU-4. Any additional work conducted at these properties would be completed in accordance with the previously approved work plans.

7.3.4.1 Overall Protection of Human Health and the Environment

SU-4 would be protective of human health and the environment by removing the PCB-containing surface and subsurface soil from the high and low activity areas of the special use properties and disposing of it in an appropriate manner, whether in an on-site soil management area or at an off-site landfill(s). Potential direct contact at the affected properties by human or environmental receptors

would be eliminated with the removal. The removal would also eliminate the potential for transport by storm water.

Future exposure to PCB-containing soil potentially remaining beneath structures would be addressed through soil management that would remain in place in perpetuity. Should these subsurface soils beneath a structure become accessible, measures would be implemented to manage the excavation and disposal of these soils, as necessary, to address worker exposures and potential recontamination of properties previously addressed as part of the Stipulation and the NTC Removal Action Agreement. Implementing these programs would provide an additional level of protectiveness than anticipated under the NTC Removal Action Program and Stipulation, and would provide overall protectiveness of human health and the environment.

7.3.4.2 Compliance with ARARs

SU-4 would comply with the following key ARARs from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. Part 261 for the management and disposal of remediation wastes
- Regulations at 40 C.F.R. Part 761 for the management and disposal of PCB remediation wastes
- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes

7.3.4.3 Short-Term Effectiveness

The activities associated with SU-4 would result in manageable short-term risks to construction workers primarily as a result of excavating impacted soil. These risks would be managed by using engineering controls, administrative controls, and appropriate health and safety measures. Short-term impacts to the community would be moderate to high and would generally be associated with traffic caused by trucks hauling materials to and from the Site. Due to the number and overall size of the properties that would be addressed under this alternative, it would include significantly more traffic on the roadways versus the other alternatives. These risks can be mitigated by requiring protocols that reduce dust and debris on roadways and by adhering to traffic laws. Construction of all the remedial components included in this alternative would likely be completed during normal construction hours (e.g., during daylight). Typical construction equipment (e.g., excavators, backhoes, and dump trucks) would be used.

Energy use for SU-4 is approximately 3,800 MMBtu and the greenhouse gas emissions are approximately 300 CO2e.

7.3.4.4 Long-Term Effectiveness and Permanence

SU-4 provides long-term permanent protection of human health and the environment by removing impacted surface and subsurface soils from high and low activity portions of special use properties above acceptable risk levels. Soil management and long-term O&M would prevent risks from subsurface soils remaining at these special use properties. This alternative would meet the RAOs for special use areas.

7.3.4.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative SU-4 does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.3.4.6 Implementability

As shown through previous work completed under the NTC Removal Action Agreement, the remedial components provided in SU-4 can be implemented using established practices, services, and

materials. If the removal and disposal of soils are required as part of soil management, the equipment, personnel, and facilities are readily available.

The construction of this alternative would be relatively straightforward. Soil excavation and backfill would be accomplished with common power construction equipment and by manual means. No specialized treatment equipment would be employed. Erosion and sedimentation controls would be necessary for the affected areas. Excavation and disposal is a proven technology that has been shown to be effective in preventing exposure to PCB-containing soil. This technology has been routinely used for remedial actions under CERCLA.

Engineering and administrative functions are not expected to impede implementation. However, based on experience gained under the NTC Removal Action Agreement, access agreements from affected property owners would be time consuming to negotiate.

7.3.4.7 Cost

A cost estimate for SU-4 is provided in Table 7-5. The capital cost for this alternative is estimated to be $2.5M. The annual long-term cost is estimated to be $14,000 per year, and the total present worth cost for this alternative over a 30-year period including soil management and contingency, is approximately $3.9M. This includes soil management for all of the special use properties where PCBs are present in subsurface soils at concentrations greater than or equal to 1 mg/kg. The cost estimate assumes that soil management will be addressed over the 30-year period; however, due to the nature of managing residual PCBs at the Site, soil management and O&M would extend in perpetuity. P/S expect that it would require two to three years to implement the initial portion of this alternative (i.e., conducting surface and subsurface removal actions at high and low activity areas). The cost estimate for the disposal of soils generated through soil management includes 75% of the excavated soils being placed in the SSSMA and the remaining 25% being disposed of at an off-site nonhazardous waste landfill. Special use properties will remain in the long-term soil management program until all surface and subsurface residuals are removed from a property and there is no potential for PCB residuals to remain beneath on-site structures.

7.4 Interim Measure Areas

Multiple IMs and removal action projects have been conducted over the past 20 years. The complete list of previously implemented IMs, interim caps, and removals actions, other than those completed under the Removal Order, the NTC Removal Action Agreement, and the Stipulation include:

- Northside Area properties
- Eastside Area properties
- Eastside Drainage Way
- Hall Street properties
- Quintard Mall
- 11th Street Ditch Removal

These projects were also conducted with Federal and/or State regulatory agency oversight. Detailed descriptions of the previously implemented IMs and removal action projects are presented in Section 3 of the OU-1/OU-2 RI (ENVIRON 2015a), and a summary is presented in Section 4.0 of this FS. The RI includes detailed descriptions of the actions that were conducted at each location (including ICs) and the associated long-term O&M activities. The detailed descriptions and figures presented in the OU-1/OU-2 RI show the design and extent of the actions and those locations where PCBs are isolated

through a combination of engineering and access controls. The PCB results for soil being isolated and contained by these controls are also presented on the OU-1/OU-2 RI figures.

An effectiveness evaluation was completed for all of the previous IMs, interim caps, and removal projects as presented in Section 4.0. The results of the effectiveness evaluation indicated that additional efforts were necessary to enhance three of the previously implemented IMs—the Northside Area, Eastside Area, and the Eastside Drainage Way. Enhancement of the Eastside Drainage Way properties would also include two nearby drainage way areas. One drainage way area is located to the north and directly adjacent to the Eastside Drainage Way and the second area (PB-RR-37) is located northeast of the Eastside Drainage Way. These alternatives (presented below) that address these areas were prepared with the understanding that P/S will restrict the future use of these properties in perpetuity as described in the alternatives.

7.4.1 IM-1: No Further Action

Alternative IM-1 is the no action alternative, which, in this case, means that no further remedial actions would be conducted beyond those already implemented. Under IM-1, no new actions would be implemented beyond those IMs and removal actions that have been previously implemented. O&M, as described in the RI, would no longer be conducted.

7.4.1.1 Overall Protection of Human Health and the Environment

IM-1 would not provide adequate protection of human health and the environment. Surface soils at the Northside Area, Eastside Area, and the Eastside Drainage Way exceed the nonresidential PRG for PCBs of 21 mg/kg, and isolated detections remain above 50 mg/kg. IM-1 would not address these risks. Additionally, this alternative does not provide for the O&M of the previously implemented IMs. Overall, IM-1 would not provide adequate protection of human health and the environment.

7.4.1.2 Compliance with ARARs

IM-1 would not comply with the following key ARAR from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes

7.4.1.3 Short-Term Effectiveness

No additional short-term risks to the community, workers, or the environment are posed by implementing IM-1. There are no greenhouse gas emissions or consumption of energy associated with this remedial alternative.

7.4.1.4 Long-Term Effectiveness and Permanence

IM-1 would not provide long-term effectiveness as it does not address the elevated EPCs for PCBs at the Eastside Area and the Northside Area, or maintain the previously implemented IMs and removal projects.

7.4.1.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative IM-1 does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.4.1.6 Implementability

IM-1 is straightforward and easy to implement.

7.4.1.7 Cost

There is no cost to implement IM-1.

7.4.2 IM-2: Expand Existing Measures, Address PTW if Present and ICs

Alternative IM-2 includes continuing and maintaining the existing IMs and expanding the existing IMs in the Northside Area, Eastside Area, and the Eastside Drainage Way (including the drainage ditch to the north and PB-RR-37 area) to meet the nonresidential PRG for PCBs in surface soil of 21 mg/kg and address exposed areas with surface soil PCB concentrations greater than or equal to 50 mg/kg. The extents of the IM expansions are shown on Figures 4-5b-d and Figure 4-7. This alternative would include placing an engineered cap over the additional areas using the original cover designs developed when the existing IM covers were installed. The original IM included placing a soil cap over areas with elevated PCB concentrations and capping locations in drainage ways with a low-permeability liner material if the PCB concentrations were elevated. The low-permeability liner was covered by 12 inches of clean soil and vegetated for stability. The IMs for non-drainage-way areas included a cover system with a geotextile marker layer, 12 inches of clean backfill, and vegetation to stabilize the area. For the proposed expansion of the IM areas shown in Figures 4-4, 4-6a-c, and 4-8, riprap would be used in select areas (e.g., northern drainage way) as cover over the geotextile or low-permeability liner to prevent the erosion of the cover within the drainage way. Additionally, limited excavation (and off-site disposal) may be required to address physical constraints and allow the most effective placement of the engineered cover. Further evaluation of PTW at the Eastside Area during the remedial design would be performed to confirm that PTW is not present. If PTW is found to be present, additional subsurface soil excavation will be required.

Prior to any surface disturbance, appropriate temporary erosion and sedimentation control measures and surface water management structures would be put in place to contain particulates during construction. Air would be monitored for particulates near the working area and the perimeter of the property. Clean fill would be used to construct the cover systems. The surface of the areas would be vegetated. For the area near PB-RR-37, a low-permeability liner would be placed into the ditch section and piping would be placed to convey surface water and maintain channel hydraulics prior to installing the soil cover over the area.

Enhanced ICs (additional deed restrictions) would be included to reflect the expanded nature of the IMs and would restrict the potential future uses of these areas. Operation, monitoring, and maintenance of the existing and proposed additional remedial components are included in IM-2.

7.4.2.1 Overall Protection of Human Health and the Environment

IM-2 would provide both short-term and long-term protection of human health and the environment as direct contact with soils would meet the PRGs, potential impacts to groundwater are mitigated by the previously constructed impermeable and expanded covers, and continued O&M of the existing and new covers and storm water management systems will protect surface water.

7.4.2.2 Compliance with ARARs

IM-2 would comply with the following key ARAR from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes

7.4.2.3 Short-Term Effectiveness

The activities associated with IM-2 would result in short-term risks to construction workers primarily as a result of exposures to impacted soils for a short time period since impacted soils will not be exposed once the installation of the capping system begins. These risks would be managed by using engineering controls, administrative controls, and appropriate health and safety measures. Significant short-term risks to the community are not expected. Construction of the remedial components included in this alternative would take three to six months, and work would be completed during normal construction hours (e.g., during daylight). Typical construction equipment (e.g., excavators,

backhoes, and dump trucks) would be used, in addition to moderately specialized equipment and personnel, for the placement of the impermeable cover system components.

Energy use for IM-2 is approximately 690 MMBtu, and the greenhouse gas emissions are approximately 55 CO_2e.

7.4.2.4 Long-Term Effectiveness and Permanence

IM-2 provides long-term permanent protection of human health and the environment through the containment of impacted soils to levels below the PRGs. The existing and proposed caps would eliminate long-term risks to receptors and mitigate leaching to groundwater. ICs would prevent risks from subsurface soils within the IM areas. Operation, monitoring, and maintenance would be regularly conducted to provide continued long-term effectiveness of the remedy.

7.4.2.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative IM-2 does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.4.2.6 Implementability

The remedial components provided in IM-2 are easily implemented as they utilize well-established practices and the services and materials required are standard within the industry and are readily available. The long-term O&M requirements for all remedial components provided by this alternative can be readily performed, and the personnel and equipment are expected to be readily available.

7.4.2.7 Cost

A cost estimate for Alternative IM-2 is shown in Table 7-6. The estimated capital cost (without contingencies) for implementing the additional covers over an approximate 2.5-acre area is $0.7M. The annual long-term cost for this alternative is estimated at $100,000 per year. The total present worth cost for this alternative, including 30 years of O&M and contingency, is approximately $2.6M. P/S anticipate that it will require approximately 6 to 12 months to construct the cover system for this alternative and that O&M activities would continue in perpetuity.

7.4.3 IM-3: Expand Existing Measures, Address PTW if Present, Excavate and Off-Site Disposal of Soils at PB-RR-37, and ICs

IM-3 is the same as IM-2 except this alternative addresses the area and drainage ditch near PB-RR-37 with soil removal and off-site disposal rather than utilizing a soil cover as proposed for IM-2. Alternative IM-3 includes continuing and maintaining all the existing IMs and includes expanding the existing IMs in the Northside Area, Eastside Area, and the Eastside Drainage Way as described for IM-2. IM-3 also includes an evaluation of potential PTW in the Eastside Area during the remedial design to confirm that PTW is not present. If PTW is found to be present, additional subsurface soil excavation will be required. The extent of the IM expansions are shown on Figures 4-4, 4-6a-c, and 4-8. Alternative IM-3 would include 70 cubic yards of soil removal in the PB-RR-37 area with the objective of providing an additional measure of protectiveness for groundwater in this area.

Prior to any surface disturbance, appropriate temporary erosion and sedimentation control measures and surface water management structures would be put in place to contain particulates during construction. Air would be monitored for particulates near the working area and the perimeter of the property. Clean fill would be used to construct the cover systems. The surface of the areas would be vegetated.

Enhanced ICs (additional deed restrictions) would be included to reflect the expanded nature of the IMs and would restrict the potential future uses of these areas. Operation, monitoring, and maintenance of the existing and proposed additional remedial components are included in IM-3.

7.4.3.1 Overall Protection of Human Health and the Environment

IM-3 would provide both short-term and long-term protection of human health and the environment as direct contact with soils would meet the PRGs, potential impacts to groundwater are mitigated by the previously constructed impermeable and expanded covers and soil removal at PR-RR-37, and continued O&M of the existing and new covers and storm water management systems will protect surface water.

7.4.3.2 Compliance with ARARs

IM-3 would comply with the following key ARARs from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. Part 261 for the management and disposal of remediation wastes
- Regulations at 40 C.F.R. Part 761 for the management and disposal of PCB remediation wastes
- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes

7.4.3.3 Short-Term Effectiveness

The activities associated with IM-3 would result in manageable short-term risks to construction workers primarily as a result of exposures to impacted soils for a short time period since impacted soils will not be exposed once the installation of the capping system begins. These risks would be managed by using engineering controls, administrative controls, and appropriate health and safety measures. Significant short-term risks to the community are not expected. Construction of all remedial components included in this alternative would take three to six months, and work would likely be completed during normal construction hours (e.g., during daylight). Typical construction equipment (e.g., excavators, backhoes, and dump trucks) would be used.

Energy use for IM-3 is approximately 750 MMBtu, and the greenhouse gas emissions are approximately 60 CO2e.

7.4.3.4 Long-Term Effectiveness and Permanence

IM-3 provides long-term permanent protection of human health and the environment by containing impacted soils to levels below the PRGs and removing soils at PB-RR-37. The existing and proposed caps would eliminate long-term risks to receptors and mitigate COPCs leaching to groundwater. ICs and existing engineering controls would prevent risks from subsurface soils within the IM areas. O&M and monitoring would be regularly conducted to provide continued long-term effectiveness of the remedy. This alternative meets the RAOs for soil and groundwater.

7.4.3.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative IM-3 does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.4.3.6 Implementability

The remedial components provided in IM-3 can be implemented with available practices, and the services and materials required are standard within the industry. There would be some implementability challenges associated with excavating next to an active railway line and in a drainage way area. Normal drainage in the PB-RR-37 area would need to be relocated. The long-term O&M requirements for all remedial components provided by this alternative can be performed, and the personnel and equipment are expected to be readily available.

7.4.3.7 Cost

A cost estimate for Alternative IM-3 is shown in Table 7-7. The estimated capital cost (without contingencies) is $0.7M and includes covering an area of approximately 2.5 acres and the excavation

of approximately 100 tons of soil that would be disposed of in an off-site hazardous waste disposal facility. The estimated long-term annual cost for this alternative is estimated at $100,000 per year. The total present worth cost for this alternative, including 30 years of O&M and contingency, is approximately $2.6M. P/S anticipate that it will require approximately 6 to 12 months to construct the cover system for this alternative and that O&M activities would continue in perpetuity.

7.4.4 IM-4 Excavate Soils to Nonresidential PRGs where not Covered by Existing Measures and Dispose Off-Site, Address PTW if Present, and ICs

Alternative IM-4 includes continuing and maintaining all the existing IMs and includes the excavation and off-site disposal of surface soils (12-inch depth) in the IM expansion areas to achieve the nonresidential preliminary PRG of 21 mg/kg and to address exposed areas with surface soil PCB concentrations greater than or equal to 50 mg/kg. The extents of the IM expansions are shown on Figures 4-4, 4-6a-c, and 4-8. Following the excavation and removal of the impacted soil, the excavated areas would be backfilled with clean soil and vegetated. IM-4 also includes an evaluation of potential PTW in the Eastside Area during the remedial design to confirm that PTW is not present. If PTW is found to be present, additional subsurface soil excavation will be required.

Prior to any surface disturbance, appropriate temporary erosion and sedimentation control measures and surface water management structures would be put in place to contain particulates during construction. Air would be monitored for particulates near the working area and the perimeter of the property. Clean fill would be used as backfill.

Enhanced ICs (additional deed restrictions) would be included to reflect the expanded nature of the IMs and would restrict the potential future uses of these areas. O&M and monitoring of the existing and proposed additional remedial components are included in IM-2.

7.4.4.1 Overall Protection of Human Health and the Environment

IM-4 would provide both short-term and long-term protection of human health and the environment as direct contact with soils would meet the PRGs, potential impacts to groundwater are mitigated by the previously constructed impermeable covers and additional soil excavation, and continued O&M of the existing cover systems and storm water management systems will protect surface water.

7.4.4.2 Compliance with ARARs

IM-4 would comply with the following key ARARs from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. Part 261 for the management and disposal of remediation wastes
- Regulations at 40 C.F.R. Part 761 for the management and disposal of PCB remediation wastes
- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes

7.4.4.3 Short-Term Effectiveness

The activities associated with IM-4 would result in manageable short-term risks to construction workers primarily as a result of excavating impacted material. These risks would be managed by using engineering controls, administrative controls, and appropriate health and safety measures. Short-term impacts to the community would generally be associated with traffic caused by trucks hauling materials to and from the Site. Construction of the remedial components included in IM-4 would occur over 6 to 12 months, and work would be completed during normal construction hours (e.g., during daylight). Typical construction equipment (e.g., excavators, backhoes, and dump trucks) would be used.

Energy use for IM-4 is approximately 3,600 MMBtu, and the greenhouse gas emissions are approximately 300 CO2e.

7.4.4.4 Long-Term Effectiveness and Permanence

IM-4 provides long-term permanent protection of human health and the environment by removing impacted soils to levels below the PRGs. The existing caps and additional soil excavation would eliminate long-term risks to receptors and mitigate COPCs leaching to groundwater. ICs and existing engineering controls would prevent risks from subsurface soils within the IM areas. O&M and monitoring would be regularly conducted to provide continued long-term effectiveness of the remedy. This alternative meets the RAOs for soil and groundwater.

7.4.4.5 Reduction of Toxicity, Mobility or Volume through Treatment

Alternative IM-4 does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.4.4.6 Implementability

The remedial components provided in IM-4 can be implemented with available practices, and the services and materials required are standard within the industry. There would be some implementability challenges associated with excavating next to an active railway line and in a drainage way area. Normal drainage in the PB-RR-37 area would need to be relocated. The long-term O&M requirements for all remedial components provided by this alternative can be performed, and the personnel and equipment are expected to be readily available.

7.4.4.7 Cost

A cost estimate for Alternative IM-4 is shown in Table 7-8. The estimated capital cost (without contingencies) is $1.8M and includes excavation of approximately 6,200 tons of soil that would be disposed of in an off-site waste disposal facility. The estimated long-term annual cost for this alternative is estimated at $100,000 per year. The total present worth cost for this alternative, including 30 years of O&M and contingency, is approximately $4.3M. P/S anticipate that it will require approximately one to two years to construct the cover system for this alternative and that O&M activities would continue in perpetuity.

7.5 Dredge Spoil Piles

Based on field inspections conducted under the RCRA program, there were eight dredge spoil piles located in OU-1/OU-2 (Roux 2012). These dredge spoil piles were labeled SC-1 through SC-8 during the investigations. Since the initial field inspections were conducted, four of the eight dredge spoil piles have been removed (SC-3, SC-4, SC-5, and SC-6). The original locations of these four dredge spoil piles and the current locations of dredge spoil piles SC-1 and SC-2 are shown on Figure 4-12a. The current locations of dredge spoil piles SC-7 and SC-8 are shown on Figure 4-12b. Dredge spoil pile SC-8 has been identified as a target remedial areas based on its PCB EPC (EPC of 29 mg/kg). Long-term stability of this dredge spoil is a potential concern given its close proximity to the creek. The most recent evaluation of dredge spoil piles SC-1 and SC-2 are stable, indicating that they "have a well-established vegetative cover comprised of trees, ivy, vines, weeds, brush, brier or kudzu." (Roux 2012). There is similar vegetative growth for dredge spoil pile SC-7, although some concern for stability was mentioned. There are no PCB data available for dredge spoil pile SC-2. Additional characterization may be needed, depending on which alternative is selected, to determine whether this pile can be left in place or, if excavated, to confirm disposal options. Dredge spoil piles SC-1 and SC-7 were characterized as having EPCs below the nonresidential soil PRG of 21 mg/kg (19.6 mg/kg and 13 mg/kg, respectively). The alternatives for dredge spoil piles involve different combinations of removal and stabilization and on-site and off-site disposal. If on-site disposal of dredge spoil pile excavations (less than 50 mg/kg) was approved, it would offer logistical and cost advantages for the

remediation of the dredge spoil piles. There are also two alternatives (DSP-4 and DSP-5) that include removing the four remaining dredge spoil piles (SC-1, SC-2, SC-7, and SC-8).

7.5.1 DSP-1: No Further Action

Under DSP-1, no further actions would be taken for the dredge spoil piles. There are no greenhouse gas emissions or consumption of energy associated with this remedial alternative.

7.5.1.1 Overall Protection of Human Health and the Environment

Under DSP-1, no action would be taken for the dredge spoil piles currently remaining in OU-1/OU-2. Dredge spoil pile SC-8 would remain in place with a PCB concentration above the nonresidential PRG ($1x10^{-5}$ cancer risk for the industrial/commercial worker) of 21 mg/kg. Additional data for SC-2 would be needed to determine the concentration of PCBs in this dredge spoil pile.

7.5.1.2 Compliance with ARARs

DSP-1 would not comply with the following key ARAR from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes

7.5.1.3 Short-Term Effectiveness

DSP-1 would not result in negative impacts from remedial construction, nor would it reduce potential exposure concentrations for future workers or trespassers. There are no greenhouse gases generated or consumption of energy associated with this remedial alternative.

7.5.1.4 Long-Term Effectiveness and Permanence

Based on the persistence of PCBs in the environment, EPCs associated with SC-8 would likely remain the same over the long term. This dredge spoil pile is also susceptible to erosion given its close proximity to Snow Creek.

7.5.1.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative DSP-1 does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.5.1.6 Implementability

DSP-1 would take no further action for SC-8 or the other dredge spoil piles and would be very easy to implement.

7.5.1.7 Cost

There is no cost associated with this DSP-1.

7.5.2 DSP-2: Excavate SC-8 and Off-Site Disposal

The dredge spoil pile with a documented PCB concentration above 21 mg/kg (SC-8) would be removed under this remedial alternative, and the excavated materials would be disposed of in an off-site landfill. This alternative will also include collecting PCB data for dredge spoil pile SC-2 during a PDI. These PCB data will be used to assess if dredge spoil pile SC-2 needs to be removed under this remedial alternative. This decision would be made by comparing the EPC for SC-2 to the nonresidential PRG of 21 mg/kg for PCBs. Based on the multiple samples collected as part of the dredge spoil pile characterization program, excavated soils from SC-8 have PCB concentrations less than 50 mg/kg. As a result, it is expected that the excavated materials can be disposed of in an off-site nonhazardous waste disposal facility.

The process to remove dredge spoil pile SC-8 would include clearing trees and constructing a temporary construction roadway along the eastern edge of the dredge spoil pile. Once the trees are

cleared and the temporary roadway is built, a track-mounted excavator would be used to remove the dredge spoil pile. Dredge spoil pile SC-8 is approximately 80 feet across at its widest point, and the excavator would need to work its way into the pile to complete the removal process. It is expected that the excavated materials will pass the paint filter test with no dewatering and could be directly loaded by the excavator into over-the-road trucks staged on the temporary construction roadway. A spill apron would be placed over the truck beds to prevent the excavated materials from spilling directly on the ground surface or the truck beds. The trucks would be decontaminated and the beds lined and covered with a tarp prior to transport to the off-site disposal facility. To mitigate any concerns regarding the PCB concentration in the soils beneath dredge spoil pile following removal, a 12-inch layer of soil beneath the dredge spoil pile will also be removed as part of this alternative. Excavated soils would be disposed of in an off-site landfill. Based on the floodplain soil sampling conducted for EU24, these soils have PCBs at concentrations less than 50 mg/kg. The maximum PCB concentration in EU24 was 38 mg/kg and the average PCB concentration for the EU was 6.8 mg/kg. As noted above, dredge spoil pile SC-2 would be characterized during a PDI following the ROD for OU-1/OU-2. If the PCB EPC for dredge spoil pile SC-2 is greater than or equal to 21 mg/kg, it would be addressed through excavation and off-site disposal in a manner similar to dredge spoil pile SC-8 as described above.

Remaining dredge soil piles with concentrations below the PRG of 21 mg/kg (SC-1, SC-7, and possibly SC-2, depending on the PDI results) would be evaluated for perennial vegetation and the effectiveness of that vegetation in ensuring stability. If additional stabilization is needed, planting or seeding will be conducted to ensure stability.

Following construction, soil management would be conducted for the dredge spoil areas under the selected nonresidential remedial alternative.

7.5.2.1 Overall Protection of Human Health and the Environment

DSP-2 would be protective of human health and the environment. This alternative would remove dredge spoil materials with concentrations above 21 mg/kg and would ensure that soils remaining in place, either in spoil piles or in the surface after excavating and stabilizing, would have PCB EPCs below the nonresidential PRG of 21 mg/kg.

7.5.2.2 Compliance with ARARs

DSP-2 would comply with the following key ARARs from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. Part 261 for the management and disposal of remediation wastes
- Regulations at 40 C.F.R. Part 761 for the management and disposal of PCB remediation wastes
- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes

7.5.2.3 Short-Term Effectiveness

DSP-2 would have some limited short-term negative impacts, including truck traffic, clearing of trees, and noise. There are also risks to site workers and the community associated with dust and ambient air concentrations of COPCs. Because the area to be remediated is relatively small and localized, these adverse impacts and risks are likely to be managed effectively and would not be a significant burden on the local public or workers.

Energy use for DSP-2 is approximately 1,200 MMBtu, and the greenhouse gas emissions are approximately 100 CO_2e.

7.5.2.4 Long-Term Effectiveness and Permanence

DSP-2 would effectively and permanently reduce EPCs to below the nonresidential PRG of 21 mg/kg. If needed, this alternative would also include additional vegetation to stabilize the piles that are characterized as having concentrations less than 21 mg/kg.

7.5.2.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative DSP-2 does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.5.2.6 Implementability

Implementation of DSP-2 would be relatively easy. Although it would require construction efforts to create roadways, management pads, and, possibly, water treatment systems for storm water, these are readily available and proven technologies that can be implemented with appropriate engineering controls to protect workers and the public.

7.5.2.7 Cost

A cost estimate for DSP-2 is shown in Table 7-9. The cost includes off-site disposal of 4,900 cubic yards of soil and the clearing and restoration of approximately 1.2 acres and post-removal sampling under the excavated areas following implementation of the alternative. The estimated capital cost (without contingencies) is $0.6M. The total present worth cost for this alternative is approximately $0.9M.

7.5.3 DSP-3: Excavate SC-8 and On-Site and Off-Site Disposal

Remedial alternative DSP-3 is the same as DSP-2 with the exception that an approved on-site soil management area is proposed for the disposal of materials with PCB concentrations less than 50 mg/kg. The on-site soil management area proposed in this FS is the previously constructed SSSMA. On-site soil management is being proposed for the dredge spoil pile materials and other materials including nonresidential soils and sediment/creek bank soils from OU-1/OU-2. All of these materials would have PCB concentrations less than 50 mg/kg. It is recognized that the on-site disposal and management of materials removed from areas of the Site that are not residential would require additional approvals from the USEPA as part of the ROD for OU-1/OU-2 and would not be included under previous approvals given for the residential and special use property removals. The technical and regulatory approach to supporting the use of an on-site soil management area for these materials is presented in Section 5.2.7.

This alternative will also include collecting PCB data for dredge spoil pile SC-2 during a PDI. These PCB data will be used to assess if dredge spoil pile SC-2 would be removed under this remedial alternative. This decision would be made on the basis of the calculated EPC for SC-2 as compared to the PRG of 21 mg/kg.

Based on the multiple samples that were collected as part of the dredge spoil pile characterization program, the soils from SC-8 have PCB concentrations less than 50 mg/kg. As a result, it is expected that all of the excavated materials can be disposed of in the on-site soil management area. If a portion of the excavated materials are found to have PCB concentrations greater than or equal to 50 mg/kg, these materials would be disposed of in an off-site hazardous waste disposal facility.

Remaining dredge soil piles with concentrations below the PRG of 21 mg/kg (SC-1, SC-7, and possibly SC-2 depending on the PDI results) would be assessed to determine whether current vegetation is effectively stabilizing them or whether additional planting or seeding should be conducted.

Following construction, soil management would be conducted for the dredge spoil areas under the selected nonresidential remedial alternative.

7.5.3.1 Overall Protection of Human Health and the Environment

DSP-3 would be protective of human health and the environment. This alternative would remove dredge spoil materials with concentrations above 21 mg/kg and would ensure stability of the remaining piles. Surface soils either in spoils piles or in the surface following excavation, would have PCB EPCs below the nonresidential PRG of 21 mg/kg.

7.5.3.2 Compliance with ARARs

DSP-3 would require USEPA approvals in addition to those already in place for the on-site management of soils from residential properties. With these approvals, DSP-3 would comply with the following key ARARs from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. Part 261 for the management and disposal of remediation wastes
- Regulations at 40 C.F.R. Part 761 for the management and disposal of PCB remediation wastes
- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes

7.5.3.3 Short-Term Effectiveness

DSP-3 would have some limited short-term negative impacts, including truck traffic, clearing of trees, and noise. There are also risks to site workers and the community associated with dust and ambient air concentrations of COPCs. Because the area to be remediated is relatively small and localized, these adverse impacts and risks are likely to be managed effectively and would not be a significant burden on the local public or workers.

Energy use for DSP-3 is approximately 750 MMBtu, and the greenhouse gas emissions are approximately 60 CO2e.

7.5.3.4 Long-Term Effectiveness and Permanence

DSP-3 would effectively and permanently reduce EPCs to below the nonresidential PRG of 21 mg/kg. If needed, this alternative would also include additional vegetation to stabilize the piles that are characterized as having concentrations less than 21 mg/kg.

The SSSMA has been used and will continue to be used to effectively and permanently manage soils removed from other locations across OU-1/OU-2.

7.5.3.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative DSP-3 does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.5.3.6 Implementability

Implementation of DSP-3 would require construction efforts to create roadways, management pads and, possibly, water treatment systems for storm water. The equipment, materials and personnel are readily available to implement this alternative. The technologies are proven and can be implemented with appropriate engineering controls to protect workers and the public.

Transporting materials to the SSSMA and managing the SSSMA has been conducted with success for other soil removals throughout OU-1/OU-2.

7.5.3.7 Cost

A cost estimate for DSP-3 is shown in Table 7-10. The cost include on-site disposal of 4,900 cubic yards of soil and the clearing, restoration of approximately 1.2 acres and post-removal sampling of excavated areas following implementation of the alternative. The estimated capital cost (without contingencies) is $0.3M. The total present worth cost for this alternative is approximately $0.5M.

7.5.4 DSP-4: Excavate All Spoil Piles and Off-Site Disposal

The four remaining dredge spoil piles (SC-2, SC-2, SC-7, and SC-8) would be removed under this remedial alternative, and the excavated materials would be disposed of in an off-site landfill. Based on the multiple samples collected as part of the dredge spoil pile characterization program, excavated soils are expected to have PCB concentrations less than 50 mg/kg. As a result, it is expected that the excavated materials can be disposed of in an off-site nonhazardous waste disposal facility. Additional characterization would likely be required prior to transport and disposal of the materials.

The process to implement this alternative would be consistent with DSP-2 with the exception that all four remaining dredge spoil piles would be removed.

7.5.4.1 Overall Protection of Human Health and the Environment

DSP-4 would be protective of human health and the environment. This alternative would remove all of the dredge spoil materials and would remove and backfill 12 inches of surface soil and would ensure that surface soils remaining in place would have PCB EPCs below the nonresidential PRG of 21 mg/kg.

7.5.4.2 Compliance with ARARs

DSP-4 would comply with the following key ARARs from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. Part 261 for the management and disposal of remediation wastes
- Regulations at 40 C.F.R. Part 761 for the management and disposal of PCB remediation wastes
- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes

7.5.4.3 Short-Term Effectiveness

DSP-4 would have some limited short-term negative impacts, including truck traffic, clearing of trees, and noise. There are also risks to site workers and the community associated with dust and ambient air concentrations of COPCs. Because the areas that would be remediated are relatively small and localized, these adverse impacts and risks are likely to be managed effectively and would not be a significant burden on the local public or workers.

Energy use for DSP-4 is approximately 1,780 MMBtu, and the greenhouse gas emissions are approximately 140 CO2e.

7.5.4.4 Long-Term Effectiveness and Permanence

DSP-4 would effectively and permanently reduce EPCs in these areas to below the nonresidential PRG of 21 mg/kg.

7.5.4.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative DSP-4 does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.5.4.6 Implementability

Implementation of DSP-4 would be relatively easy. Although it would require construction efforts to create roadways, management pads, and, possibly, water treatment systems for storm water, these are readily available and proven technologies that can be implemented with appropriate engineering controls to protect workers and the public.

7.5.4.7 Cost

A cost estimate for DSP-4 is shown in Table 7-11. The cost includes off-site disposal of 7,300 cubic yards of soil, clearing and restoration of approximately 2.1 acres and post-removal sampling under the

excavated areas following implementation of the alternative. The estimated capital cost (without contingencies) is $0.9M. The total present worth cost for this alternative is approximately $1.4M.

7.5.5 DSP-5: Excavate All Spoil Piles and On-Site and Off-Site Disposal

Remedial alternative DSP-5 is the same as DSP-4 with the exception that an approved on-site soil management area is proposed for the disposal of materials with PCB concentrations less than 50 mg/kg. The on-site soil management area proposed in this FS is the previously constructed SSSMA.

7.5.5.1 Overall Protection of Human Health and the Environment

DSP-5 would be protective of human health and the environment. This alternative would remove all of the dredge spoil materials regardless of concentration and would excavate and backfill the areas with 12 inches of clean soil. Surface soils in the restored surface would have PCB EPCs below the nonresidential PRG of 21 mg/kg.

7.5.5.2 Compliance with ARARs

DSP-5 would require USEPA approvals in addition to those already in place for the on-site management of soils from residential properties. With these approvals, DSP-5 would comply with the following key ARARs from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. Part 261 for the management and disposal of remediation wastes
- Regulations at 40 C.F.R. Part 761 for the management and disposal of PCB remediation wastes
- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes

7.5.5.3 Short-Term Effectiveness

DSP-5 would have some limited short-term negative impacts, including truck traffic, clearing of trees, and noise. There are also risks to site workers and the community associated with dust and ambient air concentrations of COPCs. Because the areas that would be remediated are relatively small and localized, these adverse impacts and risks are likely to be managed effectively and would not be a significant burden on the local public or workers.

Energy use for DSP-5 is approximately 1,120 MMBtu, and the greenhouse gas emissions are approximately 90 CO2e.

7.5.5.4 Long-Term Effectiveness and Permanence

DSP-5 would effectively and permanently reduce EPCs to below the nonresidential PRG of 21 mg/kg.

The SSSMA has been used and will continue to be used to effectively and permanently manage soils removed from other locations across OU-1/OU-2.

7.5.5.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative DSP-5 does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.5.5.6 Implementability

Implementation of DSP-5 would require construction efforts to create roadways, management pads and, possibly, water treatment systems for storm water. The equipment, materials and personnel are readily available to implement this alternative. The technologies are proven and can be implemented with appropriate engineering controls to protect workers and the public.

Transport of materials to the SSSMA and management of the SSSMA has been implemented with success for other soil removals throughout OU-1/OU-2.

7.5.5.7 Cost

A cost estimate for DSP-5 is shown in Table 7-12. The cost includes on-site disposal of 7,300 cubic yards of soil and the backfilling of approximately 2.1 acres. This alternative would require clearing and restoration of approximately 2.1 acres and post-removal sampling of excavated areas following implementation of the alternative. The estimated capital cost (without contingencies) is $0.5M. The total present worth cost for this alternative is approximately $0.7M.

7.6 Unapproved Waste Disposal Areas

In conducting the investigation for OU-1/OU-2, two areas were identified that were used for the unapproved management of waste materials and are not associated with the Anniston PCB Site. The two identified UWDA areas are shown on Figure 4-14. Investigations conducted in these areas have shown that the UWDA areas contain or may contain auto fluff and/or other waste materials that have been deposited over time. The two specific locations include the Ashley Street and Legrande site and the Wilborn I site located in the southeastern portion of EU10.

7.6.1 UWDA-1: No Action

Alternative UWDA-1 is the no action alternative, which means that no additional remedial actions would be conducted at the two unapproved UWDA areas. This alternative is presented and analyzed as required by the NCP.

7.6.1.1 Overall Protection of Human Health and the Environment

UWDA-1 does not provide protection of human health and the environment as known conditions exceed PRGs and there may be risks associated with the unknown materials given the unapproved nature of these UWDAs.

7.6.1.2 Compliance with ARARs

UWDA-1 would not comply with ARARs by virtue of waste materials being directly disposed in these locations without having the necessary regulatory approvals.

7.6.1.3 Short-Term Effectiveness

The short-term risks to the community, workers, or the environment cannot be assessed under UWDA-1 due to the unknown nature of the waste materials that have been disposed in these UWDAs.

7.6.1.4 Long-Term Effectiveness and Permanence

UWDA-1 would not provide long-term effectiveness as it does not address all current and future exposures.

7.6.1.5 Reduction of Toxicity, Mobility, and Volume through Treatment

This alternative does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.6.1.6 Implementability

UWDA-1 is straightforward and easy to implement.

7.6.1.7 Cost

There is no cost to implement UWDA-1.

7.6.2 UWDA-2: Stipulation Cap, O&M, and ICs

UWDA-2 includes constructing a soil cover system, similar to the cover system described in the Stipulation to address waste areas, over the two UWDAs at the Site. This alternative would include placing an engineered cap over these areas consisting of a geotextile fabric followed by placement of a 12-inch-thick layer of clean soil. This approach requires excavating 12 inches of soil prior to

constructing the soil cover. It is assumed that most of the impacted waste materials are located at depth on these properties and that the proposed cap constructed on top of the waste areas would provide a similar level of protection as an alternative that includes excavating 12 inches of soil prior to constructing the same cap. This assumption would need to be validated during the PDI phase of the project and the design adjusted accordingly.

Prior to any surface disturbance, appropriate temporary erosion and sedimentation control measures and surface water management structures would be put in place to prevent off-site migration of contaminants during construction. Air would be continuously monitored near the working area and the perimeter of the property for soil particulates containing COPCs. The cover systems would extend over the limits of the unapproved fill areas as shown in Figures 4-15 and 4-16. Clean imported fill would be used to construct the caps. The surface of the areas would be vegetated. A cross section of the proposed cap is shown in Figure 7-1.

ICs including environmental covenants would be included to restrict future use of these areas to further restrict contact with impacted soil and potentially impacted groundwater. O&M and monitoring of the proposed remedial components are included in UWDA-2.

7.6.2.1 Overall Protection of Human Health and the Environment

UWDA-2 would provide protection of human health and the environment through preventing direct contact with surface soils. The potential for leaching to groundwater would also be mitigated under this alternative recognizing the uncertainties associated with the nature of the wastes that were placed in the UWDAs and their proximity to the groundwater table.

7.6.2.2 Compliance with ARARs

UWDA-2 would comply with the following key ARAR from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. Part 261 for the management and disposal of remediation wastes
- Regulations at 40 C.F.R. Part 761 for the management and disposal of PCB remediation wastes
- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes

7.6.2.3 Short-Term Effectiveness

The activities associated with UWDA-2 would result in manageable short-term impacts to construction workers primarily as a result of exposures to impacted soils for a short time period since impacted soils would not be exposed once the installation of the cap begins. These impacts would be managed using engineering controls, administrative controls, and appropriate health and safety measures. Significant short-term impacts to the community are not expected. Construction of all remedial components included in this alternative will take six months to a year, and work would be completed during normal construction hours (e.g., during daylight). Typical construction equipment (e.g., excavators, backhoes, and dump trucks) would be used.

Energy use for UWDA-2 is approximately 1,060 MMBtu, and the greenhouse gas emissions are approximately 85 CO2e.

7.6.2.4 Long-Term Effectiveness and Permanence

UWDA-2 provides long-term permanent protection of human health and the environment by containing soils to levels below the PRGs. Potential direct contact by human or environmental receptors would be eliminated with the placement of the soil cover. The soil cover would also eliminate the potential for off-site transport by storm water. ICs would prevent risks from subsurface soils within

these UWDA areas and groundwater, if necessary. O&M and monitoring would be regularly conducted to provide continued long-term effectiveness of the remedy.

7.6.2.5 Reduction of Toxicity, Mobility, and Volume through Treatment

This alternative does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.6.2.6 Implementability

The remedial components provided in UWDA-2 are easily implemented as they utilize well-established practices and the services, and the materials required are standard within the industry and are readily available. The long-term O&M requirements for all remedial components provided by this alternative can be readily performed, and the personnel and equipment are expected to be readily available.

7.6.2.7 Cost

A cost estimate for Alternative UWDA-2 is shown in Table 7-13. The estimated capital cost (without contingencies) is $0.6M for covering an area that is approximately 4.5 acres. The annual long-term cost is estimated at $50,000 per year. The total present worth cost for this alternative, including 30 years of O&M and contingencies, is approximately $1.6M. P/S anticipate that it will require approximately 6 to 12 months to construct the cap for this alternative and that O&M activities would continue in perpetuity.

7.6.3 UWDA-3: RCRA Subtitle D Cap, O&M, and ICs

UWDA-3 includes the construction of a RCRA Subtitle D cap over the two UWDAs. The extents of the caps are shown in Figures 4-15 and 4-16. This alternative includes removing a 12-inch layer of soil and placing a low-permeability engineered cap over these areas consisting of the following as shown in Figure 7-1:

- Earthfill material to provide the proper drainage for the cover system
- 40-mil low-density polyethylene geomembrane liner (or equivalent) to reduce infiltration
- Geocomposite drainage layer to collect and convey surface water that infiltrates through the cover soils
- Protective cover / vegetative soil layer

Prior to disturbing the surface, appropriate temporary erosion and sedimentation control measures and surface water management structures would be put in place to prevent off-site migration of contaminants during construction. Air would be monitored for particulates near the working area and the perimeter of the property. Clean imported fill would be used for the cover soils over the low permeability liner, and the surface of the areas would be vegetated.

ICs, including environmental covenants, are included in UWDA-3 to restrict future use of these areas to further restrict contact with impacted soil and potentially impacted groundwater. O&M and monitoring of the proposed remedial components are also included in this alternative. Monitoring would include installing and sampling groundwater wells downgradient of the waste materials.

7.6.3.1 Overall Protection of Human Health and the Environment

UWDA-3 would provide protection of human health and the environment through preventing direct contact with surface soils. The potential for leaching to groundwater would also be mitigated under this alternative recognizing the uncertainties associated with the nature of the wastes that were placed in the UWDAs and their proximity to the groundwater table.

7.6.3.2 Compliance with ARARs

UWDA-3 would comply with the following key ARAR from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. Part 261 for the management and disposal of remediation wastes
- Regulations at 40 C.F.R. Part 761 for the management and disposal of PCB remediation wastes
- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes

7.6.3.3 Short-Term Effectiveness

The activities associated with UWDA-3 would result in manageable short-term impacts to construction workers primarily as a result of exposures to impacted soils for a short time period since impacted soils would not be exposed once the installation of the capping system begins. These impacts would be managed by using engineering controls, administrative controls, and appropriate health and safety measures. Significant short-term impacts to the community are not expected. Construction of all remedial components included in this alternative would take one to two years, and work would be completed during normal construction hours (e.g., during daylight). Typical construction equipment (e.g., excavators, backhoes, and dump trucks) would be used, in addition to moderately specialized equipment and personnel for the placement of the impermeable cover system components.

Energy use for UWDA-3 is approximately 1,570 MMBtu, and the greenhouse gas emissions are approximately 130 CO2e.

7.6.3.4 Long-Term Effectiveness and Permanence

UWDA-3 provides long-term permanent protection of human health and the environment by containing soils to levels below the PRGs. Potential direct contact by human or environmental receptors would be eliminated with the placement of the cap. The cap would also eliminate the potential for off-site transport by storm water. ICs would prevent risks from subsurface soils within these UWDA areas and groundwater, if necessary. O&M and monitoring would be regularly conducted to provide continued long-term effectiveness of the remedy.

7.6.3.5 Reduction of Toxicity, Mobility, and Volume through Treatment

This alternative does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.6.3.6 Implementability

The remedial components provided in UWDA-3 are easily implemented as they utilize well-established practices and the services and materials required are standard within the industry and are readily available. This technology is routinely used for solid waste management units regulated under RCRA and for waste sites regulated under CERCLA.

7.6.3.7 Cost

A cost estimate for UWDA-3 is shown in Table 7-14. The estimated capital cost (without contingencies) is $1.3M and includes placing a low permeability cap over a 4.5-acre area. The annual long-term cost for this alternative is estimated at $50,000 per year. The total present worth cost for this alternative, including 30 years of O&M and contingency, is approximately $2.8M. P/S anticipate that it will require approximately one to two years to construct the cover system for this alternative and that O&M activities would continue in perpetuity.

7.6.4 UWDA-4: Excavation and Off-Site Disposal, Restore to Natural Grade

Alternative UWDA-4 includes the excavation and off-site disposal of all waste materials contained on the affected properties. This alternative consists of removing both surface and subsurface soils, replacing the removed soil with clean fill material whose upper portion shall be capable of supporting vegetative growth, and reestablishing vegetation in disturbed areas. Soil generated during the removal activities would be disposed of at an approved off-site landfill(s). Approximately 100,000 cubic yards of waste material would be excavated and disposed of at an off-site landfill under this alternative.

Prior to disturbing soil, appropriate temporary erosion and sedimentation control measures and surface water management structures would be put in place to prevent off-site migration of contaminants during construction. Air would be continuously monitored for particulates near the working area and the perimeter of the property to protect site workers and the community.

No O&M or ICs would be required for this alternative as the waste materials identified at these locations would be removed and transported to an approved landfill(s).

7.6.4.1 Overall Protection of Human Health and the Environment

UWDA-4 would be protective of human health and the environment by removing the PCB-containing soil from the affected areas and disposing of it in an appropriate manner at off-site landfills. This alternative provides permanent removal of the PCB-containing soil from the affected properties. Potential direct contact at the affected properties by human or environmental receptors would be eliminated with the removal, as would the potential for off-site transport by storm water. Impacts from the potential leaching of constituents from soils to groundwater would be mitigated by removing the impacted materials.

Workers on the affected properties could be exposed by dermal contact and fugitive dust during implementation. However, these would be mitigated by using administrative controls which will require proper training and soil handling procedures. Air monitoring during soil disturbance activities would be used to prevent ingestion or inhalation of soil particulates in air.

Workers have additional risks not related to potential chemical exposure during implementation of the remedy, including accidents related to these activities. These additional risks include general risks to construction workers and the potential for traffic accidents. A significant amount of material would be removed from each property with UWDA-4, which would increase the risk to construction workers and the public due to accidents.

7.6.4.2 Compliance with ARARs

UWDA-4 would comply with the following key ARAR from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. Part 261 for the management and disposal of remediation wastes
- Regulations at 40 C.F.R. Part 761 for the management and disposal of PCB remediation wastes
- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes

7.6.4.3 Short-Term Effectiveness

The activities associated with UWDA-4 would result in significant short-term impacts to construction workers primarily as a result of excavating impacted soil. Efforts to manage these impacts would include engineering controls, administrative controls, and health and safety measures. Short-term impacts to the community would be likely and would generally be associated with traffic caused by trucks hauling materials to and from the Site. Truck traffic associated with this alternative would be

significant. Construction of the remedial components included in UWDA-4 would occur over a one-to-two-year period, and work would be completed during normal construction hours (e.g., during daylight). Typical construction equipment (e.g., excavators, backhoes, and dump trucks) would be used.

Energy use for UWDA-4 is approximately 62,500 MMBtu, and the greenhouse gas emissions are approximately 5,000 CO2e.

7.6.4.4 Long-Term Effectiveness and Permanence

UWDA-4 provides long-term permanent protection of human health and the environment by removing waste materials.

7.6.4.5 Reduction of Toxicity, Mobility, and Volume through Treatment

This alternative does not include treatment and would not reduce the toxicity, mobility, or volume of the materials. The possible exception is the treatment of materials prior to disposal for non-PCB constituents such as lead or other metals. Stabilization as a treatment technology would reduce the mobility of these constituents (including PCBs) but would also increase the overall volume of the waste materials disposed at the landfills.

7.6.4.6 Implementability

The remedial components provided in UWDA-4 utilize well-established practices, and the services and materials required are standard within the industry and are readily available. Soil excavation and backfill would be accomplished with power construction equipment and by manual means. Specialized treatment equipment may be necessary due to the extensive and deep nature of the excavation activities that in some areas would extend in the range of 20 to 25 feet bgs. Implementability concerns include managing slope stability during excavation issues and managing runoff to the surrounding drainage way areas that lead to Snow Creek. These factors, combined with the unknown nature of the waste materials in the UWDAs make this alternative very difficult to implement. The close proximity to the surrounding residential community also increases the implementability challenges.

7.6.4.7 Cost

A cost estimate for Alternative UWDA-4 is shown in Table 7-15. The estimated capital cost (without contingencies) is $27.5M. This cost includes an extensive PDI program, excavation and off-site disposal of approximately 101,700 cubic yards of waste material, and restoring the areas. Waste disposal assumptions include 40% of the excavated materials would be disposed at a hazardous waste landfill and all of these materials would require stabilization prior to disposal. The remaining 60% of the waste would be disposed of in a nonhazardous waste landfill and stabilization would not be required for the nonhazardous materials prior to disposal. There are no annual long-term costs for this alternative assuming that all of the waste materials could be removed. The total present worth cost for this alternative, including contingency, is approximately $41.2M. P/S anticipate that it will require approximately two to three years to implement this alternative.

7.7 Nonresidential Soils

The remedial alternatives for nonresidential soils are focused on surface soils in EUs where the PCB EPC for the EU as a whole is greater than or equal to the PRG of 21 mg/kg and where individual samples results in the 0- to 1-foot horizon are greater than or equal to 50 mg/kg. The nonresidential PRG for PCBs is based on the industrial/commercial exposure scenario. Based on this evaluation, 11 general locations in OU-1/OU-2 were identified as either not meeting the nonresidential surface soil criteria PRG for PCBs or having PCB concentrations greater than or equal to 50 mg/kg. These general areas are EU5, EU7, EU10, EU14N, EU19N, EU19S, EU24, EU26, west of EU1, north of APCO, and

Highway 202 (Figure 4-17a). The overall remedial approach is to reduce the EPC values in these areas to less than the PRGs by remediating the higher-concentration areas until the EPC for the area as a whole is reduced to a value that is less than the PRG and address locations with PCB concentrations greater than or equal to 50 mg/kg. The individual remedial areas are shown on Figures 4-17b through 4-17l. Attaining the nonresidential PRGs for non-PCB constituents was also evaluated on a location-by-location basis. An overview of the resulting remedial areas is presented on Figure 4-17a. Location-specific figures were also developed for the non-PCB constituents. The individual remedial areas for PAHs as BaPE west of the Northside Area and EU14N are presented are on Figures 4-18a and 4-18b, respectively. The remedial areas for chromium in EU22 and EU24 are presented on Figure 4-19a and 4-19b, respectively. The remedial area for PCDD/DF located in EU25 is presented on Figure 4-20. The nonresidential surface soil areas being addressed as part of the remedial alternatives for other categories (i.e., IM enhancements and groundwater at T-11) are also shown on the Figure 4-17 series. However, where another category includes the area (e.g., around T-11), the cost for the remedial actions to address the nonresidential soils in these areas is included under that category and are not repeated for the nonresidential soil alternatives. This avoids the double counting of the estimated remedial cost as part of the FS process. If the USEPA selects no action for the other categories of alternatives (IM enhancements and groundwater at T-11), then nonresidential surface soils in these portions of EU5, and their associated costing, would be brought back under the selected remedy for nonresidential soils.

The range of remedial alternatives for nonresidential surface soils includes no action to removal with a range of disposal options and treatment. The options for disposal include off-site disposal and a combination of on-site and off-site disposal. The approach for on-site disposal would be to use previously constructed and approved on-site soil management area (the SSSMA). Consistent with the intent of the approval process under the NTC Removal Action Agreement and the Stipulation, on-site disposal of nonresidential soils in the SSSMA would be limited to materials with PCB concentrations less than 50 mg/kg. A remedial alternative has also been included for directly covering the surface soils. This remedial approach is presented in combination with removal for those areas (portions of EU5, EU14N, and EU19S) where placement of a cover without removal is expected to increase local flooding. The estimated loss of cross-sectional flow area in the floodway by raising the ground surface elevation by 12 inches in these three EUs is 14%, 17%, and 19%, respectively. Calculated losses in cross-sectional flow area for the other areas are less than 3%. If covering of surface soils is the selected remedial alternative, additional surface water modeling would be conducted during the design phase to refine where covering alone, without excavation, could be implemented without increasing local flooding conditions.

Figures showing locations in the EUs and other areas outside of the areas affected by the potential application of a PRG of 9 mg/kg for nonresidential soils are included in Appendix B. Cost estimates for an alternative PRG value of 9 mg/kg for the nonresidential soil alternatives are included in Appendix E.

7.7.1 NRS-1: No Action

Under NRS-1, no actions would be taken to address PCBs and PAHs in nonresidential surface soils. There are no greenhouse gas emissions or consumption of energy associated with this remedial alternative.

7.7.1.1 Overall Protection of Human Health and the Environment

NRS-1 would not be protective of human health or the environment. This alternative would leave concentrations in surface soils that are above PRGs.

7.7.1.2 Compliance with ARARs

NRS-1 would not comply with the following key ARAR from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes.

7.7.1.3 Short-Term Effectiveness

No additional short-term risks or impacts to the community, workers, or the environment are posed by implementing NRS-1. There is no greenhouse gas or consumption of energy associated with this remedial alternative.

7.7.1.4 Long-Term Effectiveness and Permanence

NRS-1 would not provide long-term effectiveness as it does not address the elevated EPCs for PCBs.

7.7.1.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative NRS-1 does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.7.1.6 Implementability

NRS-1 is straightforward and easy to implement.

7.7.1.7 Cost

There is no cost to implement NRS-1.

7.7.2 NRS-2: Soil Cover, Limited Excavation, On-Site/Off-Site Disposal, and Soil Management

Alternative NRS-2 includes a nonintrusive approach for covering nonresidential surface soils in three EUs (EU7, EU19N, and EU26) and removing and replacing nonresidential surface soils in the remaining remedial areas to achieve the PRGs. Excavation would only be conducted in those areas where placement of cover alone would likely increase the potential for flooding. The excavated soils would be disposed of, and the removal areas would be backfilled with fill materials. These actions would be taken to prevent direct contact with the nonresidential surface soil layer in candidate remedial areas identified on Figure 4-17a. The individual target remedial areas are shown on Figures 4-17b through 4-17l. The cover soils would be stabilized over the long term with a vegetative layer. A typical cross section for placing the 12-inch-cover layer is shown on Figure 7-1 and includes two 6-inch soil layers placed over a geotextile marker layer. The first 6-inch layer of cover material is a granular fill that would be overlain by a 6-inch layer of soil capable of supporting vegetative growth. To prevent the localized flooding, the remedial areas in EU5, EU14N, and EU19S would be excavated instead of having cover soils placed directly on the existing ground surface. These excavation areas would be backfilled to the original ground surface elevation. The backfill sequence would include a geotextile marker layer, soil backfill, and vegetation on the surface (Figure 7-1).

For those areas with just 12 inches of cover, modeling would be conducted as a part of the PDI. A surficial soil layer without prior excavation would only be placed in areas where modeling indicates that additional flooding would be unacceptable due to the loss of the cross-sectional flow area by placement of the cover materials. Both the covered and excavated areas would be stabilized using vegetation. Although the vegetated cover should effectively contain the placed material, the raised areas would have a greater potential to erode during rain events, especially in the time immediately after construction before the vegetative cover is fully established.

NRS-2 would involve clearing trees and surface vegetation from the target remedial areas. The amount of vegetation removed varies between target removal areas. For example, the median strip located between the eastbound and westbound lanes of Highway 202 is currently covered with grass,

yet the nearby target remedial area located between the highway and OU-3 is heavily overgrown with large trees. Similar contrasts exist between EU19N and EU19S. Vegetation in EU19N is limited to brush/weeds as the area was previously a scrap yard, and EU19S is undeveloped and heavily wooded with large trees.

For the areas where soil removal is needed to facilitate cover placement, BMPs such as a silt sock or waddle would be placed between the excavation area and Snow Creek to prevent the erosion of loose soils into the creek. Care would also be taken not to disturb bank soils in these areas. This may include placing a layer of riprap stone along the bank of EU14N coincident with the excavation area to stabilize the area during construction. Excavated soils with PCB concentrations less than 50 mg/kg would be disposed of in an on-site management area (the SSSMA). Soils with PCB concentrations greater than or equal to 50 mg/kg would be disposed of in a permitted off-site landfill.

Soil management would be conducted as part of the remedy as described in Appendix D. The soil management activities would limit future intrusive activities on the nonresidential properties from adversely impacting the effectiveness of the nonresidential surface soil remedy and the remedies already implemented for nearby residential properties. Specific soil management activities would include active outreach with property owners, local City building departments, area utility companies, and county/state-wide transportation agencies regarding any plans to disturb soils in nonresidential areas where construction activities could impact the nonresidential or adjacent residential remedies. Utility organizations that would typically be contacted as a part of the outreach process include sewer, water, gas, electric, oil, cable/fiber optic, etc. Periodic observations of the nonresidential areas would be conducted under long-term O&M to confirm that land use in the nonresidential portions of the EUs continues to be nonresidential.

7.7.2.1 Overall Protection of Human Health and the Environment

NRS-2 would provide protection to human health and the environment. This alternative would effectively reduce the surface soil concentrations in nonresidential areas to less than the

7.7.2.2 Compliance with ARARs

NRS-2 would comply with the following key ARARs from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. Part 261 for the management and disposal of remediation wastes
- Regulations at 40 C.F.R. Part 761 for the management and disposal of PCB remediation wastes
- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes
- City of Anniston Ordinance 04-O-03 regarding the local implementation of FEMA regulations to prevent flooding
- Regulations at 42 U.S.C 4001 et seq, and 42 U.S.C. 4101 regarding alteration of the floodplain that could result in flooding

7.7.2.3 Short-Term Effectiveness

NRS-2 would result in short-term risks and impacts to site workers and the community. These risks and impacts would be similar to those already experienced with the residential removals and other actions completed in the OU. The alternative would involve removing trees and brush, and creating and removing temporary staging areas, as well as managing storm water, truck traffic and associated noise. The removal of soils has the potential to create short-term dust. These risks and impacts would be managed using the engineering controls already proven to be effective for this type of remediation. Short-term impacts to the creek would be managed using siltation controls, also proven to be effective for this type of construction.

The estimated duration to implement NRS-2 is approximately one to two years. Energy use for NRS-2 is approximately 2,300 MMBtu, and the greenhouse gas emissions are approximately 185 CO2e.

7.7.2.4 Long-Term Effectiveness and Permanence

NRS-2 would provide some long-term effectiveness and permanence by meeting the nonresidential surface soil PRGs. This alternative could be susceptible to changes in use of the area (e.g., if the land were to be developed) but this will be assessed as part of long-term O&M.

7.7.2.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative NRS-2 does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.7.2.6 Implementability

NRS-2 would be implementable using technologies and procedures that have already been implemented in other areas of this and other sites.

7.7.2.7 Cost

A cost estimate for NRS-2 is shown in Table 7-16. The estimated capital cost (without contingencies) is $1.0M. The alternative assumes that 3,400 cubic yards will be excavated and disposed under this alternative. This includes on-site disposal of 2,100 cubic yards in the SSSMA, and off-site disposal of the remaining 1,300 cubic yards of the materials. This also includes 520 cubic yards in a hazardous waste landfill and 780 cubic yards in a nonhazardous landfill. The annual long-term cost for this alternative is estimated at $413,000 per year. The total present worth cost for this alternative, including 30 years of soil management contingency, is approximately $7.9M. The overall cost to implement this alternative using the alternative PCB PRG value of 9 mg/kg increases to $10.1M and is driven by the larger removal volume (8,600 cubic yards) associated with the lower PCB PRG value.

7.7.3 NRS-3: Excavation of Surface Soils, On-Site/Off-Site Disposal, and Soil Management

NRS-3 addresses the same remedial areas as NRS-2 but only includes excavation and disposal (no covers). Excavated soils with PCB concentrations less than 50 mg/kg would be disposed of in an on-site management area (the SSSMA), and soils with PCB concentrations greater than or equal to 50 mg/kg would be disposed of in a permitted off-site landfill.

7.7.3.1 Overall Protection of Human Health and the Environment

NRS-3 would provide protection to human health and the environment. This alternative would effectively reduce the surface soil concentrations in nonresidential areas to less than the PRGs.

7.7.3.2 Compliance with ARARs

NRS-3 would comply with the following key ARARs from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. Part 261 for the management and disposal of remediation wastes
- Regulations at 40 C.F.R. Part 761 for the management and disposal of PCB remediation wastes
- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes

7.7.3.3 Short-Term Effectiveness

NRS-3 would result in short-term impacts and risks to site workers and the community. These impacts and risks would be similar to those already experienced with the residential removals and other actions completed in the OU. The alternative would involve removing trees and brush, and creating and removing temporary staging areas, as well as managing storm water, truck traffic, and associated noise. The removal of soils has the potential to create short-term dust. These would be managed

using the engineering controls already proven to be effective for this type of remediation. Short-term impacts to the creek would be managed using siltation controls, also proven to be effective for this type of construction.

The soil cover placed over the excavated areas would be stabilized using vegetation. Although the vegetated layer should effectively stabilize the backfill materials, the areas would have a greater potential to erode during rain events, especially in the time after construction before the cover establishes maturity.

NRS-3 would involve some logistical coordination to ensure that material is appropriately characterized and transported for disposal on-site or off-site, based on PCB concentration. Truck traffic would follow different routes depending on the disposal facility. These issues have been managed successfully on this and other sites.

The estimated duration to implement NRS-3 is approximately one to two years. Energy use for NRS-3 is approximately 5,500 MMBtu, and the greenhouse gas emissions are approximately 440 CO2e.

7.7.3.4 Long-Term Effectiveness and Permanence

NRS-3 would provide long-term effectiveness and permanence by reducing the EPCs to below the nonresidential PRG of 21 mg/kg. Protection against potential changes in land use (e.g., if the land were to be developed) would be provided through long-term O&M.

7.7.3.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative NRS-3 does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.7.3.6 Implementability

NRS-3 would be implementable using technologies and procedures that have already been implemented in other areas of this and other sites.

7.7.3.7 Cost

A cost estimate for NRS-3 is shown in Table 7-17. The estimated capital cost (without contingencies) is $2.4M. The annual long-term cost for this alternative is estimated at $413,000 per year. The total present worth cost for this alternative, including 30 years of soil management and contingency, is approximately $10.0M. This cost is based on 5,100 cubic yards out of the 9,100 cubic yards of excavated soils being disposed of in an off-site hazardous waste landfill. The remaining 4,000 cubic yards would be disposed of in the SSSMA. The overall cost to implement this alternative using the alternative PCB PRG value of 9 mg/kg increases to $12.7M is driven by the larger removal volume (26,700 cubic yards) associated with the lower PCB PRG value.

7.7.4 NRS-4: Excavation of Surface Soils, Off-Site Disposal, and Soil Management

NRS-4 would remove nonresidential surface soils consistent with the approach used for NRS-3. The only difference is the exclusive use of off-site disposal.

7.7.4.1 Overall Protection of Human Health and the Environment

NRS-4 would provide protection of human health and the environment. This alternative would effectively reduce the surface soil concentrations in nonresidential areas to less than the PRGs.

7.7.4.2 Compliance with ARARs

NRS-4 would comply with the following key ARARs from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. Part 261 for the management and disposal of remediation wastes
- Regulations at 40 C.F.R. Part 761 for the management and disposal of PCB remediation wastes
- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes

7.7.4.3 Short-Term Effectiveness

NRS-4 would result in short-term risks and impacts to site workers and the community. These risks and impacts would be similar to those already experienced with the residential removals and other actions completed in OU-1/OU-2. The alternative would involve removing trees and brush, and creating and removing temporary staging areas, as well as managing storm water, truck traffic, and associated noise. The removal of soils has the potential to create short-term dust. These would be managed using the engineering controls already proven to be effective for this type of remediation. Short-term impacts to the creek would be managed using siltation controls, also proven to be effective for this type of construction.

The soil cover placed over the excavated areas would be stabilized using vegetation. Although the vegetated layer should effectively stabilize the backfill materials, the areas would have a greater potential to erode during rain events, especially in the time after construction before the cover establishes maturity.

The estimated duration to implement NRS-4 is approximately one to two years. Energy use for NRS-4 is approximately 5,870 MMBtu, and the greenhouse gas emissions are approximately 470 CO_2e.

7.7.4.4 Long-Term Effectiveness and Permanence

NRS-4 would provide long-term effectiveness and permanence by reducing EPCs to below the nonresidential PRGs.

7.7.4.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative NRS-4 does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.7.4.6 Implementability

NRS-4 would be implementable using technologies and procedures that have already been implemented in other areas of this and other sites.

7.7.4.7 Cost

A cost estimate for NRS-4 is shown in Table 7-18. The estimated capital cost (without contingencies) is $2.7M. This includes excavation and off-site disposal of 9,100 cubic yards of soil. Approximately 5,100 cubic yards of the soils are anticipated to require disposal at an off-site hazardous waste landfill and the remaining 4,000 cubic yards would be disposed of in an off-site nonhazardous waste landfill. The annual long-term cost for the alternative is estimated at $413,000 per year. The total present worth cost for this alternative, including 30 years of soil management and contingency, is approximately $10.4M. The overall cost to implement this alternative using the alternative PCB PRG value of 9 mg/kg increases to $14.6M and is driven by the larger removal volume (26,700 cubic yards) associated with the lower PCB PRG value.

7.7.5 NRS-5: Excavation of Surface Soils, Off-Site Treatment, and Soil Management

Alternative NRS-5 is the same as alternative NRS-4 with the exception that soils would be incinerated at a permitted off-site facility rather than disposed of in a permitted landfill.

NRS-5 would involve transporting excavated material off-site for treatment. For PCB containing materials, treatment options are limited and off-site incineration is the most likely treatment alternative. Materials would be transported to one of the three TSCA-permitted facilities in Texas or Kansas, incinerated, and the resulting ash would be disposed of by the incineration facility.

7.7.5.1 Overall Protection of Human Health and the Environment

NRS-5 would provide protection of human health and the environment. This alternative would effectively reduce the surface soil concentrations in nonresidential areas to less than the nonresidential PRGs.

7.7.5.2 Compliance with ARARs

NRS-5 would comply with the following key ARARs from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. Part 261 for the management and disposal of remediation wastes
- Regulations at 40 C.F.R. Part 761 for the management and disposal of PCB remediation wastes
- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes

7.7.5.3 Short-Term Effectiveness

NRS-5 would result in short-term risks and impacts to site workers and the community. These risks and impacts would be similar to those already experienced with the residential removals and other actions completed in the OU. The alternative would involve removing trees and brush, and constructing and removing of temporary staging areas, as well as managing storm water, truck traffic, and associated noise. The removal of soils has the potential to create short-term dust. These risks and impacts would be managed using the engineering controls already proven to be effective for this type of remediation. Short-term impacts to the creek would be managed using siltation controls, also proven to be effective for this type of construction.

The covered and excavated areas would be stabilized using vegetation. Although the vegetated cover should effectively contain the placed material, the areas would have a greater potential to erode during rain events, especially in the time after construction before the cover establishes maturity.

The number of facilities to treat PCB-containing material is limited. Transportation would involve truck traffic on Federal and State highways in addition to local roads. Truck noise, emissions and the potential for a spill or traffic accident would be proportional to the distance the truck needs to travel.

The estimated duration to implement NRS-5 is approximately one to two years. Energy use for NRS-5 is approximately 502,600 MMBtu, and the greenhouse gas emissions are approximately 35,750 CO2e. These quantities reflect a combination of a long distance to the off-site incineration facility and the energy required to incinerate soil.

7.7.5.4 Long-Term Effectiveness and Permanence

NRS-5 would provide long-term effectiveness and permanence by reducing EPCs to below the nonresidential PRGs

Off-site treatment (incineration) would permanently and effectively treat PCBs in the material. The resulting ash would be disposed of by the facility and would no longer be in or around the Anniston areas.

7.7.5.5 Reduction of Toxicity, Mobility, or Volume through Treatment

NRS-5 would treat excavated soils by incineration, thereby reducing the toxicity, mobility, and volume of PCBs in soil.

7.7.5.6 Implementability

NRS-5 would be implementable provided an off-site incineration facility could be located that was both operational and compliant with its permit requirement.

7.7.5.7 Cost

A cost estimate for NRS-5 is shown in Table 7-19. The estimated capital cost (without contingencies) is $9.7M. The annual long-term cost is estimated at $413,000 per year. The total present worth cost for this alternative, including 30 years of soil management and contingency, is approximately $21.0M. The overall cost for this remedy is driven by the significant unit cost for transporting the soil to an off-site incineration facility, incinerating soils, and disposing of the resulting ash (typically at the off-site incineration facility). The closest off-site incineration facility (Port Arthur, TX) was used for cost estimating purposes. The volume of soil that would be excavated, transported, and incinerated under this alternative is 9,100 cubic yards. The overall cost to implement this alternative using the alternative PCB PRG value of 9 mg/kg increases to $46.2M and is driven by the larger removal volume of (26,700 cubic yards) associated with the lower PCB PRG value.

7.7.6 NRS-6: Excavation of Surface Soils, On-Site Treatment, and Soil Management

Alternative NRS-6 is the same as alternative NRS-5 with the difference that soils would be treated on-site as opposed to treatment at an off-site facility. It is likely that the preferred on-site treatment would be thermal desorption, as it is expected that the only other viable on-site option (incineration) would not be practical for the relatively small amount of soil requiring treatment. Thermal desorption would be conducted on-site, creating a high-concentration PCB waste oil that would be transported off-site for incineration and lower concentration treated soils that would be below 50 mg/kg and could be disposed on on-site in the SSSMA.

NRS-6 would involve building an on-site materials handling pad, capable of managing incoming materials, treated materials, the treatment unit itself, and a water treatment unit. For high-concentration PCB oil from the treatment process, off-site incineration is the most likely treatment alternative. The PCB-containing soils would be transported to one of the three TSCA-permitted facilities in Texas or Kansas for incineration. The treated soil residual would have low PCB concentrations, and disposal of those is assumed to be in an on-site solid management area (the SSSMA).

7.7.6.1 Overall Protection of Human Health and the Environment

NRS-6 would provide protection of human health and the environment. This alternative would effectively reduce the surface soil concentrations in nonresidential areas to less than the USEPA nonresidential PCB PRGs.

7.7.6.2 Compliance with ARARs

NRS-6 would be designed to comply with the ARARs from Tables 3-1 to 3-3. Approvals would be needed for the on-site treatment of soils and for the on-site disposal of treated materials. In particular, NRS-6 would be designed to comply with the following ARARs:

- Regulations at 40 C.F.R. Part 261 for the management and disposal of remediation wastes
- Regulations at 40 C.F.R. Part 761 for the management and disposal of PCB remediation wastes
- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes

7.7.6.3 Short-Term Effectiveness

NRS-5 would result in short-term risks and impacts to site workers and the community. The alternative would involve removing trees and brush, and constructing and removing temporary staging areas, as well as managing storm water, truck traffic, and associated noise. The removal of soils has the potential to create short-term dust. These risks and impacts would be managed using the engineering controls already proven to be effective for this type of remediation. Short-term impacts to the creek would be managed using siltation controls, also proven to be effective for this type of construction.

The covered and excavated areas would be stabilized using vegetation. Although the vegetated cover should effectively contain the placed material, the areas would have a greater potential to erode during rain events, especially in the time after construction before the cover establishes maturity.

The thermal treatment system will be sited and operated so as to have minimal impacts to the local community; however, because of the mixed land uses in and around OU-1/OU-2 and because the system will most likely be sited outside of the floodplain, impacts to the local community cannot be completely avoided. The permitting process will likely require some air modeling and stack testing during the start-up phase of the project to ensure that the controls of stack emissions substantive elements are protective of the local community.

The thermal treatment process will generate a lower-concentration, treated solid material that can be disposed of on-site, assuming USEPA's choice and approval of this alternative. The process will also generate a high-concentration PCB oil that will require additional treatment and/or disposal. It is likely that off-site incineration would be the most appropriate disposition for these high-concentration oils. The number of facilities to treat PCB-containing material is limited. Transportation would involve truck traffic on Federal and State highways in addition to local roads. Truck noise, emissions and the potential for a spill or traffic accident would be proportional to the distance the truck needs to travel.

The estimated duration to implement NRS-6 would include about six months to a year of planning and permitted, followed by approximately one to three years and is highly dependent on reliable operation of the low-temperature thermal desorption treatment system. Energy use for NRS-6 is approximately 31,600 MMBtu, and the greenhouse gas emissions are approximately 2,250 CO_2e. These quantities reflect a combination of a long distance to the off-site incineration facility and the energy required to incinerate soil.

7.7.6.4 Long-Term Effectiveness and Permanence

NRS-6 would provide long-term effectiveness and permanence by reducing EPCs in nonresidential surface soils to below the nonresidential PRG of 21 mg/kg. Permanent protection against potential changes in land use (e.g., if the land were to be developed) would be provided through long-term O&M.

Treated, lower-concentration soils would be disposed of in the SSSMA. Off-site treatment (incineration) would permanently and effectively treat PCBs in the oil generated from the thermal desorption process. The resulting ash would be disposed of by the facility and would no longer be in or around the Anniston areas.

7.7.6.5 Reduction of Toxicity, Mobility, or Volume through Treatment

NRS-6 would treat excavated soils by thermal desorption and incineration, thereby reducing the toxicity, mobility, and volume of PCBs in soil.

7.7.6.6 Implementability

NRS-6 would be implementable provided an on-site thermal treatment system could be procured, permitted and sited appropriately and with approvals for the treatment system and the on-site

disposal of treated solid materials. Destruction of the PCBs in the high concentration oil would require than an off-site incineration facility could be located that was both operational and compliant with its permit requirement.

7.7.6.7 Cost

A cost estimate for NRS-6 is shown in Table 7-20. The estimated capital cost (without contingencies) is $8.5M. The annual long-term cost is estimated at $413,000 per year. The total present worth cost for this alternative, including 30 years of soil management and contingency, is approximately $19.1M. The closest off-site incineration facility (Port Arthur, TX) was used for cost estimating purposes. The volume of soil that would be excavated, transported, and incinerated under this alternative is 9,100 cubic yards. The overall cost to implement this alternative using the alternative PCB PRG value of 9 mg/kg increases to $36.6M and is driven by the larger removal volume of (26,700 cubic yards) associated with the lower PCB PRG value.

7.8 Groundwater and PTW at T-11

Potential remedial activities to address the groundwater RAOs in OU-1/OU-2 would be focused on the eastern portion of EU5 located to the east of Snow Creek as shown on Figures 2-3 and 4-18. The FEMA floodway zone is shown on these figures as it needs to be considered for remedial approaches that include filling activities in the floodway that raise the local ground surface elevations.

7.8.1 GW-1: No Action

Alternative GW-1 is the no action alternative, which means that no additional remedial actions would be conducted. This alternative is presented and analyzed as required by the NCP.

7.8.1.1 Overall Protection of Human Health and the Environment

GW-1 would not be protective of human health or the environment. This alternative would leave concentrations in groundwater that are above PRGs at the T-11 area.

7.8.1.2 Compliance with ARARs

GW-1 would not achieve State and Federal Safe Drinking Water Act MCLs for groundwater.

7.8.1.3 Short-Term Effectiveness

No additional short-term impacts to the community, workers, or the environment are posed by implementing GW-1.

7.8.1.4 Long-Term Effectiveness and Permanence

GW-1 would not provide long-term effectiveness as it does not address the elevated groundwater concentration above the MCLs.

7.8.1.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative GW-1 does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.8.1.6 Implementability

GW-1 is straightforward and easy to implement.

7.8.1.7 Cost

There is no cost associated with GW-1.

7.8.2 GW-2: Excavate Area, O&M, and ICs

GW-2 includes excavating material immediately surrounding well T-11 and removing a 12-inch layer of soil over the broader T-11 area (Figure 7-2). The area immediately surrounding well T-11 is

considered to be PTW based on the presence of soils with the elevated concentrations of lower chlorinated PCB mixtures in close proximity to groundwater. The soils immediately surrounding T-11 would be excavated and transported to an approved off-site facility for disposal. The planned depth of excavation in the area immediately surrounding the well is approximately 4 feet based on existing data that show this to be the vertical limits of impacted materials. The samples (CA-05-8583-14), collected at depths of 2–3 feet and 3–4 feet near well T-11, indicate the presence of Aroclor 1232, which may have contributed to the groundwater impacts in the area. Aroclor 1232 and other lower-chlorinated Aroclors were not detected in soil samples collected from approximately 10 feet in each direction from T-11. In order to remove these impacted soils, the excavation would extend 20 feet in each direction from T-11. The deeper excavation immediately surrounding groundwater well T-11 would encompass these sample locations. The materials excavated from this area (approximately 200 cubic yards of soil) would be loaded into trucks and taken to an approved off-site disposal facility. The excavation area would be backfilled with clean fill materials once the excavation is complete.

The 12-inches of soil removed over the broader T-11 area (Figure 7-2) would be backfilled with soil and vegetated as shown on Figure 7-1. The final surfaces of the covered area would be gently graded into the surrounding terrain, and no significant or noticeable changes from the existing topography are anticipated. Prior to disturbing surface soil, appropriate temporary erosion and sedimentation control measures and surface water management structures would be put in place to prevent migration of soil and particulates during excavation. Air monitoring would be conducted at the location of soil disturbances.

ICs, such as a deed restriction, would be included to restrict access to groundwater and to restrict future uses of the property. Monitoring and O&M of the proposed remedial components, including further groundwater monitoring, are included in this alternative.

7.8.2.1 Overall Protection of Human Health and the Environment

GW-2 would provide long-term protection of human health and the environment through addressing surface soil PRGs, removing the PTW material at T-11, and providing ICs to limit access to the area and the use of groundwater.

7.8.2.2 Compliance with ARARs

GW-2 would comply with the following key ARARs from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. Part 261 for the management and disposal of remediation wastes
- Regulations at 40 C.F.R. Part 761 for the management and disposal of PCB remediation wastes
- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes
- State and Federal Safe Drinking Water Act MCLs
- Regulations at ADEM Admin. Code r. 335-9-1-.05 and ADEM Admin. Code r. 335-9-1 -.06 for construction of new extraction wells

GW-2 would comply with potential ARARs recognizing that time would likely be required to achieve the MCL for PCBs.

7.8.2.3 Short-Term Effectiveness

The activities associated with GW-2 would result in short-term risks to construction workers primarily as a result of exposures to impacted soils during excavation. The impacted soils would not be exposed once the installation of the capping system begins. These risks would be managed by using engineering controls, administrative controls, and appropriate health and safety measures. Significant

short-term risks and impacts to the community are not expected. Construction of all remedial components included in this alternative would take 6 to 12 months, and work would likely be completed during normal construction hours (e.g., during daylight). Typical construction equipment (e.g., excavators, backhoes, and dump trucks) would be used.

Prior to implementing GW-2, access must be obtained from Norfolk Southern to cross the tracks or a bridge must be constructed over Snow Creek. It is anticipated to take approximately 6 to 12 months to gain the necessary approvals and construct the appropriate access.

Energy use for GW-2 is approximately 2,250 MMBtu, and the greenhouse gas emissions are approximately 180 CO2e.

7.8.2.4 Long-Term Effectiveness and Permanence

GW-2 provides long-term permanent protection of human health and the environment. This is achieved by eliminating the potential for direct contact with or erosion of surface soils above PRGs with the placement of cover soils following the removal of the current surface soil layer. Removing PTW at T-11 in combination with the cover soils will be protective of groundwater over the long-term. O&M would also be regularly conducted to provide continued long-term effectiveness of the remedy.

7.8.2.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative GW-2 does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.8.2.6 Implementability

The remedial components provided in GW-2 can be implemented as they utilize well-established practices and the services and materials required are standard within the industry and are readily available. The long-term O&M requirements for all remedial components provided by this alternative can be readily performed, and the personnel and equipment are expected to be readily available. The primary implementability challenges are associated with the location of the T-11 area. Access in this area is complicated by the location of Snow Creek and the Norfolk Southern railroad tracks that collectively isolate the T-11 area as an island. Significant efforts would be required to construct a bridge or use other means to provide access to this property. Daily communication would be necessary to coordinate the construction schedule with active railway operations.

7.8.2.7 Cost

A cost estimate for Alternative GW-2 is shown in Table 7-21. The estimated capital cost (without contingencies) is $1.3M including the excavation and disposal of approximately 3,000 cubic yards of soil, and placing cover soils over a 1.7 acre area. The annual long-term cost for this alternative is estimated at $15,000 per year. The total present worth cost for this alternative, including 30 years of O&M and contingencies, is approximately $2.2M. P/S anticipate that it will require approximately 6 to 12 months to construct the cover system for this alternative once approvals and access have been established and that O&M activities would continue in perpetuity.

7.8.3 GW-3: Excavate Area, Low-Permeability Cap, O&M, and ICs

Alternative GW-3 is similar to GW-2 with the exception of installing a low-permeability cap around well T-11. In order to accommodate the thickness of the cap without changing surface water drainage, the excavation of the broader area around T-11 would be slightly deeper (18 inches) than the 12 inches included under GW-2. Alternative GW-3 includes excavating 4 feet immediately around T-11 and 18 inches of soil across the broader T-11 area, as shown on Figure 7-3, and constructing a RCRA compliant cover system.

Surface soil would be removed to maintain the hydraulic profile of the ground surface within the floodway of Snow Creek. Excavated soil would be transported to an off-site disposal facility. After removing these soils, a low-permeability cap would be constructed over the area to the limits shown on Figure 7-3. The capping system would consist of the following, as shown on Figure 7-1:

- Earthfill material to provide the proper drainage for the cover system
- 40-mil low-density polyethylene geomembrane liner (or equivalent) to reduce infiltration
- Geocomposite drainage layer to collect and convey surface water that infiltrates through the cover soils
- Protective cover/vegetative soil layer

Capping and cover materials would be brought to the area. The final surfaces of the capped areas would be gently graded into the surrounding terrain, and no significant or noticeable changes from the existing topography are anticipated. Prior to any surface disturbance, appropriate temporary erosion and sedimentation control measures and surface water management structures would be put in place to prevent off-site migration of contaminants during excavation. Continuous air monitoring would be conducted at the location of soil disturbances to monitor soil particulates.

ICs, such as a deed restriction, would be included to restrict future uses of the property and restrict access to groundwater. Monitoring and O&M of the proposed additional remedial components, including further groundwater monitoring, are included in this alternative.

7.8.3.1 Overall Protection of Human Health and the Environment

GW-3 would provide protection of human health and the environment through addressing surface soil PRGs, placing a low-permeability cap to limit surface water infiltration, removing the PTW material at T-11, and providing ICs to limit access to the area and the use of groundwater. Removing PTW at T-11 in combination with placing a low-permeability cap will be protective of groundwater of the long term recognizing that time would likely be required to achieve the MCL for PCBs.

7.8.3.2 Compliance with ARARs

GW-3 would comply with the following key ARARs from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. Part 261 for the management and disposal of remediation wastes
- Regulations at 40 C.F.R. Part 761 for the management and disposal of PCB remediation wastes
- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes
- State and federal Safe Drinking Water Act MCLs

GW-3 would comply with potential ARARs recognizing that time would likely be required to achieve the MCL for PCBs.

7.8.3.3 Short-Term Effectiveness

The activities associated with GW-3 may result in short-term risks to construction workers through exposure to impacted soils during excavation. The impacted soils would not be exposed once the installation of the capping system begins. These risks would be managed by using engineering controls, administrative controls, and appropriate health and safety measures. Significant short-term risks and impacts to the community are not expected. Construction of all remedial components included in this alternative would take 6 to 12 months, and work would likely be completed during

normal construction hours (e.g., during daylight). Typical construction equipment (e.g., excavators, backhoes, and dump trucks) would be used.

Prior to implementing GW-3, access must be obtained from Norfolk Southern to cross the tracks or a bridge must be constructed over Snow Creek. It is anticipated to take approximately 6 to 12 months to gain the necessary approvals and construct the appropriate access.

Energy use for GW-3 is approximately 3,220 MMBtu, and the greenhouse gas emissions are approximately 260 CO2e.

7.8.3.4 Long-Term Effectiveness and Permanence

GW-3 provides long-term permanent protection of human health and the environment. This is achieved through eliminating the potential for direct contact with or erosion of surface soils through placement of the low-permeability cap after removing the current surface soil layer. Removing PTW at T-11 combined with placing a low-permeability cap will be protective of groundwater over the long term. O&M would be regularly conducted to provide continued long-term effectiveness of the remedy.

7.8.3.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative GW-3 does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.8.3.6 Implementability

The remedial components provided in GW-3 can be implemented as they utilize well-established practices and the services and materials required are standard within the industry and are readily available. This technology is routinely used for SWMUs regulated under RCRA and for waste sites regulated under CERCLA. The long-term O&M requirements for all remedial components provided by this alternative can be readily performed, and the personnel and equipment are expected to be readily available.

The primary implementability challenges are associated with the location of the T-11 area. Access in this area is complicated by the location of Snow Creek and the Norfolk Southern railroad tracks that collectively isolate the T-11 area as an island. Significant efforts would be required to construct a bridge or use of other means to provide access to this property. Daily communication would be necessary to coordinate the construction schedule with active railway operations.

7.8.3.7 Cost

A cost estimate for Alternative GW-3 is shown in Table 7-22. The estimated capital cost (without contingencies) is $2.0M. This includes the excavation and disposal of approximately 4,400 cubic yards of soil, and placing a low-permeability cap and cover soils over a 1.7-acre area. The annual long-term cost for this remedial alternative is estimated at $15,000 per year. The total present worth cost for this alternative, including 30 years of O&M and contingencies, is approximately $3.3M. P/S anticipate that it will require approximately 6 to 12 months to construct the cover system for this alternative once approvals and access have been established and that O&M activities would continue in perpetuity.

7.8.4 GW-4: Excavate Area, Low Permeability Cap, Pore Volume Removal, O&M, and ICs

The soil removal and capping components of GW-4 are identical to GW-3. In addition to the soil removal (4 feet around T-11 and 18 inches across the broader T-11 area) and capping components, GW-4 includes installing a groundwater pump-and-treat system to address groundwater concentrations measured at T-11. The system would include two extraction wells with pumps that operate using solar power, a temporary carbon filter, and an NPDES discharge to Snow Creek. During the remedial design phase, alternate methods for groundwater extraction, treatment, and disposal

may be considered. This system would provide additional means for groundwater concentrations to meet the MCLs over the long term by extracting an initial slug of contaminant mass through the removal of two pore volumes of groundwater throughout the T-11 area. The proposed groundwater treatment components for GW-4 are shown in Figure 7-4 including details of the extraction wells and treatment system. For this alternative, an extraction rate of 2 gallons per minute would be expected for the proposed groundwater extraction wells at the T-11 location based on slug testing that was conducted for groundwater well T-11 (Golder 2013). It is expected that pumping operations would require for approximately 12 months. This is based upon removing two pore volumes of groundwater from a saturated zone of 10 feet over an area of approximately 1.7 acres. The impacted saturated zone was assumed as the approximate saturated zone from the high groundwater level to the bottom elevation of well T-11. An effective porosity of 0.25 was assumed. For estimating the duration of pumping required, a conservative pumping rate (less than 0.5 gallon per minute) was assumed. This rate would need to be confirmed as part of the PDI and could vary from the rates determined from short-term slug testing.

Under GW-4, two pore volumes of groundwater would be removed and groundwater conditions would be monitored on a yearly basis until the first five-year review. If the MCL is achieved after the removal of two pore volumes, or during the first five-year operational period, the remedy would be deemed effective and the groundwater extraction/treatment system would be removed. If the MCL had not been achieved, the ASM approach includes evaluation of the data as part of the five-year review process to determine if further monitoring or the removal of an additional two pore volumes should be required.

ICs, such as a deed restriction, would be included to restrict future uses of the property and to restrict access to groundwater. Monitoring and O&M of the proposed additional remedial components, including further groundwater monitoring, are included in GW-4.

7.8.4.1 Overall Protection of Human Health and the Environment

GW-4 would provide protection of human health and the environment through addressing surface soil PRGs, placing a low-permeability cap to limit surface water infiltration, removing the PTW material at T-11, extracting and treating groundwater from T-11 to achieve the groundwater MCL, and providing ICs to limit access to the area and the use of groundwater.

7.8.4.2 Compliance with ARARs

GW-4 would comply with the following key ARARs from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. Part 261 for the management and disposal of remediation wastes
- Regulations at 40 C.F.R. Part 761 for the management and disposal of PCB remediation wastes
- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes
- State and Federal Safe Drinking Water Act MCLs
- Regulations at ADEM Admin. Code r. 335-6-6-.04 and ADEM Admin. Code r. 335-6-6-.14 for discharge of treated groundwater to surface water
- Regulations at ADEM Admin. Code r. 335-9-1-.05 and ADEM Admin. Code r. 335-9-1 -.06 for construction of new extraction wells

GW-4 would comply with potential ARARs recognizing that time would likely be required to achieve the MCL for PCBs. However, the timeframe would be less for this alternative than for GW-3. Substantive compliance with the requirements for a NPDES discharge permit would also be required under this

alternative and may require a PDI to demonstrate compliance during the design process for the alternative.

7.8.4.3 Short-Term Effectiveness

The activities associated with GW-4 would result in short-term risks to construction workers primarily as a result of exposures to impacted soils during excavation. The impacted soils would not be exposed once the installation of the capping system begins. These risks would be managed by using engineering controls, administrative controls, and appropriate health and safety measures. Significant short-term risks and impacts to the community are not expected. Construction of all remedial components included in this alternative would take one to two years, and work will likely be completed during normal construction hours (e.g., during daylight). Typical construction equipment (e.g., excavators, backhoes, drill rigs, and dump trucks) would be used.

Prior to implementing GW-4, access must be obtained from Norfolk Southern to cross the tracks or a bridge must be constructed over Snow Creek. It is anticipated to take approximately 6 to 12 months to gain the necessary approvals and construct the appropriate access, which would also be required over the long term to maintain the cover system.

Energy use for GW-4 is approximately 3,370 MMBtu, and the greenhouse gas emissions are approximately 260 CO2e. These quantities reflect the use of solar energy to power the groundwater extraction, treatment, and discharge system.

7.8.4.4 Long-Term Effectiveness and Permanence

GW-4 would provide a higher level of long-term effectiveness and permanence than GW-3 as active groundwater extraction is included in this alternative. GW-4 would expedite the removal and treatment of impacted groundwater in the T-11 area.

7.8.4.5 Reduction of Toxicity, Mobility, or Volume through Treatment

GW-4 would reduce the toxicity, mobility, and volume of constituents in groundwater by treating the groundwater with activated carbon.

7.8.4.6 Implementability

Remedial components provided in GW-4 can be implemented. Established practices and the services and material required are standard within the industry and are readily available. The long-term O&M requirements for all remedial components provided by this alternative can be readily performed, and the personnel, equipment, and spare parts are expected to be readily available.

The primary implementability challenges are associated with the location of the T-11 area. Access in this area is complicated by the location of Snow Creek and the Norfolk Southern railroad tracks that collectively isolate the T-11 area as an island. Significant efforts would be required to construct a temporary bridge or other means to access this property. Daily communication would to be necessary to coordinate the construction schedule with active railway operations. Efforts would be needed to meet the substantive requirements for an NPDES permit for the discharge of the treated groundwater.

7.8.4.7 Cost

A cost estimate for Alternative GW-4 is shown in Table 7-23. The estimated capital cost (without contingencies) is $2.4M. This includes the excavating and disposing of approximately 4,500 cubic yards of soil, placing a low-permeability cap and covering soils over a 1.7-acre area, and installing and monitoring the long-term operation of a groundwater extraction and treatment system. The annual long-term cost is estimated at $40,000 per year. The total present worth cost for this alternative, including 30 years of O&M and contingencies, is approximately $4.2M. P/S anticipate that it will require approximately 6 to 12 months to construct the cover system for this alternative once approvals and access have been established and that O&M activities would continue in perpetuity.

7.9 Sediment and Creek Bank

The remedial alternatives for sediment are focused on the sediment deposits from the OU-1/OU-2 portion of Snow Creek with PCBs and metals exceeding their respective PRGs. The resulting sediment deposits targeted for remediation are presented on the Figure 4-22 series. The average PCB concentrations for the sediment deposits were used to characterize the deposits relative to the 3 mg/kg PRG value. There are two sediment deposits where the average PCB concentration is below the 3 mg/kg PRG value and the concentrations of one or more metals exceeds the respective PRGs. These include the sediment deposit associated with sample S-5-04 shown on Figure 4-22h where the PRG for manganese was exceeded. The sediment deposit associated with sample PECON-020 shown on Figure 4-22i exceeded the PRGs for chromium, lead, manganese, and nickel.

The creek bank areas are included with the sediment alternatives to address materials with PCB concentrations above the PRG that could enter the aquatic system. The areas where bank stability measures are anticipated are shown on the Figure 4-22 series. Based on the survey results described in Section 2.5.5.3, several creek bank areas were targeted for stabilization. These areas are identified in Section and 4.8 and include EU5 and EU10, especially at the upstream end of EU5 near the confluence of the 11th Street Ditch and the downstream end of EU5 where it merges with EU10 (Figure 4-22a). Based on the sharp changes in flow direction at these locations, hardened or engineered approaches for bank stabilization such as riprap, gabion rock baskets, or articulated concrete mats are included with the alternatives. A more natural approach for stabilizing the creek banks along the remainder of EU5 and along the banks of the creek between EU12 and EU13 has been included (Figure 4-22c). These natural measures could include allowing the vegetation to reestablish itself along the creek bank instead of having it regularly cut to ground surface as part of routine maintenance activities and/or augmenting the creek banks with natural features such as large tree stumps or logs. Remedial measures could also include placing a layer of armor stone riprap on the creek bank face along the excavation area. Of the 1,400 feet of bank area identified for stabilization, approximately 350 feet are targeted for engineered approaches and approximately 1,050 feet are targeted for a naturalized bank stabilization using the range of potential techniques identified above.

If removal of sediments is the selected remedial alternative, a small wedge of riprap or plantings may be needed in locations where sediment removal would proceed all the way to the edge of the creek. This will depend on local conditions and would be included in the remedy design, as necessary. The active remedial alternatives for sediment also include removing the materials from the culvert structures that convey Snow Creek under Highway 202.

At the request of the USEPA, the areas, volumes, and costs associated with the potential application of an alternative PRG value of 1 mg/kg were identified in this FS. Figures showing the remedial areas using this alternative PRG are included in Appendix C. The associated sediment volumes and cost estimates for applying the alternative PRG value of 1 mg/kg for the range of sediment and creek bank alternatives are included in Appendix F.

7.9.1 SED-1: No Action

No action would be conducted to address sediment deposits or creek bank areas along Snow Creek.

7.9.1.1 Overall Protection of Human Health and the Environment

SED-1 would not be protective of the environment. Sediment and creek bank soils would remain in place with concentrations above the PRGs developed for ecological receptors. This alternative would be protective of human health as the HHRA found that the nature of Snow Creek and the surrounding area are not conducive to human use and, therefore, potential exposures were considered minimal.

7.9.1.2 Compliance with ARARs

SED-1 would not comply with the following key ARAR from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. § 131.36 for the chronic AWQC for PCBs (0.014 µg/L) and the parallel regulations under the State of Alabama's Administrative Code 335—6-10, especially during high-flow events

7.9.1.3 Short-Term Effectiveness

No additional short-term risks or impacts to the community, workers, or the environment are posed by implementing SED-1. There are no greenhouse gas emissions or consumption of energy associated with this remedial alternative.

7.9.1.4 Long-Term Effectiveness and Permanence

SED-1 would not provide long-term effectiveness as it does not address the elevated PCBs above the PRG.

7.9.1.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative SED-1 does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.9.1.6 Implementability

SED-1 is straightforward and easy to implement.

7.9.1.7 Cost

There is no cost associated with SED-1.

7.9.2 SED-2: Excavation, On-Site/Off-Site Disposal, and MNR

Remedial alternative SED-2 uses an average target PCB concentration of 10 mg/kg for the sediment deposits to define whether sediment deposits will be removed, and MNR is used to achieve the long-term goal of 3 mg/kg. The excavated materials would be disposed of off-site if concentrations are greater than or equal to 50 mg/kg; on-site disposal would be used for materials with PCB concentrations less than 50 mg/kg. The majority of sediments to be excavated under this alternative are located upstream of the Highway 202 culverts. Only one sediment deposit, located downstream of the Highway 202 culvert, would be excavated based on having an average PCB concentration above 10 mg/kg. The average PCB concentrations for the sediment deposits remaining following implementation under this remedial alternative would be 1.9 mg/kg.

The process to implement SED-2 is based on an ASM approach where attainment of the PRG including the chronic AWQC PCBs would be met over a defined period time. If the data collected prior to the second five-year review of the remedy indicated that the chronic AWQC was not being achieved in dissolved phase surface water samples collected during periods of low flow, then an evaluation of potential options would be conducted as part of this second five-year review. This review would assess if additional actions in the OU-1/OU-2 portion of Snow Creek and/or in the reach of Snow Creek upstream of its confluence with the 11th Street Ditch were necessary for the remedy to be protective. The range of actions could include additional sediment removal in OU-1/OU-2 or upstream, additional monitoring and revisiting remedy performance in the third five-year review, or other options deemed appropriate as part of the five-year review process.

SED-2 also addresses three small sediment deposits where the average PCB concentration does not exceed 10 mg/kg, but the PRGs for one or more metals are exceeded. These three deposits include S-2-03A (shown on Figure 4-22c) where the PRGs for chromium, cobalt, manganese, mercury, nickel, and vanadium were exceeded, S-5-04 (shown on Figure 4-22h) where the PRG for manganese was

exceeded, and PECON-020 (shown on Figure 4-22i) where the PRGs for chromium, lead, manganese, and nickel were exceeded. The total resulting removal volume is estimated to be 2,300 cubic yards. Prior to implementing this remedial alternative, a PDI would be implemented for the Snow Creek sediment deposits that had not been sampled.

A combination of on-site and off-site disposal of the excavated materials would be used. On-site disposal in a soil management area (the SSSMA) would be used for materials with PCB concentrations less than 50 mg/kg and off-site disposal would be used for materials with PCB concentrations greater than or equal to 50 mg/kg. Based on the sediment characterization data for Snow Creek, only a small portion of the sediments to be removed from the creek (approximately 10% to 15%) are expected to have PCB concentrations greater than or equal to 50 mg/kg and require off-site disposal.

Field construction would take 6 to 12 months to complete. Monitoring would be conducted to support the five-year review process.

7.9.2.1 Overall Protection of Human Health and the Environment

SED-2 would be protective of human health and the environment by meeting the ecological PRGs for PCBs and metals.

7.9.2.2 Compliance with ARARs

SED-2 would comply with the following key ARARs from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. Part 261 for the management and disposal of remediation wastes
- Regulations at 40 C.F.R. Part 761 for the management and disposal of PCB remediation wastes
- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes
- Regulations at 40 C.F.R. § 131.36 for the chronic AWQC for PCBs (0.014 µg/L) and the parallel regulations under the State of Alabama's Administrative Code 335—6-10, recognizing that a period of several years may be necessary for MNR to achieve the AWQC as part of the ASM process under this alternative
- Regulations at 40 C.F.R. § 230, 231, 320, 322, 323, 325, 328, 329 and 330 regarding dredging and filling in the creek
- Regulations at U.S.C 4001 et seq. and 4101 regarding alternation of the creek

7.9.2.3 Short-Term Effectiveness

SED-2 may cause short-term risks and impacts to site workers and the community. These risks and impacts may be associated with removing trees and constructing and removing staging and dewatering areas. There are 1.5 acres of tree clearing associated with SED-2. Most of this clearing is located directly along the edge of the creek in the riparian buffer zone. The excavation, staging, and dewatering of sediment along with the necessary truck traffic could cause noise, dust, and odors that may disturb the local public. Risks to site workers and the community may also be associated with dust generated during excavation, stockpiling, and loading trucks for off-site transportation/disposal.

Removing sediment is likely to cause a short-term increase in suspended sediment in the surface water column and an associated increase in concentrations of COCs in surface water. Stabilizing the creek banks would require hard engineering (such as riprap or concrete) in places, which would permanently affect the aesthetics of the creek banks. There are significant, but manageable, logistical issues associated with accessing and removing sediment from the Highway 202 culverts.

The duration to implement the field construction components of SED-2 is 6 to 12 months recognizing that the time to achieve the PRGs may be longer as the alternative relies on a combination of source control and MNR, and the elimination of upstream sources.

Energy use for SED-2 is approximately 1,400 MMBtu, and the greenhouse gas emissions are approximately 110 CO2e. Approximately 75% of the creek bank stabilization (1,050 linear feet of 1,400 linear feet of bank stabilization areas) would be stabilized using natural techniques.

7.9.2.4 Long-Term Effectiveness and Permanence

SED-2 would effectively and permanently remove sediments with elevated concentrations of PCB and metals. Although it may take a period of time under this alternative, it is expected that removing sediment would also achieve a long-term reduction in surface water concentrations to achieve the surface water PRG. Long-term effectiveness and permanence will also be determined by the contribution of multiple historical and ongoing sources to Snow Creek. The Anniston area is industrial in nature with multiple possible sources for discharges and runoff into the creek. Although environmental awareness and enforcement has reduced the number and magnitude of the many possible direct sources of discharge of constituents to Snow Creek, discharges and surface runoff will probably continue to contribute concentrations of organic chemicals and metals to the sediment and surface water in Snow Creek. With the remediation measures already taken and those anticipated to be taken in OU-3 and in soils areas in OU-1/OU-2, the concentration of PCBs entering the creek from discharge and runoff is expected to continue to decrease over time, allowing MNR, in combination with source removal, to be a long-term, effective alternative to achieve the PRG for PCBs in sediment.

7.9.2.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative SED-2 does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.9.2.6 Implementability

SED-2 is implementable using conventional and proven technology. This alternative would involve some significant logistical issues, especially with accessing and removing sediments from the Highway 202 culverts. These issues would be manageable using appropriate management and engineering practices.

7.9.2.7 Cost

A cost estimate for Alternative SED-2 is shown in Table 7-24. The estimated capital cost (without contingencies) is $1.6M. The estimated cost is based on a sediment removal volume of 2,300 cubic yards. The annual long-term cost for this alternative is estimated at $15,000 per year. The total present worth cost for this alternative, including 30 years of monitoring and contingencies, is approximately $2.7M.

7.9.3 SED-3: Excavation and On-Site/Off-Site Disposal

Remedial alternative SED-3 is similar to SED-2 with the exception that the alternative targets the remediation of sediment deposits with average PCB concentrations greater than or equal to a PRG of 3 mg/kg. SED-3 also includes the removal of sediment deposits with average concentrations exceeding the non-PCB PRG values. This includes two of the three deposits targeted in SED-2 for non-PCB constituents (S-5-04 and PECON-020). The approach for sediment disposal under alternatives SED-2 and SED-3 are identical where a combination of on-site and off-site disposal is used for the excavated materials.

Field construction of SED-3 would take 6 to 12 months to complete. Monitoring would be conducted to support the five-year review process.

7.9.3.1 Overall Protection of Human Health and the Environment

SED-3 would be protective of human health and the environment. This alternative would achieve the ecological PRGs for PCBs and metals.

7.9.3.2 Compliance with ARARs

SED-3 would comply with the following key ARARs from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. Part 261 for the management and disposal of remediation wastes
- Regulations at 40 C.F.R. Part 761 for the management and disposal of PCB remediation wastes
- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes
- Regulations at 40 C.F.R. § 131.36 for the chronic AWQC for PCBs (0.014 µg/L) and the parallel regulations under the State of Alabama's Administrative Code 335—6-10
- Regulations at 40 C.F.R. § 230, 231, 320 322, 323, 325, 328, 329 and 330 regarding dredging and filling in the creek
- Regulations at U.S.C 4001 et seq, and 4101 regarding alternation of the creek

7.9.3.3 Short-Term Effectiveness

SED-3 may cause short-term risks and impacts to site workers and the community. These risks and impacts may be associated with removing trees and constructing and removing staging and dewatering areas. There are 1.9 acres of tree clearing associated with SED-3. Most of this clearing will occur in the riparian buffer zone along the edge of Snow Creek. The excavation, staging, and dewatering of sediment along with the necessary truck traffic could cause noise, dust, and odors that may disturb the local public. Risks to site workers and the community may also be associated with dust generated during excavation, stockpiling, and loading trucks for off-site transportation/disposal. Removing sediment is likely to cause a short-term increase in suspended sediment in the surface water column and an associated increase in concentrations of COCs in surface water. Stabilizing the creek banks would require hard engineering (such as riprap or concrete) in places, which would permanently affect the aesthetics of the creek banks. There are significant, but manageable, logistical issues associated with accessing and removing sediment from the Highway 202 culverts.

The anticipated duration to construct SED-3 is 6 to 12 months. The PRGs for sediment would be achieved following implementation, but, the surface water PRG may take some time to achieve as upstream sources are controlled over time.

Energy use for SED-3 is approximately 1,530 MMBtu, and the greenhouse gas emissions are approximately 120 CO2e. Approximately 75% of the creek bank stabilization (1,050 linear feet of 1,400 linear feet of bank stabilization areas) would be stabilized using natural techniques.

7.9.3.4 Long-Term Effectiveness and Permanence

SED-3 would effectively and permanently remove sediments with concentrations above PCB and metals PRGs. Although it may take a period of time under this alternative, it is expected that the sediment removal would also achieve a long-term reduction in surface water concentrations to achieve the surface water PRG. Long-term effectiveness and permanence would also be impacted by the contribution of multiple historical and ongoing sources of constituents to Snow Creek. The Anniston area is industrial with multiple possible sources for discharges and runoff into the creek. Although environmental awareness and enforcement has reduced the number and magnitude of the many possible direct sources of discharge to Snow Creek, discharges and surface runoff will probably continue to contribute concentrations of organic chemicals and metals to the sediment and surface

water in Snow Creek. With the remediation measures already taken and those anticipated to be taken in OU-3 and in soils areas in OU-1/OU-2, the concentration of PCBs entering the creek from discharge and runoff is expected to continue to decrease over time.

7.9.3.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative SED-3 does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.9.3.6 Implementability

SED-3 is implementable using conventional and proven technology. This alternative would involve some significant logistical issues, especially with accessing and removing sediments from the Highway 202 culverts. These issues would be manageable using appropriate management and engineering practices.

7.9.3.7 Cost

A cost estimate for Alternative SED-3 is shown in Table 7-25 and is based on sediment removal volume of 2,500 cubic yards. The estimated capital cost (without contingencies) is $1.8M. The annual long-term cost for this alternative is estimated at $15,000 per year. The total present worth cost for this alternative, including 30 years of monitoring and contingencies, is approximately $2.9M. The estimated cost to implement SED-3 using the alternative PCB PRG of 1 mg/kg is $4.1M. The increased cost is associated with the larger removal volume of 4,000 cubic yards under the 1 mg/kg PRG scenario and the associated increase of impacted shoreline area (increased to 3.7 acres from 1.9 acres).

7.9.4 SED-4: Excavation and Off-Site Disposal

SED-4 is almost identical to SED-3 with the exception of the approach used for sediment disposal. SED-4 targets the removal of sediment deposits with average PCB concentrations exceeding the PCB PRG of 3 mg/kg and the two small sediment deposits where the PCB PRG is not exceeded but the PRG for one or more metals is exceeded. Once removed, the sediments would be transported to and disposed of in a permitted off-site facility.

Field construction of SED-4 would take 6 to 12 months to implement. Monitoring would be conducted to support the five-year review process.

7.9.4.1 Overall Protection of Human Health and the Environment

SED-4 would be protective of human health and the environment. This alternative would achieve the ecological PRGs for PCBs and metals.

7.9.4.2 Compliance with ARARs

SED-4 would comply with the following key ARARs from Tables 3-1 to 3-3:

- Regulations at 40 C.F.R. Part 261 for the management and disposal of remediation wastes
- Regulations at 40 C.F.R. Part 761 for the management and disposal of PCB remediation wastes
- Regulations at 40 C.F.R. § 761.61(c) for risk-based disposal of PCB remediation wastes
- Regulations at 40 C.F.R. § 131.36 for the chronic AWQC for PCBs (0.014 µg/L) and the parallel regulations under the State of Alabama's Administrative Code 335—6-10
- Regulations at 40 C.F.R. § 230, 231, 320 322, 323, 325, 328, 329 and 330 regarding dredging and filling in the creek
- Regulations at U.S.C 4001 et seq, and 4101 regarding alternation of the creek

7.9.4.3 Short-Term Effectiveness

SED-4 may cause short-term risks and impacts to site workers and the community. These may be associated with removing trees, as well as constructing and removing staging and dewatering areas. There are 1.9 acres of tree clearing associated with implementing SED-4. Most of this clearing is located directly along the edge of the creek in the riparian buffer zone. The excavation, staging, and dewatering of sediment along with the necessary truck traffic could cause noise and odors that may disturb the local public. Risks to site workers and the community may also be associated with dust generated during excavation, stockpiling, and loading trucks for off-site transportation/disposal. Removing sediment is likely to cause a short-term increase in suspended sediment in the surface water column and an associated increase in concentrations of COCs in surface water. Stabilizing the creek banks would require hard engineering (such as riprap or concrete) in places, permanently affecting the aesthetics of the creek banks. There are significant, but manageable logistical issues associated with accessing and removing sediment from the Highway 202 culverts.

The anticipated construction duration of SED-4 is 6 to 12 months. The PRGs for sediment would be achieved following implementation, but the surface water PRG may take some time to achieve as upstream sources are controlled over time.

Energy use for SED-4 is approximately 1,720 MMBtu, and the greenhouse gas emissions are approximately 140 CO2e. Approximately 75% of the creek bank stabilization (1,050 linear feet of 1,400 linear feet of bank stabilization areas) would be stabilized using natural techniques.

7.9.4.4 Long-Term Effectiveness and Permanence

SED-4 would effectively and permanently remove sediments with concentrations above PCB and metals PRGs. Although it may take a period of time under this alternative, it is expected that removing sediment will also achieve a long-term reduction in surface water concentrations to achieve the surface water PRG. Long-term effectiveness and permanence will also be impacted by the contribution of multiple historical and ongoing sources of constituents to Snow Creek. The Anniston area is industrial with multiple possible sources for runoff into the creek. Although environmental awareness and enforcement has reduced the number and magnitude of many possible direct sources of discharge to Snow Creek, discharges and surface runoff may continue to contribute concentrations of organic chemicals and metals to the sediment and surface water in Snow Creek. With the remediation measures already taken and those anticipated to be taken in OU-3 and in areas in OU-1/OU-2, the concentration of PCBs entering the creek from discharge and runoff is expected to continue to decrease over time.

7.9.4.5 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative SED-4 does not include treatment and would not reduce the toxicity, mobility, or volume of the materials.

7.9.4.6 Implementability

SED-4 is implementable using conventional and proven technology. This alternative would involve some logistical issues, especially with accessing and removing sediments from the Highway 202 culverts. These issues would be manageable using appropriate management and engineering practices.

7.9.4.7 Cost

A cost estimate for Alternative SED-4 is shown in Table 7-26. The estimated capital cost (without contingencies) is $1.9M. This cost is based on an estimated volume for removal and off-site disposal of 2,500 cubic yards. The annual long-term cost for this alternative is estimated at $15,000 per year. The total present worth cost for this alternative, including 30 years of monitoring and contingencies, is

approximately $3.1M. The estimated cost to implement SED-4 using the alternative PCB PRG of 1 mg/kg is $4.5M. The increased cost is associated with the larger removal volume of 4,000 cubic yards under the 1 mg/kg PRG scenario and the associated increase of impacted shoreline area (increased to 3.7 acres from 1.9 acres).

8 COMPARATIVE EVALUATION OF ALTERNATIVES

In this section, the evaluation from the detailed analysis of each category is used to compare the alternatives under each specific evaluation criterion. The purpose of this comparative analysis is to identify the advantages and disadvantages of each alternative relative to one another so that the key benefits and disadvantages of each alternative can be understood and weighed against each other. This can be especially important and easiest to understand in the circumstances where one alternative offers a small benefit with a corresponding large negative aspect. The comparative analysis also allows evaluation of some of the subtle differences between two alternatives that may not be fully realized when the alternatives are only evaluated with respect to the individual criterion.

Overall protection of human health and the environment and compliance with ARARs are used as threshold determinations in that they must be met by any alternative in order for it to be eligible for selection. The next five criteria (long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost) are the primary focus of the comparative evaluation because the major differences, benefits, and disadvantages among alternatives usually relate to one or more of these five criteria (USEPA 1988a).

Evaluation of State and community acceptance is not included in this FS. The USEPA will evaluate these after the public comment period on the proposed Record of Decision for OU-1/OU-2.

The following subsections are organized in the same manner as Section 7, first by category (residential soils, special use properties, etc.) and then by the individual evaluation criteria. An overall summary of the evaluations for each category is included as the last subsection for each category. Tables 8-1a through 8-1h provide the summary-level findings and an overall summary of the costs. A comparison of the costs for all of the alternatives using a 7% discount rate and a performance period of 30 years is provided in Table 8-2. A comparison of costs for three different discount rates (0%, 3%, and 7%) is presented in Table 8-3a for a performance period of 30 years and in Table 8-3b for a performance period of 60 years. A summary of the environmental footprint analysis conducted for each of the active remedial alternatives is provided in Table 8-4.

8.1 Residential Soil Alternatives

The detailed evaluations of the residential soil alternatives are included in Section 7.2. These alternatives—RS-1 through RS-3—have been mostly implemented with the exception of removing residuals at depth with RS-3, and the remaining activities are focused on managing PCB residuals on these properties. In addition to the previously completed removal actions under the Removal Order and the NTC Removal Action Agreement, RS-2 would use a soil management approach to address the PCB residuals at depth beneath previously remediated yard areas. Soil management would also be used to monitor locations where structures may be removed over time and the potential for additional evaluations and/or removal actions at these locations. The only difference between RS-3 and RS-2 is the approach to address the PCB residuals at depth. Under RS-3, subsurface soils with PCB concentrations between 1 mg/kg and 10 mg/kg would be removed and disposed of in the SSSMA.

8.1.1 Overall Protection of Human Health and the Environment

Each of the RS alternatives would meet (partially or fully) the overall protection of human health and the environment threshold criterion. RS-1 would meet this criterion in the short term for the areas/properties where removals have been conducted, but would not meet this criterion in the short term for the few remaining residential properties with surface soil concentrations above 1 mg/kg and where removals have not been conducted. Additionally, RS-1 would not be protective in the long term where removals have been conducted, because residual contamination on these properties would not be managed. Both RS-2 and RS-3 would meet this threshold criterion.

8.1.2 Compliance with ARARs

Alternative RS-1 would not meet this criterion and Alternatives RS-2 and RS-3 would.

8.1.3 Short-Term Effectiveness

Since the majority of the residential removals have already been implemented, the comparative short-term impacts are much higher for alternative RS-3 than under RS-2. These impacts are associated with returning to properties where surface soils were previously removed and repeating the process to remove subsurface soils with PCB concentration between 1 mg/kg and 10 mg/kg. RS-3 will have a larger environmental impact in terms of energy use and greenhouse gas emissions than RS-1 and RS-2. RS-3 will also take two to three years longer to implement than RS-2.

8.1.4 Long-Term Effectiveness and Permanence

Each of the active RS alternatives would provide long-term effectiveness and permanence where removals/backfill have been or will be completed. RS-1 would not provide effectiveness or permanence for the few remaining properties where removals may be conducted but are currently limited by access or overgrown vegetation. RS-1 would also not provide the long-term effectiveness and permanence through soil management activities conducted over the long term. RS-2 and RS-3 would both provide higher levels of protection by completing the necessary removal actions as required and conducting long-term residuals management with RS-3 providing a slightly higher level of permanence through the removal of subsurface soils.

8.1.5 Reduction of Toxicity, Mobility, or Volume through Treatment

The RS alternatives are not treatment alternatives and thus do not reduce the toxicity, mobility or volume of the materials.

8.1.6 Implementability

Both of the active RS alternatives are implementable. RS-2 has been or will be implemented in the same manner as previously conducted for the residential properties. RS-3 would be conducted in the same manner, but is slightly less implementable given that it would require excavating to greater depths around structures and other obstructions.

8.1.7 Cost

There is no cost associated with RS-1. RS-2 is estimated to cost $7.3M, and RS-3 is estimated to cost $15.7M.

8.1.8 Residential Soils (RS) Summary

RS-1, RS-2, and RS-3 are similar in that most of the affected residential properties have already been effectively addressed. Alternatives RS-2 and RS-3 provide equivalent levels of effectiveness. The primary differences between RS-2 and RS-3 are the increased level of community impact and implementability challenges under RS-3, and the slight increase in permanence that RS-3 provides. There is also a substantial difference in cost between the two approaches ($7.3M for RS-2 and $15.7M for RS-3). Table 8-1a provides a summary level of the comparative analysis for the RS alternatives.

8.2 Special Use Properties Alternatives

The detailed evaluation of the SU alternatives is included in Section 7.3 and includes alternatives SU-1 through SU-4, with SU-1 being the no further action alternative. SU-1 and SU-2 have been mostly implemented, and the remaining activities under SU-2 are focused on soil management for the PCB residuals at depth within high activity areas with concentrations between 1 and 10 mg/kg. Soil management would also be used to monitor locations where structures may be removed over time

and the potential for additional evaluations and/or removal actions at these locations. Under SU-3, the approach described in the NTC Removal Action Agreement would be applied to the low activity portions of the special use areas. This is in contrast to SU-2 where the low activities areas are to be addressed as nonresidential soils. For SU-4, the removals would be further expanded to include removing both surface and subsurface soil above 1 mg/kg in high and low activity portions of the special use areas. Consistent with the alternatives for residential soil, the SSSMA would be used for the disposal of materials with PCB concentrations less than 10 mg/kg that have been characterized with five-point composite samples.

8.2.1 Overall Protection of Human Health and the Environment

Alternative SU-1 (no further action) does not include a mechanism for addressing residuals at the high activity areas or for monitoring potential changes in land use or the removal of structures, and thus, SU-1 does not fully meet this threshold criterion. SU-1 does not meet this threshold criterion, while each of the active SU alternatives would meet this threshold criterion.

8.2.2 Compliance with ARARs

In accordance with the USEPA guidance, compliance with ARARs is used as a threshold criterion which must be met in order for the alternative to be considered for implementation. SU-2 through SU-4 would meet this criterion, whereas SU-1 would not.

8.2.3 Short-Term Effectiveness

SU-2 would require mostly soil management and would have minimal short-term impacts as compared to SU-3 and SU-4. SU-2 through SU-4 will have increasing environmental impacts in terms of energy use and greenhouse gas emissions as compared to SU-1 (that has none). SU-2 results in a relatively small environmental footprint (280 MMBtu and 20 CO_2e), while the environmental footprint for SU-3 (2,800 MMBtu and 225 CO_2e) and SU-4 (3,800 MMBtu and 300 CO_2e) are more significant.

8.2.4 Long-Term Effectiveness and Permanence

Each of the active SU alternatives would provide long-term effectiveness and permanence where removals/backfill have been or will be completed. SU-1 would not address subsurface residuals or provide long-term soil management support and would, therefore, not provide effectiveness or permanence. This includes the residuals at depth, potential changes of areas from low activity to high activity, or circumstances where a structure is removed. SU-3 would provide a slightly higher level of permanence through the removal of surface soils from the high activity areas, and surface and subsurface soils in the low activity areas using the NTC Removal Action criteria (surface soils less than 1 mg/kg and subsurface soils less than 10 mg/kg). SU-4 would provide even a higher level of permanence by removing all soils (surface and subsurface) above 1 mg/kg from all the high activity and low activity areas.

8.2.5 Reduction of Toxicity, Mobility, or Volume through Treatment

The SU alternatives are not treatment alternatives and thus do not reduce the toxicity, mobility or volume of the materials.

8.2.6 Implementability

All of the SU alternatives are implementable. SU-1 and SU-2 have been or will be implemented in the same manner as previously conducted for other special use properties. SU-3 would be conducted in the similar manner, but is less implementable given the work that would be conducted in the low activity areas. SU-4 would be conducted in the same manner as SU-3, but is even less implementable given the surface and subsurface removals in the low activity areas and the need to return to high activity areas where the surface soils have already been remediated to address residuals at depth.

8.2.7 Cost

No cost is associated with SU-1. The estimated cost for SU-2 is approximately $0.5M, and the cost for SU-3 is approximately $3.1M. SU-4 would cost approximately $3.9M.

8.2.8 Special Use Properties Summary

SU-1 and SU-2 are similar in that the high activity areas of the special use properties have already been effectively addressed. SU-2 would provide the additional long-term effectiveness through soil management to address PCB residuals at depth or potential residuals beneath structures. O&M would be conducted to monitor potential changes of areas from low activity to high activity. SU-3 would provide an additional level of long-term protectiveness by addressing the high and low activity portions of special use areas using the Stipulation approach. SU-4 would be similar to SU-3 except that it would include conducting removals at depth the low activity and high activity portions of the special use areas. There is a substantial difference in cost between SU-2, SU-3 and SU-4 ($0.5M for SU-2, $3.1M for SU-3, and $3.9M for SU-4), while the level of protectiveness increases slightly from SU-2 to SU-4. Table 8-1b provides a summary level of the comparative analysis for the SU alternatives.

8.3 Interim Measures Alternatives

The detailed evaluation of the IM alternatives is included in Section 7.4. These include four alternatives—IM-1 through IM-4—that include no further action (IM-1), expansion of soil and liner cap over portions of the IMs that are currently lacking in spatial coverage (IM-2), and under IM-3, expanding the spatial extent of the caps in the same manner as IM-2 with the exception that soils in the vicinity of PB-RR-37 would be removed rather than capped. IM-4 relies upon soil excavation and off-site disposal to address the proposed IM enhancement areas. IM-2 through IM-4 would all include long-term O&M and ICs.

8.3.1 Overall Protection of Human Health and the Environment

IM-1 is protective for those areas where covers have been put in place. IM-1 would leave some areas without adequate cover or controls to be completely protective. IM-2 and IM-3 would provide protection of human health and the environment. IM-4 would provide an additional level of protection over IM-2 and IM-3 by excavating and disposing of impacted soils that need to be addressed.

8.3.2 Compliance with ARARs

Although IM-1 does not comply with all potential ARARs, the other three IM alternatives would comply with potential ARARs.

8.3.3 Short-Term Effectiveness

The three active IM alternatives would be effective as soon as they are implemented. Because of the location of the IM areas, the short-term negative impacts to the public would be minimal. Potential impacts to workers would be addressed in the same manner as other construction work conducted for the Site. IM-2 would be easier to implement and would disturb less high-concentration soils in the vicinity of PB-RR-37 than IM-3. IM-3 would also require water diversion and water control procedures during excavation to minimize the potential for erosion and surface water runoff during the excavation of high-concentration soils. IM-4 would be the most difficult to implement as it would require the excavation and removal of impacted soil prior to placing a 12-inch clean soil cover over the removal areas. As a result, IM-2 would be more effective in the short term than IM-3 or IM-4.

The environmental footprints of the three active IM alternatives are similar with a slightly larger footprint for IM-4. The energy use for IM-2 and IM-3 are very close—IM-2 at 690 MMBtu and IM-3 at approximately 750 MMBtu. IM-3 has a slightly higher quantity of greenhouse gas emissions (60 CO_2e)

versus IM-2 (55 CO_2e). This difference is associated with the transportation of excavated soils to an off-site TSCA disposal facility for soils excavated from the PB-RR-37 portion of the Eastside Area. IM-4 has a higher quantity of greenhouse gas emissions (300 CO_2e) versus each of the other alternatives. This difference is associated with the transportation of excavated soils to an off-site TSCA disposal facility for soils excavated from the IM areas.

8.3.4 Long-Term Effectiveness and Permanence

Both IM-2 and IM-3 would provide long-term effectiveness and permanence through isolation, O&M, and ICs. The potential PTW area at PB-RR-37 is not expected to impact groundwater based on the CSM for PCB leaching to groundwater at the Site and the distribution of PCBs present at PB-RR-37. The cap will also protect these soils from direct contact or erosion from surface water flow. To maintain the current surface water flow conditions in the local area, a culvert would be placed in the area prior to capping. IM-4 would provide further long-term effectiveness and permanence with the removal of impacted soil in areas previously not covered by existing IMs.

8.3.5 Reduction of Toxicity, Mobility, or Volume through Treatment

The IM alternatives are not treatment alternatives and would not reduce the toxicity, mobility or volume of the materials.

8.3.6 Implementability

The IM alternatives could be implemented in a manner similar to IM-related work that has been implemented previously on the Site. IM-3 would be more difficult to implement than IM-2, as it would involve surface water controls and diversion and the removal, transport, and disposal of the high-concentration materials near PB-RR-37. IM-4 would be more difficult to implement than IM-3, as it would involve more excavation and off-site transport and disposal than the other alternatives.

8.3.7 Cost

The costs for IM alternatives IM-2 and IM-3 are comparable, with both IM-2 and IM-3 estimated at approximately $2.6M. There is no cost to implement IM-1. The cost for implementing IM-4 is significantly higher than the other alternatives at approximately $4.3M.

8.3.8 Interim Measures Summary

The three active IMs (IM-2, IM-3, and IM-4) would effectively address the current gaps in spatial coverage for the previously implemented IMs. These actions, in combination with O&M and ICs would provide long-term effectiveness and permanence for each alternative. IM-2 would be easier to implement; while IM-4 would provide higher long-term effectiveness and permanence through soil removal. Soils in the area of PB-RR-37 would be removed under IM-3 and IM-4, and this would include additional controls to manage surface water runoff during construction and additional truck traffic associated with off-site disposal operations. Truck traffic would be further increased with the implementation of IM-4. The costs for IM-2 and IM-3 are similar, while the cost for IM-4 is significantly higher. Table 8-1c provides a summary of the comparative analysis.

8.4 Dredge Spoil Pile Alternatives

The detailed evaluation of the five dredge spoil pile alternatives is included in Section 7.5. In addition to no action (DSP-1), there are four active alternatives to address the dredge spoil piles (DSP-2 through DSP-5). DSP-2 and DSP-3 are the same with the exception of how materials are disposed. Both DSP-2 and DSP-3 are assumed to include removal and disposal of dredge spoil pile SC-8. A PDI for dredge spoil pile SC-2 would be conducted under either of the first two active alternatives (DSP-2 and DSP-3). A stabilization cover system would be used for the dredge spoil piles characterized as having PCB concentrations below the PRG of 21 mg/kg to the extent needed. Alternatives DSP-2 and

DSP-3 would remove the dredge spoil piles with EPCs calculated as greater than 21 mg/kg and would remove and backfill 12-inches of underlying soils. The excavated materials would be transported to an off-site disposal facility under alternative DSP-2. For alternative DSP-3, the excavated materials would be transported to an on-site soil management area for disposal (the SSSMA), provided that the materials have PCB concentrations less than 50 mg/kg. Alternatives DSP-4 and DSP-5 would involve excavation of each of the four dredge spoil piles and 12 inches of underlying soil. DSP-4 would involve off-site disposal at a nonhazardous landfill. DSP-5 would dispose of material on-site if the concentrations are confirmed to be less than 50 mg/kg. For each of the active alternatives, the remaining backfilled areas would be managed using the same approach as selected for nonresidential soils.

8.4.1 Overall Protection of Human Health and the Environment

Each of the active DSP alternatives would provide protection of human health and the environment. Surface soil concentrations would be less than the nonresidential PRG of 21 mg/kg. The PCB EPC for SC-8 of 29 mg/kg is above the nonresidential surface soil PRG of 21 mg/kg and thus, the no action alternative (DSP-1) would not be protective.

8.4.2 Compliance with ARARs

The no action alternative (DSP-1) would leave dredge spoil pile(s) in place with PCB concentrations above the PRGs and would not comply with ARARs. Each of the active DSP alternatives would meet this criterion.

8.4.3 Short-Term Effectiveness

Each of the active DSP alternatives would be similar in short-term effectiveness and short-term negative impacts. Each active alternative would achieve the PRG of 21 mg/kg immediately upon completion and would have short-term negative impacts associated with clearing, truck traffic, the potential for fugitive emissions, noise, and dust. There is slightly less truck traffic with DSP-3 and DSP-5 than with DSP-2 or DSP-4, as under the off-site disposal option, the trucks are on the local roadways for a longer period of time due to the increased distance between the excavation area and the off-site disposal facilities. Under no action (DSP-1), the negative impacts of not addressing dredge spoil pile SC-8 would continue.

The differences in energy consumption between DSP-2 (1,200 MMBtu) and DSP-3 (750 MMBtu) is associated with use of an on-site management area under DSP-3 as opposed to the off-site facility used under DSP-2. The same rationale applies to greenhouse gas emissions—100 CO_2e for DSP-2 and 60 CO_2e for DSP-3. DSP-4 has the largest environmental footprint as all four dredge spoil piles are excavated and transported to an off-site landfill.

8.4.4 Long-Term Effectiveness and Permanence

Each of the active alternatives would effectively and permanently remove dredge spoil pile(s) with concentrations above the PRG of 21 mg/kg. DSP-2 and DSP-3 would further reduce the exposure to concentrations below 21 mg/kg and would stabilize the materials if needed. DSP-4 and DSP-5 would effectively and permanently remove all of the remaining dredge spoil piles, regardless of concentration. DSP-4 and DSP-5 would provide slightly better long-term permanence over DSP-2 and DSP-3 if some of the remaining dredge spoil piles required stabilization.

8.4.5 Reduction of Toxicity, Mobility, or Volume through Treatment

The DSP alternatives are not treatment alternatives and do not change the toxicity, mobility, or volume of the materials.

8.4.6 Implementability

All of the DSP alternatives are implementable and have similar levels of implementability. DSP-4 and DSP-5 would require more property access and shoreline clearing to implement and would include the excavation and disposal of more materials (4,900 cubic yards for DSP-2 and DSP-3, and 7,300 cubic yards for DSP-4 and DSP-5).

8.4.7 Cost

The costs for the DSP alternatives are highly dependent on the disposal costs. The PCB concentrations of dredge spoil pile SC-8 and the 12-inch layer of soil beneath SC-8 are less than 50 mg/kg. Based on this, these materials could be disposed of in the SSSMA and would significantly reduce the cost for DSP-3 and DSP-5 as compared to DSP-2 and DSP-4. The cost for DSP-2 (with off-site disposal) is approximately $0.9M, and the cost with on-site and off-site disposal (DSP-3) is significantly less ($0.5M). The cost to sample SC-2 is included for both DSP-2 and DSP-3. The cost for DSP-4 is $1.4M and the cost for DSP-5 is $0.7M. The cost to remove SC-2 has not been included in alternatives DSP-2 and DSP-3.

8.4.8 Dredge Spoil Pile Summary

The four active dredge spoil alternatives would have similar levels of effectiveness, yet DSP-4 and DSP-5 would have more impacts during implementation. There are more impacts under the off-site disposal options (DSP-2 and DSP-4) as the trucks would be on the local roadways for a longer period of time than if the materials were disposed of in the SSSMA. Because the PCB concentrations in the dredge spoils piles are relatively low (less than 50 mg/kg), the disposal cost for using an on-site soil management area (the SSSMA) under DSP-3 and DSP-5 are cost effective relative to using the off-site disposal approach under DSP-2 and DSP-4. A tabular summary of the comparative analysis is presented in Table 8-1d.

8.5 Unapproved Waste Disposal Areas Alternatives

Detailed evaluations for four alternatives to address the two UWDA areas are included in Section 4.5. The four alternatives—UWDA-1 through UWDA-4—include no action and three different approaches to address the UWDAs. UWDA-2 and UWDA-3 would each involve a cover system, with UWDA-2 being the cap design identified in the Stipulation. UWDA-3 includes a RCRA-type cap over each of the UWDA areas. UWDA-4 includes significantly more intrusive work and would include excavating all of the unapproved waste and transporting these materials to an off-site facility.

8.5.1 Overall Protection of Human Health and the Environment

Each of the UWDA alternatives, with the exception of UWDA-1 (no further action), would meet this threshold criterion.

8.5.2 Compliance with ARARs

Each of the active UWDA alternatives would comply with potential ARARs. The no action alternative (UWDA-1) would not comply with potential ARARs by virtue of the unapproved waste disposal activities historically occurring at these locations.

8.5.3 Short-Term Effectiveness

The two capping alternatives (UWDA-2 and UWDA-3) would have similar short-term effectiveness. They would each take about the same amount of time and would have similar issues with truck traffic, dust, and noise. Each capping alternative would achieve surface soil PRGs immediately upon completion. UWDA-4 (waste removal and disposal) would be a much larger construction project and would involve the excavation, handling, and transport of PCB-containing materials; include a range of

unknown waste materials; and have more dust and emissions and proportionally more truck traffic to transport waste and backfill materials. These unknown waste materials may include constituents such as lead or other metals that may require pretreatment through stabilization prior to disposal at the landfill. UWDA-4 also presents significant challenges and the potential to impact the local community and surrounding creeks/drainage way areas. Implementing a large open excavation project in the floodplain where unknown waste material is to be excavated has the potential for significant short-term impacts. Given that unapproved wastes were placed in these areas, the nature of the waste materials is unknown. It is not possible to completely characterize these materials prior to excavation. To address these uncertainties, significant efforts would be required to characterize materials prior to excavating, monitor and control emissions during implementation, and protect the creeks and drainage way areas that border the UWDAs. The construction duration for UWDA-4 is difficult to estimate, but the time to complete the process of excavating, off-site transport and disposal, backfilling, and restoring the areas, is approximately one to two years. PDI efforts would also be needed to ensure that the excavation areas were stable during implementation. This includes portions of the UWDAs where deep excavations—up to 18 feet below the current grade—would be necessary. These PDI efforts would focus on preventing damage to adjoining properties and structures during project implementation. Instead of capping approximately 4.5 acres, UWDA-4 would require excavation and off-site disposal of approximately 100,000 cubic yards of material from the same 4.5-acre area. The environmental footprints of UWDA-2 and UWDA-3 are similar with a significant increase for UWDA-4 that is approximately 50 times larger than UWDA-2 and UWDA-3.

8.5.4 Long-Term Effectiveness and Permanence

Each of the active UWDA alternatives would provide similar long-term effectiveness and permanence. The Stipulation cap (UWDA-2) has been shown to be effective and permanent throughout the Site. RCRA capping has been used effectively on many sites, and excavation and removal is also a proven technology.

8.5.5 Reduction of Toxicity, Mobility, and Volume through Treatment

Two of the UWDA alternatives (UWDA-2 and UWDA-3) do not include treatment and thus do not reduce the toxicity, mobility, or volume of waste materials. There is a possibility that a portion of the materials excavated under UWDA-4 would require pretreatment with stabilization for leachable metals. This pretreatment would reduce the mobility of the metals (and the PCB) but would increase the volume of the waste material requiring disposal.

8.5.6 Implementability

The active capping alternatives (UWDA-2 and UWDA-3) are equally implementable as demonstrated on this and other sites. UWDA-4 would be an enormous excavation and backfilling effort, essentially relocating landfills. Although excavation and backfilling are also known and reliable technologies, the magnitude of the effort, the duration of construction, and the possible implications of large open excavations of unknown materials would make UWDA-4 a very complex alternative to implement.

8.5.7 Cost

The costs for the active UWDA alternatives vary widely, with UWDA-2 estimated at $1.6M, UWDA-3 estimated to be $2.8M, and UWDA-4 estimated to be $41.2M.

8.5.8 Unapproved Waste Disposal Areas Summary

UWDA-2 and UWDA-3 are equivalent alternatives for the majority of the criteria. Both are proven technologies on and off the Site. UWDA-3 would cost ($2.8M) almost twice as much as UWDA-2 ($1.6M) with little added level of effectiveness or permanence. UWDA-4 would require an enormous construction effort, taking one or more years longer to implement than the capping alternatives. The

associated short-term impacts from community disturbance, air emissions, odors, truck traffic, noise, surface water runoff, and an uncertain project duration would increase significantly. Table 8-1e provides a summary of the comparative analysis for the UWDA alternatives.

8.6 Nonresidential Floodplain Soil Alternatives

The detailed evaluations of the nonresidential floodplain soil alternatives are included in Section 7.6. These six alternatives—NRS-1 through NRS-6—are described on the comparative analysis table for nonresidential soils (Table 8-1f). As with all the categories, the first alternative (NRS-1) would be no action. The other five alternatives address the same nonresidential surface soil footprints in OU-1/OU-2; the differences are in how each alternative addresses those soils. NRS-2 involves placing clean cover (soil) over the area and in areas where impacts to flooding are expected to be minimal, and excavation of the 12-inch surface soil layer in areas where placing a soil cover directly over the current grade could cause unacceptable flooding. The excavated areas would be backfilled with a 12-inch layer of clean soil to return the areas to grade. Alternatives NRS-3 through NRS-6 each involves excavating 12 inches of surface soils and replacing the areas with clean backfill materials. NRS-4 involves disposing of all excavated materials off-site. NRS-3 would allow excavated materials with a concentration less than 50 mg/kg to be disposed of on-site in the SSSMA. NRS-5 would be essentially the same as NRS-3 and NRS-4 for the on-site work and would include off-site treatment instead of disposing the soils. NRS-6 would treat soils on-site using thermal desorption. The PCB concentration of the treated solids would be less than 50 mg/kg and would be disposed of on-site. The high-concentration PCB oil from the thermal treatment process would be shipped off-site for destruction using incineration. Each alternative, with the exception of NRS-1 would include soil management for the alternatives to be effective over the long term. ICs including the potential use of environmental covenants may also be included.

8.6.1 Overall Protection of Human Health and the Environment

Each of the NRS alternatives, with the exception of NRS-1 (no further action), would meet this criterion.

8.6.2 Compliance with ARARs

Each of the active NRS alternatives would be designed to meet this criterion and, where needed, would include appropriate approvals.

8.6.3 Short-Term Effectiveness

NRS-2 through NRS-5 would have similar short-term impacts on a local level. NRS-6 would involve more local impacts, as the treatment system and support operations would be more visible, take more space, have the potential for air-borne emissions, and require off-site long-distance truck transport for the extracted PCB-containing oils. Each alternative addresses the same geographical footprint and would require the same access and truck traffic. NRS-5 and NRS-6 would involve trucks transporting the excavated materials or PCB oil to the off-site incineration facility. These trucks could be traveling on highways for several hundred miles and have a higher risk for transportation-related mishaps. NRS-2 would take slightly less time to implement than the other alternatives. This is because NRS-2 only includes excavating and backfilling in three of the candidate remedial areas, and the other alternatives include excavating soil and backfilling in all of the remedial areas. All five of the active alternatives involve some level of truck traffic to and from the Site to remove materials and bring in clean cover.

There is a wide range in energy requirements and greenhouse gas emissions for the NRS alternatives. NRS-5 has the largest energy consumption at 502,600 MMBtu and the highest quantity of greenhouse gas emissions (35,750 CO2e). The energy usage between the remaining active alternatives ranges

from 2,300 MMBtu to 31,600 MMBtu. This difference is driven by the limited quantity of excavation, backfill and disposal under NRS-2 as opposed to alternatives NRS-3 and NRS-4. There is also a slight difference between NRS-3 and NRS-4 where the use of an on-site soil management area under NRS-3 has a reduced impact (5,500 MMBtu for NRS-3 versus 5,870 for NRS-4). The CO2e values for NRS-2 through NRS-4 range from 185 to 470, and the reasons for the differences are identical to the energy use as described above.

8.6.4 Long-Term Effectiveness and Permanence

Each of the active NRS alternatives would offer long-term effectiveness and permanence, resulting in surface soil concentrations less than the PRGs. NRS-3 through NRS-6 would provide slightly improved permanence over NRS-2. NRS-2 would create some areas where the final elevation is 12 inches above current grade.

8.6.5 Reduction of Toxicity, Mobility, or Volume through Treatment

NRS-5 and NRS-6 are the only two remedial alternatives that would reduce the toxicity, mobility, and volume of PCB-containing materials through treatment.

8.6.6 Implementability

NRS-2 through NRS-5 have similar implementability challenges. NRS-6 would involve procurement and permitting-type approvals for the on-site treatment of PCB- and metal-containing soils. The implementability challenges for transporting 9,100 cubic yards of soil 644 miles to an off-site incinerator (NRS-5) are significant when compared to the shipment of soils to landfills located in Alabama. Setting up and operating an on-site thermal treatment unit would involve air modeling and extensive stack testing of emissions prior to and during operations. NRS-6 would also involve the off-site transport of high-concentration oil for incinerator destruction. Although this would be significantly less volume than NRS-5, NRS-6 would involve both the local traffic involved with transporting solid materials to and from the treatment facility to the SSSMA and off-site long distance transport to an approved incinerator facility.

8.6.7 Cost

Costs for the active NRS alternatives are estimated to range from $7.9M to $21.0M. NRS-2 does not include as much excavation as the other alternatives and has the lowest cost ($7.9M). The costs for off-site disposal (NRS-4) and on-site/off-site disposal (NRS-3) are similar and are estimated to be $10.4M and $10.0M, respectively. This is because a majority of the soil (approximately 68%) for both of these alternatives is expected to have PCB concentrations greater than or equal to 50 mg/kg, and, thus, the unit cost for off-site disposal drive the overall cost for both alternatives to be similar. The cost for off-site treatment is the significant influence for the overall cost under NRS-5 ($21.0M). NRS-6 would cost $19.1M.

8.6.8 Nonresidential Floodplain Soil Summary

The five NRS alternatives considered effective are similar with respect to most of the evaluation criteria. NRS-2 may have slightly reduced long-term permanence, as less of the materials are removed from the Site, and could be susceptible to erosion. NRS-3, NRS-4, and NRS-5 would be similar in the on-site implementation and the resulting effectiveness. NRS-3 would be slightly less costly to implement, as it would be less costly to dispose of even the small proportion of acceptable material on-site. NRS-5 and NRS-6 are the only treatment alternative that would reduce the toxicity, mobility, and volume of the material through treatment. NRS-6 would have more short-term negative impacts and require more design work, coordination, advanced planning, and permitting-type activities, as well as monitoring prior to and during implementation to protect against potential airborne emissions. NRS-6 would also involve an off-site incineration component. The small

advantages to either off-site (NRS-5) or on-site (NRS-6) treatment are disproportionate to the implementability challenges and higher costs for the treatment of PCBs. Table 8-1f provides a summary of the comparative analysis.

8.7 Groundwater and PTW at T-11 Alternatives

The detailed evaluation of the groundwater and PTW alternatives are included in Section 7.7 and includes four alternatives—GW-1 through GW-4. GW-1 is the no action alternative, and the other three alternatives sequentially increase in complexity to address PCBs in soil and the associated concentrations in groundwater at the T-11 area. GW-2 would excavate soils immediately around well T-11 to a depth of 4 feet (the vertical extent of high concentrations in soils in this area) and would excavate 12 inches of material across the broader area around T-11. All of the excavation areas under GW-2 would be backfilled with clean materials. GW-3 would include a similar excavation with the exception that 18 inches of soil would be removed as opposed to the 12-inch layer of soil that would be removed under GW-2. The primary difference between GW-2 and GW-3 is the placement of a low-permeability cap (rather than backfill only) over the broader T-11 area. GW-4 is almost identical to GW-3 (excavation and capping) with the addition of extracting and treating groundwater from extraction wells that would be installed at the current location of groundwater well T-11. The extracted groundwater would be treated with activated carbon and discharged to Snow Creek.

8.7.1 Overall Protection of Human Health and the Environment

Each of the GW alternatives, with the exception of GW-1 (no action), would meet this criterion.

8.7.2 Compliance with ARARs

GW-1 (no action) is not expected to achieve MCLs in groundwater. The three active GW alternatives are expected to reduce groundwater concentrations over time with the expectation that MCLs would be met in the future.

8.7.3 Short-Term Effectiveness

Each of the active alternatives would have similar manageable short-term impacts associated with excavation and truck traffic. This includes the construction of a temporary or permanent bridge across the creek to access the area. There would be more impacts associated with GW-4 than with GW-2 and GW-3. This is due to the need to provide continued access to the area throughout the extraction period which is expected to take approximately one year. O&M personnel and equipment would be routinely accessing the area to service the treatment plant under GW-4. Removal of two pore volume of groundwater under GW-4 should also reduce the timeframe to achieve the MCL.

The energy use and greenhouse gas emissions are similar between the alternatives; GW-2 has the lowest values due to a smaller quantity of soil being excavated and transported to an off-site disposal facility (2,250 MMBtu and 180 CO_2e). The other two alternatives are equivalent with a slightly higher footprint for GW-4 (3,370 MMBtu and 260 CO_2e for GW-4 and 3,220 MMBtu and 260 CO_2e for GW-3). The environmental footprint of these two alternatives is considered to be equivalent through a combination of the similar values and the use of solar power as part of GW-4.

8.7.4 Long-Term Effectiveness and Permanence

Each of the active alternatives would provide long-term effectiveness and permanence. Each of the active alternatives would remove the highest concentration soils immediately around the groundwater well (T-11). The surrounding surface soil layer (upper 12 inches) would also be removed from the broader T-11 area bounded by Snow Creek and the railroad tracks. These actions are expected to result in an effective remedy over the long term. While GW-3 and GW-4 also include a low-permeability cap that limits infiltration over the broader T-11 area, the cap is not expected to

significantly increase the effectiveness and permanence of GW-3 and GW-4. This is based on the CSM for the Site and the associated soil and groundwater data that support impacts to groundwater being linked to lower chlorinated PCB mixtures in close proximity to groundwater.

8.7.5 Reduction of Toxicity, Mobility, or Volume through Treatment

GW-4 is the only treatment alternative; it reduces the mobility, toxicity, and volume through the extraction and treatment processes.

8.7.6 Implementability

Each of the GW alternatives is implementable using proven technologies. GW-4 has the largest implementability challenges at the T-11 area, which is an island bounded by Snow Creek and an active railway line. In order to operate the extraction well and groundwater treatment plant, continued access to the area would be required. Prior to implementing GW-4, a PDI would be needed to support the remedial design process. This would include meeting the substantive requirements for obtaining a NPDES discharge permit. The PDI and permit equivalency process would not be required for GW-2 or GW-3.

8.7.7 Cost

As each of the GW alternatives are more complex, the costs increase with complexity. GW-2 is estimated as $2.2M. GW-3 is estimated as $3.3M, and GW-4 is estimated as $4.2M.

8.7.8 Groundwater and PTW at T-11 Summary

The active alternatives for groundwater and PTW near T-11 (GW-2, GW-3, and GW-4) progressively increase in complexity and implementability challenges. However, the increasing complexity and implementability challenges increase the effectiveness by reducing the time to achieve the MCL between these active alternatives.

Table 8-1g provides a summary of the comparative analysis for the groundwater alternatives.

8.8 Sediment and Creek Bank Alternatives

The detailed evaluation of the sediment and creek bank alternatives is included in Section 7.8. SED-1 is the no action alternative and SED-3 and SED-4 would both excavate the same footprint to achieve PRGs. SED-3 and SED-4 differ only in that SED-4 would dispose of all material off-site and SED-3 would use a combination of on-site and off-site disposal. SED-2 would excavate a smaller footprint based on the source control target PCB concentration of 10 mg/kg and is combined with MNR to achieve sediment PRGs over the long term. SED-2 also includes an ASM process for systematically adjusting the remedy, if needed, to meet the PRGs including the chronic AWQC for surface water. The stabilization of 1,400 linear feet of creek bank areas is included for all three active alternatives using a combination of engineered and natural approaches is the same under all three active alternatives.

8.8.1 Overall Protection of Human Health and the Environment

Each of the SED alternatives, with the exception of SED-1 (no action), would meet this criterion.

8.8.2 Compliance with ARARs

Each of the SED alternatives would be compliant with ARARs with the exception of SED-1, which would not change the current condition of exceeding the AWQC for PCBs in surface water under high-flow conditions. SED-2 may take longer to achieve compliance given the ASM approach to achieve the PRGs.

8.8.3 Short-Term Effectiveness

SED-3 and SED-4 would have similar short-term effectiveness and associated short-term negative impacts and include the same footprint for excavation and shoreline impacts associated with tree removal, temporary access roads and staging areas, truck traffic, noise, and air issues. SED-2, SED-3, and SED-4 would each excavate the Highway 202 culverts and involve the same logistical issues with accessing and working safely in this area. SED-2 would excavate less material from fewer deposits and would only include one deposit downstream of Highway 202. With a smaller remediation footprint, SED-2 would be less intrusive, especially in the downstream portion of the creek. This alternative would require less tree cutting and fewer access roads and would have less surface water impacts during remediation. Because SED-2 has less excavation downstream of Highway 202, less tree removal would be needed, and, therefore, restoration, tree replacement, and growing time are not as significant as for SED-3 and SED-4. SED-2 would achieve an OU-wide sediment concentration of 1.9 mg/kg and would rely on MNR to achieve the PCB PRG of 3 mg/kg in the downstream deposits. SED-2 also provides an ASM process to guide achievement of the PRG and the chronic AWQC over a reasonable period.

The estimated time field construction period for SED-2, SED-3 and SED-4 is 6 to 12 months. It's expected that SED-2 would take less time than SED-3 and SED-4 as there are fewer sediment deposits to address and less shoreline areas to clear and grub. The estimated difference in time to implement SED-2 as compared to the other two active alternatives (approximately one to two months) is shorter than the expected viability in the overall field construction schedule. This schedule will likely be driven by sediment removal productivity constraints associated with the potential for confined space work inside the Highway 202 culverts and surface water flow conditions in Snow Creek that fluctuate throughout the year.

The three active alternatives have similar environmental footprints; where there are differences, they are associated with the use of an on-site management area and in the case of SED-2, the removal of a smaller volume of sediment. The energy consumption ranges from 1,720 MMBtu for SED-4 to 1,400 MMBtu for SED-2. The greenhouse gas emissions have the same distribution with 140 CO2e for SED-4 and 110 CO2e for SED-2. All of the active alternatives include natural stabilization techniques for 75% of the creek bank areas. This includes 1,050 linear feet of natural bank stability measures over 1,400 feet of creek bank that were identified as needing stabilization measures. The remaining 350 linear feet of creek bank would be stabilized with engineered measures that are considered to be less sustainable.

8.8.4 Long-Term Effectiveness and Permanence

SED-2, SED-3, and SED-4 would effectively and permanently remove sediments with elevated concentrations of PCB and metals. It is expected that the sediment removal will also achieve a long-term reduction in surface water concentrations, even under high-flow conditions. Long-term effectiveness and permanence will also be determined by the contribution of multiple historical and ongoing sources to Snow Creek. The Anniston area is industrial with multiple possible sources for discharges and runoff into the creek. Although environmental awareness and enforcement has reduced the number and magnitude of the many possible direct sources of discharge to Snow Creek, discharges and surface runoff will probably continue to contribute concentrations of organic chemicals and metals to the sediment and surface water of Snow Creek. With the remediation measures already taken and those anticipated to be taken in OU-3 and in soils areas in OU-1/OU-2, the concentration of PCBs entering the creek from discharge and runoff is expected to continue to decrease over time, allowing MNR to be a long-term, effective alternative for PCBs in sediment.

8.8.5 Reduction of Toxicity, Mobility, or Volume through Treatment

None of the SED alternatives include treatment and thus would not reduce the mobility, toxicity, or volume of that material.

8.8.6 Implementability

Each of the active SED alternatives has a similar level of implementability with SED-2 being more implementable than the two other active alternatives (SED-3 and SED-4). SED-2 requires less access and clearing (approximately 1.4 acres) than SED-3 and SED-4 which require the clearing and grubbing of 1.9 acres of land and access from eight landowners. For Snow Creek, the adjoining landowners in many cases own the rights to the creek and formal access is required. This is in contrast to other larger creeks where the creek bed is typically owned by the State.

8.8.7 Cost

The costs for the three active SED alternatives are comparable ranging from $2.7M to $3.1M. The cost for off-site disposal only (SED-4) is slightly higher ($3.1M) than the combination of on-site and off-site disposal (SED-3; $2.9M). SED-2 would remove and dispose of less material and is, therefore, the lowest cost alternative at $2.7M.

8.8.8 Sediment and Creek Bank (SED) Summary

The three active SED alternatives are comparable for most of the evaluation criteria. SED-3 and SED-4 are essentially the same, with SED-3 offering a slightly lower cost by disposing of some materials on-site rather than transporting everything off-site. SED-2 would remove less sediment, but would still achieve an OU-wide sediment concentration of 1.9 mg/kg and would rely on MNR over time to achieve the PRG of 3 mg/kg for all deposits. SED-2 would also have fewer short-term negative impacts than SED-3 and SED-4, especially downstream of Highway 202. SED-4 also provides the ASM process to guide achievement of the PRGs including the chronic AWQC over a reasonable period. Table 8-1h provides a summary of the comparative analysis.

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TABLES

Table 2-1
Summary of OU-1/OU-2 Nonresidential Surface Soil PCB Data by Exposure Unit
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

EU	Area (acres)	Locations	Maximum Discrete Detection (mg/kg)	Mean Surface Detection (mg/kg)	Surface UCL (mg/kg)	Nonresidential Area Of EU (%)	Weighted EU Surface Mean (mg/kg)
1	60.3	21	20	3.6	8.4	12	1.3
2	32.0	55	12	1.8	2.2	29	1.2
3	18.7	37	30	4.9	18	39	2.5
4	19.5	53	2.6	0.76	0.78	47	0.89
5	20.3	92	3,700	100	350	89	89
6	25.2	40	43	2.2	14	39	1.5
7	16.0	23	310	25	160	42	11
8	17.7	25	2.5	0.51	0.66	26	0.87
9	25.9	28	4.9	0.65	0.90	84	0.71
10	15.4	92	130	8.5	19	94	8.1
11	15.3	25	9.1	1.3	2.8	96	1.3
12	8.0	10	11	4.3	9.6	55	2.8
13	19.7	13	17	3.0	9.5	9.7	1.2
14 North	7.0	14	33	12	21	42	5.6
14 South	6.6	11	1.7	0.58	0.56	19	0.92
15/16	46.4	44	4.7	0.84	1.9	100	0.84
17	23.4	25	12	2.4	4.7	92	2.3
18	30.3	23	1.1	0.30	0.33	90	0.37
19 North	5.0	13	770	77	660	100	77
19 South	4.7	13	59	13	68	100	13
20	8.7	7	5.0	1.2	4.0	31	1.1
21	21.9	20	2.7	0.46	0.51	100	0.46
22	26.5	25	15	1.5	7.3	100	1.5
23	19.7	20	1.2	0.37	0.41	100	0.37
24	30.0	36	38	6.8	12	100	6.8
25	22.2	17	1.4	0.27	0.56	86	0.37
26	18.8	23	99	12	34	31	4.4
27	25.9	20	2.0	0.46	0.45	100	0.46
28	54.6	0	--	--	--	100	--
29	37.0	21	0.83	0.20	0.19	100	0.20
30	40.6	10	0.039	0.039	NC	1.8	0.98

Notes:

ProUCL 4.1 was utilized for statistical summaries and UCL calculation for EUs with sufficient sample population. Microsoft Access 2010 was utilized for base statistical summaries.

Parent and duplicate samples were combined. If both detect or both nondetect, a mean was taken. If one was detected and the other was nondetect, then the detected value was used to represent the pair.

Results for maximum, mean, and UCL were rounded to two significant figures.

--: not sampled
EU: exposure unit
mg/kg: milligram(s) per kilogram
NC: not calculated; due to low sample count and/or low number of detected concentrations.
UCL: upper confidence limit

Table 2-2
Summary of Land Use by Exposure Unit
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Former CA as defined by Solutia	Exposure Unit	Receptor Population							
		Resident	Ind./Comm. Worker	Commercial Visitor	Construction Worker	Utility Worker	School/ Daycare	Tresspasser	Recreational User
1	1	X	X	X	X	X		X	
2	2	X	X	X	X	X		X	X
3	3	X		X	X	X		X	X
4	4	X		X	X	X		X	X
5	5	X	X	X	X	X		X	
6	6	X		X	X	X		X	X
7	7	X			X	X	X	X	X
8	8	X		X	X			X	X
9	9	X	X	X	X	X		X	
10	10	X	X	X	X	X		X	X
11	11	X	X	X	X	X		X	
12	12	X	X	X	X	X		X	X
13	13	X		X	X	X		X	
14	14N	X	X	X	X	X		X	X
14	14S	X	X	X	X	X		X	X
15 and 16	15/16	X	X	X	X	X		X	X
17	17	X	X	X	X	X		X	
18	18	X		X	X	X		X	
19	19N		X		X	X		X	
19	19S		X		X	X		X	
20	20	X		X	X	X		X	
21	21			X	X	X		X	
22	22		X	X	X	X		X	
23	23			X	X	X		X	X
24	24		X	X	X	X		X	
25	25	X		X	X	X		X	
26	26	X	X		X	X		X	X
27	27			X	X	X		X	
28	28 **								
29	29			X	X	X	X		
30	30	X	X	X	X	X		X	

Notes:
X - The receptor is potentially exposed to soil/sediment and/or surface water in the corresponding exposure unit.
** No samples were collected from this characterization area, therefore no receptors are identified.
CA: characterization area

reproduced from HHRA Table 4-1 (CDM 2010a)

Table 2-3
Summary of HHRA RGOs for PCBs in Soil
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

		Total PCBs RGOs (mg/kg)					
		Cancer			Noncancer		
	Target Risk Limit =	1.E-06	1.E-05	1.E-04	0.1	1	3
Ind./Comm. Worker Value	Adult	2	21	206	3	29	88
Comm. Visitor Value	Adult	9	91	910	13	130	390
	Young Child	14	142	1,423	15	146	439
Schools/ Daycare Value	Adult	3	34	342	5	49	146
	Young Child	1	12	116	1.0	12	36
Trespasser Value	Adolescent	8	81	809	5	46	139
Recreational User Value	Young Child	3	28	278	3.0	29	86
	Adolescent	4	35	352	2.0	20	60
Construction Worker	Adult	56	565	5,645	10	97	290
Utility Worker	Adult	565	5,645	56,454	97	968	2,903

Notes:

HHRA: human health risk assessment
mg/kg: milligram(s) per kilogram
OU: operable unit
PCB: polychlorinated biphenyl
RGO: remedial goal option

Table 2-4
Summary of HHRA RGOs for Constituents other than PCBs
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

		Total BaPE RGOs (mg/kg)					
		Cancer			Noncancer		
	Target Risk Limit =	1.E-06	1.E-05	1.E-04	0.1	1	3
Ind./Comm. Worker Value	Adult	0.2	2	21	NA	NA	NA
Comm. Visitor Value	Adult	0.9	9	93	NA	NA	NA
	Young Child	1	13	128	NA	NA	NA
Schools/ Daycare Value	Adult	0.3	3	31	NA	NA	NA
	Young Child	0.1	1	11	NA	NA	NA
Trespasser Value	Adolescent	1	10	97	NA	NA	NA
Recreational User Value	Young Child	0.3	3	27	NA	NA	NA
	Adolescent	0.4	4	40	NA	NA	NA
Construction Worker	Adult	5	53	534	NA	NA	NA
Utility Worker	Adult	53	534	5,341	NA	NA	NA

		Arsenic RGOs (mg/kg)					
		Cancer			Noncancer		
	Target Risk Limit =	1.E-06	1.E-05	1.E-04	0.1	1	3
Ind./Comm. Worker Value	Adult	4	38	382	62	616	1,847
Comm. Visitor Value	Adult	17	169	1,692	272	2,724	8,173
	Young Child	22	217	2,169	84	837	2,511
Schools/ Daycare Value	Adult	5.0	53	530	85	853	2,559
	Young Child	2	20	200	8	77	231
Trespasser Value	Adolescent	20	195	1,950	125	1,254	3,761
Recreational User Value	Young Child	5	48	481	19	185	556
	Adolescent	8	79	787	51	506	1,519
Construction Worker	Adult	93	925	9,254	60	596	1,787
Utility Worker	Adult	925	9,254	92,538	596	5,956	17,867
	Background =	32			32		

Table 2-4
Summary of HHRA RGOs for Constituents other than PCBs
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

		Chromium RGOs (mg/kg)					
		Cancer			Noncancer		
	Target Risk Limit =	1.E-06	1.E-05	1.E-04	0.1	1	3
Ind./Comm. Worker Value	Adult	6.0	57	568	304	3,038	9,114
Comm. Visitor Value	Adult	25.0	251	2,512	1,343	13,429	40,286
	Young Child	23	228	2,277	878	8,776	26,329
Schools/ Daycare Value	Adult	6.0	57	570	305	3,050	9,151
	Young Child	3.0	26	255	98	984	2,953
Trespasser Value	Adolescent	92	918	9,175	1,965	19,649	58,948
Recreational User Value	Young Child	6.0	61	614	237	2,367	7,102
	Adolescent	22.0	221	2,208	473	4,731	14,192
Construction Worker	Adult	108	1,080	10,799	694	6,936	20,807
Utility Worker	Adult	1,080	10,799	107,990	6,936	69,357	208,072
	Background =	41			41		

Notes:
BaPE: benzo(a)pyrene
HHRA: human health risk assessment
mg/kg: milligram(s) per kilogram
OU: operable unit
PCB: polychlorinated biphenyl
RGO: remedial goal option

Table 2-5
Summary of Benthic Invertebrate Benchmarks/Toxicity Values and Avian and Mammalian Site-Specific Risk-Based Concentrations[1]
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

	Low Benchmarks/ Toxicity Values[2]	NOAEL Site-Specific Risk-Based Concentrations						
Constituent	**Benthic Invertebrates**	**Mallard**	**Tree Swallow**	**Spotted Sandpiper**	**Pied-Billed Grebe**	**Muskrat**	**Little Brown Bat**	**Raccoon**
tPCB (mid-range sensitivity)	1	5	1	1	5	4	0.3	3
tPCB (high sensitivity)	nc	0.4	0.05	0.1	0.4	na	na	na
Barium	nc	160	542	169	214	474	1819	1235
Chromium	43	97	19	26	131	109	24	229
Cobalt	50	120	72	57	149	142	94	370
Lead	36	41	136	22	58	140	528	403
Manganese	nc	473	4661	287	563	169	1808	549
Mercury	0.2	1	0.3	0.3	0.7	5	2	7
Nickel	23	243	32	46	164	77	11	110
Vanadium	nc	13	20	5.9	19	178	334	495
	High Benchmarks/ Toxicity Values[2]	**LOAEL Site-Specific Risk-Based Concentrations**						
tPCB (mid-range sensitivity)	3	14	2	3	14	12	1	8
tPCB (high sensitivity)	nc	1	0.1	0.3	1	na	na	na
Barium	nc	322	1086	340	429	1106	4249	2884
Chromium	111	102	20	27	138	128	28	269
Cobalt	nc	123	74	59	153	193	128	504
Lead	128	82	272	43	117	265	1000	763
Manganese	nc	919	9063	559	1095	214	2282	693
Mercury	1	3	1	0.8	2	9	3	13
Nickel	49	295	39	56	199	154	22	220
Vanadium	nc	26	42	12	38	355	667	988

[1]All Values are mg/kg sediment

[2]Benthic Invertebrate values for tPCBs represent EC0 and EC10 values for most sensitive species and endpoint from site-specific toxicity testing.
LOAEL: lowest observed adverse effect level
mg/kg: milligram(s) per kilogram
na: not applicable
nc: no criteria available
NOAEL: no observed adverse effect level
OU: Operable Unit
tPCB: total polychlorinated biphenyl

Table 3-1
Potential Chemical-Specific ARARs and TBCs
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Action / Medium	Requirements	Prerequisite	Citation
Restoration of groundwater to its beneficial uses	May not exceed MCLs for organics and inorganics established under the Safe Drinking Water Act National Revised Primary Drinking Water Regulations for community water systems.	Presence of contaminants in groundwater of the state designated as potential underground sources of drinking water as defined in ADEM Admin. Code. r. 335-6-8-.03 – **relevant and appropriate**	40 C.F.R. § 141.61(a) and (c) 40 C.F.R. § 141.62(b) ADEM Admin. Code r. 335-7-2-.03(1) ADEM Admin. Code r. 335-7-2-.04(1) ADEM Admin. Code r. 335-7-2-.05(1)
Cleanup of PCB-contaminated soil at sites in industrial areas	Recommends cleanup levels should be established within a range of 10 to 25 ppm PCB. Recommends treatment, where practicable, for principal threat wastes.	CERCLA site with PCB contamination in soil requiring response action – **TBC**	USEPA *Guidance on Remedial Actions for Superfund Sites with PCB Contamination* [EPA/540/G-90/007] (USEPA 1990)
Groundwater	PCB MCLG (non-enforceable) = 0, MCL (enforceable) MCL = 0.5 µg/L	PCBs in groundwater – **relevant and appropriate**	40 C.F.R. § 141.61(a) and (c)
Surface water	PCBs in freshwater aquatic life chronic criterion = 0.014 µg/L	PCBs in surface water – **relevant and appropriate**	33 U.S.C. §1251 et seq. 40 C.F.R. § 131.36 ADEM Admin. Code r. 335-6-10

ADEM: Alabama Department of Environmental Management
ARAR: applicable or relevant and appropriate requirement
CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act
C.F.R.: Code of Federal Regulations
MCL: maximum contaminant level
MCLG: maximum contaminant level goal
µg/L: microgram(s) per liter
PCB: polychlorinated biphenyl
ppm: parts per million
TBC: to be considered
USEPA: United States Environmental Protection Agency

Table 3-2
Potential Location-Specific ARARs and TBCs
OU-1/OU-2 Feasibility Study Report
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Location	Requirement	Prerequisite	Citation
In or near the creek	US Army Corps of Engineers (USACE) approval may be required to excavate or fill, to alter or modify the course, location, condition, or capacity of the channel of any navigable water of the US.	Dams or dikes in navigable waters of the US. Other structures or work including excavation, dredging, and/or disposal activities, in navigable waters of the US. Activities that alter or modify the course, condition, location, or capacity of a navigable water of the US – **relevant and appropriate**	Section 10 of the Rivers and Harbors Act and USACE regulations 33 USC § 403 33 C.F.R. Parts 320, 322, 323, 325, 329 and 330
In or near creek or wetland areas	These regulations apply to discharges of dredged or fill materials into US waters, which include wetlands. Includes special policies, practices, and procedures to be followed by USACE in connection with the review of applications for permits to authorize the discharge of dredged or fill material into waters of the US pursuant to Section 404 of the Clean Water Act. No activity which adversely affects aquatic ecosystems, including wetlands, shall be permitted if a practicable alternative that has less adverse impacts is available. If there is no other practicable alternative, impacts must be minimized.	Wetland as defined in USACE regulations. Discharges into the waters of the US. – **relevant and appropriate**	33 USC § 1344 33 C.F.R. Parts 320, 322, 323, 325, 328 and 330 33 USC § 1344 40 C.F.R. Parts 230 and 231
Endangered or threatened fish, wildlife, and plants	Federal statute establishing programmatic protection for endangered and threatened species.	Determination of presence of endangered or threatened fish, wildlife, and plants **– relevant and appropriate**	16 USC § 1531 et. seq.
Creek and floodplain	Prohibits alterations to river or floodplains that may increase potential for flooding, provides federal flood insurance to local authorities, and requires that the local authorities not allow fill in the river that would cause an increase in water levels associated with floods.	Land management in flood-prone areas – **relevant and appropriate**	42 USC 4001 et seq; 42 USC 4101
Floodplain	Land-disturbing activities within the Special Flood Hazard Area require contact with the Floodplain Administrator of the city of Anniston prior to the commencement of these activities.	Work in the floodplain – **relevant and appropriate**	National Flood Insurance Program administered by the Federal Emergency Management Agency, City of Anniston enacted Flood Damage Prevention Ordinance number 04-O-03.
Creek	Require consultation with the US Fish and Wildlife Service and the fish and wildlife agency of the state where the water body is located for the purpose of preventing loss of and damage to wildlife resources.	Diversion, channeling, or other activity that modifies a stream or river and affects fish or wildlife waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted . . . or otherwise controlled or modified – **relevant and appropriate**	16 USC § 662 40 C.F.R. 6.302
Site, where and if applicable	It is prohibited to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention . . . for the protection of migratory birds . . . or any part, nest, or egg of any such bird."	Determination of the presence of birds included in the respective international conventions between the US and Great Britain, the US and Mexico, the US and Japan, and the US and Russia –**TBC**	16 USC §§703-712 50 C.F.R. 10.12
Site, where and if applicable	This Act provides for the protection of the bald eagle (the national emblem) and the golden eagle by prohibiting the taking, possession, and commerce of such birds.	Determination of presence of bald eagle or golden eagle – **relevant and appropriate**	16 USC §668a-d 50 C.F.R. Part 22

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Location	Requirement	Prerequisite	Citation
Site, where and if applicable	Establishes a program for the preservation of historic properties throughout the Nation. Proposed remedial actions must take into account effect on properties in or eligible for inclusion in the National Registry of Historic Places. Actions having an effect on a listed or eligible property must provide the Advisory Council on Historic Preservation a reasonable opportunity to comment on the proposed action. Advisory Council comments must be taken into account and integrated into the decision-making process. A cultural resource survey may be necessary to identify historic properties that could be affected by remediation.	Properties in or eligible for the National Registry of Historic Places - **relevant and appropriate**	16 USC § 470 et seq. 36 C.F.R. Part 800
Floodplain and wetlands	Evaluate the potential effects of actions in a floodplain to avoid adversely impacting floodplains wherever possible. Consider flood hazards and floodplain management, including the restoration and preservation of such land areas as natural undeveloped floodplains.	Floodplains and wetlands **- TBC**	Executive Order No. 11988, 42 Fed. Reg. 26951 (May 25, 1977) 40 C.F.R. Part 6, Appendix A
	Avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative.	Wetlands - **TBC**	Executive Order No. 11990, 42 Fed. Reg. 26961 (May 25, 1977)

ARAR: applicable or relevant and appropriate requirement
C.F.R.: Code of Federal Regulations
PCB: polychlorinated biphenyl
TBC: to be considered
US: United States
USC: United States Code

Table 3-3
Potential Action-Specific ARARs and TBCs
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Action	Requirements	Prerequisite	Citation
General Construction Standards – All Land-Disturbing Activities			
Activities causing storm water runoff (e.g., clearing, grading, excavation)	Shall fully implement and regularly maintain effective BMPs to the maximum extent practicable and in accordance with the operator's CBMPP.	All new and existing construction activities as defined in ADEM Admin. Code r. 335-6-12-.02(e) disturbing one (1) acre or more in size - **applicable**	ADEM Admin. Code r. 335-6-12-.05(2)
	Appropriate, effective pollution abatement/prevention facilities, structural and nonstructural BMPs, and management strategies shall be fully implemented prior to and concurrent with commencement of the regulated activities and regularly maintained during construction as needed at the site to meet or exceed the requirements of this chapter until construction is complete, effective reclamation and/or storm water quality remediation is achieved.		
	The operator shall take all reasonable steps to prevent and/or minimize, to the maximum extent practicable, any discharge in violation of this chapter or which has a reasonable likelihood of adversely affecting the quality of groundwater or surface water receiving the discharge(s).		ADEM Admin. Code r. 335-6-12-.06(4)
	Implement a comprehensive CBMPP appropriate for site conditions consistent with the substantive requirements of ADEM Admin. Code r. 335-6-12-.21 that has been prepared and certified by a Qualified Credentialed Professional.		ADEM Admin. Code r. 335-6-12-.21(2)(a)
	The CBMPP shall include a description of appropriate, effective water quality BMPs to be implemented at the site as needed to ensure compliance with this chapter and include but not be limited to the measures provided in subsections 1 through 14.		ADEM Admin. Code r. 335-6-12-.21(2)(b)
	BMPs shall be designed, implemented, and regularly maintained to provide effective treatment of discharges of pollutants in storm water resulting from runoff generated by probable storm events expected/predicted during construction disturbance based on historic precipitation information, and during extended periods of adverse weather and seasonal conditions.		ADEM Admin. Code r. 335-6-12-.21(4)
Activities causing fugitive dust emissions	Shall not cause, suffer, allow or permit any materials to be handled, transported, or stored; or a building, its appurtenances, or a road to be used . . . without taking reasonable precautions to prevent particulate matter from becoming airborne.	Fugitive emissions from construction operations, grading, or the clearing of land – **TBC**	ADEM Admin. Code r. 335-3-4-.02(1)[1]
	Shall not cause or permit the discharge of visible fugitive dust emissions beyond the lot line of the property on which the emissions originate.		ADEM Admin. Code r. 335-3-4-.02(2)[2]
Discharge of dredge and fill material to waters of the US	The four conditions that must be satisfied before dredge and fill is an allowable alternative are: • There must be no practical alternative. • Discharge of dredged or fill material must not cause a violation of State water quality standards, violate any applicable toxic effluent standards, jeopardize an endangered species, or injure a marine sanctuary. • No discharge shall be permitted that will cause or contribute to significant degradation of the water. • Appropriate steps to minimize adverse effects must be taken. Determine long- and short-term effects on physical, chemical, and biological components of the aquatic ecosystem.	Capping, dike stabilization, construction of beams and levees, and disposal of contaminated soil, waste material, or dredged material are examples of activities that may involve a discharge of dredged or fill material. — **relevant and appropriate**	40 C.F.R. 230 33 C.F.R. 320-330

Table 3-3
Potential Action-Specific ARARs and TBCs
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Action	Requirements	Prerequisite	Citation
Groundwater Monitoring/Extraction Well Installation, Operation, and Abandonment			
Construction of extraction and monitoring wells	All materials used in the construction of a water well shall have the structural strength to accomplish the purpose for which they are installed.	Installation of wells as defined in ADEM Admin. Code r. 335-9-1-.02(g) – **relevant and appropriate**	ADEM Admin. Code r. 335-9-1-.05(a)- (c)
	Must meet any relevant substantive requirements under ADEM Admin. Code r. 335-9-1.-.05 Materials and Admin. Code r. 335-9-1.-.06 Construction Standards related to casings, liners, screens, development, and capping of wells.		ADEM Admin. Code r. 335-9-1-.06(a), (b), (c), (d), (e) & (h)
	Any holes remaining after construction or testing attempts shall be properly backfilled.		ADEM Admin. Code r. 335-9-1-.06(h)
Construction of monitoring wells	Must be cased in a manner that maintains the integrity of the monitoring well bore hole. This casing must be screened or perforated and packed with gravel or sand, where necessary, to enable sample collection at depths where appropriate aquifer flow zones exist. The annular space (i.e., the space between the bore hole and well casing) above the sampling depth must be sealed with a suitable material (e.g., cement grout or bentonite slurry) to prevent contamination of samples and the groundwater.	Installation of groundwater monitoring wells at a RCRA facility in order to detect any statistically significant amounts of hazardous waste or hazardous waste constituents – **relevant and appropriate**	ADEM Admin. Code r. 335-14-5-.06(8)(c)
	Monitoring wells must be operated and maintained in a manner to prevent soil, surface water, and/or groundwater contamination. This requirement includes the installation of protective barriers around monitoring wells, where necessary, to prevent damage to the well from traffic or other causes.		
	All monitoring wells must have functional key or combination locks on the wellhead covers to prevent unauthorized access. All monitoring wells must be assigned an identifying number by the facility, and such numbers must be permanently affixed to the outer casing of each monitoring well.		
Abandonment of extraction wells, monitoring wells, and boreholes	Any well to be abandoned shall be permanently sealed in the following manner: The well must be filled with a puddled clay material containing 50 ppm of chlorine to within 20 feet of the top of the well. The top 20 feet shall be filled with cement grout or concrete.	Abandonment of extraction wells, monitoring wells, and boreholes – **relevant and appropriate**	ADEM Admin. Code r. 335-9-1-.06(g)
Activity associated with Class V injection wells (e.g., ZVI injections)	Injection activity cannot allow the movement of fluid containing any contaminant into drinking water, if the presence of that contaminant may cause a violation of the primary drinking water standards under 40 C.F.R. part 141, other health-based standards, or may otherwise adversely affect the health of persons.	Construction, operation, maintenance, conversion, plugging, or closure of Class V injection wells associated with remedial activity – **relevant and appropriate**	40 C.F.R. § 144.82(a)(1) ADEM Admin. Code r. 335-6-8-.05(1)(d)
Plugging and abandonment of Class V injection wells	Shall close the well in a manner that prevents the movement of fluid containing any contaminant into an underground source of drinking water, if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 C.F.R. part 141 or may otherwise adversely affect the health of persons.	Operation of a Class V injection well – **relevant and appropriate**	40 C.F.R. § 146.10(c)(1)
	Shall dispose of or otherwise manage any soil, gravel, sludge, liquids, or other materials removed from or adjacent to the well in accordance with all applicable federal, state, and local regulations and requirements.		40 C.F.R. § 146.10(c)(2)
Waste Generation, Characterization, Segregation, and Storage—Primary Wastes (e.g., excavated soils) and Secondary Wastes (e.g., treatment residues)			
Characterization of solid waste (all primary and secondary wastes)	Must determine if solid waste is excluded from regulation under 40 C.F.R. § 261.4(b); and	Generation of solid waste as defined in 40 C.F.R. § 261.2 —**applicable**	40 C.F.R. § 262.11(a)
	Must determine if waste is listed as hazardous waste under subpart D 40 C.F.R. Part 261; or	Generation of solid waste which is not excluded under 40 C.F.R. § 261.4(a) —**applicable**	40 C.F.R.§ 262.11(b)

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Potential Action-Specific ARARs and TBCs
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Action	Requirements	Prerequisite	Citation
Characterization of solid waste (all primary and secondary wastes) cont.	Must determine whether the waste is (characteristic waste) identified in subpart C of 40 C.F.R. part 261 by either: (1) Testing the waste according to the methods set forth in subpart C of 40 C.F.R. part 261, or according to an equivalent method approved by the Administrator under 40 C.F.R. 260.21; or (2) Applying knowledge of the hazard characteristic of the waste in light of the materials or the processes used.		40 C.F.R. § 262.11(c)
	Must refer to Parts 261, 262, 264, 265, 266, 268, and 273 of Chapter 40 for possible exclusions or restrictions pertaining to management of the specific waste.	Generation of solid waste which is determined to be hazardous waste – **applicable**	40 C.F.R. § 262.11(d)
Characterization of hazardous waste (all primary and secondary wastes)	Must obtain a detailed chemical and physical analysis on a representative sample of the waste(s), which at a minimum contains all the information that must be known to treat, store, or dispose of the waste in accordance with pertinent sections of 40 C.F.R. Parts 264 and 268.	Generation of RCRA hazardous waste for storage, treatment, or disposal – **applicable**	40 C.F.R. § 264.13(a)(1)
Determinations for management of hazardous waste	Must determine each USEPA Hazardous Waste Number (waste code) applicable to the waste in order to determine the applicable treatment standards under 40 C.F.R. 268 et seq. Note: This determination may be made concurrently with the hazardous waste determination required in Sec. 262.11 of this chapter.	Generation of hazardous waste for storage, treatment, or disposal – **applicable**	40 C.F.R. § 268.9(a)
	Must determine the underlying hazardous constituents [as defined in 40 C.F.R. § 268.2(i)] in the waste.	Generation of RCRA characteristic hazardous waste (and is not D001 non-wastewaters treated by CMBST, RORGS, or POLYM of Section 268.42 Table 1) for storage, treatment, or disposal **– applicable**	40 C.F.R. § 268.9(a)
	Must determine if the hazardous waste meets the treatment standards in 40 C.F.R. 268.40, 268.45, or 268.49 by testing in accordance with prescribed methods or use of generator knowledge of waste. Note: This determination can be made concurrently with the hazardous waste determination required in 40 C.F.R. 262.11.		40 C.F.R. § 268.7(a)
Temporary on-site storage of hazardous waste in containers	A generator may accumulate hazardous waste at the facility provided that:	Accumulation of RCRA hazardous waste on-site as defined in 40 C.F.R. § 260.10 – **applicable**	40 C.F.R. § 262.34(a)
	• Waste is placed in containers that comply with 40 C.F.R. §§ 265.171-173; and		40 C.F.R. § 262.34(a)(1)(i)
	• The date upon which accumulation begins is clearly marked and visible for inspection on each container; and		40 C.F.R. § 262.34(a)(2)
	• Container is marked with the words "hazardous waste"; or	Accumulation of 55 gallons or less of RCRA hazardous waste or 1 quart of acutely hazardous waste listed in 261.33(e) at or near any point of generation – **applicable**	40 C.F.R. § 264.34(a)(3)
	• Container may be marked with other words that identify the contents.		40 C.F.R. § 262.34(c)(1)
Use and management of hazardous waste in containers	If container is not in good condition (e.g., severe rusting, structural defects) or if it begins to leak, must transfer waste into container in good condition.	Storage of RCRA hazardous waste in containers – **applicable**	40 C.F.R. § 265.171
	Use container made or lined with materials compatible with waste to be stored so that the ability of the container is not impaired.		40 C.F.R. § 265.172
	Keep containers closed during storage, except to add/remove waste.		40 C.F.R. § 265.173(a)
	Open, handle, and store containers in a manner that will not cause containers to rupture or leak.		40 C.F.R. § 265.173(b)

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Action	Requirements	Prerequisite	Citation
Storage of hazardous waste in container area	Area must have a containment system designed and operated in accordance with 40 C.F.R. § 264.175(b).	Storage of RCRA hazardous waste in containers with free liquids – **applicable**	40 C.F.R. § 264.175(a)
	Area must be sloped or otherwise designed and operated to drain liquid from precipitation, or containers must be elevated or otherwise protected from contact with accumulated liquid.	Storage of RCRA hazardous waste in containers that do not contain free liquids (other than F020, F021, F022, F023, F026 and F027) – **applicable**	40 C.F.R. § 264.175(c)
Temporary on-site storage of remediation waste in staging piles (e.g., excavated soils)	Must be located within the contiguous property under the control of the owner/operator where the wastes are to be managed in the staging pile originated.	Accumulation of nonflowing hazardous remediation waste (or remediation waste otherwise subject to land disposal restrictions) as defined in 40 C.F.R. § 260.10 – **applicable**	40 C.F.R. § 264.554(a)(1)
	May be temporarily stored, (including mixing, sizing, blending, or other similar physical operations intended to prepare the wastes for subsequent management or treatment) at a facility if used only during remedial operations provided that the staging pile:		40 C.F.R. § 264.554(a)(1)
	• Must facilitate a reliable, effective, and protective remedy;		40 C.F.R. § 264.554(d)(1)(i)
	• Must be designed to prevent or minimize releases of hazardous wastes and constituents into the environment, and minimize or adequately control cross-media transfer as necessary to protect human health and the environment (e.g., use of liners, covers, run-off/run-on controls); and		40 C.F.R. § 264.554(d)(1)(ii)
	• Must not operate for more than 2 years, except when an operating term extension under 40 C.F.R. 264.554(i) is granted. Note: Must measure the 2-year limit (or other operating term specified) from first time remediation waste is placed in staging pile.		40 C.F.R. § 264.554(d)(1)(iii)
	• Must not use staging pile longer than the length of time designated by USEPA in appropriate decision document.		40 C.F.R. § 264.554(i)(1)
	Extension of up to an additional 180 days beyond the operating term limit may be granted provided the continued operation of the staging pile: • Will not pose a threat to human health and the environment; and • Is necessary to ensure timely and efficient implementation of remedial actions at the facility.		40 C.F.R. 264.554(i)(1)(i) and (ii)
	In setting standards and design criteria, must consider the following factors: • Length of time pile will be in operation; • Volumes of waste you intend to store in the pile; • Physical and chemical characteristics of the wastes to be stored in the unit; • Potential for releases from the unit; • Hydrogeological and other relevant environmental conditions at the facility that may influence the migration of any potential releases; and • Potential for human and environmental exposure to potential releases from the unit.		40 C.F.R. § 264.554(d)(2)(i) –(vi)
	Must not place ignitable or reactive remediation waste in a staging pile unless the remediation waste has been treated, rendered, or mixed before placed in the staging pile so that: • The remediation waste no longer meets the definition of ignitable or reactive under 40 C.F.R. 261.21 or 40 C.F.R. 261.23; and • You have complied with 40 C.F.R. §264.17(b); or	Storage of ignitable or reactive remediation waste in staging pile – **applicable**	40 C.F.R. §264.554(e) 40 C.F.R. §264.554(e)(1)(i) and (ii)
	• Must manage the remediation waste to protect it from exposure to any material or condition that may cause it to ignite or react.		40 C.F.R. §264.554(e)(2)
	Must not place in the same staging pile unless you have complied with 40 C.F.R. § 264.17(b).	Storage of "incompatible" remediation waste (as defined in 40 C.F.R. § 260.10) in staging pile – **applicable**	40 C.F.R. § 264.554(f)(1)

Table 3-3
Potential Action-Specific ARARs and TBCs
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Action	Requirements	Prerequisite	Citation
Temporary on-site storage of remediation waste in staging piles (e.g., excavated soils) (cont.)	Must separate the incompatible waste or materials or protect them from one another by using a dike, berm, wall, or other device.	Staging pile of remediation waste stored nearby to incompatible wastes or materials in containers, other piles, open tanks or land disposal units – **applicable**	40 C.F.R. § 264.554(f)(2)
	Must not pile remediation waste on same base where incompatible wastes or materials were previously piled unless you have sufficiently decontaminated the base to comply with 40 C.F.R. § 264.17(b).		40 C.F.R. § 264.554(f)(3)
Closure of staging piles of remediation waste	Must be closed within 180 days after the operating term by removing or decontaminating all remediation waste, contaminated containment system components, and structures and equipment contaminated with waste and leachate.	Storage of remediation waste in staging pile in previously contaminated area – **applicable**	40 C.F.R. § 264.554(j)(1)
	Must decontaminate contaminated subsoils in a manner that USEPA determines will protect human health and the environment.		40 C.F.R. § 264.554(j)(2)
	Must be closed within 180 days after the operating term according to 40 C.F.R. §§ 264.258(a) and 264.111, or 265.258(a) and 265.111.	Storage of remediation waste in staging pile in uncontaminated area – **applicable**	40 C.F.R. § 264.554(k)
Waste Treatment and Disposal — Contaminated Groundwater, Excavated Soils, Debris, and Secondary Wastes			
Discharge to surface water	These standards govern discharge of water into surface waters. Due to the degraded nature of Snow Creek, regulated discharges into the waterway must meet ambient water quality criteria at the discharge point. Prohibition on new discharges into waters that do not meet applicable water quality criteria unless certain conditions are met.	NPDES requirements for point source discharge to surface water (e.g., Snow Creek) – **relevant and appropriate**	33 USC 1342; 40 C.F.R. 122, 125,131 40 C.F.R. 122.4(i)
Discharge of treated groundwater to surface water	Comply with any applicable substantive water quality requirements under the Alabama Water Pollution Control Act or the CWA including application of technology- or ambient water quality-based effluent limitations to ensure discharge does not cause or contribute to violation of water quality standards.	Discharge of pollutants into waters of the State – **applicable**	ADEM Admin. Code r. 335-6-6-.04(f), (h), (i), and (j)
	Conditions for the discharge shall meet the requirements, as appropriate, provided in ADEM Admin. Code r. 335-6-6-.14 such as the following: • Technology-based effluent limitations and standards under Sections 301, 302, 303, 304, 307, 318, and 405 of the CWA, including any applicable toxic effluent standard or prohibition under 40 C.F.R. Subchapter N. • Other requirements in addition to or more stringent than promulgated effluent limitations, guidelines, or standards under Sections 301, 306, 307, 318, and 405 of the CWA where necessary to achieve water quality standards established under Section 303 of the CWA and Alabama Water Pollution Control Act §2-22-9(g)		ADEM Admin. Code r. 335-6-6-.14 (3)(a), (b), (e)
	Limitations must be applied to control all pollutants or pollutant parameters that are or may be discharged at a level which cause, have reasonable potential to cause, or contribute to an exceedance of a narrative or numerical water quality standard.		ADEM Admin. Code r. 335-6-6-.14(e)(1)(i)
Discharge to POTW	Discharge of pollutants that pass through POTW without treatment, interfere with POTW operation, contaminate POTW sludge, or endanger health/safety of POTW workers, is prohibited. Discharge must comply with local POTW pretreatment program, including POTW-specific pollutants, spill prevention program requirements, and reporting and monitoring requirements.	Discharge to a POTW – **relevant and appropriate**	40 C.F.R. 403.5 and local POTW regulations 40 C.F.R. 270.60

Table 3-3
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Action	Requirements	Prerequisite	Citation
Discharge of treated groundwater to POTW	Shall not introduce into publicly or privately owned treatment works any pollutant(s) which, alone or in conjunction with a discharge or discharges from other sources, cause pass through or interference or in any other manner adversely impact the operation or performance of the treatment works, to include the method of sludge disposal in use by the publicly or privately owned treatment works.	Discharge pollutants into POTW or privately owned treatment facility operated by a person other than the indirect discharger – **applicable**	ADEM Admin. Code r. 335-6-5-.03(1)
	The following pollutants may not be introduced into a POTW:		ADEM Admin. Code r. 335-6-5-.03(2)
	• Pollutants which create a fire or explosion hazard in the POTW, including, but not limited to, waste streams with a closed cup flashpoint of less than 140 degrees Fahrenheit (°F) or 60 degrees Centigrade (°C) using the test methods specified in 40 C.F.R. § 261.21;		ADEM Admin. Code r. 335-6-5-.03(2)(a)
	• Pollutants which will cause corrosive structural damage to the treatment works, but in no case discharges with pH lower than 5.0, unless the treatment works are specifically designed to accommodate such discharges;		ADEM Admin. Code r. 335-6-5-.03(2)(b)
	• Solid or viscous pollutants in amounts which will cause obstruction to the flow in sewers, or other interference with the operation of the treatment works;		ADEM Admin. Code r. 335-6-5-.03(2)(c)
	• Any pollutant, including oxygen demanding pollutants released in a discharge of such volume or strength as to cause interference in the treatment works;		ADEM Admin. Code r. 335-6-5-.03(2)(d)
	• Heat in amounts which will inhibit biological activity in the treatment plant resulting in interference but in no case in such quantities that the temperature of the influent, at the treatment plant, exceeds 40 °C (104 °F) unless the treatment plant is designed to accommodate such heat;		ADEM Admin. Code r. 335-6-5-.03(2)(e)
	• Pollutants which result in the presence of toxic gases, vapors, or fumes within the treatment works in a quantity that may cause acute worker health and safety problems;		ADEM Admin. Code r. 335-6-5-.03(2)(f)
	• Any trucked or hauled pollutants, except at discharge points designated by the treatment works; and		ADEM Admin. Code r. 335-6-5-.03(2)(g)
	• Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through.		ADEM Admin. Code r. 335-6-5-.03(2)(h)
Disposal of RCRA hazardous waste in a land-based unit	May be land disposed if it meets the requirements in the table "Treatment Standards for Hazardous Waste" at 40 C.F.R. § 268.40 before land disposal.	Land disposal, as defined in 40 C.F.R. § 268.2, of restricted RCRA waste – **applicable**	40 C.F.R. § 268.40(a)
	All underlying hazardous constituents [as defined in 40 C.F.R. 268.2(i)] must meet the Universal Treatment Standard (UTS), found in 40 C.F.R. 268.48 Table UTS prior to land disposal.	Land disposal of restricted RCRA characteristic wastes (D001-D043) that are not managed in a wastewater treatment system that is regulated under the CWA, that is CWA equivalent, or that is injected into a Class I nonhazardous injection well – **applicable**	40 C.F.R. §268.40(e)
Transport and treatment of collected RCRA wastewater	Any dedicated tank systems, conveyance systems, and ancillary equipment used to treat, store, or convey wastewater to an on-site NPDES-permitted wastewater treatment facility are exempt from the requirements of RCRA Subtitle C standards.	On-site wastewater treatment unit (as defined in 40 C.F.R. 260.10) subject to regulation under § 402 or § 307(b) of the CWA (i.e., NPDES-permitted) that manages hazardous wastewaters – **applicable**	40 C.F.R. §264.1(g)(6)
Disposal of RCRA characteristic wastewaters in an NPDES-permitted wastewater treatment unit	Are not prohibited, if the wastes are managed in a treatment system which subsequently discharges to waters of the US pursuant to a permit issued under 402 the CWA (i.e., NPDES permitted), unless the wastes are subject to a specified method of treatment other than DEACT in 40 C.F.R. 268.40, or are D003 reactive cyanide.	Land disposal of hazardous wastewaters that are hazardous only because they exhibit a characteristic and are not otherwise prohibited under 40 C.F.R. 268 – **applicable**	40 C.F.R. §268.1(c)(4)(i)
Disposal of RCRA characteristic wastewaters in a POTW	Are not prohibited, if the wastes are treated for purposes of the pretreatment requirements of Section 307 of the CWA, unless the wastes are subject to a specified method of treatment other than DEACT in 40 C.F.R. 268.40, or are D003 reactive cyanide.		40 C.F.R. §268.1(c)(4)(ii)

Table 3-3
Potential Action-Specific ARARs and TBCs
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Anniston PCB Site, Anniston, Alabama

Action	Requirements	Prerequisite	Citation
Disposal of RCRA hazardous waste soil in a land-based unit	Must be treated according to the alternative treatment standards of 40 C.F.R. § 268.49(c) or according to the universal treatment standards specified in 40 C.F.R. § 268.48 applicable to the listed and/or characteristic waste contaminating the soil prior to land disposal.	Land disposal, as defined in 40 C.F.R. 268.2, of restricted hazardous soils – **applicable**	40 C.F.R. § 268.49(b)
Treatment of RCRA hazardous waste soil	Prior to land disposal, all "constituents subject to treatment" as defined in 40 C.F.R. § 268.49(d) must be treated as follows:	Treatment of restricted hazardous waste soils – **applicable**	40 C.F.R. § 268.49(c)(1)
	• For nonmetals (except carbon disulfide, cyclohexanone, and methanol), treatment must achieve a 90% reduction in total constituent concentrations, except as provided in 40 C.F.R. § 268.49(c)(1)(C). • For metals and carbon disulfide, cyclohexanone, and methanol), treatment must achieve a 90% reduction in total constituent concentrations as measured in leachate from the treated media (tested according to toxicity characteristic leaching procedure or 90% reduction in total constituent concentrations (when a metal removal technology is used), except as provided in 40 C.F.R. § 268.49(c)(1)(C). • When treatment of any constituent subject to treatment to a 90% reduction standard would result in a concentration less than 10 times the universal treatment standard for that constituent, treatment to achieve constituent concentrations less than 10 times the universal treatment standard is not required. [UTSs are identified in 40 C.F.R. § 268.48 Table UTS].		40 C.F.R. § 268.49(c)(1)(A) 40 C.F.R. § 268.49(c)(1)(B) 40 C.F.R. § 268.49(c)(1)(C)
	In addition to the treatment requirement required by paragraph (c)(1) of this section, soils must be treated to eliminate these characteristics.	Land disposal of soils that exhibit the characteristic of ignitability, corrosivity, or reactivity – **applicable**	40 C.F.R. § 268.49(c)(2)
	Provides methods on how to demonstrate compliance with the alternative treatment standards for contaminated soils that will be land disposed.	Treatment of restricted hazardous waste soils following alternative soil treatment of 40 C.F.R. § 268.49(c) –**TBC**	Guidance on Demonstrating Compliance with the LDR Alternative Soil Treatment Standards [EPA 530-R-02-003, July 2002]
Treatment of contaminated soils with RCRA hazardous constituents	Unit must be located, designed, constructed, operated and maintained, and closed in a manner that will ensure protection of human health and the environment.	Treatment of RCRA hazardous waste in miscellaneous units, except as provided in 40 C.F.R. 264.1 **- relevant and appropriate**	40 C.F.R. § 264.601
	Protection of human health and the environment includes, but is not limited to, prevention of any release that may have adverse effects on human health or the environment due to migration of waste constituents in the air, considering the factors listed in 40 C.F.R. 264.601(c)(1) through (7).		40 C.F.R. § 264.601(c)
	The requirements of RCRA Subpart A Air Emission Standards for Process Vents do not apply to process vents that would otherwise be subject to this subpart when equipped with emission controls and operated in accordance with an applicable Clean Air Act regulation codified under 40 C.F.R. part 60, part 61 or part 63.	Process vents associated with air or steam stripping operations that manage hazardous wastes with organic concentrations of at least 10 ppm – **relevant and appropriate**	40 C.F.R. § 264.1030(e)
	The requirements of RCRA Subpart CC – Air Emission Standards for Tanks, Surface Impoundments, and Containers do not apply to a waste management unit that is solely used for on-site treatment or storage of hazardous waste that is placed in the unit as result of implementing remedial activities required under RCRA 3004(u) and (v), or 3008(h), or CERCLA authorities.	Air pollutant emissions with volatile organics from a hazardous waste tank, surface impoundment, or container – **relevant and appropriate**	40 C.F.R. § 264.1080(a)(5)

Table 3-3
Potential Action-Specific ARARs and TBCs
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Anniston PCB Site, Anniston, Alabama

Action	Requirements	Prerequisite	Citation
PCB Waste Generation, Management, and Storage			
Management of PCB waste (e.g., contaminated PPE, equipment, wastewater)	Any person storing or disposing of PCB waste must do so in accordance with 40 C.F.R. § 761, Subpart D.	Generation of waste containing PCBs at concentrations ≥50 ppm – **applicable**	40 C.F.R. § 761.50(a)
Management of PCB remediation waste	Any person cleaning up and disposing of PCBs shall do so based on the concentration at which the PCBs are found.	Generation of PCB remediation waste as defined in 40 C.F.R. § 761.3 – **applicable**	40 C.F.R. § 761.61
Temporary storage of PCB waste in a container(s)	Container(s) shall be marked as illustrated in 40 C.F.R. § 761.45(a).	Storage of PCBs and PCB Items at concentrations ≥50 ppm for disposal – **applicable**	40 C.F.R. § 761.40(a)(1)
	Storage area must be properly marked as required by 40 C.F.R. § 761.40(a)(10).		40 C.F.R. § 761.65(c)(3)
	Any leaking PCB items and their contents shall be transferred immediately to a properly marked nonleaking container(s).		40 C.F.R. § 761.65(c)(5)
	Container(s) shall be in accordance with requirements set forth in DOT HMR at 49 C.F.R. §§ 171-180.		40 C.F.R. § 761.65(c)(6)
Storage of PCB waste in non-RCRA regulated unit	Storage facility must have: • Adequate roof and walls to prevent rainwater from reaching stored PCBs and PCB items; • Adequate floor that has continuous curbing with a minimum six-inch-high curb. Floor and curb must provide a containment volume equal to at least two times the internal volume of the largest PCB article or container or 25% of the internal volume of all articles or containers stored there, whichever is greater; • No drain valves, floor drains, expansion joints, sewer lines, or other openings that would permit liquids to flow from curbed area; • Floors and curbing constructed of Portland cement, concrete, or a continuous, smooth, nonporous surface that prevents or minimizes penetration of PCBs; and • Storage facility must not be located at a site that is below the 100-year flood water elevation. • Storage area must be properly marked as required by 40 C.F.R. § 761.40(a)(10).	Storage of PCBs and PCB items at concentrations of 50 ppm or greater for disposal – **applicable**	40 C.F.R. § 761.65(b)(1) 40 C.F.R. § 761.65(b)(1)(i) 40 C.F.R. § 761.65(b)(1)(ii) 40 C.F.R. § 761.65(b)(1)(iii) 40 C.F.R. § 761.65(b)(1)(iv) 40 C.F.R. § 761.65(b)(1)(v) 40 C.F.R. § 761.65(c)(3)
Storage of PCB waste in a RCRA-regulated container storage area	Does not have to meet storage unit requirements in 40 C.F.R. § 761.65(b)(1) provided unit:	Storage of PCBs and PCB Items designated for disposal – **applicable**	40 C.F.R. § 761.65(b)(2)
	• Is permitted by USEPA under RCRA § 3004 to manage hazardous waste in containers and spills of PCBs cleaned up in accordance with Subpart G of 40 C.F.R. § 761; or		40 C.F.R. § 761.65(b)(2)(i)
	• Qualifies for interim status under RCRA § 3005 to manage hazardous waste in containers and spills of PCBs cleaned up in accordance with Subpart G of 40 C.F.R. § 761; or		40 C.F.R. § 761.65(b)(2)(ii)
	• Is permitted by an authorized state under RCRA § 3006 to manage hazardous waste in containers and spills of PCBs cleaned up in accordance with Subpart G of 40 C.F.R. § 761.		40 C.F.R. § 761.65(b)(2)(iii)

Table 3-3
Potential Action-Specific ARARs and TBCs
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Anniston PCB Site, Anniston, Alabama

Action	Requirements	Prerequisite	Citation
Temporary storage of Bulk PCB remediation waste in a waste pile	May be stored at the cleanup site or site of generation for 180 days subject to the following conditions: • Waste must be placed in a pile designed and operated to control dispersal by wind, where necessary, by means other than wetting;	Storage of PCB remediation waste or PCB bulk product waste in a waste pile – **applicable**	40 C.F.R. § 761.65(c)(9)(i)
	• Waste must not generate leachate through decomposition or other reactions.		40 C.F.R. § 761.65(c)(9)(ii)
	Storage site must have a liner designed, constructed, and installed to prevent any migration of wastes off or through liner into adjacent subsurface soil, groundwater or surface water at any time during the active life (including closure period) of the storage site.		40 C.F.R. § 761.65(c)(9)(iii)(A)
	Liner must be: • Constructed of materials that have appropriate chemical properties and sufficient strength and thickness to prevent failure because of pressure gradients, physical contact with waste or leachate to which they are exposed, climatic conditions, the stress of installation, and the stress of daily operation;		40 C.F.R. § 761.65(c)(9)(iii)(A)(1)
	• Placed on foundation or base capable of providing support to liner and resistance to pressure gradients above and below the liner to present failure because of settlement compression or uplift; and		40 C.F.R. § 761.65(c)(9)(iii)(A)(2)
	• Installed to cover all surrounding earth likely to be in contact with waste.		40 C.F.R. § 761.65(c)(9)(iii)(A)(3)
	Has a cover that meets the above requirements and installed to cover all of the stored waste likely to be contacted by precipitation, and is secured so as not to be functionally disabled by winds expected under normal weather conditions at the storage site; and		40 C.F.R. § 761.65(c)(9)(iii)(B)
	Has a run-on control system designed, constructed, operated and maintained such that it:		40 C.F.R. § 761.65(c)(9)(iii)(C)
	• Prevents flow on the stored waste during peak discharge from at least a 25-year storm; and		40 C.F.R. § 761.65(c)(9)(iii)(C)(1)
	• Collects and controls at least the water volume resulting from a 24-hour, 25-year storm. Collection and holding facilities (e.g., tanks or basins) must be emptied or otherwise managed expeditiously after storms to maintain design capacity of the system.		40 C.F.R. § 761.65(c)(9)(iii)(C)(2)
	Requirements of 40 C.F.R. § 761.65(c)(9) may be modified under the risk-based disposal option of 40 C.F.R.§ 761.61(c).		40 C.F.R. § 761.65(c)(9)(iv)

Table 3-3
Potential Action-Specific ARARs and TBCs
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Anniston PCB Site, Anniston, Alabama

Action	Requirements	Prerequisite	Citation
PCB Treatment/Disposal			
Disposal of decontamination waste and residues	Such waste shall be disposed of at their existing PCB concentration unless otherwise specified in 40 C.F.R. § 761.79(g)(1) – (6).	Decontamination waste and residues – **applicable**	40 C.F.R. § 761.79(g)
	Are regulated for disposal as PCB remediation waste.	Distillation bottoms or residues and filter media – **applicable**	40 C.F.R. § 761.79(g)(1)
	Are regulated for disposal at their original concentration.	PCBs physically separated from regulated waste during decontamination, other than distillation bottoms and filter media – **applicable**	40 C.F.R. § 761.79(g)(2)
Disposal of PCB contaminated porous surfaces	Shall be disposed on-site or off-site as bulk PCB remediation waste according to 40 C.F.R. § 761.61(a)(5)(i) or decontaminated for use according to 40 C.F.R. § 761.79(b)(4).	PCB remediation waste porous surfaces (as defined in 40 C.F.R. § 761.3) – **relevant and appropriate**	40 C.F.R. § 761.61(a)(5)(iii)
Disposal liquid PCB remediation waste	Shall either: • Decontaminate the waste to the levels specified in 40 C.F.R. § 761.79(b)(1) or (2); or • Dispose of the waste in accordance with 40 C.F.R. § 761.61(b) or a risk-based approval under 40 C.F.R. § 761.61(c).	Liquid PCB remediation waste (as defined in 40 C.F.R. § 761.3) – **relevant and appropriate**	40 C.F.R. § 761.61(a)(5)(iv)(A) 40 C.F.R. § 761.61(a)(5)(iv)(B)
Disposal of PCB cleanup wastes (e.g., PPE, rags, nonliquid cleaning materials)	Shall be disposed of either: • In a facility permitted, licensed, or registered by a State to manage municipal solid waste under 40 C.F.R § 258 or nonmunicipal, nonhazardous waste subject to 40 C.R.R.§§ 257.5 through 257.30; or • In an RCRA Subtitle C landfill permitted by a State to accept PCB waste; or • In an approved PCB disposal facility; or • Through decontamination under 40 C.F.R. § 761.79(b) or (c).	Generation of nonliquid PCBs at any concentration during and from the cleanup of PCB remediation waste – **relevant and appropriate**	40 C.F.R. § 761.61(a)(5)(v)(A)
Disposal of PCB cleaning solvents, abrasives, and equipment	May be reused after decontamination in accordance with 40 C.F.R. §761.79; or For liquids, disposed in accordance with 40 C.F.R. § 761.60(a).	Generation of PCB wastes from the cleanup of PCB remediation waste – **relevant and appropriate**	40 C.F.R. § 761.61(a)(5)(v)(B) 40 C.F.R. § 761.60(b)(1)(i)(B)
Performance-based disposal of PCB remediation waste	May dispose by one of the following methods:	Disposal of nonliquid PCB remediation waste (as defined in 40 C.F.R. § 761.3) – **relevant and appropriate**	40 C.F.R. § 761.61(b)(2)
	• In a high-temperature incinerator approved under 40 C.F.R. § 761.70(b); • By an alternate disposal method approved under 40 C.F.R. § 761.60(e); • In a chemical waste landfill approved under 40 C.F.R. § 761.75; • In a facility with a coordinated approval issued under 40 C.F.R. § 761.77; or		40 C.F.R. § 761.61(b)(2)(i)
	• Through decontamination in accordance with 40 C.F.R. § 761.79.		40 C.F.R. § 761.61(b)(2)(ii)
	Shall be disposed according to 40 C.F.R. § 761.60(a) or (e), or decontaminated in accordance with 40 C.F.R. § 761.79.	Disposal of liquid PCB remediation waste – **relevant and appropriate**	40 C.F.R. § 761.61(b)(1)
Risk-based disposal of PCB remediation waste	May dispose of in a manner other than prescribed in 40 C.F.R. § 761.61(a) or (b) if approved in writing by USEPA and method will not pose an unreasonable risk of injury to human health or the environment. NOTE: USEPA Approval of alternative disposal method will be obtained by approval of the CERCLA document (e.g., ROD)	Disposal of PCB remediation waste – **relevant and appropriate**	40 C.F.R. § 761.61(c)

Table 3-3
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Anniston PCB Site, Anniston, Alabama

Action	Requirements	Prerequisite	Citation
PCB Decontamination/Cleanup			
Decontamination of PCB-contaminated water	For discharge to a treatment works as defined in 40 C.F.R. § 503.9 (aa), or discharge to navigable waters, meet standard of < 3 parts per billion PCBs; or	Water containing PCBs regulated for disposal – **applicable**	40 C.F.R. § 761.79(b)(1)(ii)
	For unrestricted use, meet standard of 0.5 parts per billion PCBs.		40 C.F.R. § 761.79(b)(1)(iii)
Transportation of Wastes			
Transportation of hazardous waste on-site	The generator manifesting requirements of 40 C.F.R. §§ 262.20-262.32(b) do not apply. Generator or transporter must comply with the requirements set forth in 40 C.F.R. §§ 263.30 and 263.31 in the event of a discharge of hazardous waste on a private or public right-of-way.	Transportation of hazardous wastes on a public or private right-of-way within or along the border of contiguous property under the control of the same person, even if such contiguous property is divided by a public or private right-of-way – **applicable**	40 C.F.R. § 262.20(f)
Transportation of hazardous waste off-site	Must comply with the generator requirements of 40 C.F.R. §§ 262.20-23 for manifesting, § 262.30 for packaging, § 262.31 for labeling, § 262.32 for marking, § 262.33 for placarding, §§ 262.40 and 262.41(a) for record keeping requirements, and § 262.12 to obtain USEPA ID number.	Preparation and initiation of shipment of hazardous waste off-site – **applicable**	40 C.F.R. § 262.10(h)
Transportation of PCB wastes off-site	Must comply with the manifesting provisions at 40 C.F.R. §§ 761.207 through 761.218.	Relinquishment of control over PCB wastes by transporting or offering for transport – **applicable**	40 C.F.R.§ 761.207(a)
Transportation of hazardous materials	Shall be subject to and must comply with all applicable provisions of the HMTA and HMR at 49 C.F.R. §§ 171-180 related to marking, labeling, placarding, packaging, emergency response, etc.	Any person who, under contract with a department or agency of the federal government, transports "in commerce," or causes to be transported or shipped, a hazardous material – **applicable**	49 C.F.R. § 171.1(c)
Land Use Restrictions			
Environmental Covenants	The State of Alabama Uniform Environmental Covenant Act (UECA) sets forth the conditions and process for placing protective covenants on properties where engineered or other controls will remain over the long term to ensure that the final remedy meets the land use requirements of the property.	Final remedy where engineered or other controls are needed to meet the land use requirements of the property – **applicable**	ADEM Admin. Code r. 355-5
Remedy selection and best practices	Describes key principles and expectations, as well as "best practices" based on program experience for the remedy selection process under Superfund. Major policy areas covered are risk assessment and risk management, developing remedial alternatives, and groundwater response actions.	Remedy selection **- TBC**	USEPA Rules of Thumb for Superfund Remedy Selection EPA 540-R-97- 013, August 1997
Land use(s)	Presents information for considering land use in making remedy selection decisions at National Priority List sites.	Land Use **- TBC**	USEPA Land Use in the CERCLA Remedy Selection Process OSWER Directive No. 9355.7-04, May 1995
Management of sediment	Presents risk management principles that site managers should consider when making risk management decisions at contaminated sediment sites.	Sediment **- TBC**	USEPA Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites OSWER Directive 9285.6-08, February 2002
Remediation of sediments	Presents risk management principles that site managers should consider when making risk management decisions at contaminated sediment sites. Specific to consider the ecological impacts.	Ecological risks at sediment sites **- TBC**	USEPA Ecological Risk Assessment and Risk Management Principles OSWER Directive 9285.7-28P, USEPA October 1999
Sediment management	Establishes an Agency-wide strategy for contaminated sediments, with the following four goals: 1) Prevent the volume of contaminated sediments from increasing 2) Reduce the volume of existing contaminated sediment	Strategy for the remediation of sediment **- TBC**	USEPA Contaminated Sediment Strategy EPA-823-R-98- 001, April 1998

Table 3-3
Potential Action-Specific ARARs and TBCs
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Action	Requirements	Prerequisite	Citation
	3) Ensure that sediment dredging and dredged material disposal are managed in an environmentally sound manner 4) Develop scientifically sound sediment management tools for use in pollution prevention, source control, remediation, and dredged material management		
Sediment management	Provides technical and policy guidance for addressing contaminated sediment sites nationwide primarily associated with CERCLA actions.	Sediment **- TBC**	USEPA Contaminated Sediment Remediation Guidance for Hazardous Waste Sites EPA-540-R-05-012, December 2005
Five-year review	Provides guidance on conducting Five-Year Reviews for sites at which hazardous substances, pollutants, or contaminants remain on-site above levels that allow for unrestricted use and unlimited exposure. The purpose of the Five-Year Review is to evaluate whether the selected response action continues to be protective of public health and the environment and is functioning as designed:	Five-year review of remediated site **- TBC**	USEPA Five-Year Review Guidance Structure and Components of Five-Year Reviews (OSWER Directive 9355.7-02, May 1991) Supplemental Five-Year Review Guidance (OSWER Directive 9355.7-02A, July 1994) Second Supplemental Five-Year Review Guidance (OSWER 9355.7-03A, December 1995)
Remedial design/remedial action	General reference manual that provides remedial project managers with an overview of the remedial design and remedial action processes.	Remedial design/remedial action process following the feasibility study and selection of a remedial action **- TBC**	USEPA Remedial Design/Remedial Action Handbook USEPA 540-R-95-059, OSWER Directive 9355.0-4B
Land disposal restrictions	Guidance outlines the process used to determine whether RCRA land disposal restrictions established under the Hazardous and Solid Waste Amendments are "applicable" to a CERCLA response action.	Land disposal **- TBC**	USEPA Area of Contamination Policy OSWER Directive 9347.3-05FS
Off-site management of wastes	The off-site policy describes procedures that should be observed when a response action under CERCLA involves off-site storage, treatment, or disposal of CERCLA waste.	off-site storage, treatment, or disposal of CERCLA waste **- TBC**	USEPA Off-Site Disposal Policy OSWER Directive 9834.11a
Remediation	Memo defines USEPA Region 4's policy to enhance environmental benefits of federal cleanup programs by promoting technologies and practices that are sustainable.	Remediation policy **- TBC**	USEPA Region 4 Clean and Green Policy USEPA Region 4 Memorandum, 2/17/2010

[1] ADEM Admin. Code r. 335-3-4-.02(1) and (2) were held unconstitutional for being unduly vague (335-3-4-.02(1)) and too restrictive (335-3-4-.02(2)). See Ross Neeley Express, Inc. v. Ala. Dep't of Envtl. Mgmt., 437 So.2d 82 (Ala. 1983).
[2] See supra n.1.

ADEM: Alabama Department of Environmental Management
ARAR: applicable or relevant and appropriate requirement
BMP: best management practices
CBMMP: Construction Best Management Practices Plan
CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act
CMBST: high temperature organic destruction (combustion); 40 CFR 268.42; Table 1
C.F.R.: Code of Federal Regulations
CWA: Clean Water Act
DEACT: deactivation 40 CFR 268.42; Table 1
DOT: US Department of Transportation
> : greater than
< : less than
≥ : greater than or equal to
≤ : less than or equal to
HMR: Hazardous Materials Regulations
HMTA: Hazardous Materials Transportation Act
LDR: Land Disposal Restrictions; 40 CFR Part 268
NPDES: National Pollutant Discharge Elimination System
OSWER: Office of Solid Waste and Emergency Response
PCB: polychlorinated biphenyl
POLYM: polymerization; 40 CFR 268.42; Table 1
POTW: publicly owned treatment works
PPE: personal protective equipment
ppm: parts per million
RCRA: Resource Conservation and Recovery Act of 1976
RORGS: recovery of organics; 40 CFR 268.42; Table 1
TBC: To be considered
TSCA: Toxic Substances Control Act of 1976
US: United States
USEPA: United States Environmental Protection Agency
UTS: Universal Treatment Standards

Table 3-4
Media Specific Preliminary Remedial Action Objectives and Preliminary Remedial Goals
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Media	Preliminary Remedial Action Objective	Preliminary Remedial Goals
Surface Soil - Floodplain, surface soil in residential use areas and special use properties	Reduce risks to residents, school children, and other users from direct contact with, inhalation of, or incidental ingestion of COCs in surface soil above levels that are protective.	tPCB = 1 mg/kg
- Floodplain, surface soil in commercial and industrial areas	Reduce risks to industrial and commercial workers, commercial visitors, trespassers and recreational activities associated with direct contact with, inhalation of, or incidental ingestion of COCs in surface soil above levels that are protective.[1]	tPCB = 21 mg/kg Arsenic = 382 mg/kg Chromium = 568 mg/kg PAHs (BaPE) = 21 mg/kg PCDD/PCDFs (TEQ) = 0.6 µg/kg
- Floodplain, surface soil	Reduce migration of COCs in surface soil to surface water.	AWQC
Subsurface soil	Reduce risks to construction and utility workers from direct contact with, inhalation of, or incidental ingestion of COCs in subsurface soil above levels that are protective.	tPCB = 97 mg/kg Arsenic = 596 mg/kg Chromium = 6,936 mg/kg PAHs (BaPE) = 534 mg/kg PCDD/PCDFs (TEQ) = 0.6 µg/kg
	Prevent migration and leaching of PCBs in surface and subsurface soils to groundwater above levels that are protective of beneficial use (i.e., attain drinking water standards).	tPCB = varies (screened soils at ≥ 500 mg/kg to groundwater to determine if PTW present)

[1] Assumes future use can be restricted to current use.

Table 3-4
Media Specific Preliminary Remedial Action Objectives and Preliminary Remedial Goals
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Media	Preliminary Remedial Action Objective	Preliminary Remedial Goals
Groundwater	Prevent exposure to groundwater from direct contact with, inhalation of, or ingestion of PCBs in groundwater above acceptable levels that are protective of beneficial use (i.e., attain drinking water standards). Restore contaminated groundwater throughout the plume, or at and beyond the edge of designated area to levels that are protective of beneficial use (i.e., attain drinking water standards).	tPCB = 0.5 µg/L
Sediment	Reduce risks to ecological receptors from exposures to sediments in Snow Creek.	
	Benthic reproduction (lowest EC10, *H. azteca*): from Table 7-16a of the OU-1/OU-2 RI (ENVIRON 2015b)	tPCB = 3 mg/kg
	Lowest LOAEL (mallard): from Table 7-16b of the OU-1/OU-2 RI (ENVIRON 2015b).	Barium = 322 mg/kg
	LOAEL (benthic): from Tables 7-11b and 7-16b of the OU-1/OU-2 RI (ENVIRON 2015b).	Chromium = 111 mg/kg
	Lowest LOAEL (sandpiper): from Table 7-16b of the OU-1/OU-2 RI (ENVIRON 2015b).	Cobalt = 59 mg/kg
	LOAEL (benthic and tree swallow): from Tables 7-11b and 7-16b of the OU-1/OU-2 RI (ENVIRON 2015b).	Mercury = 1 mg/kg

Table 3-4
Media Specific Preliminary Remedial Action Objectives and Preliminary Remedial Goals
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Media	Preliminary Remedial Action Objective	Preliminary Remedial Goals
Sediment (continued)	NOAA SQuiRT Screening Table (Buchman 2008): The mean upgradient concentrations (1,100 mg/kg) are higher than both the minimum LOAEL (214 mg/kg) and two times the mean of sediment background concentration at Fort McClellan (713 mg/kg).	Manganese = 1,100 mg/kg
	LOAEL (benthic): from Table 7-16b of the OU-1/OU-2 RI (ENVIRON 2015b).	Nickel = 49 mg/kg
	LOAEL (benthic): from Tables 7-11b and 7-16b of the OU-1/OU-2 RI (ENVIRON 2015b)	Lead = 128 mg/kg
	Two times the mean of sediment background concentration at Fort McClellan (41 mg/kg) (SAIC 1998). This values is also similar to the minimum value in NOAA SQuiRT Screening Table (50 mg/kg) and the upgradient mean (31 mg/kg).	Vanadium = 41 mg/kg
Surface Water	Reduce exceedances of AWQC for sediment COCs	PCB AWQC (chronic) = 0.014 µg/L

AWQC: ambient water quality criteria
BaPE: benzo(a)pyrene equivalent
COC: constituents of concern
EC: effect concentration
LOAEL: lowest observed adverse effect level
µg/kg: microgram(s) per kilogram
µg/L: microgram(s) per liter
mg/kg: milligram(s) per kilogram
NOAA SQuiRT: National Oceanic and Atmospheric Administration Screening Quick Reference Tables (Buchman 2008)
PAH: polycyclic aromatic hydrocarbon
PCB: polychlorinated biphenyl
PCDD/PCDF: dioxin and furans
PTW: principal threat waste
TEQ: toxic equivalent
tPCB: total polychlorinated biphenyls

Table 4-1
Target Remedial Area Summary for Nonresidential Surface Soil
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

EU	PPIN	COC	Owner Name	Potential Remediation Area ID	Estimated Area (ac)	Removal Depth (ft) [1]	Estimated Removal Volume (cy)	Pre Remediation EPC (mg/kg)	Post Remediation EPC (mg/kg)[2]
West of EU1	32695	PCB	Wilborn, Walden J and Gary	Wilborn 2 PPIN 32695	0.41	1	667	NA	NA
5	62844	PCB	First Missionary Baptist Church	FMBC	0.78	1	1,261	350	18 [3]
7	19312	PCB	Lynch, Lonzo and Lizzie	1577 Lynch EU7	0.18	1	297	160	4.1
10	18705	PCB	McDonal, David	ABS-15	0.24	1	388	19	10 [3]
14N	18125	PCB	Colyer-Lloyd Development Company. Inc.	3053 Colyer 14N	0.30	1	484	21	8.8 [3]
19N	66676	PCB	Shorty's Truck and Railroad Car Parts	8560 Shorty's 19N	0.17	1	274	660	7.8
19S	66392	PCB	Sandy M Lumber Sales Company, Inc.	5374 Sandy Lumber 19S	0.61	1	983	68	0.22
24	64446	PCB	Williams Scrap Metal, Inc.	Williams CA-24-6098-15	0.60	1	975	12	9.2
26	67788	PCB	Tull Chemical Company	6629 Tull 26	0.20	1	318	34	9.5
202	ROW	PCB	ROW	202 Median	1.42	1	2,292	NA	NA
202	32746 32763 ROW	PCB	Solutia Worsham ROW	202 South	0.50	1	809	99	17
APCO	32363	PCB	APCO	APCO	0.04	1	65	18	11
14N	63444	PAH	David & Ronald Hall	PAH (CA-14-3002-01)	0.04	1	60	38 PAH For Entire OU	2.6 PAH For Entire OU
22	67095 67096 ROW	Chromium	Wear Kote Inc Alacote Inc ROW (Front St)	Chromium (PB-003-01)	0.15	1	235	290 Chromium For Entire OU	43 Chromium For Entire OU

Table 4-1
Target Remedial Area Summary for Nonresidential Surface Soil
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

EU	PPIN	COC	Owner Name	Potential Remediation Area ID	Estimated Area (ac)	Removal Depth (ft) [1]	Estimated Removal Volume (cy)	Pre Remediation EPC (mg/kg)	Post Remediation EPC (mg/kg)[2]
24	64446	Chromium	Williams Scrap Metal, Inc.	Chromium (CA-24-6098-14)	0.08	1	133	290 Chromium For Entire OU	43 Chromium For Entire OU
25	64534 68720	Dioxin TEQ	Mueller Property Holdings LLC	Dioxin(CA-25-6127-01)	0.08	1	133	0.29 (ug/kg) Dioxin TEQ For Entire OU	0.062 (ug/kg) Dioxin TEQ For Entire OU
NS	32593	PAH	Solutia	PAH (PCWaste-10/11)	0.03	1	43	38 PAH For Entire OU	2.6 PAH For Entire OU

Notes:

1. Potential removal depths are only included to illustrate the volume of soil associated with a 1-foot removal, should it be part of the selected remedial alternative.

2. Post-remediation EPC includes actions conducted from other categories of alternatives such as groundwater, unapproved waste disposal areas, and interim measures.

ac: acres
COC: constituent of concern
cy: cubic yards
EPC: exposure point concentration
EU: exposure unit
FMBC: First Missionary Baptist Church
ft: foot/feet
MCL: maximum contaminant level
µg/L: micrograms per liter
mg/kg: milligrams per kilogram
NA: not applicable - insufficient data to estimate EPC
OU: operable unit
PAH: polycyclic aromatic hydrocarbon
PCB: polychlorinated biphenyl
PPIN: parcel pin identification number
PTW: principal threat waste
RGO: remedial goal option
ROW: right of way
TEQ: toxicity equivelent

Table 4-2
Summary of Snow Creek Deposits
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Location	Predominant Sediment Type(s)	Depostional Environment	Area (sf)	Depth to Refusal (ft)	Volume (cy)	Cores Analyzed (n)	Samples (n)	Mean PCB (mg/kg)	Maximum PCB (mg/kg)
S-1-01	dark brown silt and fine to medium sand, trace coarse sand over gravel, rock/silt along edge of channel, slight oil sheen	terrace deposit	1000	1.3	48	1	2	17	31
S-1-02	sand, silt, and railroad bedding gravels washed down by the steep bank	low terrace deposit	162	0.3	2	1	1	8.0	8.0
S-1-03	fine to very coarse sands, gravels, rocks	low terrace/ aggrading bar	280	0.8	8			15	>10
S-1-04	mixture fine to very coarse sand, silts, gravels, rocks; silt and fine sand along edge of channel/terrace	low terrace deposit	900	0.8	27	1	2	15	17
S-1-05	silt, fine sand, aquatic plant roots over rock, gravel	low terrace	180	0.3	2	1	1	11	11
S-1-06	brown fine sand, little silt, oil sheen	channel deposit	48	1.5	3			15	>10
S-1-07	soft silt over silt and fine sand, heavy oil sheen, strong organic odor behind RR tie in creek	channel deposit	144	1.5	8	1	3	5.9	16
S-1-08	soft brown silt over fine sand and clay, grey with black staining	drainage ditch outlet/ 2nd channel during high flow	75	1.0	3	1	3	27	37
S-1-09	fine sand to very coarse sand, gravel, trace silt, oil sheen, organic odor	aggrading bar	36	0.5	1			15	>10
S-1-10	soft dark brown silt over tan fine sandy clay, oil sheen	low terrace	45	1.5	3	1	3	19	29
S-1-11A	brown silt and fine sand over dark brown silt, fine to medium sand, small gravel	low terrace deposit with secondary channel	120	0.5	2	1	3	0.94	2.2

Table 4-2
Summary of Snow Creek Deposits
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Location	Predominant Sediment Type(s)	Depostional Environment	Area (sf)	Depth to Refusal (ft)	Volume (cy)	Cores Analyzed (n)	Samples (n)	Mean PCB (mg/kg)	Maximum PCB (mg/kg)
S-1-11B	brown silt and fine sand over dark brown silt, fine to medium sand, small gravel with some medium size gravel	low terrace deposit with secondary channel	600	0.5	11	1	1	12	12
S-1-12	fine to medium sand, trace coarse sand, orange brown upper part, bottom part fine sand and silt	low terrace/ channel deposit	675	0.5	13	1	2	1.4	2.1
S-1-13	fine sand to very coarse sand, gravel	sand bar deposit	20	1.2	1			15	>10
S-1-14	fine sand to very coarse sand, gravel, rocks	bank deposit/ high terrace	1000	0.3	9			15	>10
S-1-15	fine sand to very coarse sand, gravels, small to medium rock	channel deposit/ aggrading bar	225	0.6	5			15	>10
S-1-16	mostly fine sand, some medium to coarse sand, gravels, rock	bank deposit/ high terrace	750	0.9	25	1	2	30	32
SED-A09	Standalone sample location		50	1.0	2	1	1	7.8	7.8
S-1-17	medium sand to very coarse sand, gravels, small/medium rock	aggrading bar	192	1.0	7			15	>10
S-2-01	brown medium to very coarse sand, some gravels	channel deposit	270	1.0	10			15	>10
CP-C-9	Standalone sample location		50	1.0	2	1	1	2.0	2.0
S-2-02	dark brown to black silt with fine to medium sand, some coarse sand, gravels	exposed channel deposit/ aggrading bar	1000	0.5	19	1	1	19	19
CP-C-10	Standalone sample location		50	1.0	2	1	3	6.2	12

Table 4-2
Summary of Snow Creek Deposits
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Location	Predominant Sediment Type(s)	Depostional Environment	Area (sf)	Depth to Refusal (ft)	Volume (cy)	Cores Analyzed (n)	Samples (n)	Mean PCB (mg/kg)	Maximum PCB (mg/kg)
SED-A10	Standalone sample location		50	1.0	2	1	1	6.9	6.9
S-2-03A	silt, fine to very coarse sand, gravel over rock	channel deposit/ aggrading bars	100	0.3	1	1	1	3.8	3.8
S-2-03B	fine sand to coarse sand	channel deposit/ aggrading bar	150	0.5	3			5	=>3 and <10
S-2-04A	fine sand to medium sand, trace silt	aggrading bar	125	0.5	2			5	=>3 and <10
S-2-04B	fine sand to coarse sand, trace silt over rock	aggrading bar	150	0.5	3			5	=>3 and <10
CP-C-11	Standalone sample location		50	1.0	2	1	3	3.4	7.5
S-2-05	fine sand to very coarse sand, gravel, small to large rocks 1"-4"	aggrading bar above culvert pipes	2600	2.5	241	1	2	5.9	6.4
S-2-06	fine sand to very coarse sand, gravels	exposed sediment built up in culvert pipes	14400	3.0	1600	3	9	22	60
S-2-07	fine sand, some silt, medium to coarse sand, gravel	channel deposit/ aggrading bar	756	0.4	10			15	>10
S-2-08	fine sand to very coarse sand, gravels, small rock	channel deposit/ aggrading bar	4800	1.0	178	1	3	15	20
S-2-09	fine sand to coarse sand	bank deposit/ channel deposit	120	0.4	2			15	>10
SED-A11	Standalone sample location		50	1.0	2	1	1	16	16
S-2-10	fine sand to very coarse sand, gravels	low terrace/ bank deposit	60	0.3	1			15	>10
S-2-11	fine sand to very coarse sand	channel deposit	216	0.6	5			15	>10
S-2-12	fine sand to very coarse sand, gravels	channel deposit/ low terrace	100	0.5	2			15	>10
S-2-13	fine sand to medium sand, gravels, rock, some silt	channel deposit/ aggrading bar	640	0.5	12			15	>10

Table 4-2
Summary of Snow Creek Deposits
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Location	Predominant Sediment Type(s)	Depostional Environment	Area (sf)	Depth to Refusal (ft)	Volume (cy)	Cores Analyzed (n)	Samples (n)	Mean PCB (mg/kg)	Maximum PCB (mg/kg)
PECON-011	Standalone sample location		50	1.0	2	1	1	4.3	4.3
PECON-012	Standalone sample location		50	1.0	2	1	1	8.5	8.5
S-2-14	fine sand to very coarse sand, gravels, rock	aggrading bar	225	0.5	4			15	>10
SED-A12	Standalone sample location		50	1.0	2	1	1	3.9	3.9
S-2-15	fine sand to very coarse sand, trace silt, organics	aggrading bar/ channel deposit	84	0.6	2			5	=>3 and <10
S-2-16	mostly fine to medium sand, debris, some coarse sand, gravels	channel deposit	750	2.5	69	1	2	3.7	4.0
S-3-01	fine sand to coarse sand, some silt, some gravels, little medium size rocks	channel deposit	480	0.5	9	1	2	4.1	4.8
S-3-02	fine sand, some medium to coarse sand, some silt	low terrace deposit	800	1.0	30	1	3	12	17
S-3-03	fine sand to medium sand, trace coarse sand, gravels	terrace/channel deposit	225	0.5	4			5	=>3 and <10
S-3-04	fine to coarse sand, some silt, vegetated along right bank, appears to have been dumped from side of channel	channel deposit	270	0.3	3			5	=>3 and <10
S-3-05	fine sand and silt, trace medium to coarse sand	channel deposit/ low terrace	100	1.0	4	1	2	1.8	2.1
S-3-06	mostly fine sand, trace medium to coarse sand	channel deposit	100	0.5	2			2	<3
S-3-07	mostly fine sand to coarse sand, little silt, some very coarse sand, gravels, small to large stone	aggrading bar	2000	0.8	56	1	2	0.71	0.76

Table 4-2
Summary of Snow Creek Deposits
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Location	Predominant Sediment Type(s)	Depostional Environment	Area (sf)	Depth to Refusal (ft)	Volume (cy)	Cores Analyzed (n)	Samples (n)	Mean PCB (mg/kg)	Maximum PCB (mg/kg)
S-4-01	medium sand to very coarse sand, gravels, rock, cobble, debris	aggrading bar	75	0.4	1			2	<3
S-4-02	fine sand with silt over medium sand to very coarse sand, gravels, rock	high terrace	192	0.5	3	1	2	0.83	1.1
S-5-01	fine sand, some medium sand, some very coarse sand, gravels, rock	high terrace/ bank deposit	960	0.7	25	1	1	0.76	0.76
S-5-02	fine sand, silt along left bank over rock, gravels	low terrace	30	0.4	0	1	1	4.5	4.5
S-5-03	silt and fine sand over fine sand, trace medium sand	high terrace/ bank deposit	315	0.8	9	1	2	3.7	5.8
S-5-04	fine sand to coarse sand up high, medium to very coarse sand, gravels, rock, stone	low to high terrace/ channel deposit	2250	3.0	250	2	3	1.8	1.9
S-5-05	medium sand to very coarse sand, gravels, rock	aggrading bar	2600	1.5	144	1	2	1.5	1.9
S-5-06	fine sand to very coarse sand, gravels, some silt, organic matter, leaves	aggrading bar/ channel deposit	330	0.5	6	1	2	2.5	2.7
S-5-07	mostly gravel, rock over some coarse sand to very coarse sand	aggrading bar/ channel deposit	1920	0.2	14			2	<3
S-5-08A	medium to very coarse sand, gravels, rock	aggrading bar	735	0.6	16			2	<3
S-5-08B	medium sand to very coarse sand, gravels, rock		900	0.4	13			2	<3
S-5-09	medium to very coarse sand, gravels, rock 1"-6"	aggrading bar	1350	0.5	25			2	<3

Table 4-2
Summary of Snow Creek Deposits
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Location	Predominant Sediment Type(s)	Depostional Environment	Area (sf)	Depth to Refusal (ft)	Volume (cy)	Cores Analyzed (n)	Samples (n)	Mean PCB (mg/kg)	Maximum PCB (mg/kg)
S-5-10	medium sand to very coarse sand, gravels, rock, cobble	aggrading bar/ low terrace	500	0.7	13			2	<3
PECON-020	Standalone sample location		50	1.0	2	1	1	0.75	0.75
S-5-11A	fine sand over coarse sand to very coarse sand, gravels	sand mound	96	4.0	14			2	<3
S-5-11B	fine sand over coarse sand to very coarse sand, gravels	sand mound	96	4.0	14			2	<3
FE2-001-A	Standalone sample location		50	1.0	2	1	1	0.90	0.90
CA-25-9999-90	Standalone sample location		50	1.0	2	1	2	5.9	11
S-5-12A	medium sand to very coarse sand, gravel	aggrading bar	240	1.0	9			5	=>3 and <10
FE2-001-C	Standalone sample location		50	1.0	2	1	1	2.5	2.5
S-5-12B	medium sand to very coarse sand, gravel	aggrading bar	175	1.0	6			2	<3
S-5-13	fine sand to very coarse sand, gravels, rock, few cobbles	aggrading bar/ low terrace	3300	0.9	110	1	1	1.3	1.3
S-5-14	coarse sand to very coarse sand, gravel; fine sand some medium sand on terrace; medium to very coarse sand, gravels/ rock on aggrading bar	aggrading bar/ low terrace	7800	1.5	433	2	4	1.4	1.6
PCWaste-004-B	Standalone sample location		50	1.0	2	1	1	1.2	1.2

Table 4-2
Summary of Snow Creek Deposits
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Location	Predominant Sediment Type(s)	Depostional Environment	Area (sf)	Depth to Refusal (ft)	Volume (cy)	Cores Analyzed (n)	Samples (n)	Mean PCB (mg/kg)	Maximum PCB (mg/kg)
S-5-15	coarse to very coarse sand, gravels, rock, small cobble; low terrace has fine sand over small cobble	aggrading bar/ low terrace	3120	0.5	58			2	<3
S-5-16	fine sand to very coarse sand, gravel, rock	aggrading bar	3750	0.5	69			2	<3
S-5-17	coarse sand to very coarse sand, gravel, rock	aggrading bar	3000	0.5	56			2	<3
S-5-18	coarse sand to very coarse sand, gravel, rock	aggrading bar	3000	0.5	56			2	<3
S-5-19	medium sand to very coarse sand, gravel, rock	aggrading bar	3000	0.8	89			2	<3
S-5-20	coarse sand to very coarse sand, gravel, rock	aggrading bar	1000	0.6	22			2	<3
S-5-21	fine sand to very coarse sand, gravel	aggrading bar	175	0.9	6			2	<3
S-5-22	fine sand to very coarse sand, gravel	aggrading bar	1200	0.8	36			2	<3
S-5-23	coarse sand to very coarse sand, gravel, rock	aggrading bar	150	1.2	7			2	<3
S-5-24	medium to very coarse sand, gravel	channel deposit	240	2.0	18	1	2	1.2	1.2
S-5-25	fine sand to coarse sand, little gravel	aggrading bar/ sand bar	150	0.9	5			2	<3

Notes:
Shading Indicates an estimated concentration based on spatial location.
Shading Indicates sample was not collected as part of the deposit characterization program and areas, depths, and volumes are an estimate.
cy: cubic yards
ft: feet
mg/kg: milligram(s) per kilogram
n: sample size
PCB: polychlorinated biphenyl
sf: square feet

Table 5-1
Identification and Preliminary Screening of Remedial Technologies
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

General Response Action/ Remedial Technology	Process Option	Description	Technically Implementable YES = Retained No = Not proven effective or reliable for PCBs given the site-specific attributes of the Anniston PCB Site
A. No Further Action			
	-----	No further remedial activities would be implemented. Natural attenuation processes would continue.	YES
B. Source Control			
	a. Identification and Elimination of Sources	Reduce potential sources of chemical constituents to and from the Site.	YES
C. Institutional/Access Controls and Monitoring			
1. Informational Devices	a. Deed Notices	May allow elevated levels of chemical-containing soil to remain permanently on-site by binding the current property owner to certain notice requirements as well as to the obligation to inspect and maintain any engineered controls.	YES
	b. Fish Consumption Advisories	Advisories may recommend that people limit or avoid eating certain species of fish caught in certain places.	YES
2. Governmental Controls	a. Land Use Restrictions	Restrictions that apply to activities on, over, or under the land (including groundwater) which shall run with the land and be binding on parties having right, title, or interest in the property or any part thereof.	YES
	b. Zoning Restrictions	Restrictions created by and for the benefit of the general public to ensure its health, safety, comfort, and morals.	YES
	c. Ordinances	An ordinance is a legislative act taken to define and regulate conduct which is detrimental to the public health, safety, welfare, or peace.	YES
	d. Building and Other Permit Requirements	A permit requirement may be included as part of the written permit agreement between the permitee and the permit-issuing entity ensuring that certain proposed work will be conducted in accordance with the requirement. This helps ensure that the work is safe and sanitary. The permit requirement would authorize the inspections of the progress of the work during normal working hours.	YES
3. Proprietary Controls	a. Easements	An easement is a grant or reservation of an interest in land that permits someone to go onto land and do something. The purpose of the easement is to ensure that the property will be managed to preserve natural features, historic sites, scenery, traditional land uses, or other values.	YES
	b. Covenants	A covenant is a promise respecting the use (or 'non-use') of land.	YES
	c. Access Restrictions	Constraints, such as fencing and signs, would be placed on property to limit access.	YES
4. Enforcement Actions with Institutional Components	a. USEPA Administrative Orders	An Administrative Order is an enforcement document issued by the USEPA.	YES
	b. Judicial Consent Decrees	A Judicial Consent Decree is a document and process that details the steps that must be taken to bring a site into compliance with the law.	YES
5. Access Controls	a. Fencing, Signage, and Other Physical Barriers	Physical barriers that are put in place to prevent contact and hence prevent exposure.	YES

Table 5-1
Identification and Preliminary Screening of Remedial Technologies
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

General Response Action/ Remedial Technology	Process Option	Description	Technically Implementable YES = Retained No = Not proven effective or reliable for PCBs given the site-specific attributes of the Anniston PCB Site
D. Monitored Natural Attenuation (MNA) / Monitored Natural Recovery (MNR)			
1. MNA/MNR	a.MNA(groundwater)/MNR (sediment)	Natural biological, chemical, and physical processes that, under favorable conditions, act without human intervention to reduce concentration and bioavailability of chemical constituents. This process relies on long-term monitoring to demonstrate the reduction of impacts caused by chemical constituents.	YES
	b. Enhanced MNA/MNR	Addition of nutrients (e.g., oxygen, minerals) or cultured microorganisms to the soil or other chemical-containing media to facilitate or improve the rate of natural biodegradation. Could also include placing a thin layer of sediment to enhance MNR processes already occuring.	YES
E. In-Place Containment/Control for Soil or Sediment			
1. Capping	a. Clay/Soil Cap	Use of clay or soil material including alternative landfill covers (e.g., vegetated caps) to achieve chemical isolation and to minimize stormwater infiltration. Vegetated caps may be designed to minimize water infiltration.	YES
	b. Asphalt/Concrete Cap	Use of asphalt or concrete to achieve chemical isolation and to minimize stormwater infiltration.	YES
	c. Multimedia Cap	Use of a clay, soil, media, and geomembrane cap over chemical-containing soils to achieve chemical isolation and to minimize storm water infiltration.	YES
	d. Reactive Cap	Geotextile material containing an absorptive media such as organo clay or activated carbon that acts as a chemical isolation barrier.	YES
2. Containment	a. Slurry Walls	Involves excavating a trench to the depth of a confining base layer while adding a slurry (e.g., soil/cement-bentonite mixture) to limit downgradient migration.	YES
	b. Steel Sheet Piles	Steel sheet piles would be driven to the depth of a confining layer to limit downgradient migration of chemical-containing soil and groundwater. Can be inserted horizontally or vertically.	YES
	c. Grout Curtains/Grout Injection	Holes would be drilled around constituent-containing soil and groundwater plumes. Grout would be injected under pressure through the holes and allowed to cure to create a vertical barrier.	YES
	d. Vault	An enclosed container, most often made of concrete, in which chemical-containing soil will be sealed and stored.	YES
	e. Subsurface Drains	A high-permeability channel would be installed to provide groundwater collection and redirection of movement for treatment and/or disposal.	YES
3. Control	a. Grading for Surface Water Control/Collection	Grading site area to facilitate collection and control of surface water. Also reduces infiltration of surface water and soil erosion.	YES

Table 5-1
Identification and Preliminary Screening of Remedial Technologies
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

General Response Action/ Remedial Technology	Process Option	Description	Technically Implementable YES = Retained No = Not proven effective or reliable for PCBs given the site-specific attributes of the Anniston PCB Site
F. In Situ Groundwater/Soil/Sediment Treatment			
1. Biological Treatment	a. Aerobic Bioremediation	Degradation of constituents by utilizing organisms in an aerobic environment with the addition of amendments and controls to enhance the process performance and decrease duration.	NO
	b. Anaerobic Bioremediation	Degradation of constituents utilizing organisms in an anaerobic environment with the addition of amendments and controls to enhance the process performance and decrease duration.	NO
	c. Phytoremediation	The general use of plants to remediate environmental media in situ. May or may not involve periodic harvesting of plants, depending on method utilized. Most effective where constituent-containing soil is within 10 feet of the ground surface.	NO
	d. Bioventing	In bioventing, air is drawn through the impacted vadose zone via extraction wells equipped with low-flow vacuums to promote biodegradation.	NO
2. Chemical Treatment	a. In Situ Chemical Oxidation (ISCO)	An array of injection wells would be used to introduce oxidizing agents such as hydrogen peroxide (H_2O_2), potassium permanganate ($KMnO_4$), ozone, dissolved oxygen (DO), or Ruthenium Tetraoxide.	NO
	b. In Situ Electrokinetic Remediation (including ElectroChemical GeoOxidation [ECGO] - Weiss Associates)	An in situ process involving application of low-intensity, direct electrical current across electrode pairs implanted in the ground on each side of a chemical-containing area of soil, causing electroosmosis and ion migration. Chemical constituents migrate toward respective electrodes depending upon their charge. Process may be enhanced through use of surfactants or reagents to increase chemical constituent removal rates at the electrodes. Process separates and extracts heavy metals, radionuclides, and organic chemical constituents from saturated or unsaturated soils, sludges, and sediments.	NO
	c. Permeable Reactive Barriers (PRB)	A PRB is a zone of reactive material placed in the subsurface so that chemical-containing groundwater flows through and chemical constituents are destroyed in the process. The process is often used with subsurface containment systems.	NO
	d. Reduction	Reduction chemically converts chemicals to less toxic compounds that are more stable, less mobile, and/or inert.	NO
	e. Neutralization	A chemical reaction in which a water solution of acid is mixed with a water solution of base to form a salt and water; this reaction is complete only if the resulting solution is a neutral solution. Complete neutralization can take place when a strong acid is mixed with a strong base. Strong acids and strong bases completely break up, or dissociate, into their constituent ions when they dissolve in water.	NO
	f. Hydrolysis	The chemical reaction of a compound with water, usually resulting in the formation of one or more new compounds.	NO

Table 5-1
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Anniston PCB Site, Anniston, Alabama

General Response Action/ Remedial Technology	Process Option	Description	Technically Implementable YES = Retained No = Not proven effective or reliable for PCBs given the site-specific attributes of the Anniston PCB Site
F. In Situ Groundwater/Soil/Sediment Treatment (cont.)			
3. Physical Treatment	a. Vacuum Stripping	Create vacuum in media through a well; chemical constituents drawn in and extracted.	NO
	b. Soil Vapor Extraction/Air Sparging (SVE/AS)	An array of injection wells is used to inject gas (e.g., air, oxygen, or ozone) under pressure to volatilize chemicals sorbed to soil, dissolved in groundwater, or present as nonaqueous phase liquid and to stimulate biodegradation in unsaturated soil. Oxygen levels, nutrients, and pH can be controlled to enhance biological activity.	NO
	c. Multiphase Extraction (MPE)	MPE is a technology that extracts soil vapor and groundwater simultaneously. The groundwater table is lowered in order to dewater the saturated zone. This allows the volatile organic compounds (VOCs) sorbed on the previously saturated soil to be stripped by the induced vapor flow and extracted. In addition, soluble VOCs in the extracted groundwater are removed. There are two types of MPE: two-phase extraction (TPE) and low or high vacuum dual-phase extraction.	NO
	d. Soil Flushing - Surfactant-Enhanced Aquifer Remediation (SEAR)	A surfactant solution is injected into the constituent-containing zone while water is simultaneously removed to maintain hydraulic control over the movement of the surfactant solution and the mobilized chemical constituents. Surfactant flooding is followed by water flooding to remove residual chemical constituents and injected chemicals.	NO
	e. Cosolvent Flushing	Cosolvent flushing involves injecting a solvent mixture (e.g., water plus a miscible organic solvent such as alcohol) into either vadose zone, saturated zone, or both to extract organic chemical constituents.	NO
4. Thermal Treatment	a. SVE/Thermally Enhanced SVE/Bioventing	An array of extraction and injection wells is used to physically strip volatile chemicals or to stimulate biodegradation in unsaturated soil. Oxygen levels, nutrients, and pH can be controlled in bioventing applications. Removal may be enhanced by heating the system.	NO
	b. In Situ Thermal Remediation with Six Phase Heating™ (SPH)	SPH uses an in situ electrical resistance heating technique with the potential to remove dense nonaqueous phase liquid (DNAPL) by heating the subsurface sufficiently to vaporize the DNAPL. This technology can be applied to chemicals in both the vadose and saturated zones. The steam and chlorinated VOC vapors rise to the vadose zone, where they are recovered through vertical and/or horizontal vapor extraction wells. These vapors then are condensed, and the effluent air stream is discharged after polishing with activated carbon.	NO
	c. Steam Stripping	Steam is injected into soil so that chemical constituents are volatilized and can be removed via extraction wells.	NO

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General Response Action/ Remedial Technology	Process Option	Description	Technically Implementable YES = Retained No = Not proven effective or reliable for PCBs given the site-specific attributes of the Anniston PCB Site
F. In Situ Groundwater/Soil/Sediment Treatment (cont.)			
4. Thermal Treatment (cont.)	d. In Situ Thermal Desorption (ISTD)	Heat is applied to soil from a high-temperature surface in contact with the soil to facilitate radiation and thermal conduction heat transfer. Some chemical constituents are oxidized before they exit the soil. Two primary forms of ISTD technology are thermal blankets (surficial, 2-ft depth) and thermal wells (any depth).	NO
	e. In Situ Vitrification (Glassification)	Uses an electric current to melt soil or other earthen materials at extremely high temperatures (2,900 to 3,650°F). Inorganic chemical constituents are incorporated into the vitrified glass and crystalline mass, and organic pollutants are destroyed by pyrolysis. In situ applications use graphite electrodes to heat soil.	YES
5. Immobilization (Solidification, Stabilization, and Fixation)	a. Stabilization/Solidification (Organic and Inorganic Based)	Chemical immobilization of materials by injecting and mixing a stabilization/solidification agent into the soil.	YES
6. Sediment Amendment	a. Activated Carbon	Adding an amendment to the sediment that is mixed into the matrix through the action of benthic organisms.	YES
G. Ex Situ Soil/Sediment Treatment			
1. Immobilization (Solidification, Stabilization, and Fixation)	a. Stabilization/Solidification (Organic and Inorganic Based)	Chemical immobilization of materials by mixing a stabilization/solidification agent into the soil.	YES
2. Extraction	a. Solvent Extraction	Solvent used to extract organic chemical constituents from soils. The solvent is separated from the materials and reused.	YES
	b. Thermal Desorption	Chemical constituents are separated from the soils at a relatively low temperature and are condensed into a concentrated liquid form suitable for transport off-site to a traditional treatment or disposal facility.	YES
3. Soil Washing	a. Soil Washing	Soil washing process that isolates individual particles and removes the adsorbed chemicals and naturally occurring organic material from fine-grained solids.	NO
4. Destruction	**ULTRAVIOLET (UV) DESTRUCTION**		
	a. UV Photolysis	UV photolysis is the process by which chemical bonds of the chemical constituents are broken under the influence of UV light.	NO
	b. Ozonation	Ozone used to decompose chemical constituents in conjunction with UV radiation.	NO
	THERMAL DESTRUCTION		
	a. Incineration	Process for soils directly or for oil extracted from other soil treatment processes such as thermal desorption or solvent extraction. Soils thermally treated in a fluidized bed, rotary kiln, cement kiln, or infrared incinerator, which may require RCRA permitting. Incineration may be performed on-site or off-site using mobile or fixed facilities.	YES
	b. Pyrolysis	Pyrolysis is a process of destructive distillation, using a reduced-oxygen atmosphere, in which organic material is thermally decomposed into elemental ions. The process converts waste into a clean product gas and an inert vitrified slag that requires no further waste treatment and is suitable for long-term storage or reuse.	YES
	c. Molten Salt Oxidation (MSO)	MSO is a thermal, flameless process that completely destroys organic constituents of mixed wastes (chlorinated solvents, spent ion exchange resin), hazardous wastes and explosives. MSO may be applicable for a range of solid, liquid, and gaseous wastes.	NO

Table 5-1
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General Response Action/ Remedial Technology	Process Option	Description	Technically Implementable YES = Retained No = Not proven effective or reliable for PCBs given the site-specific attributes of the Anniston PCB Site
G. Ex Situ Soil/Sediment Treatment (cont.)			
4. Destruction (cont.)	d. Radio Frequency (Microwave) Heating	In a radio frequency (RF) heating system the RF generator creates an alternating electric field between two electrodes. The material to be heated is conveyed between the electrodes where the alternating energy causes polar molecules in the material to continuously reorient themselves to face opposite poles much like the way bar magnets behave in an alternating magnetic field. The friction resulting from molecular movement causes the material to rapidly heat throughout its entire mass.	NO
	e. Vitrification (Glassification)	Uses an electric current to melt soil or other earthen materials at extremely high temperatures (2,900 to 3,650°F). Inorganic chemical constituents are incorporated into the vitrified glass and crystalline mass, and organic pollutants are destroyed by pyrolysis.	YES
5. Chemical Treatment	a. Supercritical Water Oxidation	Temperature and pressure of supercritical water dissolve materials that are oxidized into carbon dioxide, water, and salts.	NO
	b. Slurry Oxidation	The same as slurry-phase biological treatment with the exception that oxidizing agents are added to decompose organics. Oxidizing agents may include ozone, hydrogen peroxide, and Fenton's Reagent.	NO
	c. Reduction/Oxidation	Reduction/Oxidation chemically converts chemicals to less toxic compounds that are more stable, less mobile, and/or inert. The oxidizing agents most commonly used are hypochlorites, chlorine, and chlorine dioxide. Another oxidizing agent used is Ruthenium Tetraoxide.	NO
	d. Precipitation	Soil is treated by chemical precipitation to remove heavy metals. Chemicals and water are added to the soil to create a sludge. The water is filtered from the sludge, treated, and pumped back into the environment. The sludge is sent off-site to a licensed disposal facility.	NO
	e. Base-Catalyzed Dechlorination (BCD)	BCD process was developed to remediate soils containing chlorinated organic chemical constituents. Constituent-containing soil is screened, processed with a crusher and pug mill, and mixed with sodium bicarbonate. The mixture is heated in a rotary reactor to partially decompose and volatilize the chemical constituents. The volatilized chemicals are captured, condensed, and treated separately.	NO
	f. Gas-Phase Reduction	Various chemical agents (e.g., sodium borohydride, sulfur dioxide) are used to destroy chemical constituents through gas-phase reduction. Chemical constituents are transferred to the gas phase through volatilization (thermal desorption unit) and destroyed in a high-temperature hydrogen environment.	NO
	g. Sodium-Based Reactions (NaPEG)	Chemical constituents broken down into oxygenated organics, sodium chloride (salt), and biodegradable glycols.	NO
	h. Alkaline Polyethylene Glycol (APEG)	Chemical-containing soils and the reagent are mixed and heated in a treatment vessel. In the APEG process, the reaction causes the polyethylene glycol to replace halogen molecules and render the compound nonhazardous or less toxic. The reagent (APEG) dehalogenates the pollutant to form a glycol ether and/or a hydroxylated compound and an alkali metal salt, which are water-soluble byproducts. Potassium polyethylene glycol (KPEG) is a common APEG reagent.	NO

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General Response Action/ Remedial Technology	Process Option	Description	Technically Implementable YES = Retained No = Not proven effective or reliable for PCBs given the site-specific attributes of the Anniston PCB Site
G. Ex Situ Soil/Sediment Treatment (cont.)			
5. Chemical Treatment (cont.)	i. Solvated Electron Technology	Neutralizes halogenated and other organic chemical constituents by exposing them to free electrons in a solvated solution.	NO
6. Biological Treatment	a. Aerobic Bioremediation	Degradation of constituents by utilizing organisms in an aerobic environment with the addition of amendments and controls to enhance the process performance and decrease duration.	NO
	b. Anaerobic Bioremediation	Degradation of constituents by utilizing organisms in an anaerobic environment with the addition of amendments and controls to enhance the process performance and decrease duration.	NO
	c. Landfarming/Composting	Soil is mixed with amendments and placed on a treatment area that typically includes leachate collection. The soil and amendments are mixed using a windrow composter, conventional tilling equipment, or other means to provide aeration. Moisture, heat, nutrients, oxygen, and pH can be controlled to enhance biodegradation. Other organic amendments such as wood chips, potato waste, or alfalfa are added to composting systems.	NO
	d. Biopiles	Excavated soil is mixed with amendments and placed in aboveground enclosures. It is an aerated static pile composting process in which compost is formed into piles and aerated with blowers or vacuum pumps. Moisture, heat, nutrients, oxygen, and pH can be controlled to enhance biodegradation.	NO
	e. Fungal Biodegradation	Fungal biodegradation refers to the degradation of a wide variety of organ pollutants by using their lignin degrading or wood-rotting enzyme system (e.g., white rot fungus).	NO
	f. Slurry Phase Biological Treatment	An aqueous slurry is created by combining soil with water and other additives. The slurry is mixed to keep solids suspended and microorganisms in contact with the chemicals (e.g., sequential anaerobic/aerobic slurry-phase bioreactors).	NO
	g. Enhanced Biodegradation	Addition of nutrients (e.g., oxygen, minerals) to the soil to improve the rate of natural biodegradation. Use of heat to break carbon-halogen bonds and to volatilize light organic chemical constituents (e.g., D-Plus [Sinre/DRAT]).	NO
H. Ex Situ Water Treatment			
1. Biological Treatment	a. Aerobic Bioremediation	Degradation of constituents by utilizing microorganisms in an aerobic environment with the addition of amendments and controls to enhance the process performance and decrease duration.	NO
	b. Anaerobic Bioremediation	Degradation of constituents utilizing microorganisms in an anaerobic environment with the addition of amendments and controls to enhance the process performance and decrease duration.	NO
2. Chemical Treatment	a. Hydrolysis	The chemical reaction of a compound with water, usually resulting in the formation of one or more new compounds.	NO
	b. Reduction (Hydrazine)	Reduction chemically converts chemicals to less toxic compounds that are more stable, less mobile, and/or inert. The reducing agent used is Hydrazine.	NO
	c. Neutralization	A chemical reaction in which a water solution of acid is mixed with a water solution of base to form a salt and water; not included to treat polychlorinated biphenyls (PCBs) in water but may be used for pH adjustment associated with other water treatment processes.	YES
	d. Radiolytic Dechlorination	Groundwater is placed in an alkaline isopropanol solution (~ 1% solution) and then gamma irradiated to a dose of < 10. Products of this dechlorination process are biphenyl, acetone, and inorganic chloride. Process must be carried out under inert atmosphere.	NO
3. Oxidation	a. Reduction/Oxidation	Reduction/oxidation chemically converts chemicals to less toxic compounds that are more stable, less mobile, and/or inert. The oxidizing agents most commonly used are ultraviolet light, hydrogen peroxide, Fenton's reagent, hypochlorites, chlorine, and chlorine dioxide.	YES

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General Response Action/ Remedial Technology	Process Option	Description	Technically Implementable YES = Retained No = Not proven effective or reliable for PCBs given the site-specific attributes of the Anniston PCB Site
H. Ex Situ Water Treatment (cont.)			
4. Physical Treatment	a. Granular Activated Carbon (GAC)	GAC uses the physical adsorption process whereby attractive van der Waals forces pull the solute out of solution and onto its surface. Once the solute is bound to the carbon, it is considered "removed" from the water.	YES
	b. Modified Organoclay and Carbon Filters	Similar to GAC except filter is comprised of a combination of organoclay and carbon.	YES
	c. Dissolved Air Flotation (DAF)	This process utilizes dissolved air to facilitate removal of insoluble material including solids and suspended-phase oil, tar, and grease. Air is injected, pressurized, and dissolved into a treatment vessel along with influent wastewater. The wastewater is saturated with finely dispersed microscopic air bubbles, which attach themselves to the flocculated particles causing the particles to rise to the top of the vessel where they are removed via a skimmer. Not included to treat PCBs in water, but may be used in association with other water treatment processes.	YES
	d. Oil/Water Separation	Process by which insoluble oils are removed from water via physical separation technologies, including gravity separation, baffled vessels, etc. Not included to treat PCBs in water but may be used in association with other water treatment processes.	YES
	e. Filtration	Process in which the groundwater is passed through a granular media in order to remove suspended solids by interception, straining, flocculation, and sedimentation activity within the filter.	YES
	f. Precipitation/Coagulation/ Flocculation	Process which transforms dissolved constituents into insoluble solids by adding coagulating agents to facilitate subsequent removal from the liquid phase by sedimentation/filtration. The process usually uses pH adjustment, addition of a chemical precipitant, and flocculation. Not included to treat PCBs in water but may be used in association with other water treatment processes.	YES
	g. Primary Settling	Large particulates are allowed to gravity settle typically prior to entry into the treatment train.	YES
	h. Reverse Osmosis	Use of high pressure to force water through a membrane leaving chemical constituents behind.	NO
	i. Distillation	Chemical constituents are separated from aqueous stream by vaporization and condensation.	NO
	j. Ion Exchange	Exchange of constituent cationic or anionic ions in the groundwater with ions held by an ion exchange material. Typically used to remove metallic elements and inorganic ions.	NO
	k. Liquid-Liquid Extraction	Liquid-liquid extraction is a process which allows separation of two or several components due to their unequal distribution in immiscible liquid phases.	NO
I. Soil/Sediment Removal			
1. Excavation	a. Mechanical	Use of standard excavation equipment such as crane, clamshell, excavator, bulldozer, etc.	YES
	b. Hydraulic	Removal of sediments with a hydraulic dredge.	NO
	c. Screening	Use of standard screening equipment to segregate rocks and debris from soils.	YES
	d. Ground Freezing	An array of pipes is placed in the ground and brine at a temperature of -20 to -40 degrees Celsius is circulated to freeze soil. Only recommended for short duration applications and to assist with excavation.	YES
	e. Pneumatic/Vacuum Removal	A soil removal tool is provided for removing soil, rock, and other debris from the bottom of an excavation, while permitting the operator to be located outside of a containment for that excavation. The tool includes a fixed jaw secured to one end of an elongate pipe, which cooperates with a movable jaw pivotably mounted on the pipe.	NO

Table 5-1
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Anniston PCB Site, Anniston, Alabama

General Response Action/ Remedial Technology	Process Option	Description	Technically Implementable YES = Retained No = Not proven effective or reliable for PCBs given the site-specific attributes of the Anniston PCB Site
J. Creek Bank Stabilization			
1. Engineered Treatment	a. Riprap	Armor stone placed along the creek bank to prevent the erosion of soils due to surface water flow. Riprap is widely available in many sizes.	YES
	b. Sheet Piling	Sheeting fall placed along the creek bank to prevent the erosion of soils. Typically used for steep creek banks when high value assets are built along the shoreline.	YES
	c. Reinforced Mats	Mats are reinforced with a range of materials including geotextiles and articulating concrete blocks. Some mats also include a growing medium to support the vegetative growth.	YES
2. Natural Treatment	a. Natural Growth	Allowing the riparian buffer to naturally recolonize by not actively maintaining the vegetation and in some cases can include conservation restrictions that limit access and use of this riparian buffer zone.	YES
	b. Plantings	Actively placing plantings such as willow whips along the shoreline to stabilize the banks.	YES
	c. Logs and Root Balls	Using fallen tree logs and root balls to reduce surface water velocities along the creek bank and prevent erosion. The logs can be tied or staked to the shoreline such that it provides a velocity break for the surface water, and the root balls can be inserted in the creek bank to help form natural snags and provide habitat.	YES
	d. Shoreline Mattress	The shoreline mattresses can be formed with a wide range of natural materials and can be used to reduce surface water velocities along the creek bank and as a growing medium to enhance vegetative growth along the shoreline.	YES
K. Soil/Sediment Dewatering			
1. Active Dewatering	a. Filtration	Filtration is possible using a variety of media and configurations under atmospheric or pressure/vacuum conditions on a batch or continuous basis.	YES
	b. Solid Bowl Centrifuge	Soil slurry fed through a central pipe that sprays into a rotating bowl. Centrate discharges out the large end of the bowl and solids are removed from tapered end of the bowl by means of a screw conveyer.	YES
	c. Evaporator	Excess water evaporated from soil slurry	YES
	d. Hydrocyclone	Continuously operating cone-shaped device which uses centrifugal force to accelerate settling.	YES
2. Gravity Dewatering	a. Dewatering Pad	Removed soils are placed on a contained pad and allowed to gravity dewater.	YES
	b. Settling Basin	Soil slurry enters basin, then material thickens an compacts at bottom of basin. Pretreatement with chemical additives can be used to enhance settling.	YES
L. Soil/Sediment Transport			
1. Transport	a. Truck	Media would be loaded and transported to another location for further treatment and/or disposal.	YES
	b. Rail	Media would be loaded and transported to another location for further treatment and/or disposal.	YES
	c. Barge	Media would be loaded and transported to another location for further treatment and/or disposal.	NO
	d. Pipeline	Media would be pumped and transported to another location for further treatment and/or disposal.	NO

Table 5-1
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Anniston PCB Site, Anniston, Alabama

General Response Action/ Remedial Technology	Process Option	Description	Technically Implementable YES = Retained No = Not proven effective or reliable for PCBs given the site-specific attributes of the Anniston PCB Site
M. Soil/Sediment Disposal			
1. Off-Site Disposal	a. New Dedicated Landfill	A newly constructed dedicated off-site landfill designed to contain chemical-containing soils removed from the Site.	YES
	b. Licensed Hazardous Waste Landfill	Off-site disposal at a licensed commercial facility that can accept hazardous waste. Depends on soil analytical data.	YES
	c. Solid Waste Landfill	Disposal of soil or stabilized sediment in existing permitted solid waste landfill. Depends on soil analytical data and RCRA-listed waste status.	YES
2. On-Site Disposal	a. On-Site Landfill (Hazardous Waste and/or Solid Waste)	Disposal of solids in landfill(s) constructed near the Site.	YES
	b. Expansion of Existing Landfill	Disposal of solids in landfill(s) existing at the Site.	YES
	c. Soil Management Area	Areas specified to contain and manage site-related soils.	YES
N. Residuals Management for Soil/Sediment/Water Treatment Processes			
1. Residuals	a. Off-Site Disposal	Off-site landfill permitted to handle residuals removed from the Site.	YES
	b. Liquid and Sludge Incineration	Chemical constituents from extraction/desorption and other process options can be destroyed in off-site incinerator.	YES
	c. Activated Carbon Recycling	Recycling is achieved using thermal reactivation techniques.	YES
	d. Soil Management Area	Area specified to contain and manage site-related soils.	YES
O. Extraction and Discharge of Treated Waters			
1. Extraction	a. Vertical Extraction Well	Vertical wells are installed and utilized to recover groundwater for treatment/disposal.	YES
	b. Horizontal Extraction Well	Horizontal wells are utilized to replace conventional cluster wells in soils.	YES
	c. Collection Trench	A zone of higher permeability material is installed within the desired capture area with a perforated collection laterally placed along the base to direct groundwater to a collection area for treatment and/or disposal.	YES
	d. Subsurface Drain	A high permeability channel is installed to provide groundwater collection and redirection of movement for treatment and/or disposal.	YES
2. Discharge	a. Discharge to a local Publicly Owned Treatment Works (POTW)	Treated or untreated water is discharged to a sanitary sewer and treated at a local POTW facility depending on constituent concentrations.	YES
	b. Discharge to Surface Water	Treated or untreated water is discharged to a surface water, provided that quality and quantity meet the allowable discharge requirements for surface waters.	YES
	c. Treatment at a privately owned treatment facility	Treated or untreated water is collected and transported to a privately owned treatment facility.	YES
	d. Beneficial Reuse	Treated groundwater is reused (e.g., irrigation, cooling water).	YES
	e. Reinjection	Groundwater is extracted via extraction wells, passed through a treatment system, and then reinjected into the ground through injection wells.	YES
	f. Deep Well Injection	The use of injection wells to place treated or untreated liquid waste into geologic formations that have no potential to allow migration of chemical constituents into potential potable water aquifers.	NO

Table 5-2
Qualitative Screening of Remedial Technologies
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Anniston PCB Site, Anniston, Alabama

General Response Action/ Remedial Technology	Process Option	Screening Criteria (see below for definiton of criteria)			Decision Retain/Eliminate
		Effectiveness	Implementability	Cost	
A. No Further Action					
	-----	Moderate	High	Low	Retained
B. Source Control					
	a. Identification and Elimination of Sources	Moderate	Moderate	Moderate	Retained
C. Institutional Access Controls and Monitoring					
1. Informational Devices	a. Deed Notices	Moderate	High	Low	Retained
	b. Fish Consumption Advisories	Moderate	High	Low	Retained
2. Governmental Controls	a. Land Use Restrictions	Moderate	High	Low	Retained
	b. Zoning Restrictions	Moderate	High	Low	Retained
	c. Ordinances	Moderate	High	Low	Retained
	d. Building and Other Permit Requirements	Moderate	High	Low	Retained
3. Proprietary Controls	a. Easements	Moderate	High	Low	Retained
	b. Covenants	Moderate	High	Low	Retained
	c. Access Restrictions	Moderate	High	Low	Retained
4. Enforcement Actions with Institutional Components	a. USEPA Administrative Orders	Moderate	High	Low	Retained
	b. Judicial Consent Decrees	Moderate	High	Low	Retained
5. Access Controls	a. Fencing, Signage, and Other Physical Barriers	Moderate	High	Low	Retained
D. Monitored Natural Attenuation (MNA) / Monitored Natural Recovery (MNR)					
1. MNA/MNR	a. MNA/MNR	Moderate	High	Low	Retained
	b. Enhanced MNA/MNR	Moderate	High	Low	Retained
E. In-Place Containment/Control for Soil or Sediment					
1. Capping	a. Clay/Soil Cap	High	High	Moderate	Retained
	b. Asphalt/Concrete Cap	High	High	Moderate	Retained
	c. Multimedia Cap	High	Moderate	Moderate	Retained
	d. Reactive Cap	High	Moderate	Moderate	Retained
2. Containment	a. Slurry Walls	Moderate	Moderate	High	Eliminate
	b. Steel Sheet Piles	Moderate	Moderate	High	Eliminate
	c. Grout Curtains/Grout Injection	Moderate	Moderate	High	Eliminate
	d. Vault	Moderate	Low	High	Eliminate
	e. Subsurface Drains	Moderate	Low	High	Eliminate
3. Control	a. Grading for Surface Water Control/Collection	Moderate	Moderate	Low	Retained (only if needed in combination with other GRAs)
F. In Situ Groundwater/Soil/Sediment Treatment					
1. Thermal Treatment	a. In Situ Vitrification (Glassification)	Moderate	Low	High	Eliminate
2. Immobilization (Solidification, Stabilization, and Fixation)	a. Stabilization/Solidification (Organic and Inorganic Based)	Moderate	Moderate	Moderate	Eliminate
3. Sediment Amendment	a. Activated Carbon	Moderate	Low	Moderate	Eliminate (only works in a low surface water velocity setting)

Table 5-2
Qualitative Screening of Remedial Technologies
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General Response Action/ Remedial Technology	Process Option	Screening Criteria (see below for definiton of criteria)			Decision Retain/Eliminate
		Effectiveness	Implementability	Cost	
G. Ex Situ Soil/Sediment Treatment					
1. Immobilization (Solidification, Stabilization, and Fixation)	a. Stabilization/Solidification (Organic and Inorganic Based)	High	Moderate	Moderate	Eliminate
2. Extraction	a. Solvent Extraction	Moderate	Low	High	Eliminate
	b. Thermal Desorption	Moderate	Moderate	High	Retained
3. Destruction	**THERMAL DESTRUCTION**				
	a. Incineration	High	Low	High	Retained
	b. Pyrolysis	High	Low	High	Eliminate
	c. Vitrification (Glassification)	High	Low	High	Eliminate
H. Ex Situ Water Treatment					
1. Chemical Treatment	a. Neutralization	High	Moderate	Moderate	Retained (only if needed in combination with other process options)
2. Oxidation	a. Reduction/Oxidation	Moderate	Low	High	Eliminate
3. Physical Treatment	a. Granular Activated Carbon (GAC)	High	Moderate	Moderate	Retained
	b. Modified Organoclay and Carbon Filters	Moderate	Low	Moderate	Eliminate (GAC is more effective and more readily implementable)
	c. Dissolved Air Flotation (DAF)	Moderate	Moderate	Moderate	Retained (only if needed in combination with other process options)
	d. Oil/Water Separation	High	High	Moderate	Eliminate (separate oil phase is not anticipated based on Site data)
	e. Filtration	High	High	Moderate	Retained (only if needed in combination with other process options)
	f. Precipitation/Coagulation/Flocculation	Moderate	Moderate	Moderate	Retained (only if needed in combination with other process options)
	g. Primary Settling	Moderate	High	Low	Retained (only if needed in combination with other process options)
I. Soil/Sediment Removal					
1. Excavation	a. Mechanical	High	Moderate	Moderate	Retained
	b. Screening	Moderate	Moderate	Low	Retained (as a potential support process option with mechanical excavation)
	c. Ground Freezing	Low	Low	High	Eliminate
J Creek Bank Stabilization					
1. Engineered Treatments	a. Riprap	Moderate	Moderate	Moderate	Retained
	b. Sheet Piling	Moderate	Low	High	Retained
	c. Reinforced Mats	Moderate	Moderate	High	Retained
2. Natural Treatments	a. Natural Growth	High	High	Low	Retained
	b. Planting	High	Moderate	Low	Retained
	c. Logs and Root Balls	Moderate	Moderate	Low	Retained
	d. Shoreline Matresses	Low	Moderate	Low	Retained
K. Soil/Sediment Dewatering					
1. Active Dewatering	a. Filtration	Moderate	Moderate	High	Retained (in association with other GRAs/process options)
	b. Solid Bowl Centrifuge	Moderate	Low	High	Eliminate
	c. Evaporator	Moderate	Low	High	Eliminate
	d. Hydrocyclone	Moderate	Low	High	Eliminate
2. Gravity Dewatering	a. Dewatering Pad	Moderate	High	Low	Retained
	b. Settling Basin	Moderate	Moderate	Moderate	Eliminate
L. Soil/Sediment Transport					
1. Transport	a. Truck	High	High	Moderate	Retained
	b. Rail	High	Low	High	Eliminate (Volume of potential excavation material is too low to support construction of a project-specific rail spur)

Table 5-2
Qualitative Screening of Remedial Technologies
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

General Response Action/ Remedial Technology	Process Option	Screening Criteria (see below for definiton of criteria)			Decision Retain/Eliminate
		Effectiveness	Implementability	Cost	
M. Soil/Sediment Disposal					
1. Off-Site Disposal	a. New Dedicated Landfill	High	Low	High	Eliminate
	b. Licensed Hazardous Waste Landfill	High	High	High	Retained
	c. Solid Waste Landfill	High	High	Moderate	Retained
2. On-Site Disposal	a. On-Site Landfill (Hazardous Waste and/or Solid Waste)	High	Low	High	Eliminate
	b. Expansion of Existing Landfill	High	Moderate	Moderate	Eliminate
	c. Soil Management Area	High	High	Low	Retained (already built and being used for residential soil with PCB concentrations less than 10 mg/kg.)
N. Residuals Management for Soil/Sediment/Water Treatment Processes					
1. Residuals	a. Off-Site Disposal	High	Moderate	Moderate	Retained
	b. Liquid and Sludge Incineration	High	Moderate	High	Eliminate
	c. Activated Carbon Recycling	High	Moderate	High	Eliminate (carbon and other treatment-generated residuals could be disposed of at an off-site facility or an on-site soil management area)
	d. Soil Management Area	High	High	Low	Retained (on-site facilites have already been constructed)
O. Extraction and Discharge of Treated Waters					
1. Extraction	a. Vertical Extraction Well	Moderate	High	Moderate	Retained
	b. Horizontal Extraction Well	Low	Moderate	High	Eliminate
	c. Collection Trench	Moderate	Moderate	Moderate	Retained
	d. Subsurface Drain	Low	Moderate	High	Eliminate
2. Discharge	a. Discharge to a local Publicly Owned Treatment Works (POTW)	High	Moderate	Low	Retained
	b. Discharge to Surface Water	High	High	Low	Retained
	c. Treatment at a Privately Owned Treatment Facility	High	Moderate	Moderate	Retained
	d. Beneficial Reuse	High	Moderate	Low	Retained
	e. Reinjection	High	Moderate	Low	Retained

Screening Criteria Definitions

Effectiveness

High - Standalone technology is highly effective at meeting RAOs under site-specific conditions.
Moderate - Technology is moderately effective at meeting RAOs under site-specific conditions. May require combination of other technologies to meet RAOs.
Low - Technology is ineffective at meeting RAOs under site-specific conditions. Would require complex array of other technologies to meet RAOs.

Implementability

High - No difficulties with implementing technology under site-specific conditions. Technology readily available, proven, and reliable.
Moderate - Some difficulties with implementing technology under site-specific conditions but no fatal flaws. Technology available, proven, and of average reliability
Low - Major difficulties with implementing technology under site-specific conditions. Fatal flaws identified. Technology not readily available or proven and has low reliability

Cost

High - High degree of capital investment and operation and maintenance (O&M) intensity.
Moderate - Moderate degree of capital investment and O&M intensity.
Low - Low degree of capital investment and O&M intensity.

Table 6-1a

Development and Screening of Remedial Alternatives for Residential Soils

OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Remedial Alternative	Description of Remedial Alternative	Screening Evaluation			Retained	Rationale	Alternative
		Effectiveness	Implementability	Cost			
No Action	No further action beyond the residential removals that have already been completed under the NTC Removal Action Agreement.	M	H	L	Y	Retained as required under the NCP. Effectiveness ranking of medium is based on residential removals already completed under the NTC Removal Action Agreement.	RS-1
Complete the NTC Removal of Residential Soils and Soil Management	Remove surface soils on residential properties with PCB concentrations ≥1 mg/kg and subsurface soils with PCB concentrations ≥10 mg/kg. This alternative is consistent with actions already taken under the NTC Removal Action Agreement and the Stipulation for residential properties where property access was available and the properties were not overgrown with vegetation. Soil management would be implemented as part of the remedial alternative for residential properties where subsurface soil PCB residuals (between 1 mg/kg and 10 mg/kg) remain. Additional removal actions would be implemented for properties if access is granted or if overgrown conditions change. Soils generated during additional removals may be disposed of on-site in the SSSMA provided that the PCB concentration results from the five-point composite samples collected for the property are <10 mg/kg. The estimated timeframe to complete is 6 to 12 months.	H	M	M	Y	Retained as the alternative is effective and can be implemented.	RS-2
Removal of Residential Soils ≥ 1 mg/kg PCBs and Soil Management	Remove surface and subsurface soil from residential properties with PCB concentrations ≥1 mg/kg to a depth of 48 inches below ground surface. The actions for surface soils are consistent with removals previously completed under the NTC Removal Action Agreement and the Stipulation. This alternative includes returning to 97 of the properties previously addressed under the earlier agreements, removing the previously placed 12-inch layer of clean backfill, excavating deeper to achieve PCB concentrations of 1 mg/kg and backfilling and restoring the area. Conduct additional residential removals, where applicable, if access is granted or if overgrown conditions change. Soils generated during the additional removals may be disposed of in the SSSMA if the PCB concentrations of the composite samples are <10 mg/kg. The estimated timeframe to complete is 1 to 2 years.	H	M	H	Y	Retained as the alternative is effective and can be implemented.	RS-3

Alternatives that have been retained are shaded in green.
mg/kg: milligram(s) per kilogram
NCP: National Contingency Plan
NTC: non-time-critical
PCB: polychlorinated biphenyl
SSSMA: south staging soil management area

Table 6-1b
Development and Screening of Remedial Alternatives for Special Use Properties[1]
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Remedial Alternative	Description of Remedial Alternative	Screening Evaluation			Retained	Rationale	Alternative
		Effectiveness	Implementability	Cost			
No Action	No further action beyond the cleanups that have already been conducted for the high activity portions of the special use properties.	M	H	L	Y	Retained as required under the NCP. Effectiveness ranking of medium is based on the removals previously completed under the Stipulation.	SU-1
NTC Removals in High Activity Areas and Soil Management	Remove surface soils on high activity special use properties with PCB concentrations ≥1 mg/kg and subsurface soils with PCB concentrations ≥10 mg/kg. This alternative is consistent with actions already taken under the NTC Removal Action Agreement and the Stipulation for high activity special use properties where property access was available and the properties were not overgrown with vegetation. Soil management would be implemented as part of the remedial alternative for high activity special use properties where subsurface soil PCB residuals (between 1 mg/kg and 10 mg/kg) remain. Additional removal actions would be implemented for properties if access is granted or if overgrown conditions change. Soils generated during additional removals may be disposed of on-site in the SSSMA provided that the PCB concentration results from the five-point composite samples collected for the property are <10 mg/kg. In addition to the remedial actions included with this alternative, the low activity portions of the special use properties would be evaluated and addressed as part of the broader nonresidential areas in OU-1/OU-2 based on the Exposure Units (EUs) having a PCB exposure point concentration less than the nonresidential preliminary remedial goal (PRG) of 21 mg/kg. Low activity areas would be monitored. If land use changes to high activity, removal actions will be implemented consistent with the requirements of the NTC Removal Action. The estimated timeframe to complete is less than 6 months.	H	M	M	Y	Retained as the alternative is effective and implementable.	SU-2
Complete the NTC Removals in High Activity Areas, Removal of Nonresidential Surface Soil from Low Activity Areas with PCBs ≥ 1 mg/kg and Soil Management	Excavate surface soils with PCB concentrations ≥1 mg/kg in the high activity portions of the special use properties. The soils excavated will be disposed of on-site/off-site. Nonresidential surface soils in low activity areas with PCB concentrations ≥ 1.2 mg/kg would be removed and disposed of on-site/off-site. The nonresidential surface soil in the low activity areas is being addressed to provide a cancer risk of 1 X 10^{-6} for the young child under the school/day care exposure scenario. Subsurface soils within the high activity and low activity areas with PCB concentrations ≥10 mg/kg would also be excavated. Excavated materials would be disposed of on-site if PCB concentrations are <10 mg/kg and disposed of off-site if PCB concentrations ≥10 mg/kg. On-site disposal of soils with PCB concentrations <10 mg/kg that have been characterized by five-point composite samples is provided for in the Stipulation through the NTC Removal Action Agreement. Soil management for subsurface soils would include interactive outreach with landowners regarding any plans to disturb subsurface soils in areas where removal actions were conducted under the Stipulation. If a structure is removed, implement soil removal with on-site/off-site disposal where PCB surface concentrations are ≥1 mg/kg or subsurface concentrations are ≥10 mg/kg. The estimated timeframe to complete is 1 to 2 years.	H	L	M	Y	Retained as the alternative is effective and implementable.	SU-3
Removal of Soils with PCBs ≥1 mg/kg from High Activity Areas and Removal of Nonresidential Soil from Low Activity Areas with PCBs ≥ 1 mg/kg	Excavate surface and subsurface soils with PCB concentrations ≥1 mg/kg in the high activity portions of the special use properties. The soils excavated will be disposed of on-site/off-site. Excavate surface and subsurface nonresidential soils in the low activity areas with PCB concentrations ≥ 1.2 mg/kg. The soils excavated will be disposed of on-site/off-site. The nonresidential soil in the low activity areas is being addressed to provide a cancer risk of 1 X 10^{-6} for the young child under the school/day care exposure scenario. Excavated materials would be disposed of on-site if PCB concentrations are <10 mg/kg and disposed of off-site if PCB concentrations ≥10 mg/kg. On-site disposal of soils with PCB concentrations <10 mg/kg is provided for in the Stipulation through the NTC Removal Action Agreement that USEPA approved for the Site. The technical approach described in the NTC Removal Action Agreement includes the use of five-point composite soil samples to characterize PCBs for the purposes of removal and disposal. If a structure from a high or low activity area is removed, implement subsurface soil removal with on-site/off-site disposal where PCB concentrations are ≥1 mg/kg. The estimated timeframe to complete is 2 to 3 years.	H	L	H	Y	Retained as the alternative is effective and implementable.	SU-4

Alternatives that have been retained are shaded in green.

1. Under the Stipulation to the Partial Consent Decree, the definition of residential properties was modified to include the high activity areas of schools, churches, day-care centers, community centers, playgrounds, and parks (i.e., the areas where persons, primarily children, are likely to spend considerable time). For purposes of clarity, these properties were designated as special use properties in project work documents.

mg/kg: milligram(s) per kilogram
NCP: National Contingency Plan
NTC: non-time-critical
OU: Operable Unit
PCB: polychlorinated biphenyl
SSSMA: south staging soil management area
USEPA: United States Environmental Protection Agency

Table 6-1c
Development and Screening of Remedial Alternatives for Interim Measures
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Remedial Alternative	Description of Remedial Alternative	Screening Evaluation			Retained	Rationale	Alternative
		Effectiveness	Implementability	Cost			
No Further Action	No further action, recognizing the multiple removal actions and IMs conducted to date.	M	H	L	Y	Retained as required under the NCP. Effectiveness ranking of medium is based on the previously completed removals and IMs.	IM-1
Expand Existing Measures, Address PTW if Present, and ICs	Expand existing IMs in the Eastside Area (including the drainage ditch to the north and PB-RR-37) and the Northside Area to meet the nonresidential PRG for PCBs of 21 mg/kg. This would include placing caps and covers using the original approaches used for these IMs. The approach for capping drainage way areas with high PCB concentrations included placing a low-permeability liner, covering the liner with a 12-inch layer of clean soil, and planting vegetation to stabilize the area. Nondrainage way areas included a cover system with a geotextile marker layer, a 12-inch layer of clean backfill, and vegetation to stabilize the area. Further evaluate potential principal threat waste (PTW) in the Eastside IM during the remedial design (RD) to confirm PTW is not present. If PTW is found to be present, additional subsurface soil excavation will be required. Conduct long-term O&M for the covers, and implement ICs, if applicable. The estimated timeframe to complete is 6 to 12 months.	H	H	M	Y	Retained as the alternative is effective and implementable.	IM-2
Expand Existing Measures, Address PTW if Present, Excavate and Off-Site Disposal of Soils at PB-RR-37, and ICs	Expand existing IMs in the Eastside Area (including the drainage ditch to the north) and the Northside Area to meet the nonresidential PRG for PCBs of 21 mg/kg except for the PB-RR-37 area that would be excavated. The technical approaches for placing caps and covers is based on the original approaches used for these IMs. The approach for capping drainage way areas with high PCB concentrations included placing a low-permeability liner, covering the liner with a 12-inch layer of clean soil, and planting vegetation to stabilize the area. Nondrainage way areas included a cover system with a geotextile marker layer, a 12-inch layer of clean backfill, and vegetation to stabilize the area. Further evaluate potential PTW in the Eastside IM during the RD to confirm PTW is not present. If PTW is found to be present, additional subsurface soil excavation will be required. Conduct long-term O&M for the covers, and implement ICs, if applicable. The estimated timeframe to complete is 6 to 12 months.	H	M	M	Y	Retained as the alternative is effective and implementable.	IM-3
Excavate Soils to Nonresidential PRG Where Not Covered by Existing Measures and Dispose of Off-Site, Address PTW if Present, and ICs	Expand existing IMs including portions of the Eastside Area (including the drainage ditch to the north) and the Northside Area to meet the nonresidential PRG for PCBs of 21 mg/kg. This would include the excavation and off-site disposal of surface soils in the IM expansion areas, placing a 12-inch layer of clean backfill and vegetation to stabilize the areas. Further evaluate potential PTW in the Eastside IM during the RD to confirm PTW is not present. If PTW is found to be present, additional subsurface soil excavation with off-site disposal will be required. Conduct long-term O&M for the covers and implement ICs, if applicable. The estimated timeframe to complete is 1 to 2 years.	H	L	H	Y	Retained as the alternative is effective and implementable.	IM-4

Alternatives that have been retained are shaded in green.
IC: institutional control
IM: interim measure
mg/kg: milligram(s) per kilogram
NCP: National Contingency Plan
O&M: operations and maintenance
OU: Operable Unit
PCB: polychlorinated biphenyl
PRG: preliminary remediation goal
USEPA: United States Environmental Protection Agency

Table 6-1d
Development and Screening of Remedial Alternatives for Dredge Spoil Pile Alternatives
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Remedial Alternative	Description of Remedial Alternative	Screening Evaluation			Retained	Rationale	Alternative
		Effectiveness	Implementability	Cost			
No Action	No further action	L	H	L	Y	Retained as required under the NCP.	DSP-1
Capping and O&M	Capping target dredge spoil pile SC-8. The cap for dredge spoil pile SC-8 would extend into Snow Creek including a multilayer armor riprap to prevent erosion of the underlying cap material (likely sand). Long-term O&M of the cap would be necessary after remedy implementation.	H	L	M	N	Not retained due to implementability concerns as dredge spoil pile SC-8 directly borders the creek. As a result, the cap materials, including an overlying layer of riprap armor stone, would be constructed in the creek bed and cause localized flooding during periods of high surface water flow.	
Excavate SC-8 and Off-Site Disposal	Excavation and off-site disposal of dredge spoil pile SC-8. All of the excavated materials are anticipated to have PCB concentrations <50 mg/kg and would be disposed of in an off-site nonhazardous waste landfill. The area beneath dredge spoil pile SC-8 would be addressed as part of the nonresidential portion of the floodplain. Other dredge spoil piles would be stabilized as necessary to prevent further erosion. The estimated timeframe to complete is 6 to 12 months.	H	M	M	Y	Retained as the alternative is effective and implementable.	DSP-2
Excavate SC-8 and On-Site and Off-Site Disposal	Excavation and off-site/on-site disposal of dredge spoil pile SC-8. Materials with PCB concentrations <50 mg/kg would be disposed of on-site, and materials with concentrations ≥50 mg/kg would be disposed of off-site. Based on the characterization data for the dredge spoil pile SC-8, little to none of the material from dredge spoil pile SC-8 will require off-site disposal. The area beneath dredge spoil pile SC-8 would be addressed as part of the nonresidential portion of the floodplain. Other dredge spoil piles would be stabilized as necessary to prevent further erosion. The estimated timeframe to complete is 6 to 12 months.	H	M	M	Y	Retained as the alternative is effective and implementable.	DSP-3
Excavate All Piles and Off-Site Disposal	Excavation and off-site disposal of all dredge spoil piles. All of the excavated materials are anticipated to have PCB concentrations of < 50 mg/kg and would be disposed of in an off-site nonhazardous waste landfill. The area beneath dredge spoil piles would be addressed as part of the nonresidential portion of the floodplain. The estimated timeframe to complete is 6 to 12 months.	H	M	H	Y	Retained as the alternative is effective and implementable.	DSP-4
Excavate All Piles and On-Site and Off-Site Disposal	Excavation and off-site/on-site disposal of all dredge spoil piles. Materials with PCB concentrations <50 mg/kg would be disposed of on-site, and materials with concentrations ≥50 mg/kg would be disposed of off-site. Based on the characterization data for the dredge spoil piles, little to none of the material from dredge spoil piles will require off-site disposal. The area beneath dredge spoil piles would be addressed as part of the nonresidential portion of the floodplain. The estimated timeframe to complete is 6 to 12 months.	H	M	H	Y	Retained as the alternative is effective and implementable.	DSP-5

Alternatives that have been retained are shaded in green.
mg/kg: milligram(s) per kilogram
NCP: National Contingency Plan
O&M: operation and maintenance
OU: Operable Unit
PCB: polychlorinated biphenyl

Table 6-1e

Development and Screening of Remedial Alternatives for Unapproved Waste Disposal Areas (UWDA) [1]
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Remedial Alternative	Description of Remedial Alternative	Screening Evaluation			Retained	Rationale	Alternative
		Effectiveness	Implementability	Cost			
No Action	No action	L	H	L	Y	Retained as required under the National Contingency Plan (NCP).	UWDA-1
Stipulation Cap, Operation and Maintenance (O&M) and Institutional Controls (ICs)	Placement of a geotextile fabric over the area(s) followed by the placement of a 12-inch-thick cover layer of clean soil as described in the Stipulation and Agreement. This alternative also includes long-term O&M. ICs may be necessary for groundwater and the stipulation cap. The estimated timeframe to complete is 6 to 12 months.	H	M	L	Y	Retained as the remedy is effective and implementable.	UWDA-2
RCRA Subtitle D Cap, O&M and ICs	Placement of a low permeability cap to cover the unauthorized waste materials and to minimize potential impacts to groundwater. This alternative also includes groundwater monitoring and long-term O&M to be effective. ICs may be necessary for groundwater and the cap. The estimated timeframe to complete is 1 to 2 years.	H	M	M	Y	Retained as the remedy is effective and implementable.	UWDA-3
Excavation and Off-Site Disposal, Restore to Natural Grade	Excavation and off-site disposal of all waste. Minimal restoration involving grading for erosion control and hydroseeding to protect slopes. No O&M or ICs are required as all of the UWDA would be removed under this alternative. The estimated timeframe to complete is 2 to 3 years.	H	L	H	Y	Retained as the remedy is effective and implementable.	UWDA-4

1. UWDAs include the one Wilborn property and the properties associated with the Ashley/Legrande Street site.

mg/kg: milligram(s) per kilogram
OU: Operable Unit
PCB: polychlorinated biphenyl
RCRA: Resource Conservation and Recovery Act

Table 6-1f
Development and Screening of Remedial Alternatives for Nonresidential Floodplain Soil Alternatives
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Remedial Alternative	Description of Remedial Alternative	Screening Evaluation			Retained	Rationale	Alternative
		Effectiveness	Implementability	Cost			
No Action	No further action beyond the removal actions and IMs that have been previously implemented.	M	H	L	Y	Retained as required under the NCP.	NRS-1
Covering Surface Soils, and Soil Management	Use a nonintrusive approach to covering the existing ground surface with a geotextile marker layer and a 12-inch soil layer to reduce exposure to surface soils. This alternative would be implemented in specific portions of EUs to achieve EU-wide PCB EPC below the nonresidential surface soil PRG of 21 mg/kg. The resulting target remedial areas are located in EU5, EU7, EU14N, EU19N, EU19S, and EU26. Surface soils in the two areas adjoining the interior of the overall EU footprint with PCB EPC values ≥21 mg/kg would also be addressed under this alternative. These two areas are located adjacent to Highway 202 (near the OU-3 boundary). This remedial alternative would also address the one constituent (PAH) where the EPC value for the OU as a whole exceeds the respective PRG. Soil management would be conducted as part of the remedy. The soil management activities would limit future intrusive activities on the nonresidential properties from adversely impacting the effectiveness of the nonresidential surface soil remedy and the remedy implemented for nearby residential properties. Specific soil management activities would include active outreach with property owners, local city building departments, area utility companies, and county/state-wide transportation agencies regarding any plans to disturb soils in nonresidential areas where construction activities could impact the nonresidential or adjacent residential remedies. Utility organizations typically contacted as a part of the outreach process include sewer, water, gas, electric, oil, cable/fiber optic, etc. Periodic observations of the nonresidential areas would be conducted to confirm that land use remains nonresidential. The estimated timeframe to complete is 1 to 2 years.	H	L	L	N	Not retained. Covering surface soils in EU5, EU14N, and EU19S will result in increased local flooding due to the soil cover raising the surface soil elevations in the Federal Emergency Management Agency floodway zone that surrounds Snow Creek.	
Soil Cover, Limited Excavation, On-Site/Off-Site Disposal, and Soil Management	Use a nonintrusive approach to covering the existing ground surface with a geotextile marker layer and a 12-inch soil layer to reduce exposure to surface soils. This alternative would be implemented in specific portions of EUs to achieve EU-wide EPCs below the nonresidential surface soil PRG of 21 mg/kg. The covers would only be placed in EUs where the addition of 12 inches of soil to the existing ground surface elevations would not increase local flooding—EU7, EU19N, and EU26. For the target remedial areas that cannot be covered due to flooding concerns—EU5, EU14N and EU19S—excavation with on-site/off-site disposal of surface soils would be implemented to achieve EU-wide EPCs below 21 mg/kg. Excavated soils with PCB concentrations <50 mg/kg would be disposed of on-site in the SSSMA, and soils with PCB concentrations >50 mg/kg would be disposed of in an appropriately permitted off-site landfill. Soil management would be conducted as part of the remedy. The soil management activities would limit future intrusive activities on the nonresidential properties from adversely impacting the effectiveness of the nonresidential surface soil remedy and the remedy implemented for nearby residential properties. Specific soil management activities would include active outreach with property owners, local city building departments, area utility companies, and county/state-wide transportation agencies regarding any plans to disturb soils in nonresidential areas where construction activities could impact the nonresidential or adjacent residential remedies. Utility organizations typically contacted as part of the outreach process include sewer, water, gas, electric, oil, cable/fiber optic, etc. Periodic observations of the nonresidential areas would be conducted to confirm that land use remains nonresidential. ICs would include Environmental Covenants. The estimated timeframe to complete is 1 to 2 years.	H	M	M	Y	Retained as the alternative is effective and implementable.	NRS-2
Excavation of Surface Soils, On-Site/Off-Site Disposal, and Soil Management	Excavate surface soils to achieve an EU-wide EPC below the nonresidential surface soil PRG of 21 mg/kg, dispose of soil on-site and off-site, backfilling the excavated areas with clean soil, and soil management. Excavated soils with PCB concentrations <50 mg/kg would be disposed of on-site in the SSSMA, and soils with PCB concentrations >50 mg/kg would be disposed of in an appropriately permitted off-site landfill. Soil management activities would limit future intrusive activities on the nonresidential properties from adversely impacting the effectiveness of the nonresidential surface soil remedy and the remedy implemented for nearby residential properties. Specific soil management activities would include active outreach with property owners, local city building departments, area utility companies, and county/state-wide transportation agencies regarding any plans to disturb soils in nonresidential areas where construction activities could impact the nonresidential or adjacent residential remedies. Utility organizations typically contacted as a part of the outreach process include sewer, water, gas, electric, oil, cable/fiber optic, etc. Periodic observations of the nonresidential areas would be conducted confirm that land use remains nonresidential. ICs would include Environmental Covenants. The estimated timeframe to complete is 1 to 2 years.	H	M	M	Y	Retained as the alternative is effective and implementable.	NRS-3

Table 6-1f
Development and Screening of Remedial Alternatives for Nonresidential Floodplain Soil Alternatives
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Remedial Alternative	Description of Remedial Alternative	Screening Evaluation			Retained	Rationale	Alternative
		Effectiveness	Implementability	Cost			
Excavation of Surface Soils, Off-Site Disposal, and Soil Management	Excavate surface soils to achieve an EU-wide EPC below the nonresidential surface soil PRG of 21 mg/kg, dispose of soil off-site, backfilling the excavated areas with clean soil, and soil management. Excavated soils would be disposed of in an appropriately permitted off-site landfill. Soil management would be conducted as part of the remedy. The soil management activities would limit future intrusive activities on the nonresidential properties from adversely impacting the effectiveness of the nonresidential surface soil remedy and the remedy implemented for nearby residential properties. Specific soil management activities would include active outreach with property owners, local city building departments, area utility companies, and county/state-wide transportation agencies regarding any plans to disturb soils in nonresidential areas where construction activities could impact the nonresidential or adjacent residential remedies. Utility organizations that would typically be contacted as part of the outreach process include sewer, water, gas, electric, oil, cable/fiber optic, etc. Periodic observations of the nonresidential areas would be conducted under confirm that land use continues to be nonresidential. ICs would include Environmental Covenants to restrict use. The estimated timeframe to complete is 1 to 2 years.	H	M	M	Y	Retained as the alternative is effective and implementable.	NRS-4
Excavation of Surface Soils, Off-Site Treatment, and Soil Management	Excavate surface soils to achieve an EU-wide EPC below the nonresidential PRG of 21 mg/kg, off-site treatment for the excavated soils with incineration to destroy the PCBs, backfill the excavated areas with clean soil, and conduct soil management. Soil management activities would limit future intrusive activities on the nonresidential properties from adversely impacting the effectiveness of the nonresidential surface soil remedy and the remedy implemented for nearby residential properties. Specific soil management activities would include active outreach with property owners, local city building departments, area utility companies, and county/state-wide transportation agencies regarding any plans to disturb soils in nonresidential areas where construction activities could impact the nonresidential or adjacent residential remedies. Utility organizations typically contacted as a part of the outreach process include sewer, water, gas, electric, oil, cable/fiber optic, etc. Periodic observations of the nonresidential areas would be conducted confirm that land use remains nonresidential. ICs would include Environmental Covenants to restrict use. The estimated timeframe to complete is 1 to 2 years.	H	M	H	Y	Retained as the alternative is effective and implementable.	NRS-5
Excavation of Surface Soils, On-Site Treatment, and Soil Management	Excavate surface soils to achieve an EU-wide EPC below the nonresidential PRG of 21 mg/kg, on-site treatment for the excavated soils with thermal desorption to destroy the PCBs, backfill the excavated areas with clean soil, and conduct soil management. Soil management activities would limit future intrusive activities on the nonresidential properties from adversely impacting the effectiveness of the nonresidential surface soil remedy and remedy implemented for nearby residential properties. Specific soil management activities would include active outreach with property owners, local city building departments, area utility companies, and county/state-wide transportation agencies regarding any plans to disturb soils in nonresidential areas where construction activities could impact the nonresidential or adjacent residential remedies. Utility organizations typically contacted as a part of the outreach process include sewer, water, gas, electric, oil, cable/fiber optic, etc. Periodic observations of the nonresidential areas would be conducted to confirm that land use remains nonresidential. ICs would include Environmental Covenants to restrict use. The estimated timeframe to complete is 1 to 3 years.	H	L	H	Y	Retained as the alternative is effective and implementable.	NRS-6

Alternatives that have been retained are shaded in green.

1. An alternative PCB PRG value of 9 mg/kg will also be evaluated to highlight volume and cost sensitivity.

EPC: exposure point concentration
EU: exposure unit
IM: interim measure
mg/kg: milligram(s) per kilogram
NCP: National Contingency Plan
O&M: operation and maintenance
OU: Operable Unit
PAH: polycyclic aromatic hydrocarbon
PCB: polychlorinated biphenyl
PRG: preliminary remediation goal

Table 6-1g
Development and Screening of Remedial Alternatives for Groundwater and Principal Threat Waste (PTW) at T-11
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Remedial Alternative	Description of Remedial Alternative	Screening Evaluation			Retained	Rationale	Alternative
		Effectiveness	Implementability	Cost			
No Action	No action	L	H	L	Y	Retained as required under the NCP.	GW-1
Install Low-Permeability Cap, O&M, ICs, and Monitor Groundwater	Install and maintain a low-permeability cap across the broader T-11 area to limit infiltration and to meet the surface soil PRG of 21 mg/kg. This alternative assumes that excavation of existing soils is not required to maintain hydraulic cross section. Conduct long-term O&M of the cap. Monitor groundwater and implement groundwater use restrictions through ICs. It is possible that ICs may be required for the cap. The estimated timeframe to complete is 6 to 12 months.	L	L	L	N	Not retained. Will result in increased local flooding due to the increased ground surface elevation in the floodway.	
Excavate Area, O&M, and ICs	Excavate 12 inches of soil across the broader T-11 area and the deeper soils immediately surrounding T-11 to protect groundwater and meet the floodplain surface soil PRGs and backfill with clean fill. Excavated soils would be disposed of off-site. Groundwater would be monitored, and O&M of the cover soils would be implemented. Groundwater use would be restricted through ICs. The estimated timeframe to complete is 6 to 12 months.	M	M	M	Y	Retained as the alternative is effective and implementable.	GW-2
Excavate Area, Low-Permeability Cap, O&M, and ICs	Excavate 18 inches of soil across the broader T-11 area and high concentration soils immediately surrounding well T-11 to protect groundwater, meet the surface soil PRGs, and maintain the hydraulic profile. Excavated soils would be disposed of off-site. Install a low permeability cap to limit infiltration and monitor groundwater concentrations. Long-term O&M will be necessary for the cap. Implement ICs for groundwater and the cap. The estimated timeframe to complete is 6 to 12 months.	H	L	M	Y	Retained as the alternative is effective and implementable.	GW-3
Excavate Area, Low-Permeability Cap, Pore Volume Removal, O&M, and ICs	Excavate 18 inches of soil across the broader T-11 area and deeper soils immediately surrounding T-11 to protect groundwater, meet the surface soil PRGs, and maintain the hydraulic profile. Excavated soils would be disposed of off-site. Install a low-permeability cap to limit infiltration. Install and temporarily operate and maintain a groundwater extraction and treatment system with discharge of treated waters to Snow Creek. Remove approximately two pore volumes of groundwater from affected area. System performance and additional actions, if any, will be assessed and implemented using an adaptive site management approach. Conduct O&M for the low-permeability cap. Groundwater monitoring will be necessary. Implement ICs for groundwater and the cap. The estimated timeframe to complete is 6 to 12 months.	H	L	H	Y	Retained as the alternative is effective and implementable.	GW-4

Alternatives that have been retained are shaded in green.
IC: institutional control
mg/kg: milligram(s) per kilogram
NCP: National Contingency Plan
O&M: operation and maintenance
OU: Operable Unit
PCB: polychlorinated biphenyl
PRG: preliminary remediation goal

Table 6-1h
Development and Screening of Remedial Alternatives for Sediment and Creek Bank Alternatives[1]
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Remedial Alternative	Description of Remedial Alternative	Screening Evaluation			Retained	Rationale	Alternative
		Effectiveness	Implementability	Cost			
No Action	No action	L	H	L	Y	Retained as required under the NCP.	SED-1
Removal of Sediments from Culverts with On-Site/Off-Site Disposal and MNR	Remove sediment from culverts with on-site/off-site disposal. On-site disposal for sediment with PCB concentrations <50 mg/kg in the SSSMA, and off-site disposal for sediment with PCB concentrations ≥50 mg/kg. MNR of sediment through the continuous contribution of clean sediments from uncontaminated portions of the upstream watershed. The estimated timeframe to complete is 6 to 12 months.	L	H	L	N	Not retained due to the uncertainty regarding the time to achieve the PRGs under MNR.	
Capping, Removal of Sediment from Culverts with On-Site/Off-Site Disposal, O&M, and ICs,	Remove sediment from culverts and cap sediment in Snow Creek with concentrations above PRGs.[2] On-site disposal for sediment from the culverts with PCB concentrations <50 mg/kg in the SSSMA and off-site disposal for soils with PCB concentrations ≥50 mg/kg. In-creek capping of the sediment deposits would require using a riprap stone armor layer to keep the cap in place during high-flow events. The resulting cap may be 24 to 36 inches higher in elevation than the surrounding creek bed due to the size of armor stone required to be stable during high surface water flow events. Stabilize creek bank areas that are unstable and that have soil concentrations above sediment PRGs. Conduct long-term O&M of capped areas and implement ICs, if applicable. The estimated timeframe to complete is 6 to 12 months.	H	L	M	N	Not retained. Capping PCB-containing sediment is an effective remedial technology. However, the localized flooding associated with the elevated cap profile (due the necessary riprap armor) raises significant implementability challenges.	
Excavation, On-Site/Off-Site Disposal, and MNR	Remove sediment from culverts, excavate sediment from the OU-1/OU-2 portion of Snow Creek with PCB concentrations ≥10 mg/kg and use on-site/off-site disposal options, and apply MNR for the remainder of the sediment. Dispose of materials with PCB concentrations ≥50 mg/kg off-site , and dispose of excavated sediment with PCB concentrations <50 mg/kg on-site in the SSSMA. MNR would be applied to sediment deposits that have average PCB concentrations <10 mg/kg. Monitoring and additional actions, if needed, would be implemented using an adaptive site management approach to assess effectiveness. Stabilize creek banks that are unstable or may become unstable during or following excavation of creek sediment and that have soil concentrations above PRGs. The estimated timeframe to complete is 6 to 12 months.	H	L	H	Y	Retained as effective and implementable.	SED-2
Excavation and On-Site/Off-Site Disposal	Remove sediment from culverts and excavate and dispose of sediment from the OU-1/OU-2 portion of Snow Creek with PCB concentrations above PRGs. Off-site disposal of materials with PCB concentrations ≥50 mg/kg with on-site disposal of excavated sediment with PCB concentrations <50 mg/kg in the SSSMA. Stabilize creek banks that are unstable or may become unstable during or following excavation of creek sediment and that have soil concentrations above PRGs. The estimated timeframe to complete is 6 to 12 months.	H	M	H	Y	Retained as effective and implementable.	SED-3
Excavation and Off-Site Disposal	Remove sediment from culverts and excavate sediment from the OU-1/OU-2 portion of Snow Creek with PCB concentrations above PRGs with off-site disposal for all excavated materials. Stabilize creek banks that are unstable or may become unstable during or following excavation of creek sediment and that have soil concentrations above sediment PRGs. The estimated timeframe to complete is 6 to 12 months.	H	M	H	Y	Retained as effective and implementable.	SED-4

Alternatives that have been retained are shaded in green.

1. PCB PRG values include 3 mg/kg for the in-creek sediments and 21 mg/kg for nonresidential exposure in creek bank areas. Creek bank stabilization has also been included for those creek bank areas that are unstable and have PCB concentrations of ≥ 3 mg/kg.

2. PRG values for non-PCB constituents are as follows: barium = 322 mg/kg, chromium= 111 mg/kg, cobalt = 59 mg/kg, lead = 128 mg/kg, manganese = 1,100 mg/kg, mercury = 1 mg/kg, nickel = 46 mg/kg, and vanadium = 41 mg/kg.

IC: institutional control
mg/kg: milligram(s) per kilogram
MNR: monitored natural recovery
NCP: National Contingency Plan
O&M: operation and maintenance
PCB: polychlorinated biphenyl
PRG: preliminary remediation goal

Table 7-1
Estimated Costs for Remedial Alternative RS-2
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative RS-2: Remove surface soils on residential properties with polychlorinated biphenyl (PCB) concentrations ≥1 milligram per kilogram (mg/kg) and subsurface soils with PCB concentrations ≥10 mg/kg. This alternative is consistent with actions already taken under the Non-Time Critical (NTC) Removal Action Agreement and the Stipulation for residential properties where property access was available and the properties were not overgrown with vegetation. Soil management would be implemented as part of the remedial alternative for residential properties where subsurface soil PCB residuals (between 1 mg/kg and 10 mg/kg) remain. Additional removal actions would be implemented for properties if access is granted or if overgrown conditions change. Soils generated during additional removals may be disposed of on-site in the south staging and soil management area (SSSMA) provided that the PCB concentration results from the five-point composite samples collected for the property are <10 mg/kg.

Item No.	Item	Unit Cost	Units	Estimated Quantity	Estimated Cost
	Capital Costs				
1.	Program Administration and Sampling	$617,600	Lump Sum	1	$617,600
2.	Excavation, Handling, and On-Site Disposal (<10 mg/kg)	$5.00	Cubic Feet	494,900	$2,474,500
3.	Upcharge for T&D Material Off-Site (≥10 ppm <50 ppm)	$75.00	Cubic Yard	2,100	$157,500
4.	Upcharge for T&D Material Off-Site (≥50 ppm)	$300.00	Cubic Yard	300	$90,000
5.	Backfill Delivery and Placement	$21	Cubic Yard	18,400	$386,400
				TOTAL CAPITAL COST	**$3,726,000**
	Long-Term Costs (Soil Management Program)				
6.	Addressing PCBs Concentrations at Depth	$32,000	Annually	1	$32,000
7.	Properties with Structures	$81,000	Annually	1	$81,000
				TOTAL ANNUAL LONG-TERM COST	**$113,000**
	Present Worth of Long-Term Costs				
8.	Years of Long-Term Program (Items 6 & 7)	30	Years		
9.	Discount Rate	7	%		
				PRESENT WORTH OF ANNUAL LONG-TERM COSTS (YEARS 1-30)	**$1,402,000**
	Administrative/Management				
				CONSTRUCTION BONDING (3% of Capital Cost)	**$112,000**
				PROJECT MANAGEMENT (5% of Capital Cost)	**$186,000**
				PROJECT MANAGEMENT (5% of Long-Term Cost)	**$70,000**
				ENGINEERING DESIGN/PERMITTING (6% of Capital Cost)	**$224,000**
				CONSTRUCTION MANAGEMENT (6% of Capital Cost)	**$224,000**
				SUBTOTAL	**$5,944,000**
	Contingency Costs				
				CONTINGENCY CAPITAL COSTS (15% scope + 15% bid)	**$1,118,000**
				CONTINGENCY LONG-TERM COSTS (10% scope + 10% bid)	**$280,000**
				TOTAL PRESENT WORTH	**$7,342,000**

General Notes:

- Cost estimate is based on past experience, cost estimating resources, and vendor estimates. Costs provided in 2016 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost.
- Cost factors based on *A Guide to Developing and Documenting Cost Estimates During Feasibility Study,* prepared by the United States Environmental Protection Agency (USEPA) and United States Army Corps of Engineers (USACE), July 2000.
- Cost estimate does not include previously implemented remediation activities.

Table 7-1
Estimated Costs for Remedial Alternative RS-2
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Assumptions:

1. Sampling and administrative costs include administrative efforts, maintaining project database, sampling efforts not completed, preparing removal packages, etc. Based on previous experience in Operable Units 1 and 2 (OU-1/OU-2). Note that complete depth data are not available for every property. Additional sampling would be required to address depth impacts.
2. Includes costs for labor, equipment, and materials to perform removal obligations for properties without access or that are unsuitable for removal. Assumes transportation and on-site disposal of excavated soils at the SSSMA. Assumes residential property removal quantities with PCBs at depth based on existing sampling data. A 10% contingency was added to the remedial quantities to address potential PCB impacts in the underlying soil where data are not available.
3. Additional costs for labor, equipment, and materials to load, transport, and dispose of materials with >10 but <50 mg/kg PCBs at the off-site Three Corners facility. A 10% contingency was added to the remedial quantities to address potential PCB impacts in the underlying soil where data are not available.
4. Additional costs for labor, equipment, and materials to load, transport, and dispose of materials with >50 mg/kg PCBs at the off-site Emelle facility. A 10% contingency was added to the remedial quantities to address potential PCB impacts in the underlying soil where data are not
5. Includes labor, equipment, and materials to purchase, import, place, grade, and compact general fill and topsoil to replace removed materials to pre-removal grades.
6. A soil management program would be implemented for residential properties where residual PCB concentrations (between 1 mg/kg and 10 mg/kg) remain in subsurface soil underlying areas that were previously remediated. Soil management activities would include interactive outreach with local landowners and/or local communities regarding any plans to disturb these impacted subsurface soils. If replacement of subsurface soils is not feasible at a particular property, provisions would be made for on-site or off-site disposal of these materials and for the placement of clean fill material back into the excavation area.
7. Annual activities under this item are assumed to include sampling of 11 residential properties where structures are demolished and soil removals on 4 of those properties. It is assumed that excavated soil from 3 of the properties would be disposed of on-site in the SSSMA (based on assumed PCB concentrations less than 10 mg/kg from 5-point composite samples), and soil from 1 property would be disposed of off-site at a nonhazardous waste landfill (based on assumed PCB concentrations less than 10 mg/kg from 5-point composite samples). The estimate assumes that the level of activities will decrease each year as properties are addressed.
8. Assumes 30 years for implementation of the soil management program. Based on industry standard and guidance in the document titled *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.
9. Present worth is estimated based on a 7% beginning-of-year discount rate. Present cost factor based on *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.

Table 7-2
Estimated Costs for Remedial Alternative RS-3
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative RS-3: Remove surface and subsurface soil from residential properties with polychlorinated biphenyl (PCB) concentrations ≥1 milligram per kilogram (mg/kg) to a depth of 48 inches below ground surface. The actions for surface soils are consistent with removals previously completed under the Non-Time Critical (NTC) Removal Action Agreement and the Stipulation. This alternative includes returning to 95 of the properties previously addressed under the earlier agreements, removing the previously placed 12-inch layer of clean backfill, excavating deeper to achieve PCB concentrations of 1 mg/kg and backfilling and restoring the area. Conduct additional residential removals, where applicable, if access is granted or if overgrown conditions change. Soils generated during the additional removals may be disposed of in the south staging and soil management area (SSSMA) if the PCB concentrations of the composite samples are <10 mg/kg.

Item No.	Item	Unit Cost	Units	Estimated Quantity	Estimated Cost
	Capital Costs				
1.	Program Administration and Sampling	$915,900	Lump Sum	1	$915,900
2.	Excavation, Handling, and On-Site Disposal (<10 mg/kg)	$5.00	Cubic Feet	1,514,800	$7,574,000
3.	Upcharge for T&D Material Off-Site (≥10 ppm <50 ppm)	$75.00	Cubic Yard	2,100	$157,500
4.	Upcharge for T&D Material Off-Site (≥50 ppm)	$300.00	Cubic Yard	300	$90,000
5.	Backfill Delivery and Placement	$21	Cubic Yard	56,200	$1,180,200
				TOTAL CAPITAL COST	**$9,918,000**
	Long-Term Costs				
6.	Soil Management Program	$0	Annually	1	$0
7.	Properties with Structures	$54,000	Annually	1	$54,000
				TOTAL ANNUAL LONG-TERM COST	**$54,000**
	Present Worth of Long-Term Costs				
8.	Years of Long-Term Program (Items 6 and 7)	30	Years		
9.	Discount Rate	7	%		
				PRESENT WORTH OF ANNUAL LONG-TERM COSTS (YEARS 1-30)	**$670,000**
	Administrative/Management				
				CONSTRUCTION BONDING (3% of Capital Cost)	**$298,000**
				PROJECT MANAGEMENT (5% of Capital Cost)	**$496,000**
				PROJECT MANAGEMENT (5% of Long-Term Cost)	**$34,000**
				ENGINEERING DESIGN/PERMITTING (6% of Capital Cost)	**$595,000**
				CONSTRUCTION MANAGEMENT (6% of Capital Cost)	**$595,000**
				SUBTOTAL	**$12,606,000**
	Contingency Costs				
				CONTINGENCY CAPITAL COSTS (15% scope + 15% bid)	**$2,975,000**
				CONTINGENCY LONG-TERM COSTS (10% scope + 10% bid)	**$134,000**
				TOTAL PRESENT WORTH	**$15,715,000**

General Notes:

- Cost estimate is based on past experience, cost estimating resources, and vendor estimates. Costs provided in 2016 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost.
- Cost factors based on *A Guide to Developing and Documenting Cost Estimates During Feasibility Study,* prepared by the United States Environmental Protection Agency (USEPA) and United States Army Corps of Engineers (USACE), July 2000.
- Cost estimate does not include previously implemented remediation activities.

Table 7-2
Estimated Costs for Remedial Alternative RS-3
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Assumptions:

1. Sampling and administrative costs include administrative efforts, maintaining project database, sampling efforts not completed, preparing removal packages, etc. Based on previous experience in Operable Units 1 and 2 (OU-1/OU-2). Note that depth data are not available.
2. Includes costs for labor, equipment, and materials to remove soils on residential properties with PCB concentrations greater than or equal to 1 mg/kg to a maximum depth of 4 feet below ground surface. Also includes removal obligations for properties without access or that are unsuitable for removal. Assumes transportation and on-site disposal of excavated soils at the SSSMA. Assumes residential property removal quantities with PCBs at depth (95 properties) based on existing sampling data. Assumes that clean fill material above the PCB-containing soil would be removed with the impacted soil and placed in the SSSMA. A 10% contingency was added to the remedial quantities to address potential PCB impacts in the underlying soil where data are not available.
3. Additional costs for labor, equipment, and materials to load, transport, and dispose of materials with >10 but <50 ppm PCBs at the off-site Three Corners facility. A 10% contingency was added to the remedial quantities to address potential PCB impacts in the underlying soil where data are not available.
4. Additional costs for labor, equipment, and materials to load, transport, and dispose of materials with >50 mg/kg PCBs at the off-site Emelle facility. A 10% contingency was added to the remedial quantities to address potential PCB impacts in the underlying soil where data are not available.
5. Includes labor, equipment, and materials to purchase, import, place, grade, and compact general fill and topsoil to replace removed materials to pre-removal grades.
6. This alternative does not include a residuals management component to the soil management program to address residual PCB concentrations (between 1 mg/kg and 10 mg/kg) in subsurface soil.
7. Annual activities under this item are assumed to include sampling of 11 residential properties where structures are demolished and soil removals on 4 of those properties. It is assumed that excavated soil from 3 of the properties would be disposed of on-site in the SSSMA (based on assumed PCB concentrations less than 10 mg/kg from 5-point composite samples), and soil from 1 property would be disposed of off-site at a nonhazardous waste landfill (based on assumed PCB concentrations less than 10 mg/kg from 5-point composite samples). The estimate assumes that the level of activity will decrease each year as properties are addressed.
8. Assumes 30 years for remediation of residential properties with structures. Based on industry standard and guidance in the document titled *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.
9. Present worth is estimated based on a 7% beginning-of-year discount rate. Present cost factor based on *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.

Table 7-3
Estimated Costs for Remedial Alternative SU-2
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative SU-2: Remove surface soils on high activity special use properties with polychlorinated biphenyl (PCB) concentrations ≥1 milligram per kilogram (mg/kg) and subsurface soils with PCB concentrations ≥10 mg/kg. This alternative is consistent with actions already taken under the Non-Time Critical (NTC) Removal Action Agreement and the Stipulation for high activity special use properties where property access was available and the properties were not overgrown with vegetation. Soil management would be implemented as part of the remedial alternative for high activity special use properties where subsurface soil PCB residuals (between 1 mg/kg and 10 mg/kg) remain. Additional removal actions would be implemented for properties if access is granted or if overgrown conditions change. Soils generated during additional removals may be disposed of on-site in the south staging and soil management area (SSSMA) provided that the PCB concentration results from the five-point composite samples collected for the property are <10 mg/kg. In addition to the remedial actions included with this alternative, the low activity portions of the special use properties would be evaluated and addressed as part of the broader nonresidential areas in OU-1/OU-2. Low activity areas would be monitored. If land use changes to high activity, removal actions will be implemented consistent with the requirements of the NTC Removal Action.

Item No.	Item	Unit Cost	Units	Estimated Quantity	Estimated Cost
	Capital Costs				
1.	Program Administration and Sampling	$3,400	Lump Sum	1	$3,400
2.	Excavation and On-Site Disposal (<10 mg/kg) (low activity)	$5.50	Cubic Feet	25,300	$139,150
3.	Upcharge for T&D Material Off-Site (≥10 ppm <50 ppm)	$75	Cubic Yard	230	$17,250
4.	Backfill Delivery and Placement	$21	Cubic Yard	1,000	$21,000
				TOTAL CAPITAL COST	**$181,000**
	Long-Term Costs (Soil Management Program)				
5.	Addressing PCBs Concentrations at Depth	$8,000	Annually	1	$8,000
6.	High Activity Properties with Structures	$14,000	Annually	1	$14,000
				TOTAL ANNUAL LONG-TERM COST	**$22,000**
	Present Worth of Long-Term Costs				
7.	Years of Long-Term Program (Item 5)	30	Years		
8.	Years of Long-Term Program (Item 6)	10	Years		
9.	Discount Rate	7	%		
				PRESENT WORTH OF ANNUAL LONG-TERM COSTS (YEARS 1-30)	**$197,000**
	Administrative/Management				
				CONSTRUCTION BONDING (3% of Capital Cost)	**$5,000**
				PROJECT MANAGEMENT (5% of Capital Cost)	**$9,000**
				PROJECT MANAGEMENT (5% of Long-Term Cost)	**$10,000**
				ENGINEERING DESIGN/PERMITTING (6% of Capital Cost)	**$11,000**
				CONSTRUCTION MANAGEMENT (6% of Capital Cost)	**$11,000**
				SUBTOTAL	**$424,000**
	Contingency Costs				
				CONTINGENCY CAPITAL COSTS (15% scope + 15% bid)	**$54,000**
				CONTINGENCY LONG-TERM COSTS (10% scope + 10% bid)	**$39,000**
				TOTAL PRESENT WORTH	**$517,000**

General Notes:

- Cost estimate is based on past experience, cost estimating resources, and vendor estimates. Costs provided in 2016 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost.
- Cost factors based on *A Guide to Developing and Documenting Cost Estimates During Feasibility Study,* prepared by the United States Environmental Protection Agency (USEPA) and United States Army Corps of Engineers (USACE), July 2000.
- Cost estimate does not include previously implemented remediation activities.

Table 7-3
Estimated Costs for Remedial Alternative SU-2
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Assumptions:

1. Sampling and administrative costs include administrative efforts, maintaining project database, sampling efforts not completed, preparing removal packages, etc. Based on previous experience in Operable Units 1 and 2 (OU-1/OU-2). Note that depth data are not available. Additional sampling would be required to assess depth impacts.
2. Includes costs for labor, equipment, and materials to remove soils on select low activity special use properties with PCB concentrations greater than or equal to 1 mg/kg (assumed based on the number of low activity areas that are expected to be converted to high activity areas). Assumes transportation and on-site disposal of excavated soils at the SSSMA based on existing sampling data, plus a contingency factor of 15% to address potential PCB impacts in the underlying soil where data are not available.
3. Includes additional costs for off-site transportation and disposal of soils with PCB concentrations greater than 10 mg/kg and less than 50 mg/kg. Quantity is based on 1 low activity area where composite sample data exceeded 10 mg/kg.
4. Includes labor, equipment, and materials to purchase, import, place, grade, and compact general fill and topsoil to replace removed materials to pre-removal grades.
5. A soil management program would be implemented for special use properties where residual PCB concentrations (between 1 mg/kg and 10 mg/kg) remain in subsurface soil. Soil management activities would include interactive outreach with local landowners and/or local communities regarding any plans to disturb these PCB-containing subsurface soils. If replacement of subsurface soils is not feasible at a particular property, provisions would be made for on-site or off-site disposal of these materials and for the placement of clean fill material back into the excavation area. This cost estimate assumes that approximately 250 square feet of area will be addressed on an annual basis as part of the soil management program and that soils generated during the soil management program would be disposed of on-site in the SSSMA.
6. Annual activities under this item assume that sampling and remediation is performed on 1 special use property each year where a structure(s) is demolished. Cost estimate assumes that soil excavated from 75% of the properties would be disposed of on-site in the SSSMA and 25% would be disposed of off-site at a nonhazardous waste landfill. The estimate assumes that the level of activities will decrease each year as properties are addressed.
7. Assumes 30 years for implementation of the soil management program. Based on industry standard and guidance in the document titled *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.
8. The estimate assumes that efforts will continue for 10 years as properties are addressed.
9. Present worth is estimated based on a 7% beginning-of-year discount rate. Present cost factor based on *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.

Table 7-4
Estimated Costs for Remedial Alternative SU-3
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative SU-3: Excavate surface soils with polychlorinated biphenyl (PCB) concentrations ≥1 milligram per kilogram (mg/kg) in the high activity portions of the special use properties. Nonresidential surface soils in low activity areas with PCB concentrations > 1 mg/kg would be removed and disposed of on-site/off-site. The nonresidential surface soil in the low activity areas is being addressed to provide a cancer risk of 1 X 10^{-6} for the young child under the school/day care exposure scenario. Remove subsurface soils with PCB concentrations ≥10 mg/kg. Excavated soils with PCB concentrations <10 mg/kg would be disposed of on-site in the south staging and soil management area (SSSMA), and soils with PCB concentrations ≥ 10 mg/kg would be disposed of in an appropriately permitted off-site landfill. On-site disposal of soils with PCB concentrations <10 mg/kg that have been characterized by five-point composite samples is provided for in the Stipulation through the Non-Time Critical (NTC) Removal Action Agreement. Soil management for subsurface soils would include interactive outreach with landowners regarding any plans to disturb subsurface soils in areas where removal actions were conducted under the Stipulation. If a structure is removed, implement soil removal with on-site/off-site disposal where PCB surface concentrations are ≥1 mg/kg or subsurface concentrations are ≥10 mg/kg.

Item No.	Item	Unit Cost	Units	Estimated Quantity	Estimated Cost
	Capital Costs				
1.	Program Administration and Sampling	$75,000	Lump Sum	1	$75,000
2.	Excavation and On-Site Disposal (<10 mg/kg) (low activity)	$5.50	Cubic Feet	286,400	$1,575,200
3.	Upcharge for T&D Material Off-Site (≥10 ppm <50 ppm)	$75	Cubic Yard	230	$17,250
4.	Backfill Delivery and Placement	$21	Cubic Yard	10,600	$222,600
				TOTAL CAPITAL COST	**$1,890,000**
	Long-Term Costs				
5.	Soil Management Program	$11,000	Annually	1	$11,000
6.	High Activity Properties with Structures	$14,000	Annually	1	$14,000
				TOTAL ANNUAL LONG-TERM COST	**$25,000**
	Present Worth of Long-Term Costs				
7.	Years of Long-Term Program (Item 5)	30	Years		
8.	Years of Long-Term Program (Item 6)	10	Years		
9.	Discount Rate	7	%		
				PRESENT WORTH OF ANNUAL LONG-TERM COSTS (YEARS 1-30)	**$234,000**
	Administrative/Management				
				CONSTRUCTION BONDING (3% of Capital Cost)	**$57,000**
				PROJECT MANAGEMENT (5% of Capital Cost)	**$95,000**
				PROJECT MANAGEMENT (5% of Long-Term Cost)	**$12,000**
				ENGINEERING DESIGN/PERMITTING (6% of Capital Cost)	**$113,000**
				CONSTRUCTION MANAGEMENT (6% of Capital Cost)	**$113,000**
				SUBTOTAL	**$2,514,000**
	Contingency Costs				
				CONTINGENCY CAPITAL COSTS (15% scope + 15% bid)	**$567,000**
				CONTINGENCY LONG-TERM COSTS (10% scope + 10% bid)	**$47,000**
				TOTAL PRESENT WORTH	**$3,128,000**

General Notes:

- Cost estimate is based on past experience, cost estimating resources, and vendor estimates. Costs provided in 2016 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost.
- Cost factors based on *A Guide to Developing and Documenting Cost Estimates During Feasibility Study,* prepared by the United States Environmental Protection Agency (USEPA) and United States Army Corps of Engineers (USACE), July 2000.
- Cost estimate does not include previously implemented remediation activities.

Table 7-4
Estimated Costs for Remedial Alternative SU-3
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Assumptions:

1. Sampling and administrative costs include administrative efforts, maintaining project database, sampling efforts not completed, preparing removal packages, etc. Based on previous experience in Operable Units 1 and 2 (OU-1/OU-2). Note that depth data are not available. Additional sampling would be required to assess depth impacts.
2. Includes costs for labor, equipment, and materials to remove soils on low activity special use properties with PCB concentrations greater than or equal to 1 mg/kg. Assumes transportation and on-site disposal of excavated soils at the SSSMA. Assumes low activity special use property removal quantities with PCBs greater than or equal to 1 mg/kg (19 properties - 249,000 square feet) based on existing sampling data, plus a contingency factor of 15% to address potential PCB impacts in the underlying soil where data are not available. Assumes that clean fill material above the PCB-containing soil would be removed with the impacted soil and placed in the SSSMA.
3. Includes additional costs for off-site transportation and disposal of soils with PCB concentrations greater than 10 mg/kg and less than 50 mg/kg. Quantity is based on 1 low activity area where composite sample data exceeded 10 mg/kg.
4. Includes labor, equipment, and materials to purchase, import, place, grade, and compact general fill and topsoil to replace removed materials to pre-removal grades.
5. A soil management program would be implemented for special use properties where residual PCB concentrations (between 1 mg/kg and 10 mg/kg) remain in subsurface soil. Soil management activities would include interactive outreach with local landowners and/or local communities regarding any plans to disturb these PCB-containing subsurface soils. If replacement of subsurface soils is not feasible at a particular property, provisions would be made for on-site or off-site disposal of these materials and for the placement of clean fill material back into the excavation area. This cost estimate assumes that approximately 500 square feet of area will be addressed on an annual basis as part of the soil management program and that soils generated during the soil management program would be disposed of on-site in the SSSMA.
6. Annual activities under this item assume that sampling and remediation is performed on 1 special use property each year where a structure(s) is demolished. Cost estimate assumes that soil excavated from 75% of the properties would be disposed of on-site in the SSSMA and 25% would be disposed of off-site at a nonhazardous waste landfill. The estimate assumes that the level of activities will decrease each year as properties are addressed.
7. The estimate assumes that efforts associated with low activity properties will continue for 30 years. Based on industry standard and guidance in the document titled *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.
8. The estimate assumes that efforts will continue for 10 years as properties are addressed.
9. Present worth is estimated based on a 7% beginning-of-year discount rate. Present cost factor based on *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.

Table 7-5
Estimated Costs for Remedial Alternative SU-4
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative SU-4: Excavate surface and subsurface soils to a maximum depth of 4 feet below ground surface with polychlorinated biphenyl (PCB) concentrations ≥1 milligram per kilogram (mg/kg) in the high activity portions of the special use properties. Excavate surface and subsurface nonresidential soils in the low activity areas with PCB concentrations > 1 mg/kg. The nonresidential soil in the low activity areas is being addressed to provide a cancer risk of 1 X 10^{-6} for the young child under the school/day care exposure scenario. Excavated soils with PCB concentrations <10 mg/kg would be disposed of on-site in the south staging and soil management area (SSSMA), and soils with PCB concentrations ≥ 10 mg/kg would be disposed of in an appropriately permitted off-site landfill. On-site disposal of soils with PCB concentrations <10 mg/kg is provided for in the Stipulation through the NTC Removal Action Agreement that USEPA approved for the Site. The technical approach described in the Non-Time Critical (NTC) Removal Action Agreement includes the use of five-point composite soil samples to characterize PCBs for the purposes of removal and disposal. If a structure from a high or low activity area is removed, implement subsurface soil removal with on-site/off-site disposal where PCB concentrations are ≥1 mg/kg.

Item No.	Item	Unit Cost	Units	Estimated Quantity	Estimated Cost
	Capital Costs				
1.	Program Administration and Sampling	$75,000	Lump Sum	1	$75,000
2.	Excavation and On-Site Disposal (<10 mg/kg)	$5.50	Cubic Feet	388,600	$2,137,300
3.	Upcharge for T&D Material Off-Site (≥10 ppm <50 ppm)	$75	Cubic Yard	230	$17,250
4.	Backfill Delivery and Placement	$21	Cubic Yard	14,400	$302,400
				TOTAL CAPITAL COST	**$2,532,000**
	Long-Term Costs				
5.	Soil Management Program	$0	Annually	1	$0
6.	High Activity Properties with Structures	$14,000	Annually	1	$14,000
				TOTAL ANNUAL LONG-TERM COST	**$14,000**
	Present Worth of Long-Term Costs				
7.	Years of Long-Term Program (Item 5)	30	Years		
8.	Years of Long-Term Program (Item 6)	10	Years		
9.	Discount Rate	7	%		
				PRESENT WORTH OF ANNUAL LONG-TERM COSTS (YEARS 1-30)	**$98,000**
	Administrative/Management				
				CONSTRUCTION BONDING (3% of Capital Cost)	**$76,000**
				PROJECT MANAGEMENT (5% of Capital Cost)	**$127,000**
				PROJECT MANAGEMENT (5% of Long-Term Cost)	**$5,000**
				ENGINEERING DESIGN/PERMITTING (6% of Capital Cost)	**$152,000**
				CONSTRUCTION MANAGEMENT (6% of Capital Cost)	**$152,000**
				SUBTOTAL	**$3,142,000**
	Contingency Costs				
				CONTINGENCY CAPITAL COSTS (15% scope + 15% bid)	**$760,000**
				CONTINGENCY LONG-TERM COSTS (10% scope + 10% bid)	**$20,000**
				TOTAL PRESENT WORTH	**$3,922,000**

General Notes:

- Cost estimate is based on past experience, cost estimating resources, and vendor estimates. Costs provided in 2016 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost.
- Cost factors based on *A Guide to Developing and Documenting Cost Estimates During Feasibility Study,* prepared by the United States Environmental Protection Agency (USEPA) and United States Army Corps of Engineers (USACE), July 2000.
- Cost estimate does not include previously implemented remediation activities.

Table 7-5
Estimated Costs for Remedial Alternative SU-4
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Assumptions:

1. Sampling and administrative costs include administrative efforts, maintaining project database, sampling efforts not completed, preparing removal packages, etc. Based on previous experience in Operable Units 1 and 2 (OU-1/OU-2). Note that depth data are not available. Additional sampling would be required to assess depth impacts.
2. Includes costs for labor, equipment, and materials to remove soils on low and high activity special use properties with PCB concentrations greater than or equal to 1 mg/kg. Assumes transportation and on-site disposal of excavated soils at the SSSMA. Assumes low activity (19 properties - 249,000 square feet) and high activity (3 properties - 83,000 square feet) special use property removal quantities with PCBs greater than or equal to 1 mg/kg based on existing sampling data, plus a contingency factor of 20% to address potential PCB impacts in the underlying soil where data are not available. Includes an extra 1 foot of removal at the 401 Chestnut property (0.75 acres) where PCB concentrations between 1 and 10 mg/kg were recorded. For high activity areas, assumes that clean fill material above the PCB-containing soil would be removed with the impacted soil and placed in the SSSMA.
3. Includes additional costs for off-site transportation and disposal of soils with PCB concentrations greater than 10 mg/kg and less than 50 mg/kg. Quantity is based on 1 low activity area where composite sample data exceeded 10 mg/kg.
4. Includes labor, equipment, and materials to purchase, import, place, grade, and compact general fill and topsoil to replace removed materials to pre-removal grades.
5. A soil management program would not be required for this alternative based on the extent of removal.
6. Annual activities under this item assume that sampling and remediation is performed on 1 special use property each year where a structure(s) is demolished. Cost estimate assumes that soil excavated from 75% of the properties would be disposed of on-site in the SSSMA and 25% would be disposed of off-site at a nonhazardous waste landfill. The estimate assumes that the level of activities will decrease each year as properties are addressed.
7. The estimate assumes that efforts associated with low activity properties will continue for 30 years. Based on industry standard and guidance in the document titled *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.
8. The estimate assumes that efforts will continue for 10 years as properties are addressed.
9. Present worth is estimated based on a 7% beginning-of-year discount rate. Present cost factor based on *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.

Table 7-6
Estimated Costs for Remedial Alternative IM-2
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative IM-2: Expand existing interim measures (IMs) in the Eastside Area, the Eastside Drainage Way (including the drainage ditch to the north and PB-RR-37), and the Northside Area to meet the nonresidential preliminary remediation goal for polychlorinated biphenyls (PCBs) of 21 milligrams per kilogram (mg/kg) and address locations with PCBs ≥ 50 mg/kg. This would include placing caps and covers using the original approaches used for these IMs. The approach for capping drainage way areas with high PCB concentrations included placing a low-permeability liner, covering the liner with a 12-inch layer of clean soil, and planting vegetation to stabilize the area. Nondrainage way areas included a cover system with a geotextile marker layer, a 12-inch layer of clean backfill, and vegetation to stabilize the area. Further evaluate potential principal threat waste (PTW) in the Eastside IM during the remedial design (RD) to confirm PTW is not present. If PTW is found to be present, these materials would be addressed as part of the remedy using an approach selected by the United States Environmental Protection Agency (USEPA) as part of the RD. Conduct long-term operation and maintenance (O&M) for the covers, and implement institutional controls (ICs), if applicable.

Item No.	Item	Unit Cost	Units	Estimated Quantity	Estimated Cost
	Capital Costs				
1.	Mobilization / Demobilization	10%	Lump Sum	1	$46,000
2.	Temporary Facilities	$10,000	Month	3	$30,000
3.	Clearing and Site Preparation	$4,000	Acre	2.5	$10,000
4.	Surveying	$13,000	Lump Sum	1	$13,000
5.	Erosion, Sediment, and Storm Water Control	$10,000	Lump Sum	1	$10,000
6.	Geotextile Marker Layer	$0.25	Square Feet	108,900	$27,225
7.	Soil Cover Installation	$15	Square Yard	12,100	$181,500
8.	Low-Permeability Membrane Installation	$9	Square Yard	12,100	$108,900
9.	Armor Stone Placement	$45	Ton	1,000	$45,000
10.	Contractor Health & Safety/Air Monitoring	$10,000	Month	3	$30,000
11.	PTW Evaluation	$100,000	Lump Sum	1	$100,000
12.	Institutional Controls	$100,000	Lump Sum	1	$100,000
				TOTAL CAPITAL COST	**$702,000**
	Long-Term Costs				
13.	Cover Inspection and Maintenance	$100,000	Annually	1	$100,000
				TOTAL ANNUAL LONG-TERM COST	**$100,000**
	Present Worth of Long-Term Costs				
14.	Years of Long-Term Program	30	Years		
15.	Discount Rate	7	%		
				PRESENT WORTH OF ANNUAL LONG-TERM COSTS (YEARS 1-30)	**$1,241,000**
	Administrative/Management				
				CONSTRUCTION BONDING (3% of Capital Cost)	**$21,000**
				PROJECT MANAGEMENT (5% of Capital Cost)	**$35,000**
				PROJECT MANAGEMENT (5% of Long-Term Cost)	**$62,000**
				ENGINEERING DESIGN/PERMITTING (6% of Capital Cost)	**$42,000**
				CONSTRUCTION MANAGEMENT (6% of Capital Cost)	**$42,000**
				SUBTOTAL	**$2,145,000**
	Contingency Costs				
				CONTINGENCY CAPITAL COSTS (15% scope + 15% bid)	**$211,000**
				CONTINGENCY LONG-TERM COSTS (10% scope + 10% bid)	**$248,000**
				TOTAL PRESENT WORTH	**$2,604,000**

General Notes:

- Cost estimate is based on past experience, cost estimating resources, and vendor estimates. Costs provided in 2016 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost.
- Cost factors based on *A Guide to Developing and Documenting Cost Estimates During Feasibility Study,* prepared by the USEPA and United States Army Corps of Engineers (USACE), July 2000.
- Cost estimate does not include previously implemented remediation activities.

Table 7-6
Estimated Costs for Remedial Alternative IM-2
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Assumptions:

1. Includes costs for mobilization/demobilization of labor, equipment, and materials to perform the remedial construction activities. The cost is estimated as 10% of the total capital cost for the alternative, excluding ICs costs. It is assumed that a single mobilization/demobilization will be necessary.
2. Includes costs for temporary facilities and utilities including project trailers, sanitation/waste facilities and services, field office services, and fuel storage.
3. Includes costs for labor, equipment, and materials to perform clearing, construct support facilities areas, and otherwise prepare the site for construction.
4. Includes costs for labor, equipment, and materials to perform pre- and post-construction survey of the IM remedial areas to verify, confirm, and document pre- and post-construction elevations and conditions.
5. Includes costs for labor, equipment, and materials to install and manage temporary erosion and sedimentation controls.
6. Includes costs for labor, equipment, and materials to place a geotextile marker layer over the excavated surface prior to placing soil cover.
7. Includes costs for labor, equipment, and materials to install a soil cover system in nondrainage ways. The soil cover system would include a geotextile marker layer, 12-inch layer of clean backfill, and vegetation for stability. The cost estimate assumes that soil covers will be placed on a total footprint of 2.5 acres.
8. Includes costs for labor, equipment, and materials to install a low-permeability low-density polyethylene (LDPE) geomembrane where PCB concentrations were elevated and the areas were located near or in a drainage way. The low-permeability liner would be covered by a 12-inch layer of clean soil and vegetated for stability. The cost estimate assumes that the low-permeability LDPE cap will be placed at sample location PB-RR-37 over a footprint of 300 square yards.
9. Includes costs for labor, equipment, and materials to deliver and install approximately 1,000 tons of riprap stone as part of the IM expansion project to protect the soil cover from storm water runoff and erosion, and to cover impacted soil in the northern drainage ditch.
10. Includes costs for labor, equipment, and materials for contractor health and safety activities, monitoring dust and air emissions during intrusive activities, and dust control, as necessary.
11. The scope of the investigation to confirm that PTW is not present at the Eastside Area will be developed in conjunction with the USEPA as part the predesign investigation.
12. Includes administrative and legal costs to implement institutional controls (e.g., deed restrictions, environmental covenants) to limit future property use where engineering controls are installed.
13. Long-term O&M activities would include periodic inspection of the engineered cover systems to document their condition and perform maintenance and repairs as needed to maintain the integrity of the cover system.
14. Assumes 30 years for implementation of long-term cover inspection and maintenance activities based on industry standard and guidance in the document titled *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.
15. Present worth is estimated based on a 7% beginning-of-year discount rate. Present cost factor based on *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.

Table 7-7
Estimated Costs for Remedial Alternative IM-3
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative IM-3: Expand existing interim measures (IMs) in the Eastside Area, the Eastside Drainage Way (including the drainage ditch to the north), and the Northside Area to meet the nonresidential preliminary remediation goal for polychlorinated biphenyls (PCBs) of 21 milligrams per kilogram (mg/kg) and address locations with PCBs ≥ 50 mg/kg, except for the PB-RR-37 area that would be excavated. The technical approaches for placing caps and covers is based on the original approaches used for these IMs. The approach for capping drainage way areas with high PCB concentrations included placing a low-permeability liner, covering the liner with a 12-inch layer of clean soil, and planting vegetation to stabilize the area. Nondrainage way areas included a cover system with a geotextile marker layer, a 12-inch layer of clean backfill, and vegetation to stabilize the area. Further evaluate potential principal threat waste (PTW) in the Eastside IM during the remedial design (RD) to confirm PTW is not present. If PTW is found to be present, these materials will be addressed as part of the remedy using an approach selected by the United States Environmental Protection Agency (USEPA) as part of the RD. Conduct long-term operation and maintenance (O&M) for the covers, and implement institutional controls (ICs), if applicable.

Item No.	Item	Unit Cost	Units	Estimated Quantity	Estimated Cost
	Capital Costs				
1.	Mobilization / Demobilization	10%	Lump Sum	1	$43,000
2.	Temporary Facilities	$10,000	Month	3	$30,000
3.	Clearing and Site Preparation	$4,000	Acre	2.5	$10,000
4.	Surveying	$13,000	Lump Sum	1	$13,000
5.	Erosion, Sediment, and Storm Water Control	$10,000	Lump Sum	1	$10,000
6.	Excavation	$20	Ton	100	$2,000
7.	Transportation and Off-site Disposal (≥50 mg/kg)	$200	Ton	100	$20,000
8.	Geotextile Marker Layer	$0.25	Square Feet	108,900	$27,225
9.	Soil Cover Installation	$15	Square Yard	12,100	$181,500
10.	Low-Permeability Membrane Installation	$9	Square Yard	12,100	$108,900
11.	Armor Stone Placement	$45	Ton	1,000	$45,000
12.	Contractor Health & Safety/Air Monitoring	$10,000	Month	3	$30,000
13.	PTW Evaluation	$100,000	Lump Sum	1	$100,000
14.	Institutional Controls	$100,000	Lump Sum	1	$100,000
				TOTAL CAPITAL COST	**$721,000**
	Long-Term Costs				
15.	Cover Inspection and Maintenance	$100,000	Annually	1	$100,000
				TOTAL ANNUAL LONG-TERM COST	**$100,000**
	Present Worth of Long-Term Costs				
16.	Years of Long-Term Program	30	Years		
17.	Discount Rate	7	%		
				PRESENT WORTH OF ANNUAL LONG-TERM COSTS (YEARS 1-30)	**$1,241,000**
	Administrative/Management				
				CONSTRUCTION BONDING (3% of Capital Cost)	**$22,000**
				PROJECT MANAGEMENT (5% of Capital Cost)	**$36,000**
				PROJECT MANAGEMENT (5% of Long-Term Cost)	**$62,000**
				ENGINEERING DESIGN/PERMITTING (6% of Capital Cost)	**$43,000**
				CONSTRUCTION MANAGEMENT (6% of Capital Cost)	**$43,000**
				SUBTOTAL	**$2,168,000**
	Contingency Costs				
				CONTINGENCY CAPITAL COSTS (15% scope + 15% bid)	**$216,000**
				CONTINGENCY LONG-TERM COSTS (10% scope + 10% bid)	**$248,000**
				TOTAL PRESENT WORTH	**$2,632,000**

General Notes:

- Cost estimate is based on past experience, cost estimating resources, and vendor estimates. Costs provided in 2016 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost.
- Cost factors based on *A Guide to Developing and Documenting Cost Estimates During Feasibility Study,* prepared by the USEPA and United States Army Corps of Engineers (USACE), July 2000.
- Cost estimate does not include previously implemented remediation activities.

Table 7-7
Estimated Costs for Remedial Alternative IM-3
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Assumptions:

1. Includes costs for mobilization/demobilization of labor, equipment, and materials to perform the remedial construction activities. The cost is estimated as 10% of the total capital cost for the alternative, excluding transportation/disposal and ICs costs. It is assumed that a single mobilization/demobilization will be necessary.
2. Includes costs for temporary facilities and utilities including project trailers, sanitation/waste facilities and services, field office services, and fuel storage.
3. Includes costs for labor, equipment, and materials to perform clearing, construct support facilities areas, and otherwise prepare the site for construction.
4. Includes costs for labor, equipment, and materials to perform pre- and post-construction survey of the IM remedial areas to verify, confirm, and document pre- and post-construction elevations and conditions.
5. Includes costs for labor, equipment, and materials to install and manage temporary erosion and sedimentation controls.
6. Includes costs for labor, equipment, and materials to remove soil at sample location PB-RR-37 to address high PCB concentrations in the ditch adjacent to the railroad tracks.
7. Includes costs for labor, equipment, and materials to transport and dispose of soil offsite from sample location PB-RR-37 to address high PCB concentrations in the ditch adjacent to the railroad tracks.
8. Includes costs for labor, equipment, and materials to place a geotextile marker layer over the excavated surface prior to placing soil cover.
9. Includes costs for labor, equipment, and materials to install a soil cover system in nondrainage ways. The soil cover system would include a geotextile marker layer, 12-inch layer of clean backfill, and vegetation for stability. The cost estimate assumes that soil covers will be placed on a total footprint of 2.5 acres.
10. Includes costs for labor, equipment, and materials to install a low-permeability low-density polyethylene (LDPE) geomembrane where PCB concentrations were elevated and the areas were located near or in a drainage way. The low-permeability liner would be covered by a 12-inch layer of clean soil and vegetated for stability. The cost estimate assumes that the low-permeability LDPE cap will be placed at sample location PB-RR-37 over a footprint of 300 square yards.
11. Includes costs for labor, equipment, and materials to deliver and install approximately 1,000 tons of riprap stone as part of the IM expansion project to protection the soil cover from storm water runoff and erosion, and to cover impacted soil in the northern drainage ditch.
12. Includes costs for labor, equipment, and materials for contractor health and safety activities, monitoring dust and air emissions during intrusive activities, and dust control, as necessary.
13. The scope of the investigation to confirm that PTW is not present at the Eastside Area will be developed in conjunction with the USEPA as part the predesign investigation.
14. Includes administrative and legal costs to implement institutional controls (e.g., deed restrictions, environmental covenants) to limit future property use where engineering controls are installed.
15. Long-term O&M activities would include periodic inspection of the engineered cover systems to document their condition and perform maintenance and repairs as needed to maintain the integrity of the cover system.
16. Assumes 30 years for implementation of long-term cover inspection and maintenance activities based on industry standard and guidance in the document titled *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.
17. Present worth is estimated based on a 7% beginning-of-year discount rate. Present cost factor based on *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.

Table 7-8
Estimated Costs for Remedial Alternative IM-4
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative IM-4: Expand existing interim measures (IMs) including portions of the Eastside Area, the Eastside Drainage Way (including the drainage ditch to the north), and the Northside Area to meet the nonresidential preliminary remediation goal (PRG) for polychlorinated biphenyls (PCBs) of 21 milligrams per kilogram (mg/kg) and address locations with PCBs≥ 50 mg/kg. This would include the excavation and off-site disposal of surface soils in the IM expansion areas, placing a 12-inch layer of clean backfill and vegetation to stabilize the areas. Further evaluate potential principal threat waste (PTW) in the Eastside IM during the remedial design (RD) to confirm PTW is not present. If PTW is found to be present, these materials will be addressed as part of the remedy using an approach selected by the United States Environmental Protection Agency (USEPA) as part of the RD. Conduct long-term operation and maintenance (O&M) for the covers and implement institutional controls (ICs), if applicable.

Item No.	Item	Unit Cost	Units	Estimated Quantity	Estimated Cost
	Capital Costs				
1.	Mobilization / Demobilization	10%	Lump Sum	1	$26,000
2.	Temporary Facilities	$10,000	Month	3	$30,000
3.	Clearing and Site Preparation	$4,000	Acre	2.5	$10,000
4.	Surveying	$13,000	Lump Sum	1	$13,000
5.	Erosion, Sediment, and Storm Water Control	$10,000	Lump Sum	1	$10,000
6.	Excavation	$20	Ton	6,200	$124,000
7.	Transportation and Off-site Disposal (≥50 mg/kg)	$200	Ton	6,200	$1,240,000
8.	Backfill Delivery and Placement	$21	Cubic Yard	4,200	$88,200
9.	Surface Restoration	$28,300	Acre	3	$70,750
10.	Contractor Health & Safety/Air Monitoring	$10,000	Month	3	$30,000
11.	PTW Evaluation	$100,000	Lump Sum	1	$100,000
12.	Institutional Controls	$100,000	Lump Sum	1	$100,000
				TOTAL CAPITAL COST	**$1,842,000**
	Long-Term Costs				
13.	Cover Inspection and Maintenance	$100,000	Annually	1	$100,000
				TOTAL ANNUAL LONG-TERM COST	**$100,000**
	Present Worth of Long-Term Costs				
14.	Years of Long-Term Program	30	Years		
15.	Discount Rate	7	%		
				PRESENT WORTH OF ANNUAL LONG-TERM COSTS (YEARS 1-30)	**$1,241,000**
	Administrative/Management				
				CONSTRUCTION BONDING (3% of Capital Cost)	**$55,000**
				PROJECT MANAGEMENT (5% of Capital Cost)	**$92,000**
				PROJECT MANAGEMENT (5% of Long-Term Cost)	**$62,000**
				ENGINEERING DESIGN/PERMITTING (6% of Capital Cost)	**$111,000**
				CONSTRUCTION MANAGEMENT (6% of Capital Cost)	**$111,000**
				SUBTOTAL	**$3,514,000**
	Contingency Costs				
				CONTINGENCY CAPITAL COSTS (15% scope + 15% bid)	**$553,000**
				CONTINGENCY LONG-TERM COSTS (10% scope + 10% bid)	**$248,000**
				TOTAL PRESENT WORTH	**$4,315,000**

General Notes:

- Cost estimate is based on past experience, cost estimating resources, and vendor estimates. Costs provided in 2016 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost.
- Cost factors based on *A Guide to Developing and Documenting Cost Estimates During Feasibility Study,* prepared by the USEPA and United States Army Corps of Engineers (USACE), July 2000.
- Cost estimate does not include previously implemented remediation activities.

Table 7-8
Estimated Costs for Remedial Alternative IM-4
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Assumptions:

1. Includes costs for mobilization/demobilization of labor, equipment, and materials to perform the remedial construction activities. The cost is estimated as 10% of the total capital cost for the alternative, excluding transportation/disposal and ICs costs. It is assumed that a single mobilization/demobilization will be necessary.
2. Includes costs for temporary facilities and utilities including project trailers, sanitation/waste facilities and services, field office services, and fuel storage.
3. Includes costs for labor, equipment, and materials to perform clearing, construct support facilities areas, and otherwise prepare the site for construction.
4. Includes costs for labor, equipment, and materials to perform pre- and post-construction survey of the IM remedial areas to verify, confirm, and document pre- and post-construction elevations and conditions.
5. Includes costs for labor, equipment, and materials to install and manage temporary erosion and sedimentation controls.
6. Includes costs for labor, equipment, and materials to remove soil from areas exceeding the nonresidential PRG for PCBs of 21 mg/kg and areas with PCBs ≥ 50 mg/kg.
7. Includes costs for labor, equipment, and materials to transport and dispose of soil offsite from areas exceeding the nonresidential PRG for PCBs of 21 mg/kg and areas with PCBs ≥ 50 mg/kg.
8. Includes labor, equipment, and materials to purchase, import, place, grade, and compact general fill and topsoil to replace materials removed to meet surrounding grade.
9. Includes costs for labor, equipment, and materials to restore disturbed areas following construction. Includes topsoil placement, grading, seeding, mulching, and limited tree/shrub planting.
10. Includes costs for labor, equipment, and materials for contractor health and safety activities, monitoring dust and air emissions during intrusive activities, and dust control, as necessary.
11. The scope of the investigation to confirm that PTW is not present at the Eastside Area will be developed in conjunction with the USEPA as part the predesign investigation.
12. Includes administrative and legal costs to implement ICs (e.g., deed restrictions, environmental covenants) to limit future property use where engineering controls are installed.
13. Long-term O&M activities would include periodic inspection of the engineered cover systems to document their condition and perform maintenance and repairs as needed to maintain the integrity of the cover system.
14. Assumes 30 years for implementation of long-term cover inspection and maintenance activities based on industry standard and guidance in the document titled *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.
15. Present worth is estimated based on a 7% beginning-of-year discount rate. Present cost factor based on *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.

Table 7-9
Estimated Costs for Remedial Alternative DSP-2
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative DSP-2: Excavation and off-site disposal of dredge spoil pile SC-8. All of the excavated materials are anticipated to have polychlorinated biphenyls (PCBs) concentrations <50 milligrams per kilogram (mg/kg) and would be disposed of in an off-site nonhazardous waste landfill. The area beneath dredge spoil pile SC-8 would be addressed as part of the nonresidential portion of the floodplain.

Item No.	Item	Unit Cost	Units	Estimated Quantity	Estimated Cost
	Capital Costs				
1.	Mobilization / Demobilization	10%	Lump Sum	1	$22,000
2.	Temporary Facilities	$10,000	Month	1	$10,000
3.	Clearing and Site Preparation	$20,000	Acre	1.2	$24,000
4.	Surveying	$6,000	Lump Sum	1	$6,000
5.	Erosion, Sediment, and Storm Water Control	$4,500	Lump Sum	1	$4,500
6.	Soil Excavation	$25	Cubic Yard	4,900	$122,500
7.	Waste Transportation and Off-site Disposal (<50 mg/kg)	$50	Ton	7,350	$367,500
8.	Backfill Delivery and Placement	$21	Cubic Yard	1,200	$25,200
9.	Surface Restoration	$28,300	Acre	1.2	$33,960
10.	Contractor Health & Safety/Air Monitoring	$10,000	Month	1	$10,000
11.	Predesign Investigation	$5,000	Lump Sum	1	$5,000
				TOTAL CAPITAL COST	**$631,000**
	Long-Term Costs				
12.	None	$0	Annually	1	$0
				TOTAL ANNUAL LONG-TERM COST	**$0**
	Present Worth of Long-Term Costs				
13.	Years of Long-Term Program	0	Years		
14.	Discount Rate	7	%		
				PRESENT WORTH OF ANNUAL LONG-TERM COSTS (YEARS 1-30)	**$0**
	Administrative/Management				
				CONSTRUCTION BONDING (3% of Capital Cost)	**$19,000**
				PROJECT MANAGEMENT (5% of Capital Cost)	**$32,000**
				PROJECT MANAGEMENT (5% of Long-Term Cost)	**$0**
				ENGINEERING DESIGN/PERMITTING (6% of Capital Cost)	**$38,000**
				CONSTRUCTION MANAGEMENT (6% of Capital Cost)	**$38,000**
				SUBTOTAL	**$758,000**
	Contingency Costs				
				CONTINGENCY CAPITAL COSTS (15% scope + 15% bid)	**$189,000**
				CONTINGENCY LONG-TERM COSTS (10% scope + 10% bid)	**$0**
				TOTAL PRESENT WORTH	**$947,000**

General Notes:

- Cost estimate is based on past experience, cost estimating resources, and vendor estimates. Costs provided in 2016 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost.
- Cost factors based on *A Guide to Developing and Documenting Cost Estimates During Feasibility Study,* prepared by the United States Environmental Protection Agency and United States Army Corps of Engineers, July 2000.

Table 7-9
Estimated Costs for Remedial Alternative DSP-2
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Assumptions:

1. Includes costs for mobilization/demobilization of labor, equipment, and materials to perform the remedial construction activities. The cost is estimated as 10% of the total capital cost for the alternative, excluding transportation/disposal costs. It is assumed that a single mobilization/demobilization will be necessary.
2. Includes costs for temporary facilities and utilities including project trailers, sanitation/waste facilities and services, field office services, and fuel storage.
3. Includes costs for labor, equipment, and materials to perform clearing, construct support facilities areas, and otherwise prepare the site for construction. Clearing costs assume that approximately 1.2 acres of heavily wooded area will require clearing to allow access to complete the dredge spoil removal activities.
4. Includes costs for labor, equipment, and materials to perform pre- and post-construction survey of the remedial areas to verify, confirm, and document pre- and post-construction elevations and conditions.
5. Includes costs for labor, equipment, and materials to install and manage temporary erosion and sedimentation controls.
6. Includes costs for labor, equipment, and materials to excavate approximately dredge spoil SC-8. Based on prior observations during prior reconnaissance efforts, it is estimated that the dredge spoil thickness is 3 feet and approximately 4,900 cubic yards of soil will be excavated under this alternative.
7. Includes transportation and off-site disposal of material excavated from SC-8 at a nonhazardous landfill. Existing sampling data indicate that PCB concentrations are less than 50 mg/kg in dredge spoil pile SC-8. Cost estimate assumes a soil density of 1.5 tons per cubic yard.
8. Includes labor, equipment, and materials to purchase, import, place, grade, and compact general fill and topsoil to replace materials removed from SC 8 to meet surrounding grade.
9. Includes costs for labor, equipment, and materials to restore disturbed areas following construction. Includes topsoil placement, grading, seeding, mulching, and limited tree/shrub planting.
10. Includes costs for labor, equipment, and materials for contractor health and safety activities, monitoring dust and air emissions during intrusive activities, and dust control, as necessary.
11. Includes costs for labor, equipment, and materials to perform predesign soil sampling activities for dredge spoil pile SC-2 to determine if the results of the sampling indicated that the PCB exposure point concentration is greater than or equal to 21 mg/kg.
12. No long-term monitoring, maintenance, or inspection is included under this alternative.

Table 7-10
Estimated Costs for Remedial Alternative DSP-3
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative DSP-3: Excavation and off-site/on-site disposal of dredge spoil pile SC-8. Materials with polychlorinated biphenyls (PCBs) concentrations <50 milligrams per kilogram (mg/kg) would be disposed of on-site, and materials with concentrations≥50 mg/kg would be disposed of off-site. Based on the characterization data for the dredge spoil pile SC-8, little to none of the material from dredge spoil pile SC-8 would require off-site disposal. The area beneath dredge spoil pile SC-8 would be addressed as part of the nonresidential portion of the floodplain.

Item No.	Item	Unit Cost	Units	Estimated Quantity	Estimated Cost
	Capital Costs				
1.	Mobilization / Demobilization	10%	Lump Sum	1	$22,000
2.	Temporary Facilities	$10,000	Month	1	$10,000
3.	Clearing and Site Preparation	$20,000	Acre	1.2	$24,000
4.	Surveying	$6,000	Lump Sum	1	$6,000
5.	Erosion, Sediment, and Storm Water Control	$4,500	Lump Sum	1	$4,500
6.	Soil Excavation	$25	Cubic Yard	4,900	$122,500
7.	Waste Transportation and On-site Disposal (<50 mg/kg)	$8	Ton	7,350	$61,005
8.	Backfill Delivery and Placement	$21	Cubic Yard	1,200	$25,200
9.	Surface Restoration	$28,300	Acre	1.2	$33,960
10.	Contractor Health & Safety/Air Monitoring	$10,000	Month	1	$10,000
11.	Predesign Investigation	$5,000	Lump Sum	1	$5,000
				TOTAL CAPITAL COST	**$324,000**
	Long-Term Costs				
12.	None	$0	Annually	1	$0
				TOTAL ANNUAL LONG-TERM COST	**$0**
	Present Worth of Long-Term Costs				
13.	Years of Long-Term Program	0	Years		
14.	Discount Rate	7	%		
				PRESENT WORTH OF ANNUAL LONG-TERM COSTS (YEARS 1-30)	**$0**
	Administrative/Management				
				CONSTRUCTION BONDING (3% of Capital Cost)	**$10,000**
				PROJECT MANAGEMENT (5% of Capital Cost)	**$16,000**
				PROJECT MANAGEMENT (5% of Long-Term Cost)	**$0**
				ENGINEERING DESIGN/PERMITTING (6% of Capital Cost)	**$19,000**
				CONSTRUCTION MANAGEMENT (6% of Capital Cost)	**$19,000**
				SUBTOTAL	**$388,000**
	Contingency Costs				
				CONTINGENCY CAPITAL COSTS (15% scope + 15% bid)	**$97,000**
				CONTINGENCY LONG-TERM COSTS (10% scope + 10% bid)	**$0**
				TOTAL PRESENT WORTH	**$485,000**

General Notes:

- Cost estimate is based on past experience, cost estimating resources, and vendor estimates. Costs provided in 2016 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost.
- Cost factors based on *A Guide to Developing and Documenting Cost Estimates During Feasibility Study,* prepared by the United States Environmental Protection Agency and United States Army Corps of Engineers, July 2000.

Table 7-10
Estimated Costs for Remedial Alternative DSP-3
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Assumptions:

1. Includes costs for mobilization/demobilization of labor, equipment, and materials to perform the remedial construction activities. The cost is estimated as 10% of the total capital cost for the alternative, excluding transportation/disposal costs. It is assumed that a single mobilization/demobilization will be necessary.
2. Includes costs for temporary facilities and utilities including project trailers, sanitation/waste facilities and services, field office services, and fuel storage.
3. Includes costs for labor, equipment, and materials to perform clearing, construct support facilities areas, and otherwise prepare the site for construction. Clearing costs assume that approximately 1.2 acres of heavily wooded area will require clearing to allow access to complete the dredge spoil removal activities.
4. Includes costs for labor, equipment, and materials to perform pre- and post-construction survey of the remedial areas to verify, confirm, and document pre- and post-construction elevations and conditions.
5. Includes costs for labor, equipment, and materials to install and manage temporary erosion and sedimentation controls.
6. Includes costs for labor, equipment, and materials to excavate approximately dredge spoil SC-8. Based on prior observations during prior reconnaissance efforts, it is estimated that the dredge spoil thickness is 3 feet and approximately 4,900 cubic yards of soil will be excavated under this alternative.
7. Includes transportation and on-site disposal of excavated soils from SC-8 with PCB concentrations less than 50 mg/kg. Assumes that excavated soils under this line item will be disposed of in the SSSMA. Cost estimate assumes a soil density of 1.5 tons per cubic yard.
8. Includes labor, equipment, and materials to purchase, import, place, grade, and compact general fill and topsoil to replace materials removed from SC 8 to meet surrounding grade.
9. Includes costs for labor, equipment, and materials to restore disturbed areas following construction. Includes topsoil placement, grading, seeding, mulching, and limited tree/shrub planting.
10. Includes costs for labor, equipment, and materials for contractor health and safety activities, monitoring dust and air emissions during intrusive activities, and dust control, as necessary.
11. Includes costs for labor, equipment, and materials to perform pre-design soil sampling activities for dredge spoil pile SC-2 to determine if the results of the sampling indicated that the PCB exposure point concentration is greater than or equal to 21 mg/kg.
12. No long-term monitoring, maintenance, or inspection is included under this alternative.

Table 7-11
Estimated Costs for Remedial Alternative DSP-4
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative DSP-4: Excavation and off-site disposal of dredge spoil pile SC-1, SC-2, SC-7, and SC-8. All of the excavated materials are anticipated to have polychlorinated biphenyls (PCBs) concentrations <50 milligrams per kilogram (mg/kg) and would be disposed of in an off-site nonhazardous waste landfill. The area beneath the dredge spoil piles would be addressed as part of the nonresidential portion of the floodplain.

Item No.	Item	Unit Cost	Units	Estimated Quantity	Estimated Cost
	Capital Costs				
1.	Mobilization / Demobilization	10%	Lump Sum	1	$32,000
2.	Temporary Facilities	$10,000	Month	1	$10,000
3.	Clearing and Site Preparation	$20,000	Acre	2.1	$42,000
4.	Surveying	$6,000	Lump Sum	1	$6,000
5.	Erosion, Sediment, and Storm Water Control	$4,500	Lump Sum	1	$4,500
6.	Soil Excavation	$25	Cubic Yard	7,300	$182,500
7.	Waste Transportation and Off-site Disposal (<50 mg/kg)	$50	Ton	10,950	$547,500
8.	Backfill Delivery and Placement	$21	Cubic Yard	1,800	$37,800
9.	Surface Restoration	$28,300	Acre	2.1	$59,430
10.	Contractor Health & Safety/Air Monitoring	$10,000	Month	1	$10,000
11.	Predesign Investigation	$5,000	Lump Sum	0	$0
				TOTAL CAPITAL COST	**$932,000**
	Long-Term Costs				
12.	None	$0	Annually	1	$0
				TOTAL ANNUAL LONG-TERM COST	**$0**
	Present Worth of Long-Term Costs				
13.	Years of Long-Term Program	0	Years		
14.	Discount Rate	7	%		
				PRESENT WORTH OF ANNUAL LONG-TERM COSTS (YEARS 1-30)	**$0**
	Administrative/Management				
				CONSTRUCTION BONDING (3% of Capital Cost)	**$28,000**
				PROJECT MANAGEMENT (5% of Capital Cost)	**$47,000**
				PROJECT MANAGEMENT (5% of Long-Term Cost)	**$0**
				ENGINEERING DESIGN/PERMITTING (6% of Capital Cost)	**$56,000**
				CONSTRUCTION MANAGEMENT (6% of Capital Cost)	**$56,000**
				SUBTOTAL	**$1,119,000**
	Contingency Costs				
				CONTINGENCY CAPITAL COSTS (15% scope + 15% bid)	**$280,000**
				CONTINGENCY LONG-TERM COSTS (10% scope + 10% bid)	**$0**
				TOTAL PRESENT WORTH	**$1,399,000**

General Notes:

- Cost estimate is based on past experience, cost estimating resources, and vendor estimates. Costs provided in 2016 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost.
- Cost factors based on *A Guide to Developing and Documenting Cost Estimates During Feasibility Study,* prepared by the United States Environmental Protection Agency and United States Army Corps of Engineers, July 2000.

Table 7-11
Estimated Costs for Remedial Alternative DSP-4
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Assumptions:

1. Includes costs for mobilization/demobilization of labor, equipment, and materials to perform the remedial construction activities. The cost is estimated as 10% of the total capital cost for the alternative, excluding transportation/disposal costs. It is assumed that a single mobilization/demobilization will be necessary.
2. Includes costs for temporary facilities and utilities including project trailers, sanitation/waste facilities and services, field office services, and fuel storage.
3. Includes costs for labor, equipment, and materials to perform clearing, construct support facilities areas, and otherwise prepare the site for construction. Clearing costs assume that approximately 1.2 acres of heavily wooded area will require clearing to allow access to complete the dredge spoil removal activities.
4. Includes costs for labor, equipment, and materials to perform pre- and post-construction survey of the remedial areas to verify, confirm, and document pre- and post-construction elevations and conditions.
5. Includes costs for labor, equipment, and materials to install and manage temporary erosion and sedimentation controls.
6. Includes costs for labor, equipment, and materials to excavate approximately dredge spoil SC-1, 2, 7, and 8. Based on prior observations during prior reconnaissance efforts, it is estimated that the dredge spoil thickness is 3 feet and approximately 7,300 cubic yards of soil will be excavated under this alternative.
7. Includes transportation and on-site disposal of excavated soils from SC-1, 2, 7 and 8 with PCB concentrations less than 50 mg/kg. Assumes that excavated soils under this line item will be disposed of in the south staging and soil management area. Cost estimate assumes a soil density of 1.5 tons per cubic yard.
8. Includes labor, equipment, and materials to purchase, import, place, grade, and compact general fill and topsoil to replace materials removed to meet surrounding grade.
9. Includes costs for labor, equipment, and materials to restore disturbed areas following construction. Includes topsoil placement, grading, seeding, mulching, and limited tree/shrub planting.
10. Includes costs for labor, equipment, and materials for contractor health and safety activities, monitoring dust and air emissions during intrusive activities, and dust control, as necessary.
11. Includes costs for labor, equipment, and materials to perform predesign soil sampling activities for dredge spoil pile SC-2 to determine if the results of the sampling indicated that the PCB exposure point concentration is greater than or equal to 21 mg/kg.
12. No long-term monitoring, maintenance, or inspection is included under this alternative.

Table 7-12
Estimated Costs for Remedial Alternative DSP-5
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative DSP-5: Excavation and off-site/on-site disposal of dredge spoil pile SC-1, SC-2, SC-7, and SC-8. Materials with polychlorinated biphenyls (PCBs) concentrations <50 milligrams per kilogram (mg/kg) would be disposed of on-site, and materials with concentrations ≥50 mg/kg would be disposed of off-site. Based on the characterization data for the dredge spoil pile SC-8, little to none of the material from dredge spoil pile SC-8 would require off-site disposal. The area beneath the dredge spoil piles would be addressed as part of the nonresidential portion of the floodplain.

Item No.	Item	Unit Cost	Units	Estimated Quantity	Estimated Cost
	Capital Costs				
1.	Mobilization / Demobilization	10%	Lump Sum	1	$32,000
2.	Temporary Facilities	$10,000	Month	1	$10,000
3.	Clearing and Site Preparation	$20,000	Acre	2.1	$42,000
4.	Surveying	$6,000	Lump Sum	1	$6,000
5.	Erosion, Sediment, and Storm Water Control	$4,500	Lump Sum	1	$4,500
6.	Soil Excavation	$25	Cubic Yard	7,300	$182,500
7.	Waste Transportation and On-site Disposal (<50 mg/kg)	$8	Ton	10,950	$90,885
8.	Backfill Delivery and Placement	$21	Cubic Yard	1,800	$37,800
9.	Surface Restoration	$28,300	Acre	2.1	$59,430
10.	Contractor Health & Safety/Air Monitoring	$10,000	Month	1	$10,000
11.	Predesign Investigation	$5,000	Lump Sum	0	$0
				TOTAL CAPITAL COST	**$475,000**
	Long-Term Costs				
12.	None	$0	Annually	1	$0
				TOTAL ANNUAL LONG-TERM COST	**$0**
	Present Worth of Long-Term Costs				
13.	Years of Long-Term Program	0	Years		
14.	Discount Rate	7	%		
				PRESENT WORTH OF ANNUAL LONG-TERM COSTS (YEARS 1-30)	**$0**
	Administrative/Management				
				CONSTRUCTION BONDING (3% of Capital Cost)	**$14,000**
				PROJECT MANAGEMENT (5% of Capital Cost)	**$24,000**
				PROJECT MANAGEMENT (5% of Long-Term Cost)	**$0**
				ENGINEERING DESIGN/PERMITTING (6% of Capital Cost)	**$29,000**
				CONSTRUCTION MANAGEMENT (6% of Capital Cost)	**$29,000**
				SUBTOTAL	**$571,000**
	Contingency Costs				
				CONTINGENCY CAPITAL COSTS (15% scope + 15% bid)	**$143,000**
				CONTINGENCY LONG-TERM COSTS (10% scope + 10% bid)	**$0**
				TOTAL PRESENT WORTH	**$714,000**

General Notes:

- Cost estimate is based on past experience, cost estimating resources, and vendor estimates. Costs provided in 2016 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost.
- Cost factors based on *A Guide to Developing and Documenting Cost Estimates During Feasibility Study,* prepared by the United States Environmental Protection Agency and United States Army Corps of Engineers, July 2000.

Table 7-12
Estimated Costs for Remedial Alternative DSP-5
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Assumptions:

1. Includes costs for mobilization/demobilization of labor, equipment, and materials to perform the remedial construction activities. The cost is estimated as 10% of the total capital cost for the alternative, excluding transportation/disposal costs. It is assumed that a single mobilization/demobilization will be necessary.
2. Includes costs for temporary facilities and utilities including project trailers, sanitation/waste facilities and services, field office services, and fuel storage.
3. Includes costs for labor, equipment, and materials to perform clearing, construct support facilities areas, and otherwise prepare the site for construction. Clearing costs assume that approximately 1.2 acres of heavily wooded area will require clearing to allow access to complete the dredge spoil removal activities.
4. Includes costs for labor, equipment, and materials to perform pre- and post-construction survey of the remedial areas to verify, confirm, and document pre- and post-construction elevations and conditions.
5. Includes costs for labor, equipment, and materials to install and manage temporary erosion and sedimentation controls.
6. Includes costs for labor, equipment, and materials to excavate approximately dredge spoil SC-1, 2, 7, and 8. Based on prior observations during prior reconnaissance efforts, it is estimated that the dredge spoil thickness is 3 feet and approximately 7,300 cubic yards of soil will be excavated under this alternative.
7. Includes transportation and on-site disposal of excavated soils from SC-1, 2, 7 and 8 with PCB concentrations less than 50 mg/kg. Assumes that excavated soils under this line item will be disposed of in the south staging and soil management area. Cost estimate assumes a soil density of 1.5 tons per cubic yard.
8. Includes labor, equipment, and materials to purchase, import, place, grade, and compact general fill and topsoil to replace materials removed to meet surrounding grade.
9. Includes costs for labor, equipment, and materials to restore disturbed areas following construction. Includes topsoil placement, grading, seeding, mulching, and limited tree/shrub planting.
10. Includes costs for labor, equipment, and materials for contractor health and safety activities, monitoring dust and air emissions during intrusive activities, and dust control, as necessary.
11. Includes costs for labor, equipment, and materials to perform pre-design soil sampling activities for dredge spoil pile SC-2 to determine if the results of the sampling indicated that the PCB exposure point concentration is greater than or equal to 21 mg/kg.
12. No long-term monitoring, maintenance, or inspection is included under this alternative.

Table 7-13
Estimated Costs for Remedial Alternative UWDA-2
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative UWDA-2: Placement of a geotextile fabric over the area(s) followed by the placement of a 12-inch-thick cover layer of clean soil as described in the Stipulation and Agreement. This alternative also includes long-term operation and maintenance (O&M). Institutional controls (ICs) may be necessary for groundwater and the stipulation cap.

Item No.	Item	Unit Cost	Units	Estimated Quantity	Estimated Cost
	Capital Costs				
1.	Mobilization / Demobilization	10%	Lump Sum	1	$43,000
2.	Temporary Facilities	$10,000	Month	2	$22,299
3.	Clearing and Site Preparation	$5,000	Acre	4.5	$22,578
4.	Surveying	$12,000	Lump Sum	1	$12,000
5.	Erosion, Sediment, and Storm Water Control	$19,000	Lump Sum	1	$19,000
6.	Install Soil Cover System (Stipulation Cap)	$15	Square Yard	21,900	$328,500
7.	Contractor Health & Safety/Air Monitoring	$10,000	Month	2	$22,299
8.	Institutional Controls	$100,000	Lump Sum	1	$100,000
				TOTAL CAPITAL COST	**$570,000**
	Long-Term Costs				
9	Cap Inspection and Maintenance	$50,000	Annually	1	$50,000
				ADDITIONAL ANNUAL LONG-TERM COST	**$50,000**
	Present Worth of Additional Long-Term Costs				
10.	Years of Long-Term Program	30	Years		
11.	Discount Rate	7	%		
				PRESENT WORTH OF ANNUAL LONG-TERM COSTS (YEARS 1-30)	**$620,000**
	Administrative/Management				
				CONSTRUCTION BONDING (3% of Capital Cost)	**$17,000**
				PROJECT MANAGEMENT (5% of Capital Cost)	**$29,000**
				PROJECT MANAGEMENT (5% of Long-Term Cost)	**$31,000**
				ENGINEERING DESIGN/PERMITTING (6% of Capital Cost)	**$34,000**
				CONSTRUCTION MANAGEMENT (6% of Capital Cost)	**$34,000**
				SUBTOTAL	**$1,335,000**
	Contingency Costs				
				CONTINGENCY CAPITAL COSTS (15% scope + 15% bid)	**$171,000**
				CONTINGENCY LONG-TERM COSTS (10% scope + 10% bid)	**$124,000**
				TOTAL PRESENT WORTH	**$1,630,000**

General Notes:

- Cost estimate is based on past experience, cost estimating resources, and vendor estimates. Costs provided in 2016 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost.
- Cost factors based on *A Guide to Developing and Documenting Cost Estimates During Feasibility Study* , prepared by the United States Environmental Protection Agency (USEPA) and United States Army Corps of Engineers (USACE), July 2000.

Table 7-13
Estimated Costs for Remedial Alternative UWDA-2
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Assumptions:

1. Includes costs for mobilization/demobilization of labor, equipment, and materials to perform the remedial construction activities. The cost is estimated as 10% of the total capital cost for the alternative. It is assumed that a single mobilization/demobilization will be necessary.
2. Includes costs for temporary facilities and utilities including project trailers, sanitation/waste facilities and services, field office services, and fuel storage.
3. Includes costs for labor, equipment, and materials to perform clearing, construct support facilities areas, and otherwise prepare the site for construction.
4. Includes costs for labor, equipment, and materials to perform pre- and post-construction survey of the remedial areas to verify, confirm, and document pre- and post-construction elevations and conditions.
5. Includes costs for labor, equipment, and materials to install and manage temporary erosion and sedimentation controls.
6. Includes costs for labor, equipment, and materials to install a geotextile fabric over the unapproved waste disposal areas (UWDAs) followed by the placement of a 12-inch-thick cover layer of clean soil as described in the Stipulation and Agreement. The cover system will be vegetated for stability. The cost estimate assumes that cover system will be placed at the UWDAs over a total footprint of 197,100 square feet. Soil cover for Ashley Street/Legrande is approximately 1.3 acres and the Wilborn #1 property is approximately 3.2 acres.
7. Includes costs for labor, equipment, and materials for contractor health and safety activities, monitoring dust and air emissions during intrusive activities, and dust control, as necessary.
8. Includes administrative and legal costs to implement ICs (e.g., deed restrictions, environmental covenants) to limit future property use where engineering controls are installed.
9 Long-term O&M activities would include periodic inspection of the engineered cover systems to document their condition and maintenance and repairs as needed to maintain the integrity of the cover system.
10. Assumes 30 years for implementation of long-term cover inspection and maintenance activities based on industry standard and guidance in the document titled *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study* , prepared by USEPA and USACE, July 2000.
11. Present worth is estimated based on a 7% beginning-of-year discount rate. Present cost factor based on *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study* , prepared by USEPA and USACE, July 2000.

Table 7-14
Estimated Costs for Remedial Alternative UWDA-3
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative UWDA-3: Placement of a low permeability cap to cover the unauthorized waste materials and to minimize potential impacts to groundwater. This alternative also includes groundwater monitoring and long-term operation and maintenance (O&M) to be effective. Institutional controls (ICs) may be necessary for groundwater and the cap.

Item No.	Item	Unit Cost	Units	Estimated Quantity	Estimated Cost
	Capital Costs				
1.	Mobilization / Demobilization	10%	Lump Sum	1	$111,000
2.	Temporary Facilities	$10,000	Month	3	$33,448
3.	Clearing and Site Preparation	$5,000	Acre	4.5	$22,578
4.	Surveying	$12,000	Lump Sum	1	$12,000
5.	Erosion, Sediment, and Storm Water Control	$19,000	Lump Sum	1	$19,000
6.	Install Low-Permeability RCRA Cap	$45	Square Yard	21,900	$985,500
7.	Contractor Health & Safety/Air Monitoring	$10,000	Month	3	$33,448
8.	Institutional Controls	$100,000	Lump Sum	1	$100,000
				TOTAL CAPITAL COST	**$1,317,000**
	Long-Term Costs				
9	Cap Inspection and Maintenance	$50,000	Annually	1	$50,000
				ADDITIONAL ANNUAL LONG-TERM COST	**$50,000**
	Present Worth of Additional Long-Term Costs				
10.	Years of Long-Term Program	30	Years		
11.	Discount Rate	7	%		
				PRESENT WORTH OF ANNUAL LONG-TERM COSTS (YEARS 1-30)	**$620,000**
	Administrative/Management				
				CONSTRUCTION BONDING (3% of Capital Cost)	**$40,000**
				PROJECT MANAGEMENT (5% of Capital Cost)	**$66,000**
				PROJECT MANAGEMENT (5% of Long-Term Cost)	**$31,000**
				ENGINEERING DESIGN/PERMITTING (6% of Capital Cost)	**$79,000**
				CONSTRUCTION MANAGEMENT (6% of Capital Cost)	**$79,000**
				SUBTOTAL	**$2,232,000**
	Contingency Costs				
				CONTINGENCY CAPITAL COSTS (15% scope + 15% bid)	**$395,000**
				CONTINGENCY LONG-TERM COSTS (10% scope + 10% bid)	**$124,000**
				TOTAL PRESENT WORTH	**$2,751,000**

General Notes:

- Cost estimate is based on past experience, cost estimating resources, and vendor estimates. Costs provided in 2016 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost.
- Cost factors based on *A Guide to Developing and Documenting Cost Estimates During Feasibility Study* , prepared by the United States Environmental Protection Agency (USEPA) and United States Army Corps of Engineers (USACE), July 2000.

Table 7-14
Estimated Costs for Remedial Alternative UWDA-3
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Assumptions:

1. Includes costs for mobilization/demobilization of labor, equipment, and materials to perform the remedial construction activities. The cost is estimated as 10% of the total capital cost for the alternative. It is assumed that a single mobilization/demobilization will be necessary.
2. Includes costs for temporary facilities and utilities including project trailers, sanitation/waste facilities and services, field office services, and fuel storage.
3. Includes costs for labor, equipment, and materials to perform clearing, construct support facilities areas, and otherwise prepare the site for construction.
4. Includes costs for labor, equipment, and materials to perform pre- and post-construction survey of the remedial areas to verify, confirm, and document pre- and post-construction elevations and conditions.
5. Includes costs for labor, equipment, and materials to install and manage temporary erosion and sedimentation controls.
6. Includes costs for labor, equipment, and materials to install low-permeability Resource Conservation and Recovery Act caps over the unapproved waste disposal areas (UWDAs), consisting of low-density polyethylene geomembrane, double-sided geocomposite, 18 inches of cover soil, and vegetated cover. The cost estimate assumes that cover system will be placed at the UWDAs over a total footprint of 197,100 square feet. Soil cover for Ashley Street/Legrande is approximately 1.3 acres and the Wilborn #1 property is approximately 3.2 acres.
7. Includes costs for labor, equipment, and materials for contractor health and safety activities, monitoring dust and air emissions during intrusive activities, and dust control, as necessary.
8. Includes administrative and legal costs to implement ICs (e.g., deed restrictions, environmental covenants) to limit future property use where engineering controls are installed.
9. Long-term O&M activities would include periodic inspection of the engineered cover systems to document their condition and maintenance and repairs as needed to maintain the integrity of the cover system.
10. Assumes 30 years for implementation of long-term cover inspection and maintenance activities based on industry standard and guidance in the document titled *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study* , prepared by USEPA and USACE, July 2000.
11. Present worth is estimated based on a 7% beginning-of-year discount rate. Present cost factor based on *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study* , prepared by USEPA and USACE, July 2000.

Table 7-15
Estimated Costs for Remedial Alternative UWDA-4
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative UWDA-4: Excavation and off-site disposal of all waste. Minimal restoration involving grading for erosion control and hydroseeding to protect slopes. No operation and maintenance or institutional controls are required as all of the unapproved waste disposal areas (UWDAs) would be removed under this alternative.

Item No.	Item	Unit Cost	Units	Estimated Quantity	Estimated Cost
	Capital Costs				
1.	Mobilization / Demobilization	10%	Lump Sum	1	$491,000
2.	Temporary Facilities	$10,000	Month	9	$90,000
3.	Clearing and Site Preparation	$5,000	Acre	4.5	$22,500
4.	Surveying	$12,000	Lump Sum	1	$12,000
5.	Erosion, Sediment, and Storm Water Control	$18,000	Lump Sum	1	$18,000
6.	Soil Excavation	$25	Cubic Yard	101,700	$2,542,500
7.	Soil Backfill Placement	$21	Cubic Yard	100,100	$2,102,100
8.	Stabilization of Lead-Contaminated Soils	$35	Ton	77,600	$2,716,000
9.	Waste Transportation and Off-Site Disposal (≥50 mg/kg)	$200	Ton	77,600	$15,520,000
10.	Waste Transportation and Off-Site Disposal (<50 mg/kg)	$50	Ton	75,100	$3,755,000
11.	Surface Restoration	$6,000	Acre	4.5	$27,000
12.	Contractor Health & Safety/Air Monitoring	$10,000	Month	9	$90,000
13.	Pre-Design Investigation	$100,000	Lump Sum	1	$100,000
				TOTAL CAPITAL COST	**$27,486,000**
	Long-Term Costs				
14.	None	$0	Annually	1	$0
				ADDITIONAL ANNUAL LONG-TERM COST	**$0**
	Present Worth of Additional Long-Term Costs				
15.	Years of Long-Term Program	0	Years		
16.	Discount Rate	7	%		
				PRESENT WORTH OF ANNUAL LONG-TERM COSTS (YEARS 1-30)	**$0**
	Administrative/Management				
				CONSTRUCTION BONDING (3% of Capital Cost)	**$825,000**
				PROJECT MANAGEMENT (5% of Capital Cost)	**$1,374,000**
				PROJECT MANAGEMENT (5% of Long-Term Cost)	**$0**
				ENGINEERING DESIGN/PERMITTING (6% of Capital Cost)	**$1,649,000**
				CONSTRUCTION MANAGEMENT (6% of Capital Cost)	**$1,649,000**
				SUBTOTAL	**$32,983,000**
	Contingency Costs				
				CONTINGENCY CAPITAL COSTS (15% scope + 15% bid)	**$8,246,000**
				CONTINGENCY LONG-TERM COSTS (10% scope + 10% bid)	**$0**
				TOTAL PRESENT WORTH	**$41,229,000**

General Notes:

- Cost estimate is based on past experience, cost estimating resources, and vendor estimates. Costs provided in 2016 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost.
- Cost factors based on *A Guide to Developing and Documenting Cost Estimates During Feasibility Study*, prepared by the United States Environmental Protection Agency and United States Army Corps of Engineers, July 2000.

Table 7-15
Estimated Costs for Remedial Alternative UWDA-4
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Assumptions:

1. Includes costs for mobilization/demobilization of labor, equipment, and materials to perform the remedial construction activities. The cost is estimated as 10% of the total capital cost for the alternative, excluding transportation/disposal costs. It is assumed that a single mobilization/demobilization will be necessary.
2. Includes costs for temporary facilities and utilities including project trailers, sanitation/waste facilities and services, field office services, and fuel storage.
3. Includes costs for labor, equipment, and materials to perform clearing, construct support facilities areas, and otherwise prepare the site for construction.
4. Includes costs for labor, equipment, and materials to perform pre- and post-construction survey of the remedial areas to verify, confirm, and document pre- and post-construction elevations and conditions.
5. Includes costs for labor, equipment, and materials to install and manage temporary erosion and sedimentation controls.
6. Includes costs for labor, equipment, and materials to excavate all waste materials in two unapproved waste disposal areas (UWDAs). The cost estimate assumes that this will involve the removal of 101,700 cubic yards of soil within a footprint of 4.5 acres. The boundary of the UWDA at Ashley/Legrande is based on data collected as part of the Operable Unit 1/2 (OU-1/OU-2) Residential Program. The delineation of the area is estimated to be 1.3 acres with an estimated depth of 4.3 feet. The boundary of the UWDA at Wilborn #1 is based on an interpretation of topographic data in the area of the floodplain. No delineation has been performed at this property. The Wilborn #1 area is estimated to be 3.2 acres. The boring at groundwater well T-13 located on the Wilborn #1 property indicates auto-fluff debris extends to approximately 20 to 25 feet below ground surface. This cost estimate assumes an average depth of 18 feet of remedial action at the property.
7. Includes labor, equipment, and materials to purchase, import, place, grade, and compact general fill and topsoil to replace removed materials to pre-removal grades. Assumes that 0.5 acre will be left approximately 2 feet low to promote drainage while meeting surrounding grades.
8. Includes labor, equipment, and materials to stabilize lead-contaminated soils to allow for landfill disposal. The cost estimate assumes that approximately 51% of the total volume excavated from the UWDAs will require stabilization to comply with land disposal restriction requirements prior to landfill disposal. Cost estimate assumes a soil density of 1.5 tons per cubic yard.
9. Includes transportation and off-site disposal of excavated materials with polychlorinated biphenyl (PCB) concentrations greater than or equal to 50 milligrams per kilogram (mg/kg) at a Toxic Substances Control Act regulated landfill. The estimated volume of excavated material for off-site disposal under this line item is assumed to be approximately 51% of the total volume. Cost estimate assumes a soil density of 1.5 tons per cubic yard.
10. Includes transportation and off-site disposal of excavated materials with PCB concentrations less than 50 mg/kg at a nonhazardous landfill. The estimated volume of excavated material for off-site disposal under this line item is assumed to be approximately 40% of the total volume. Cost estimate assumes that the excavated waste material will not be a characteristic hazardous waste. Cost estimate assumes a soil density of 1.5 tons per cubic yard.
11. Includes costs for labor, equipment, and materials to restore the disturbed areas following construction. Includes grading, seeding, mulching, and other necessary surface restoration.
12. Includes costs for labor, equipment, and materials for contractor health and safety activities, monitoring dust and air emissions during intrusive activities, and dust control, as necessary.
13. Includes costs for labor, equipment, and materials to perform pre-design investigation activities to define the limits of the targeted remediation areas.
14. No long-term monitoring, maintenance, or inspection is included under this alternative.
15. No long-term monitoring, maintenance, or inspection is included under this alternative.
16. No long-term monitoring, maintenance, or inspection is included under this alternative.

Table 7-16
Estimated Costs for Remedial Alternative NRS-2 (21 mg/kg PRG)
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative NRS-2: Use a nonintrusive approach to covering the existing ground surface with a geotextile marker layer and a 12-inch soil layer to reduce exposure to surface soils. This alternative would be implemented in specific portions of exposure unites (EUs) to achieve EU-wide exposure point concentrations (EPCs) below the nonresidential surface soil preliminary remediation goal of 21 milligrams per kilogram (mg/kg). The covers would only be placed in EUs where the addition of 12 inches of soil to the existing ground surface elevations would not increase local flooding—EU7, EU19N, and EU26. For the target remedial areas that cannot be covered due to flooding concerns—EU5, EU14N and EU19S—excavation with on-site/off-site disposal of surface soils would be implemented to achieve EU-wide EPCs below 21 mg/kg. Excavated soils with polychlorinated biphenyl (PCB) concentrations <50 mg/kg would be disposed of on-site in the south staging and soil management area (SSSMA), and soils with PCB concentrations >50 mg/kg would be disposed of in an appropriately permitted off-site landfill. Soil management would be conducted as part of the remedy. The soil management activities would limit future intrusive activities on the nonresidential properties from adversely impacting the effectiveness of the nonresidential surface soil remedy and the remedy implemented for nearby residential properties. Specific soil management activities would include active outreach with property owners, local city building departments, area utility companies, and county/state-wide transportation agencies regarding any plans to disturb soils in nonresidential areas where construction activities could impact the nonresidential or adjacent residential remedies. Utility organizations typically contacted as part of the outreach process include sewer, water, gas, electric, oil, cable/fiber optic, etc. Periodic observations of the nonresidential areas would be conducted to confirm that land use remains nonresidential.

Item No.	Item	Unit Cost	Units	Estimated Quantity	Estimated Cost
	Capital Costs				
1.	Mobilization / Demobilization	10%	Lump Sum	1	$53,000
2.	Temporary Facilities	$10,000	Month	5	$50,000
3.	Clearing and Site Preparation	$5,000	Acre	6.5	$32,500
4.	Surveying	$17,000	Lump Sum	1	$17,000
5.	Erosion, Sediment, and Storm Water Control	$26,000	Lump Sum	1	$26,000
6.	Soil Excavation	$25	Cubic Yard	3,500	$87,500
7.	Soil Backfill Placement	$21	Cubic Yard	3,500	$73,500
8.	Soil Cover Placement	$21	Cubic Yard	7,100	$149,100
9.	Waste Transportation and Off-Site Disposal (≥50 mg/kg)	$200	Ton	2,000	$400,000
10.	Waste Transportation and On-Site Disposal (<50 mg/kg)	$8	Ton	3,200	$26,560
11.	Surface Restoration	$6,000	Acre	6.5	$39,000
12.	Contractor Health & Safety/Air Monitoring	$10,000	Month	5	$50,000
				TOTAL CAPITAL COST	**$1,004,000**
	Long-Term Costs				
13.	Soil Management Program	$ 413,000	Annually	1	$413,000
				ADDITIONAL ANNUAL LONG-TERM COST	**$413,000**
	Present Worth of Additional Long-Term Costs				
14.	Years of Long-Term Program	30	Years		
15.	Discount Rate	7	%		
				PRESENT WORTH OF ANNUAL LONG-TERM COSTS (YEARS 1-30)	**$5,125,000**
	Administrative/Management				
				CONSTRUCTION BONDING (3% of Capital Cost)	**$30,000**
				PROJECT MANAGEMENT (5% of Capital Cost)	**$50,000**
				PROJECT MANAGEMENT (5% of Long-Term Cost)	**$256,000**
				ENGINEERING DESIGN/PERMITTING (6% of Capital Cost)	**$60,000**
				CONSTRUCTION MANAGEMENT (6% of Capital Cost)	**$60,000**
				SUBTOTAL	**$6,585,000**
	Contingency Costs				
				CONTINGENCY CAPITAL COSTS (15% scope + 15% bid)	**$301,000**
				CONTINGENCY LONG-TERM COSTS (10% scope + 10% bid)	**$1,025,000**
				TOTAL PRESENT WORTH	**$7,911,000**

Table 7-16
Estimated Costs for Remedial Alternative NRS-2 (21 mg/kg PRG)
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

General Notes:

- Cost estimate is based on past experience, cost estimating resources, and vendor estimates. Costs provided in 2016 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost.
- Cost factors based on *A Guide to Developing and Documenting Cost Estimates During Feasibility Study,* prepared by the United States Environmental Protection Agency (USEPA) and United States Army Corps of Engineers (USACE), July 2000.

Assumptions:

1. Includes costs for mobilization/demobilization of labor, equipment, and materials to perform the remedial construction activities. The cost is estimated as 10% of the total capital cost for the alternative, excluding transportation/disposal costs. It is assumed that a single mobilization/demobilization will be necessary.
2. Includes costs for temporary facilities and utilities including project trailers, sanitation/waste facilities and services, field office services, and fuel storage.
3. Includes costs for labor, equipment, and materials to perform clearing, construct support facilities areas, and otherwise prepare the site for construction.
4. Includes costs for labor, equipment, and materials to perform pre- and post-construction survey of the remedial areas to verify, confirm, and document pre- and post-construction elevations and conditions.
5. Includes costs for labor, equipment, and materials to install and manage temporary erosion and sedimentation controls.
6. Includes costs for labor, equipment, and materials to remove surface soils in areas where a soil cover cannot be placed directly on existing grades due to the potential to increase localized flooding. Under this alternative, it is assumed that excavation will be required in EU-5, EU-14N, and EU-19S. To achieve specific PRGs for non-PCB constituents of concern, EU-22 and EU-24 will be targeted to achieve a chromium PRG of 538 mg/kg, EU-14N and the Northside Area will be targeted to achieve a polycyclic aromatic hydrocarbon PRG of 21 mg/kg, and EU-25 will be targeted to achieve a polychlorinated dibenzo-p-dioxin/dibenzofuran toxic equivalent PRG of 0.6 micrograms per kilogram. The cost estimate assumes that 3,500 cubic yards of soil within a footprint of 7.1 acres will be excavated from these EUs.
7. Includes labor, equipment, and materials to purchase, import, place, grade, and compact a geotextile marker layer, general fill, and topsoil to replace removed materials to pre-removal grades.
8. Includes labor, equipment, and materials to cover the existing ground surface with a geotextile marker layer and a 12-inch soil layer to reduce exposure to surface soils. The covers would only be placed in EUs where the addition of 12 inches of soil to the existing ground surface elevations will not increase local flooding (EU-7, EU-19N, and EU-26). It is assumed that covers over a footprint of 2.5 acres.
9. Includes transportation and off-site disposal of excavated materials with PCB concentrations greater than or equal to 50 mg/kg at a Toxic Substances Control Act regulated landfill. This cost estimate assumes that approximately 40% of the soil material excavated from EU-5, EU-14N, and EU-19S under this alternative would be greater than 50 mg/kg. Cost estimate assumes a soil density of 1.5 tons per cubic yard.
10. Includes transportation and on-site disposal of excavated soils with PCB concentrations less than 50 mg/kg. Assumes that excavated soils under this line item will be disposed of in the SSSMA. This cost estimate assumes that approximately 60% of the soil material excavated from EU-5, EU-14N, and EU-19S under this alternative would be less than 50 mg/kg. Cost estimate assumes a soil density of 1.5 tons per cubic yard.
11. Includes costs for labor, equipment, and materials to restore the disturbed areas following construction. Includes grading, seeding, mulching, and other necessary surface restoration.
12. Includes costs for labor, equipment, and materials for contractor health and safety activities, monitoring dust and air emissions during intrusive activities, and dust control, as necessary.
13. Soil management would include active outreach with property owners, local city building departments, area utility companies, and county/state-wide transportation agencies regarding any plans to disturb soils in nonresidential areas where construction activities could impact the nonresidential or residential remedies. Cost estimates assumes that soil management will be required on 5 nonresidential properties per year. In addition, this cost estimate assumes that one large soil management project will be implemented every other year or 2 moderately sized soil management projects will be implemented each year. Includes periodic observations of the nonresidential areas to confirm that land use continues to be nonresidential.
14. Assumes 30 years for implementation of the soil management program based on industry standard and guidance in the document titled *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.
15. Present worth is estimated based on a 7% beginning-of-year discount rate. Present cost factor based on *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.

Table 7-17
Estimated Costs for Remedial Alternative NRS-3 (21 mg/kg PRG)
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative NRS-3: Excavate surface soils to achieve an EU-wide EPC below the nonresidential surface soil preliminary remediation goal (PRG) of 21 milligrams per kilogram (mg/kg), dispose of soil on-site and off-site, backfilling the excavated areas with clean soil, and soil management. Excavated soils with polychlorinated biphenyl (PCB) concentrations <50 mg/kg would be disposed of on-site in the south staging and soil management area (SSSMA), and soils with PCB concentrations >50 mg/kg would be disposed of in an appropriately permitted off-site landfill. Soil management activities would limit future intrusive activities on the nonresidential properties from adversely impacting the effectiveness of the nonresidential surface soil remedy and the remedy implemented for nearby residential properties. Specific soil management activities would include active outreach with property owners, local city building departments, area utility companies, and county/state-wide transportation agencies regarding any plans to disturb soils in nonresidential areas where construction activities could impact the nonresidential or adjacent residential remedies. Utility organizations typically contacted as a part of the outreach process include sewer, water, gas, electric, oil, cable/fiber optic, etc. Periodic observations of the nonresidential areas would be conducted confirm that land use remains nonresidential.

Item No.	Item	Unit Cost	Units	Estimated Quantity	Estimated Cost
	Capital Costs				
1.	Mobilization / Demobilization	10%	Lump Sum	1	$73,000
2.	Temporary Facilities	$10,000	Month	5	$50,000
3.	Clearing and Site Preparation	$10,000	Acre	7.0	$70,000
4.	Surveying	$35,000	Lump Sum	1	$35,000
5.	Erosion, Sediment, and Storm Water Control	$28,000	Lump Sum	1	$28,000
6.	Soil Excavation	$25	Cubic Yard	9,700	$242,500
7.	Soil Backfill Placement	$21	Cubic Yard	9,700	$203,700
8.	Waste Transportation and Off-Site Disposal (≥50 mg/kg)	$200	Ton	7,700	$1,540,000
9.	Waste Transportation and On-Site Disposal (<50 mg/kg)	$8	Ton	6,900	$57,270
10.	Surface Restoration	$6,000	Acre	7.0	$42,000
11.	Contractor Health & Safety/Air Monitoring	$10,000	Month	5	$50,000
				TOTAL CAPITAL COST	**$2,391,000**
	Long-Term Costs				
12.	Soil Management Program	$413,000	Annually	1	$413,000
				ADDITIONAL ANNUAL LONG-TERM COST	**$413,000**
	Present Worth of Additional Long-Term Costs				
13.	Years of Long-Term Program	30	Years		
14.	Discount Rate	7	%		
				PRESENT WORTH OF ANNUAL LONG-TERM COSTS (YEARS 1-30)	**$5,125,000**
	Administrative/Management				
				CONSTRUCTION BONDING (3% of Capital Cost)	**$72,000**
				PROJECT MANAGEMENT (5% of Capital Cost)	**$120,000**
				PROJECT MANAGEMENT (5% of Long-Term Cost)	**$256,000**
				ENGINEERING DESIGN/PERMITTING (6% of Capital Cost)	**$143,000**
				CONSTRUCTION MANAGEMENT (6% of Capital Cost)	**$143,000**
				SUBTOTAL	**$8,250,000**
	Contingency Costs				
				CONTINGENCY CAPITAL COSTS (15% scope + 15% bid)	**$717,000**
				CONTINGENCY LONG-TERM COSTS (10% scope + 10% bid)	**$1,025,000**
				TOTAL PRESENT WORTH	**$9,992,000**

Table 7-17
Estimated Costs for Remedial Alternative NRS-3 (21 mg/kg PRG)
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

General Notes:

- Cost estimate is based on past experience, cost estimating resources, and vendor estimates. Costs provided in 2016 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost.
- Cost factors based on *A Guide to Developing and Documenting Cost Estimates During Feasibility Study,* prepared by the United States Environmental Protection Agency (USEPA) and United States Army Corps of Engineers (USACE), July 2000.

Assumptions:

1. Includes costs for mobilization/demobilization of labor, equipment, and materials to perform the remedial construction activities. The cost is estimated as 10% of the total capital cost for the alternative, excluding transportation/disposal costs. It is assumed that a single mobilization/demobilization will be necessary.
2. Includes costs for temporary facilities and utilities including project trailers, sanitation/waste facilities and services, field office services, and fuel storage.
3. Includes costs for labor, equipment, and materials to perform clearing, construct support facilities areas, and otherwise prepare the site for construction.
4. Includes costs for labor, equipment, and materials to perform pre- and post-construction survey of the remedial areas to verify, confirm, and document pre- and post-construction elevations and conditions.
5. Includes costs for labor, equipment, and materials to install and manage temporary erosion and sedimentation controls.
6. Includes costs for labor, equipment, and materials to remove surface soils to achieve an EU-wide PCB EPC below the nonresidential surface soil PRG of 21 mg/kg. The target remedial areas are located in EU-5, EU-7, EU-14N, EU-19N, EU-19S, and EU-26. To achieve specific PRGs for non-PCB constituents of concern, EU-22 and EU-24 will be targeted to achieve a chromium PRG of 538 mg/kg, EU-14N and the Northside Area will be targeted to achieve a polycyclic aromatic hydrocarbon PRG of 21 mg/kg, and EU-25 will be targeted to achieve a polychlorinated dibenzo-p-dioxin/dibenzofuran toxic equivalent PRG of 0.6 micrograms per kilogram. The cost estimate assumes that 9,700 cubic yards of soil within a footprint of 7 acres will be excavated from these EUs.
7. Includes labor, equipment, and materials to purchase, import, place, grade, and compact a geotextile marker layer, general fill, and topsoil to replace removed materials to pre-removal grades.
8. Includes transportation and off-site disposal of excavated materials with PCB concentrations greater than or equal to 50 mg/kg at a Toxic Substances Control Act regulated landfill. This cost estimate assumes that approximately 56% of the soil excavated under this alternative would be greater than or equal to 50 mg/kg. Cost estimate assumes a soil density of 1.5 tons per cubic yard.
9. Includes transportation and on-site disposal of excavated soils with PCB concentrations less than 50 mg/kg. Assumes that excavated soils under this line item will be disposed in the SSSMA. This cost estimate assumes that approximately 44% of the soil material excavated under this alternative would be less than 50 mg/kg. Cost estimate assumes a soil density of 1.5 tons per cubic yard.
10. Includes costs for labor, equipment, and materials to restore the disturbed areas following construction. Includes grading, seeding, mulching, and other necessary surface restoration.
11. Includes costs for labor, equipment, and materials for contractor health and safety activities, monitoring dust and air emissions during intrusive activities, and dust control, as necessary.
12. Soil management would include active outreach with property owners, local city building departments, area utility companies, and county/state-wide transportation agencies regarding any plans to disturb soils in nonresidential areas where construction activities could impact the nonresidential or residential remedies. Cost estimate assumes that soil management will be required on 5 nonresidential properties per year. In addition, this cost estimate assumes that one large soil management project will be implemented every other year or 2 moderately sized soil management projects will be implemented each year. Includes periodic observations of the nonresidential areas to confirm that land use continues to be nonresidential.
13. Assumes 30 years for implementation of the soil management program based on industry standard and guidance in the document titled *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.
14. Present worth is estimated based on a 7% beginning-of-year discount rate. Present cost factor based on *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.

Table 7-18
Estimated Costs for Remedial Alternative NRS-4 (21 mg/kg PRG)
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative NRS-4: Excavate surface soils to achieve an exposure unit (EU)-wide exposure point concentration (EPC) below the nonresidential surface soil preliminary remediation goal (PRG) of 21 milligrams per kilogram (mg/kg), dispose of soil off-site, and backfill the excavated areas with clean soil, and soil management. Excavated soils would be disposed of in an appropriately permitted off-site landfill. Soil management would be conducted as part of the remedy. The soil management activities would limit future intrusive activities on the nonresidential properties from adversely impacting the effectiveness of the nonresidential surface soil remedy and the remedy implemented for nearby residential properties. Specific soil management activities would include active outreach with property owners, local city building departments, area utility companies, and county/state-wide transportation agencies regarding any plans to disturb soils in nonresidential areas where construction activities could impact the nonresidential or adjacent residential remedies. Utility organizations that would typically be contacted as part of the outreach process include sewer, water, gas, electric, oil, cable/fiber optic, etc. Periodic observations of the nonresidential areas would be conducted under confirm that land use continues to be nonresidential.

Item No.	Item	Unit Cost	Units	Estimated Quantity	Estimated Cost
	Capital Costs				
1.	Mobilization / Demobilization	10%	Lump Sum	1	$73,000
2.	Temporary Facilities	$10,000	Month	5	$50,000
3.	Clearing and Site Preparation	$10,000	Acre	7.0	$70,000
4.	Surveying	$35,000	Lump Sum	1	$35,000
5.	Erosion, Sediment, and Storm Water Control	$28,000	Lump Sum	1	$28,000
6.	Soil Excavation	$25	Cubic Yard	9,700	$242,500
7.	Soil Backfill Placement	$21	Cubic Yard	9,700	$203,700
8.	Waste Transportation and Off-Site Disposal (≥50 mg/kg)	$200	Ton	7,700	$1,540,000
9.	Waste Transportation and Off-Site Disposal (<50 mg/kg)	$50	Ton	6,900	$345,000
10.	Surface Restoration	$6,000	Acre	7.0	$42,000
11.	Contractor Health & Safety/Air Monitoring	$10,000	Month	5	$50,000
				TOTAL CAPITAL COST	**$2,679,000**
	Long-Term Costs				
12.	Soil Management Program	$413,000	Annually	1	$413,000
				ADDITIONAL ANNUAL LONG-TERM COST	**$413,000**
	Present Worth of Additional Long-Term Costs				
13.	Years of Long-Term Program	30	Years		
14.	Discount Rate	7	%		
				PRESENT WORTH OF ANNUAL LONG-TERM COSTS (YEARS 1-30)	**$5,125,000**
	Administrative/Management				
				CONSTRUCTION BONDING (3% of Capital Cost)	**$80,000**
				PROJECT MANAGEMENT (5% of Capital Cost)	**$134,000**
				PROJECT MANAGEMENT (5% of Long-Term Cost)	**$256,000**
				ENGINEERING DESIGN/PERMITTING (6% of Capital Cost)	**$161,000**
				CONSTRUCTION MANAGEMENT (6% of Capital Cost)	**$161,000**
				SUBTOTAL	**$8,596,000**
	Contingency Costs				
				CONTINGENCY CAPITAL COSTS (15% scope + 15% bid)	**$804,000**
				CONTINGENCY LONG-TERM COSTS (10% scope + 10% bid)	**$1,025,000**
				TOTAL PRESENT WORTH	**$10,425,000**

Table 7-18
Estimated Costs for Remedial Alternative NRS-4 (21 mg/kg PRG)
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

General Notes:

- Cost estimate is based on past experience, cost estimating resources, and vendor estimates. Costs provided in 2016 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost.
- Cost factors based on *A Guide to Developing and Documenting Cost Estimates During Feasibility Study,* prepared by the United States Environmental Protection Agency (USEPA) and United States Army Corps of Engineers (USACE), July 2000.

Assumptions:

1. Includes costs for mobilization/demobilization of labor, equipment, and materials to perform the remedial construction activities. The cost is estimated as 10% of the total capital cost for the alternative, excluding transportation/disposal costs. It is assumed that a single mobilization/demobilization will be necessary.
2. Includes costs for temporary facilities and utilities including project trailers, sanitation/waste facilities and services, field office services, and fuel storage.
3. Includes costs for labor, equipment, and materials to perform clearing, construct support facilities areas, and otherwise prepare the site for construction.
4. Includes costs for labor, equipment, and materials to perform pre- and post-construction survey of the remedial areas to verify, confirm, and document pre- and post-construction elevations and conditions.
5. Includes costs for labor, equipment, and materials to install and manage temporary erosion and sedimentation controls.
6. Includes costs for labor, equipment, and materials to remove surface soils to achieve an EU-wide PCB EPC below the nonresidential surface soil PRG of 21 mg/kg. The target remedial areas are located in EU-5, EU-7, EU-14N, EU-19N, EU-19S, and EU-26. To achieve specific PRGs for non-PCB constituents of concern, EU-22 and EU-24 will be targeted to achieve a chromium PRG of 538 mg/kg, EU-14N and the Northside Area will be targeted to achieve a polycyclic aromatic hydrocarbon PRG of 21 mg/kg, and EU-25 will be targeted to achieve a polychlorinated dibenzo-p-dioxin/dibenzofuran toxic equivalent PRG of 0.6 micrograms per kilogram. The cost estimate assumes that 9,700 cubic yards of soil within a footprint of 7 acres will be excavated from these EUs.
7. Includes labor, equipment, and materials to purchase, import, place, grade, and compact a geotextile marker layer, general fill, and topsoil to replace removed materials to pre-removal grades.
8. Includes transportation and off-site disposal of excavated materials with PCB concentrations greater than or equal to 50 mg/kg at a Toxic Substances Control Act regulated landfill. This cost estimate assumes that approximately 56% of the soil excavated under this alternative would be greater than or equal to 50 mg/kg. Cost estimate assumes a soil density of 1.5 tons per cubic yard.
9. Includes transportation and off-site disposal of excavated materials with PCB concentrations less than 50 mg/kg at a nonhazardous landfill. This cost estimate assumes that approximately 44% of the soil excavated under this alternative would be less than 50 mg/kg. Cost estimate assumes a soil density of 1.5 tons per cubic yard.
10. Includes costs for labor, equipment, and materials to restore the disturbed areas following construction. Includes grading, seeding, mulching, and other necessary surface restoration.
11. Includes costs for labor, equipment, and materials for contractor health and safety activities, monitoring dust and air emissions during intrusive activities, and dust control, as necessary.
12. Soil management would include active outreach with property owners, local city building departments, area utility companies, and county/state-wide transportation agencies regarding any plans to disturb soils in nonresidential areas where construction activities could impact the nonresidential or residential remedies. Cost estimates assumes that soil management will be required on 5 nonresidential properties per year. In addition, this cost estimate assumes that one large soil management project will be implemented every other year or 2 moderately sized soil management projects will be implemented each year. Includes periodic observations of the nonresidential areas to confirm that land use continues to be nonresidential.
13. Assumes 30 years for implementation of the soil management program based on industry standard and guidance in the document titled *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.
14. Present worth is estimated based on a 7% beginning-of-year discount rate. Present cost factor based on *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.

Table 7-19
Estimated Costs for Remedial Alternative NRS-5 (21 mg/kg PRG)
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative NRS-5: Excavate surface soils to achieve an exposure unit (EU)-wide exposure point concentration (EPC) below the nonresidential preliminary remediation goal (PRG) of 21 milligrams per kilogram (mg/kg), off-site treatment for the excavated soils with incineration to destroy the polychlorinated biphenyls (PCBs), backfill the excavated areas with clean soil, and conduct soil management. Soil management activities would limit future intrusive activities on the nonresidential properties from adversely impacting the effectiveness of the nonresidential surface soil remedy and the remedy implemented for nearby residential properties. Specific soil management activities would include active outreach with property owners, local city building departments, area utility companies, and county/state-wide transportation agencies regarding any plans to disturb soils in nonresidential areas where construction activities could impact the nonresidential or adjacent residential remedies. Utility organizations typically contacted as a part of the outreach process include sewer, water, gas, electric, oil, cable/fiber optic, etc. Periodic observations of the nonresidential areas would be conducted confirm that land use remains nonresidential.

Item No.	Item	Unit Cost	Units	Estimated Quantity	Estimated Cost
	Capital Costs				
1.	Mobilization / Demobilization	10%	Lump Sum	1	$73,000
2.	Temporary Facilities	$10,000	Month	5	$50,000
3.	Clearing and Site Preparation	$10,000	Acre	7.0	$70,000
4.	Surveying	$35,000	Lump Sum	1	$35,000
5.	Erosion, Sediment, and Storm Water Control	$28,000	Lump Sum	1	$28,000
6.	Soil Excavation	$25	Cubic Yard	9,700	$242,500
7.	Soil Backfill Placement	$21	Cubic Yard	9,700	$203,700
8.	Waste Transportation and Off-Site Treatment (Incineration)	$612	Ton	14,600	$8,935,200
9.	Surface Restoration	$6,000	Acre	7.0	$42,000
10.	Contractor Health & Safety/Air Monitoring	$10,000	Month	5	$50,000
				TOTAL CAPITAL COST	**$9,729,000**
	Long-Term Costs				
11.	Soil Management Program	$413,000	Annually	1	$413,000
				ADDITIONAL ANNUAL LONG-TERM COST	**$413,000**
	Present Worth of Additional Long-Term Costs				
12.	Years of Long-Term Program	30	Years		
13.	Discount Rate	7	%		
				PRESENT WORTH OF ANNUAL LONG-TERM COSTS (YEARS 1-30)	**$5,125,000**
	Administrative/Management				
				CONSTRUCTION BONDING (3% of Capital Cost)	**$292,000**
				PROJECT MANAGEMENT (5% of Capital Cost)	**$486,000**
				PROJECT MANAGEMENT (5% of Long-Term Cost)	**$256,000**
				ENGINEERING DESIGN/PERMITTING (6% of Capital Cost)	**$584,000**
				CONSTRUCTION MANAGEMENT (6% of Capital Cost)	**$584,000**
				SUBTOTAL	**$17,056,000**
	Contingency Costs				
				CONTINGENCY CAPITAL COSTS (15% scope + 15% bid)	**$2,919,000**
				CONTINGENCY LONG-TERM COSTS (10% scope + 10% bid)	**$1,025,000**
				TOTAL PRESENT WORTH	**$21,000,000**

Table 7-19
Estimated Costs for Remedial Alternative NRS-5 (21 mg/kg PRG)
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

General Notes:

- Cost estimate is based on past experience, cost estimating resources, and vendor estimates. Costs provided in 2016 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost.
- Cost factors based on *A Guide to Developing and Documenting Cost Estimates During Feasibility Study*, prepared by the United States Environmental Protection Agency (USEPA) and United States Army Corps of Engineers (USACE), July 2000.

Assumptions:

1. Includes costs for mobilization/demobilization of labor, equipment, and materials to perform the remedial construction activities. The cost is estimated as 10% of the total capital cost for the alternative, excluding transportation/disposal costs. It is assumed that a single mobilization/demobilization will be necessary.
2. Includes costs for temporary facilities and utilities including project trailers, sanitation/waste facilities and services, field office services, and fuel storage.
3. Includes costs for labor, equipment, and materials to perform clearing, construct support facilities areas, and otherwise prepare the site for construction.
4. Includes costs for labor, equipment, and materials to perform pre- and post-construction survey of the remedial areas to verify, confirm, and document pre- and post-construction elevations and conditions.
5. Includes costs for labor, equipment, and materials to install and manage temporary erosion and sedimentation controls.
6. Includes costs for labor, equipment, and materials to remove surface soils to achieve an EU-wide PCB EPC below the nonresidential surface soil PRG of 21 mg/kg. The target remedial areas are located in EU-5, EU-7, EU-14N, EU-19N, EU-19S, and EU-26. To achieve specific PRGs for non-PCB constituents of concern, EU-22 and EU-24 will be targeted to achieve a chromium PRG of 538 mg/kg, EU-14N and the Northside Area will be targeted to achieve a polycyclic aromatic hydrocarbon PRG of 21 mg/kg, and EU-25 will be targeted to achieve a polychlorinated dibenzo-p-dioxin/dibenzofuran toxic equivalent PRG of 0.6 micrograms per kilogram. The cost estimate assumes that 9,700 cubic yards of soil within a footprint of 7 acres will be excavated from these EUs.
7. Includes labor, equipment, and materials to purchase, import, place, grade, and compact a geotextile marker layer, general fill, and topsoil to replace removed materials to pre-removal grades.
8. Includes transportation and off-site treatment of PCB-containing soil excavated under this alternative. Cost estimate assumes that the excavated soils will be transported to the Veolia Gulf Coast Service Center in Port Arthur, Texas, for incineration to destroy the PCBs. Unit cost is based on a $420 per ton incineration/disposal fee plus a transport rate of $0.30 per mile per ton and approximately 640 miles between Anniston. Alabama. and Port Arthur. Texas.
9. Includes costs for labor, equipment, and materials to restore the disturbed areas following construction. Includes grading, seeding, mulching, and other necessary surface restoration.
10. Includes costs for labor, equipment, and materials for contractor health and safety activities, monitoring dust and air emissions during intrusive activities, and dust control, as necessary.
11. Soil management would include active outreach with property owners, local city building departments, area utility companies, and county/state-wide transportation agencies regarding any plans to disturb soils in nonresidential areas where construction activities could impact the nonresidential or residential remedies. Cost estimates assumes that soil management will be required on five nonresidential properties per year. In addition, this cost estimate assumes that one large soil management project will be implemented every other year or two moderately sized soil management projects will be implemented each year. Includes periodic observations of the nonresidential areas to confirm that land use continues to be nonresidential.
12. Assumes 30 years for implementation of the soil management program based on industry standard and guidance in the document titled *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.
13. Present worth is estimated based on a 7% beginning-of-year discount rate. Present cost factor based on *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.

Table 7-20
Estimated Costs for Remedial Alternative NRS-6 (21 mg/kg PRG)
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative NRS-6: Excavate surface soils to achieve an exposure unit (EU)-wide exposure point concentration (EPC) below the nonresidential preliminary remediation goal (PRG) of 21 milligrams per kilogram (mg/kg), on-site treatment of excavated soils with off-site incineration of any oils from the thermal desorption process to destroy the polychlorinated biphenyls (PCBs), backfill the excavated areas with clean soil, and conduct soil management. Soil management activities would limit future intrusive activities on the nonresidential properties from adversely impacting the effectiveness of the nonresidential surface soil remedy and the remedy implemented for nearby residential properties. Specific soil management activities would include active outreach with property owners, local city building departments, area utility companies, and county/state-wide transportation agencies regarding any plans to disturb soils in nonresidential areas where construction activities could impact the nonresidential or adjacent residential remedies. Utility organizations typically contacted as a part of the outreach process include sewer, water, gas, electric, oil, cable/fiber optic, etc. Periodic observations of the nonresidential areas would be conducted confirm that land use remains nonresidential.

Item No.	Item	Unit Cost	Units	Estimated Quantity	Estimated Cost
	Capital Costs				
1.	Mobilization / Demobilization	10%	Lump Sum	1	$78,000
2.	Temporary Facilities	$10,000	Month	5	$50,000
3.	Clearing and Site Preparation	$10,000	Acre	9.0	$90,000
4.	Surveying	$45,000	Lump Sum	1	$45,000
5.	Erosion, Sediment, and Storm Water Control	$36,000	Lump Sum	1	$36,000
6.	Soil Excavation	$25	Cubic Yard	9,700	$242,500
7.	Soil Backfill Placement	$21	Cubic Yard	9,700	$203,700
8.	On-Site Treatment Commissioning	$1,650,000	Lump Sum	1	$1,650,000
9.	On-Site Treatment (Thermal Desorption)	$400	Ton	14,600	$5,840,000
10.	Waste Transportation and Off-Site Treatment (Incineration of Oils)	$810	Drums	4	$3,240
11.	Onsite Placement of Low Temperature Thermal Desorption. Soils	$8	Ton	14,600	$121,180
12.	Surface Restoration	$6,000	Acre	9.0	$54,000
13.	Contractor Health & Safety/Air Monitoring	$10,000	Month	5	$50,000
				TOTAL CAPITAL COST	**$8,464,000**
	Long-Term Costs				
14.	Soil Management Program	$413,000	Annually	1	$413,000
				ADDITIONAL ANNUAL LONG-TERM COST	**$413,000**
	Present Worth of Additional Long-Term Costs				
15.	Years of Long-Term Program	30	Years		
16.	Discount Rate	7	%		
				PRESENT WORTH OF ANNUAL LONG-TERM COSTS (YEARS 1-30)	**$5,125,000**
	Administrative/Management				
				CONSTRUCTION BONDING (3% of Capital Cost)	**$254,000**
				PROJECT MANAGEMENT (5% of Capital Cost)	**$423,000**
				PROJECT MANAGEMENT (5% of Long-Term Cost)	**$256,000**
				ENGINEERING DESIGN/PERMITTING (6% of Capital Cost)	**$508,000**
				CONSTRUCTION MANAGEMENT (6% of Capital Cost)	**$508,000**
				SUBTOTAL	**$15,538,000**
	Contingency Costs				
				CONTINGENCY CAPITAL COSTS (15% scope + 15% bid)	**$2,539,000**
				CONTINGENCY LONG-TERM COSTS (10% scope + 10% bid)	**$1,025,000**
				TOTAL PRESENT WORTH	**$19,102,000**

Table 7-20
Estimated Costs for Remedial Alternative NRS-6 (21 mg/kg PRG)
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

General Notes:

- Cost estimate is based on past experience, cost estimating resources, and vendor estimates. Costs provided in 2016 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost.
- Cost factors based on *A Guide to Developing and Documenting Cost Estimates During Feasibility Study* , prepared by the United States Environmental Protection Agency (USEPA) and United States Army Corps of Engineers (USACE), July 2000.

Assumptions:

1. Includes costs for mobilization/demobilization of labor, equipment, and materials to perform the remedial construction activities. The cost is estimated as 10% of the total capital cost for the alternative, excluding transportation/disposal costs. It is assumed that a single mobilization/demobilization will be necessary.
2. Includes costs for temporary facilities and utilities including project trailers, sanitation/waste facilities and services, field office services, and fuel storage.
3. Includes costs for labor, equipment, and materials to perform clearing, construct support facilities areas, and otherwise prepare the site for construction. Includes 2 acres for siting of the on-site treatment facility and associated stockpiles.
4. Includes costs for labor, equipment, and materials to perform pre- and post-construction survey of the remedial areas to verify, confirm, and document pre- and post-construction elevations and conditions.
5. Includes costs for labor, equipment, and materials to install and manage temporary erosion and sedimentation controls.
6. Includes costs for labor, equipment, and materials to remove surface soils to achieve an EU-wide PCB EPC below the nonresidential surface soil PRG of 21 mg/kg. The target remedial areas are located in EU-5, EU-7, EU-14N, EU-19N, EU-19S, and EU-26. To achieve specific PRGs for non-PCB constituents of concern, EU-22 and EU-24 will be targeted to achieve a chromium PRG of 538 mg/kg, EU-14N and the Northside Area will be targeted to achieve a polycyclic aromatic hydrocarbon PRG of 21 mg/kg, and EU-25 will be targeted to achieve a polychlorinated dibenzo-p-dioxin/dibenzofuran toxic equivalent PRG of 0.6 micrograms per kilogram. The cost estimate assumes that 9,700 cubic yards of soil within a footprint of 9 acres will be excavated from these EUs.
7. Includes labor, equipment, and materials to purchase, import, place, grade, and compact a geotextile marker layer, general fill, and topsoil to replace removed materials to pre-removal grades.
8. Includes mobilization/demobilization, permitting, testing, and other required commissioning activities for use of the on-site treatment facility.
9. Includes setup and operation of an on-site treatment facility to treat PCB-containing soil excavated under this alternative. Includes on-site disposal of treated materials except collected oil.
10. Includes transportation and off-site treatment of PCB-containing oil from the on-site Low Temperature Thermal Desorption. process. Cost estimate assumes that the collected oil will be transported to the Veolia Gulf Coast Service Center in Port Arthur, Texas, for incineration to destroy the PCBs. Unit cost is based on a $370 per ton incineration/disposal fee plus a transport rate of $443 per ton and approximately 640 miles between Anniston, Alabama, and Port Arthur, Texas. Assumes 1 barrel of oil per 2,500 cubic yards of treated soil.
11. Includes transportation and on-site disposal of treated soils. Assumes that treated soils under this line item will be disposed in the SSSMA. Cost estimate assumes a soil density of 1.5 tons per cubic yard.
12. Includes costs for labor, equipment, and materials to restore the disturbed areas following construction. Includes grading, seeding, mulching, and other necessary surface restoration.
13. Includes costs for labor, equipment, and materials for contractor health and safety activities, monitoring dust and air emissions during intrusive activities, and dust control, as necessary.
14. Soil management would include active outreach with property owners, local city building departments, area utility companies, and county/state-wide transportation agencies regarding any plans to disturb soils in nonresidential areas where construction activities could impact the nonresidential or residential remedies. Cost estimates assumes that soil management will be required on five nonresidential properties per year. In addition, this cost estimate assumes that one large soil management project will be implemented every other year or two moderately sized soil management projects will be implemented each year. Includes periodic observations of the nonresidential areas to confirm that land use continues to be nonresidential.
15. Assumes 30 years for implementation of the soil management program based on industry standard and guidance in the document titled *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.
16. Present worth is estimated based on a 7% beginning-of-year discount rate. Present cost factor based on *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.

Table 7-21
Estimated Costs for Remedial Alternative GW-2
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative GW-2: Excavate 12 inches of soil across the broader T-11 area and the deeper soils immediately surrounding T-11 to protect groundwater and meet the floodplain surface soil preliminary remediation goals (PRGs). Excavated soils would be disposed of off-site and a soil cover system would be installed. Groundwater would be monitored, and operation and maintenance (O&M) of the cover soils would be implemented. Groundwater use would be restricted through institutional controls (ICs).

Item No.	Item	Unit Cost	Units	Estimated Quantity	Estimated Cost
	Capital Costs				
1.	Mobilization / Demobilization	10%	Lump Sum	1	$49,000
2.	Temporary Facilities (including access)	$150,000	Lump Sum	1	$150,000
3.	Clearing and Site Preparation	$50,000	Lump Sum	1	$50,000
4.	Surveying	$25,000	Lump Sum	1	$25,000
5.	Erosion, Sediment, and Storm Water Control	$10,000	Lump Sum	1	$10,000
6.	Soil Excavation	$25	Cubic Yard	3,000	$75,000
7.	Waste Transportation and Off-Site Disposal (≥50 mg/kg)	$200	Ton	3,400	$680,000
8.	Waste Transportation and Off-Site Disposal (<50 mg/kg)	$50	Ton	1,100	$55,000
9.	Soil Cover Installation	$15	Square Yard	8,300	$124,500
10.	Armor Stone Placement	$45	Ton	500	$22,500
11.	Contractor Health & Safety/Air Monitoring	$10,000	Month	3	$30,000
12.	Well Abandonment and Reinstallation	$15,000	Lump Sum	1	$15,000
13.	Institutional Controls	$30,000	Lump Sum	1	$30,000
				TOTAL CAPITAL COST	**$1,316,000**
	Long-Term Costs				
14.	Cap Inspection and Maintenance	$10,000	Annually	1	$10,000
15.	Groundwater Monitoring & Reporting	$5,000	Annually	1	$5,000
				ADDITIONAL LONG-TERM COST	**$15,000**
	Present Worth of Long-Term Costs				
16.	Years of Long-Term Program	30	Years		
17.	Discount Rate	7	%		
				PRESENT WORTH OF ANNUAL LONG-TERM COSTS (YEARS 1-30)	**$186,000**
	Administrative/Management				
				CONSTRUCTION BONDING (3% of Capital Cost)	**$39,000**
				PROJECT MANAGEMENT (5% of Capital Cost)	**$66,000**
				PROJECT MANAGEMENT (5% of Long-Term Cost)	**$9,000**
				ENGINEERING DESIGN/PERMITTING (6% of Capital Cost)	**$79,000**
				CONSTRUCTION MANAGEMENT (6% of Capital Cost)	**$79,000**
				SUBTOTAL	**$1,774,000**
	Contingency Costs				
				CONTINGENCY CAPITAL COSTS (15% scope + 15% bid)	**$395,000**
				CONTINGENCY LONG-TERM COSTS (10% scope + 10% bid)	**$37,000**
				TOTAL PRESENT WORTH	**$2,206,000**

General Notes:

- Cost estimate is based on past experience, cost estimating resources, and vendor estimates. Costs provided in 2016 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost.
- Cost factors based on *A Guide to Developing and Documenting Cost Estimates During Feasibility Study,* prepared by the United States Environmental Protection Agency (USEPA) and United States Army Corps of Engineers (USACE), July 2000.

Table 7-21
Estimated Costs for Remedial Alternative GW-2
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Assumptions:

1. Includes costs for mobilization/demobilization of labor, equipment, and materials to perform the remedial construction activities. The cost is estimated as 10% of the total capital cost for the alternative, excluding transportation/disposal costs. It is assumed that a single mobilization/demobilization will be necessary.
2. Includes costs for temporary facilities and utilities including project trailers, sanitation/waste facilities and services, field office services, and fuel storage. This line item also include costs for constructing access across Snow Creek to the T-11 area.
3. Includes costs for labor, equipment, and materials to perform clearing, construct support facilities areas, and otherwise prepare the site for construction.
4. Includes costs for labor, equipment, and materials to perform pre- and post-construction survey of the remedial areas to verify, confirm, and document pre- and post-construction elevations and conditions.
5. Includes costs for labor, equipment, and materials to install and manage temporary erosion and sedimentation controls.
6. Includes costs for labor, equipment, and materials to excavate 12 inches of soil across the broader T-11 area and high concentration soils immediately surrounding well T-11 to protect groundwater, meet the surface soil PRGs, and maintain the hydraulic profile of surface soil. The cost estimate assumes that this will involve the removal of 3,000 cubic yards of soil within a footprint of 1.7 acres.
7. Includes transportation and off-site disposal of excavated materials with polychlorinated biphenyl (PCB) concentrations greater than or equal to 50 mg/kg at a Toxic Substances Control Act regulated landfill. This cost estimate assumes that 75% of the soil material excavated under this alternative would be greater than 50 mg/kg. Cost estimate assumes a soil density of 1.5 tons per cubic yard.
8. Includes transportation and off-site disposal of excavated materials with PCB concentrations less than 50 mg/kg at a nonhazardous landfill. The estimated volume of excavated material for off-site disposal under this line item is assumed to be approximately 25% of the total volume. Cost estimate assumes a soil density of 1.5 tons per cubic yard.
9. Includes costs for labor, equipment, and materials to install a soil cover over the T-11 area. The cost estimate assumes that the cover will be installed over approximately 1.7 acres. The soil cover would include a geotextile marker layer, 12-inch layer of clean backfill, and vegetation for stability.
10. Includes costs for labor, equipment, and materials to deliver and install approximately 500 tons of riprap stone to protect the cover from storm water runoff and erosion.
11. Includes costs for labor, equipment, and materials for contractor health and safety activities, monitoring dust and air emissions during intrusive activities, and dust control, as necessary.
12. Includes costs for labor, equipment, and materials for well abandonment and reinstallation where necessary.
13. Includes administrative and legal costs to implement ICs (e.g., deed restrictions, groundwater use restrictions) to limit future property use where engineering controls are installed.
14. Long-term O&M activities would include periodic inspection of the engineered cover systems to document their condition and maintenance and repairs as needed to maintain the integrity of the cover system.
15. Groundwater monitoring is assumed to be conducted once per year for the 30-year O&M period and will be coordinated with other site groundwater sampling events.
16. Assumes 30 years for implementation of long-term cover inspection and maintenance activities based on industry standard and guidance in the document titled *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.
17. Present worth is estimated based on a 7% beginning-of-year discount rate. Present cost factor based on *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.

Table 7-22
Estimated Costs for Remedial Alternative GW-3
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative GW-3: Excavate 18 inches of soil across the broader T-11 area and high concentration soils immediately surrounding well T-11 to protect groundwater, meet the surface soil preliminary remediation goals (PRGs), and maintain the hydraulic profile. Excavated soils would be disposed of off-site. Install a low permeability cap to limit infiltration and monitor groundwater concentrations. Long-term operation and maintenance (O&M) will be necessary for the cap. Implement institutional controls (ICs) for groundwater and the cap.

Item No.	Item	Unit Cost	Units	Estimated Quantity	Estimated Cost
	Capital Costs				
1.	Mobilization / Demobilization	10%	Lump Sum	1	$82,000
2.	Temporary Facilities (including access)	$150,000	Lump Sum	1	$150,000
3.	Clearing and Site Preparation	$50,000	Lump Sum	1	$50,000
4.	Surveying	$40,000	Lump Sum	1	$40,000
5.	Erosion, Sediment, and Storm Water Control	$10,000	Lump Sum	1	$10,000
6.	Soil Excavation	$25	Cubic Yard	4,400	$110,000
7.	Waste Transportation and Off-Site Disposal (≥50 mg/kg)	$200	Ton	5,000	$1,000,000
8.	Waste Transportation and Off-Site Disposal (<50 mg/kg)	$50	Ton	1,600	$80,000
9.	Install Low-Permeability Cap	$45	Square Yard	8,300	$373,500
10.	Armor Stone Placement	$45	Ton	500	$22,500
11.	Contractor Health & Safety/Air Monitoring	$10,000	Month	6	$60,000
12.	Well Abandonment and Reinstallation	$15,000	Lump Sum	1	$15,000
13.	Institutional Controls	$30,000	Lump Sum	1	$30,000
				TOTAL CAPITAL COST	**$2,023,000**
	Long-Term Costs				
14.	Cap Inspection and Maintenance	$10,000	Annually	1	$10,000
15.	Groundwater Monitoring & Reporting	$5,000	Annually	1	$5,000
				ADDITIONAL LONG-TERM COST	**$15,000**
	Present Worth of Long-Term Costs				
16.	Years of Long-Term Program	30	Years		
17.	Discount Rate	7	%		
				PRESENT WORTH OF ANNUAL LONG-TERM COSTS (YEARS 1-30)	**$186,000**
	Administrative/Management				
				CONSTRUCTION BONDING (3% of Capital Cost)	**$61,000**
				PROJECT MANAGEMENT (5% of Capital Cost)	**$101,000**
				PROJECT MANAGEMENT (5% of Long-Term Cost)	**$9,000**
				ENGINEERING DESIGN/PERMITTING (6% of Capital Cost)	**$121,000**
				CONSTRUCTION MANAGEMENT (6% of Capital Cost)	**$121,000**
				SUBTOTAL	**$2,622,000**
	Contingency Costs				
				CONTINGENCY CAPITAL COSTS (15% scope + 15% bid)	**$607,000**
				CONTINGENCY LONG-TERM COSTS (10% scope + 10% bid)	**$37,000**
				TOTAL PRESENT WORTH	**$3,266,000**

General Notes:

- Cost estimate is based on past experience, cost estimating resources, and vendor estimates. Costs provided in 2016 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost.
- Cost factors based on *A Guide to Developing and Documenting Cost Estimates During Feasibility Study,* prepared by the United States Environmental Protection Agency (USEPA) and United States Army Corps of Engineers (USACE), July 2000.

Table 7-22
Estimated Costs for Remedial Alternative GW-3
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Assumptions:

1. Includes costs for mobilization/demobilization of labor, equipment, and materials to perform the remedial construction activities. The cost is estimated as 10% of the total capital cost for the alternative, excluding transportation/disposal costs. It is assumed that a single mobilization/demobilization will be necessary.
2. Includes costs for temporary facilities and utilities including project trailers, sanitation/waste facilities and services, field office services, and fuel storage. This line item also include costs for constructing access across Snow Creek to the T-11 area.
3. Includes costs for labor, equipment, and materials to perform clearing, construct support facilities areas, and otherwise prepare the site for construction.
4. Includes costs for labor, equipment, and materials to perform pre- and post-construction survey of the remedial areas to verify, confirm, and document pre- and post-construction elevations and conditions.
5. Includes costs for labor, equipment, and materials to install and manage temporary erosion and sedimentation controls.
6. Includes costs for labor, equipment, and materials to excavate 18 inches of soil across the broader T-11 area and high-concentration soils immediately surrounding well T-11 to protect groundwater, meet the surface soil PRGs, and maintain the hydraulic profile of surface soil. The cost estimate assumes that this will involve the removal of 4,400 cubic yards of soil within a footprint of 1.7 acres.
7. Includes transportation and off-site disposal of excavated materials with polychlorinated biphenyl (PCB) concentrations greater than or equal to 50 mg/kg at a Toxic Substances Control Act regulated landfill. This cost estimate assumes that 75% of the soil material excavated within the upper 18 inches would be greater than or equal to 50 mg/kg. Cost estimate assumes a soil density of 1.5 tons per cubic yard.
8. Includes transportation and off-site disposal of excavated materials with PCB concentrations less than 50 mg/kg at a nonhazardous landfill. The estimated volume of excavated material for off-site disposal under this line item is assumed to be approximately 25% of the total volume. Cost estimate assumes a soil density of 1.5 tons per cubic yard.
9. Includes costs for labor, equipment, and materials to install a low-permeability cap over the T-11 area, consisting of low-density polyethylene geomembrane, double-sided geocomposite, 18 inches of cover soil, and vegetated cover. The cost estimate assumes that cover system will be installed over approximately 1.7 acres.
10. Includes costs for labor, equipment, and materials to deliver and install approximately 500 tons of riprap stone to protect the cover from storm water runoff and erosion.
11. Includes costs for labor, equipment, and materials for contractor health and safety activities, monitoring dust and air emissions during intrusive activities, and dust control, as necessary.
12. Includes costs for labor, equipment, and materials for well abandonment and reinstallation where necessary.
13. Includes administrative and legal costs to implement institutional controls (e.g., deed restrictions, groundwater use restrictions) to limit future property use where engineering controls are installed.
14. Long-term O&M activities would include periodic inspection of the engineered cover systems to document their condition and maintenance and repairs as needed to maintain the integrity of the cover system.
15. Groundwater monitoring is assumed to be conducted once per year for the 30-year O&M period and will be coordinated with other site groundwater sampling events.
16. Assumes 30 years for implementation of long-term cover inspection and maintenance activities based on industry standard and guidance in the document titled *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.
17. Present worth is estimated based on a 7% beginning-of-year discount rate. Present cost factor based on *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.

Table 7-23
Estimated Costs for Remedial Alternative GW-4
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative GW-4: Excavate 18 inches of soil across the broader T-11 area and deeper soils immediately surrounding T-11 to protect groundwater, meet the surface soil preliminary remediation goals (PRGs), and maintain the hydraulic profile. Excavated soils would be disposed of off-site. Install a low-permeability cap to limit infiltration. Install and temporarily operate and maintain a groundwater extraction and treatment system with discharge of treated waters to Snow Creek. Remove approximately two pore volumes of groundwater from affected area. System performance and additional actions, if any, will be assessed and implemented using an adaptive site management approach. Conduct operation and maintenance (O&M) for the low-permeability cap. Groundwater monitoring will be necessary. Implement institutional controls (ICs) for groundwater and the cap.

Item No.	Item	Unit Cost	Units	Estimated Quantity	Estimated Cost
	Capital Costs				
1.	Mobilization / Demobilization	10%	Lump Sum	1	$110,000
2.	Temporary Facilities (including access)	$200,000	Lump Sum	1	$200,000
3.	Clearing and Site Preparation	$50,000	Lump Sum	1	$50,000
4.	Surveying	$40,000	Lump Sum	1	$40,000
5.	Erosion, Sediment, and Storm Water Control	$10,000	Lump Sum	1	$10,000
6.	Soil Excavation	$25	Cubic Yard	4,500	$112,500
7.	Waste Transportation and Off-Site Disposal (≥50 mg/kg)	$200	Ton	5,000	$1,000,000
8.	Waste Transportation and Off-Site Disposal (<50 mg/kg)	$50	Ton	1,600	$80,000
9.	Install Low-Permeability Cap	$45	Square Yard	8,300	$373,500
10.	Armor Stone Placement	$45	Ton	500	$22,500
11.	Groundwater Extraction Wells	$20,000	Each	2	$40,000
12.	Well Abandonment and Reinstallation	$15,000	Lump Sum	1	$15,000
13.	Trenching/Piping	$40,000	Lump Sum	1	$40,000
14.	Groundwater Treatment System Installation	$70,000	Lump Sum	1	$70,000
15.	Groundwater Treatment System Startup	$50,000	Lump Sum	1	$50,000
16.	Contractor Health & Safety/Air Monitoring	$12,000	Month	6	$72,000
17.	Institutional Controls	$30,000	Lump Sum	1	$30,000
18.	Predesign Investigation	$50,000	Lump Sum	1	$50,000
				TOTAL CAPITAL COST	**$2,366,000**
	Long-Term Costs				
19.	Cap Inspection & Repair	$10,000	Annually	1	$10,000
20.	Groundwater Monitoring & Reporting	$5,000	Annually	1	$5,000
21.	Groundwater Treatment System O&M	$25,000	Annually	1	$25,000
				ADDITIONAL LONG-TERM COST	**$40,000**
	Present Worth of Long-Term Costs				
22.	Years of Long-Term Program	30	Years		
23.	Discount Rate	7	%		
				PRESENT WORTH OF ANNUAL LONG-TERM COSTS (YEARS 1-30)	**$496,000**
	Administrative/Management				
				CONSTRUCTION BONDING (3% of Capital Cost)	**$71,000**
				PROJECT MANAGEMENT (5% of Capital Cost)	**$118,000**
				PROJECT MANAGEMENT (5% of Long-Term Cost)	**$25,000**
				ENGINEERING DESIGN/PERMITTING (6% of Capital Cost)	**$142,000**
				CONSTRUCTION MANAGEMENT (6% of Capital Cost)	**$142,000**
				SUBTOTAL	**$3,360,000**
	Contingency Costs				
				CONTINGENCY CAPITAL COSTS (15% scope + 15% bid)	**$710,000**
				CONTINGENCY LONG-TERM COSTS (10% scope + 10% bid)	**$99,000**
				TOTAL PRESENT WORTH	**$4,169,000**

Table 7-23
Estimated Costs for Remedial Alternative GW-4
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

General Notes:

- Cost estimate is based on past experience, cost estimating resources, and vendor estimates. Costs provided in 2016 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost.
- Cost factors based on *A Guide to Developing and Documenting Cost Estimates During Feasibility Study,* prepared by the United States Environmental Protection Agency (USEPA) and United States Army Corps of Engineers (USACE), July 2000.

Assumptions:

1. Includes costs for mobilization/demobilization of labor, equipment, and materials to perform the remedial construction activities. The cost is estimated as 10% of the total capital cost for the alternative, excluding transportation/disposal costs. It is assumed that a single mobilization/demobilization will be necessary.
2. Includes costs for temporary facilities and utilities including project trailers, sanitation/waste facilities and services, field office services, and fuel storage. This line item also include costs for constructing access across Snow Creek to the T-11 area.
3. Includes costs for labor, equipment, and materials to perform clearing, construct support facilities areas, and otherwise prepare the site for construction.
4. Includes costs for labor, equipment, and materials to perform pre- and post-construction survey of the remedial areas to verify, confirm, and document pre- and post-construction elevations and conditions.
5. Includes costs for labor, equipment, and materials to install and manage temporary erosion and sedimentation controls.
6. Includes costs for labor, equipment, and materials to excavate 18 inches of soil across the broader T-11 area and high-concentration soils immediately surrounding well T-11 to protect groundwater, meet the surface soil PRGs, and maintain the hydraulic profile of surface soil. The cost estimate assumes that this will involve the removal of 4,500 cubic yards of soil within a footprint of 1.7 acres.
7. Includes transportation and off-site disposal of excavated materials with polychlorinated biphenyl (PCB) concentrations greater than or equal to 50 mg/kg at a Toxic Substances Control Act regulated landfill. This cost estimate assumes that 75% of the soil material excavated within the upper 18 inches would be greater than or equal to 50 mg/kg. Cost estimate assumes a soil density of 1.5 tons per cubic yard.
8. Includes transportation and off-site disposal of excavated materials with PCB concentrations less than 50 mg/kg at a nonhazardous landfill. The estimated volume of excavated material for off-site disposal under this line item is assumed to be approximately 25% of the total volume. Cost estimate assumes a soil density of 1.5 tons per cubic yard.
9. Includes costs for labor, equipment, and materials to install a low-permeability cap over the T-11 area, consisting of low-density polyethylene geomembrane, double-sided geocomposite, 18 inches of cover soil, and vegetated cover. The cost estimate assumes that cover system will be installed over approximately 1.7 acres.
10. Includes costs for labor, equipment, and materials to deliver and install approximately 500 tons of riprap stone to protect the cover from storm water runoff and erosion.
11. Includes costs for labor, equipment, and materials to install two groundwater extraction wells. Costs include costs for drilling, logging, reporting, mobilization/demobilization, decontamination, disposal, pumping, well development, etc.
12. Includes costs for labor, equipment, and materials for well abandonment and reinstallation where necessary.
13. Includes costs for labor, equipment, and materials to install and connect piping associated with the groundwater extraction and treatment system.
14. Includes costs for labor, equipment, and materials to install an activated carbon groundwater treatment system, including electrical and plumbing connections.
15. Includes costs for labor, equipment, and materials to startup, test, troubleshoot, and prepare the groundwater extraction/treatment system.
16. Includes costs for labor, equipment, and materials for contractor health and safety activities, monitoring dust and air emissions during intrusive activities, and dust control, as necessary.
17. Includes administrative and legal costs to implement ICs (e.g., deed restrictions, groundwater use restrictions) to limit future property use where engineering controls are installed.
18. Includes costs for labor, equipment, and materials to perform a predesign investigation to gather supplemental data and information needed to finalize the design of the groundwater extraction/treatment system.
19. Includes annual periodic inspection of the low-permeability cap to document its condition and determine if maintenance or repairs are needed.
20. Groundwater monitoring is assumed to be conducted once per year for the 30-year O&M period and will be coordinated with other site groundwater sampling events.
21. For this estimate, it is assumed that the groundwater extraction system will be operated for one year. This assumption will be evaluated as part of the predesign investigation.
22. Assumes 30 years for implementation of long-term cover inspection and maintenance activities based on industry standard and guidance in the document titled *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.
23. Present worth is estimated based on a 7% beginning-of-year discount rate. Present cost factor based on *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.

Table 7-24
Estimated Costs for Remedial Alternative SED-2
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative SED-2: Remove sediment from culverts, excavate sediment from the OU-1/OU-2 portion of Snow Creek with polychlorinated biphenyl (PCB) concentrations ≥10 milligrams per kilogram (mg/kg) and use on-site/off-site disposal options, and apply monitored natural remediation (MNR) for the remainder of the sediment. The preliminary remediation goals (PRGs) for Snow Creek and the associated creek bank areas include 3 mg/kg for PCBs in sediment and 21 mg/kg for PCBs in the adjoining creek bank areas. The chronic ambient water quality criteria (AWQC) value of 0.014 micrograms per liter (µg/L) also applies to the waters of Snow Creek. PRGs for metals that apply to Snow Creek sediment include for 322 mg/kg barium, 111 mg/kg for chromium, 59 mg/kg for cobalt, 128 mg/kg for lead, 1,100 for manganese, 1 mg/kg for mercury, 49 mg/kg for nickel and 41 mg/kg for vanadium. Dispose of materials with PCB concentrations ≥50 mg/kg off-site, and dispose of excavated sediment with PCB concentrations <50 mg/kg on-site in the south staging and soil management area (SSSMA). MNR would be applied to sediment deposits that have average PCB concentrations <10 mg/kg to achieve the PRG of 3 mg/kg over time using an adaptive site management (ASM) process. Monitoring and additional actions, if needed, would be implemented using an adaptive site management approach to assess effectiveness. Stabilize creek banks that are unstable or may become unstable during or following excavation of creek sediment and that have soil concentrations above PRGs.

Item No.	Item	Unit Cost	Units	Estimated Quantity	Estimated Cost
	Capital Costs				
1.	Mobilization / Demobilization	10%	Lump Sum	1	$134,000
2.	Temporary Facilities	$10,000	Month	5	$50,000
3.	Site Preparation	$64,000	Acres	1.4	$89,600
4.	Material Staging Pad	$135,000	Lump Sum	1	$135,000
5.	Surveying	$50,000	Lump Sum	1	$50,000
6.	Sediment Excavation and Handling	$210	Cubic Yard	2,300	$483,000
7.	Sediment Dewatering and Stabilization	$110	Cubic Yard	2,300	$253,000
8.	Backfill Placement	$35	Cubic Yard	600	$21,000
9.	Waste Transportation and Off-Site Disposal (≥50 mg/kg)	$200	Ton	600	$120,000
10.	Waste Transportation and On-Site Disposal (<50 mg/kg)	$8	Ton	3,100	$25,730
11.	Shoreline Restoration	$78,000	Lump Sum	1	$78,000
12.	Bank Stabilization	$6.50	Square Feet	13,800	$89,700
13.	Contractor Health & Safety/Air Monitoring	$10,000	Month	5	$50,000
14.	Predesign Investigation	$40,000	Lump Sum	1	$40,000
				TOTAL CAPITAL COST	**$1,619,000**
	Long-Term Costs				
15.	Long-Term Monitoring	$15,000	Annually	1	$15,000
				ADDITIONAL LONG-TERM COST	**$15,000**
	Present Worth of Long-Term Costs				
16.	Years of Long-Term Program	30	Years		
17.	Discount Rate	7	%		
				PRESENT WORTH OF ANNUAL LONG-TERM COSTS (YEARS 1-30)	**$186,000**
	Administrative/Management				
				CONSTRUCTION BONDING (3% of Capital Cost)	**$49,000**
				PROJECT MANAGEMENT (5% of Capital Cost)	**$81,000**
				PROJECT MANAGEMENT (5% of Long-Term Cost)	**$9,000**
				ENGINEERING DESIGN/PERMITTING (6% of Capital Cost)	**$97,000**
				CONSTRUCTION MANAGEMENT (6% of Capital Cost)	**$97,000**
				SUBTOTAL	**$2,138,000**
	Contingency Costs				
				CONTINGENCY CAPITAL COSTS (15% scope + 15% bid)	**$486,000**
				CONTINGENCY LONG-TERM COSTS (10% scope + 10% bid)	**$37,000**
				TOTAL PRESENT WORTH	**$2,661,000**

General Notes:

- Cost estimate is based on past experience, cost estimating resources, and vendor estimates. Costs provided in 2016 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost.
- Cost factors based on *A Guide to Developing and Documenting Cost Estimates During Feasibility Study*, prepared by the United States Environmental Protection Agency (USEPA) and United States Army Corps of Engineers (USACE), July 2000.

Table 7-24
Estimated Costs for Remedial Alternative SED-2
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Assumptions:

1. Includes costs for mobilization/demobilization of labor, equipment, and materials to perform the remedial construction activities. The cost is estimated as 10% of the total capital cost for the alternative, excluding transportation/disposal costs. It is assumed that a single mobilization/demobilization will be necessary.
2. Includes costs for temporary facilities and utilities including project trailers, sanitation/waste facilities and services, field office services, and fuel storage.
3. Includes costs for labor, equipment, and materials to perform clearing, construct support facilities areas, install temporary gravel roads for access, and otherwise prepare the site for construction. Estimate assumes that 1.4 acres of upland area adjacent to Snow Creek will require clearing, construction of temporary access ways, and erosion/sedimentation control in order to access the various targeted sediment deposits throughout Snow Creek. The unit cost is based on site clearing ($10,000 per acre), erosion/sedimentation control ($4,000 per acre), and construction of temporary gravel access roads ($50,000 per acre).
4. Includes costs for labor, equipment, and materials to construct a temporary material staging pad for the sediment excavated from the creek. The cost estimate assumes a 75-foot by 150-foot material staging area constructed of a 6-inch gravel subbase and 6-inch asphalt pavement and equipped with a 12-inch berm and sloped to a sump.
5. Includes costs for labor, equipment, and materials to perform pre- and post-construction survey of the remedial areas to verify, confirm, and document pre- and post-construction elevations and conditions.
6. Includes costs for labor, equipment, and materials to remove sediment obstructing culverts and excavation of sediment from the OU-1/OU-2 portion of Snow Creek with concentrations greater than preliminary remediation goals (PRGs). The cost estimate assumes that this will include the removal of 2,300 cubic yards of sediment within a footprint of 32,000 square feet. Cost estimate assumes that a long-reach excavator and a smaller skidsteer unit will be used to excavate the targeted sediment deposits and load those materials into watertight trucks for transfer to a material staging area. Due to the isolated nature of the sediment deposits, this cost estimate assumes that the average sediment removal production rate will be 50 cubic yards per day.
7. Sediment dewatering and stabilization cost assumes handling of dredged soils, stabilization of dredged material with a stabilization agent (5% by volume). Water generated during dredged material staging and processing (including storm water) will be collected and treated prior to discharge to Snow Creek or to a local publicly owned treatment works.
8. Includes labor, equipment, and materials to purchase, import, and place a 12-inch backfill layer in the excavated areas.
9. Includes transportation and off-site disposal of excavated materials with PCB concentrations greater than or equal to 50 mg/kg at a Toxic Substances Control Act regulated landfill. Based on available PCB data, this cost estimate assumes that approximately 20% (320 cubic yards) of sediment within the Highway 202 culvert will have PCB concentrations exceeding 50 mg/kg. Cost estimate assumes a soil density of 1.5 tons per cubic yard plus additional weight (5% by volume) for applying stabilization agents.
10. Includes transportation and on-site disposal of excavated soils with PCB concentrations less than 50 mg/kg. Assumes that excavated sediments under this line item will be disposed in the SSSMA. This cost estimate assumes that approximately 2,000 cubic yards of sediment will be less than 50 mg/kg. Cost estimate assumes a soil density of 1.5 tons per cubic yard plus additional weight (5% by volume) for applying stabilization agents.
11. Includes costs for labor, equipment, and materials for removing the temporary roads constructed to provide access to the creek, importing and placing 6 inches of topsoil in the disturbed upland areas, seeding the topsoil, and planting a limited number of shrubs/trees in the disturbed upland areas. This cost estimate also assumes that riprap will be used to stabilize the shoreline in approximately one-third of the areas where sediment deposits were removed.
12. Includes costs for labor, equipment, and materials to perform bank stabilization of unstable creek banks. For cost estimating purposes, it is assumed that 1,400 linear feet of creek banks will require either engineered stabilization measures or natural stabilization measures. This cost estimate assumes that bank stabilization measures will include one or more of the following: placing "dirty" riprap, planting live stakes, or installing articulated concrete mats to protect against continued bank erosion.
13. Includes costs for labor, equipment, and materials for contractor health and safety activities, monitoring dust and air emissions during intrusive activities, and dust control, as necessary.
14. Includes costs for labor, equipment, and materials to perform predesign investigation activities. Under this alternative, it is assumed that the predesign investigation will include sediment sampling to characterize sediment deposits that were not previously sampled.
15. Includes sediment and surface water sampling and analysis to monitor the effectiveness of the remedy. The cost estimate assumes that 10 surface water samples and 10 sediment samples will be collected and analyzed during sampling events that occur once every 5 years.
16. Assumes 30 years for implementation of long-term cover inspection and maintenance activities based on industry standard and guidance in the document titled *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.
17. Present worth is estimated based on a 7% beginning-of-year discount rate. Present cost factor based on *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.

Table 7-25
Estimated Costs for Remedial Alternative SED-3
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative SED-3: Remove sediment from culverts and excavate and dispose of sediment from the OU-1/OU-2 portion of Snow Creek with polychlorinated biphenyls (PCB) concentrations above preliminary remediation goals (PRGs). The PRGs for Snow Creek and the associated creek bank areas include 3 mg/kg for PCBs in sediment and 21 mg/kg for PCBs in the adjoining creek bank areas. The chronic ambient water quality criteria (AWQC) value of 0.014 micrograms per liter (µg/L) also applies to the waters of Snow Creek. PRGs for metals that apply to Snow Creek sediment include for 322 mg/kg barium, 111 mg/kg for chromium, 59 mg/kg for cobalt, 128 mg/kg for lead, 1,100 for manganese, 1 mg/kg for mercury, 49 mg/kg for nickel and 41 mg/kg for vanadium. Off-site disposal of materials with PCB concentrations ≥50 milligrams per kilogram (mg/kg) with on-site disposal of excavated sediment with PCB concentrations <50 mg/kg in the south staging and soil management area (SSSMA). Stabilize creek banks that are unstable or may become unstable during or following excavation of creek sediment and that have soil concentrations above PRGs.

Item No.	Item	Unit Cost	Units	Estimated Quantity	Estimated Cost
	Capital Costs				
1.	Mobilization / Demobilization	10%	Lump Sum	1	$146,000
2.	Temporary Facilities	$10,000	Month	5	$50,000
3.	Site Preparation	$64,000	Acres	1.9	$121,600
4.	Material Staging Pad	$135,000	Lump Sum	1	$135,000
5.	Surveying	$50,000	Lump Sum	1	$50,000
6.	Sediment Excavation and Handling	$210	Cubic Yard	2,500	$525,000
7.	Sediment Dewatering and Stabilization	$110	Cubic Yard	2,500	$275,000
8.	Backfill Placement	$35	Cubic Yard	700	$24,500
9.	Waste Transportation and Off-Site Disposal (≥50 mg/kg)	$200	Ton	600	$120,000
10.	Waste Transportation and On-Site Disposal (<50 mg/kg)	$8	Ton	3,500	$29,050
11.	Shoreline Restoration	$95,000	Lump Sum	1	$95,000
12.	Bank Stabilization	$6.50	Square Feet	13,800	$89,700
13.	Contractor Health & Safety/Air Monitoring	$10,000	Month	5	$50,000
14.	Predesign Investigation	$40,000	Lump Sum	1	$40,000
				TOTAL CAPITAL COST	**$1,751,000**
	Long-Term Costs				
15.	Long-Term Monitoring	$15,000	Annually	1	$15,000
				ADDITIONAL LONG-TERM COST	**$15,000**
	Present Worth of Long-Term Costs				
16.	Years of Long-Term Program	30	Years		
17.	Discount Rate	7	%		
				PRESENT WORTH OF ANNUAL LONG-TERM COSTS (YEARS 1-30)	**$186,000**
	Administrative/Management				
				CONSTRUCTION BONDING (3% of Capital Cost)	**$53,000**
				PROJECT MANAGEMENT (5% of Capital Cost)	**$88,000**
				PROJECT MANAGEMENT (5% of Long-Term Cost)	**$9,000**
				ENGINEERING DESIGN/PERMITTING (6% of Capital Cost)	**$105,000**
				CONSTRUCTION MANAGEMENT (6% of Capital Cost)	**$105,000**
				SUBTOTAL	**$2,297,000**
	Contingency Costs				
				CONTINGENCY CAPITAL COSTS (15% scope + 15% bid)	**$525,000**
				CONTINGENCY LONG-TERM COSTS (10% scope + 10% bid)	**$37,000**
				TOTAL PRESENT WORTH	**$2,859,000**

General Notes:

- Cost estimate is based on past experience, cost estimating resources, and vendor estimates. Costs provided in 2016 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost.
- Cost factors based on *A Guide to Developing and Documenting Cost Estimates During Feasibility Study,* prepared by the United States Environmental Protection Agency (USEPA) and United States Army Corps of Engineers (USACE), July 2000.

Table 7-25
Estimated Costs for Remedial Alternative SED-3
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Assumptions:

1. Includes costs for mobilization/demobilization of labor, equipment, and materials to perform the remedial construction activities. The cost is estimated as 10% of the total capital cost for the alternative, excluding transportation/disposal costs. It is assumed that a single mobilization/demobilization will be necessary.
2. Includes costs for temporary facilities and utilities including project trailers, sanitation/waste facilities and services, field office services, and fuel storage.
3. Includes costs for labor, equipment, and materials to perform clearing, construct support facilities areas, install temporary gravel roads for access, and otherwise prepare the site for construction. Estimate assumes that 1.9 acres of upland area adjacent to Snow Creek will require clearing, construction of temporary access ways, and erosion/sedimentation control to access the various targeted sediment deposits throughout Snow Creek. The unit cost is based on site clearing ($10,000 per acre), erosion/sedimentation control ($4,000 per acre), and construction of temporary gravel access roads ($50,000 per acre).
4. Includes costs for labor, equipment, and materials to construct a temporary material staging pad for the sediment excavated from the creek. The cost estimate assumes a 75-foot by 150-foot material staging area constructed of a 6-inch gravel subbase and 6-inch asphalt pavement and equipped with a 12-inch berm and sloped to a sump.
5. Includes costs for labor, equipment, and materials to perform pre- and post-construction survey of the remedial areas to verify, confirm, and document pre- and post-construction elevations and conditions.
6. Includes costs for labor, equipment, and materials to remove sediment obstructing culverts and excavation of sediment from the OU-1/OU-2 portion of Snow Creek with concentrations greater than PRGs. The cost estimate assumes that this will include the removal of 2,500 cubic yards of sediment within a footprint of 35,000 square feet. Cost estimate assumes that a long-reach excavator and a smaller skidsteer unit will be used to excavate the targeted sediment deposits and load those materials into watertight trucks for transfer to a material staging area. Due to the isolated nature of the sediment deposits, this cost estimate assumes that the average sediment removal production rate will be 50 cubic yards per day.
7. Sediment dewatering and stabilization cost assumes handling of dredged soils and stabilization of dredged material with a stabilization agent (5% by volume). Water generated during dredged material staging and processing (including storm water) will be collected and treated prior to discharge to Snow Creek or to a local publicly owned treatment works.
8. Includes labor, equipment, and materials to purchase, import, and place a 1-foot backfill layer in the excavated areas.
9. Includes transportation and off-site disposal of excavated materials with PCB concentrations greater than or equal to 50 mg/kg at a Toxic Substances Control Act regulated landfill. Based on available PCB data, this cost estimate assumes that approximately 20% (320 cubic yards) of sediment within the Highway 202 culvert will have PCB concentrations exceeding 50 mg/kg. Cost estimate assumes a soil density of 1.5 tons per cubic yard plus additional weight (5% by volume) for applying stabilization agents.
10. Includes transportation and on-site disposal of excavated soils with PCB concentrations less than 50 mg/kg. Assumes that excavated sediments under this line item will be disposed in the SSSMA. This cost estimate assumes that approximately 2,100 cubic yards of sediment will be less than 50 mg/kg. Cost estimate assumes a soil density of 1.5 tons per cubic yard plus additional weight (5% by volume) for applying stabilization agents.
11. Includes costs for labor, equipment, and materials for removing the temporary roads constructed to provide access to the creek, importing and placing 6 inches of topsoil in the disturbed upland areas, seeding the topsoil, and planting a limited number of shrubs/trees in the disturbed upland areas. This cost estimate also assumes that riprap will be used to stabilize the shoreline in approximately one-third of the areas where sediment deposits were removed.
12. Includes costs for labor, equipment, and materials to perform bank stabilization of unstable creek banks. For cost estimating purposes, it is assumed that 1,400 linear feet of creek banks will require either engineered stabilization measures or natural stabilization measures. This cost estimate assumes that bank stabilization measures will include one or more of the following: placing "dirty" riprap, planting live stakes, or installing articulated concrete mats to protect against continued bank erosion.
13. Includes costs for labor, equipment, and materials for contractor health and safety activities, monitoring dust and air emissions during intrusive activities, and dust control, as necessary.
14. Includes costs for labor, equipment, and materials to perform predesign investigation activities. Under this alternative, it is assumed that the predesign investigation will include sediment sampling to characterize sediment deposits that were not previously sampled.
15. Includes sediment and surface water sampling and analysis to monitor the effectiveness of the remedy. The cost estimate assumes that 10 surface water samples and 10 sediment samples will be collected and analyzed during sampling events that occur once every 5 years.
16. Assumes 30 years for implementation of long-term cover inspection and maintenance activities based on industry standard and guidance in the document titled *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.
17. Present worth is estimated based on a 7% beginning-of-year discount rate. Present cost factor based on *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.

Table 7-26
Estimated Costs for Remedial Alternative SED-4
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative SED-4: Remove sediment from culverts and excavate sediment from the OU-1/OU-2 portion of Snow Creek with polychlorinated biphenyl (PCB) concentrations above preliminary remediation goals (PRGs) with off-site disposal for all excavated materials. The PRGs for Snow Creek and the associated creek bank areas include 3 milligrams per kilogram (mg/kg) for PCBs in sediment and 21 mg/kg for PCBs in the adjoining creek bank areas. The chronic ambient water quality criteria (AWQC) value of 0.014 micrograms per liter (µg/L) also applies to the waters of Snow Creek. PRGs for metals that apply to Snow Creek sediment include for 322 mg/kg barium, 111 mg/kg for chromium, 59 mg/kg for cobalt, 128 mg/kg for lead, 1,100 for manganese, 1 mg/kg for mercury, 49 mg/kg for nickel and 41 mg/kg for vanadium. Stabilize creek banks that are unstable or may become unstable during or following excavation of creek sediment and that have soil concentrations above sediment PRGs.

Item No.	Item	Unit Cost	Units	Estimated Quantity	Estimated Cost
	Capital Costs				
1.	Mobilization / Demobilization	10%	Lump Sum	1	$146,000
2.	Temporary Facilities	$10,000	Month	5	$50,000
3.	Site Preparation	$64,000	Acres	1.9	$121,600
4.	Material Staging Pad	$135,000	Lump Sum	1	$135,000
5.	Surveying	$50,000	Lump Sum	1	$50,000
6.	Sediment Excavation and Handling	$210	Cubic Yard	2,500	$525,000
7.	Sediment Dewatering and Stabilization	$110	Cubic Yard	2,500	$275,000
8.	Backfill Placement	$35	Cubic Yard	700	$24,500
9.	Waste Transportation and Off-Site Disposal (≥50 mg/kg)	$200	Ton	600	$120,000
10.	Waste Transportation and Off-Site Disposal (<50 mg/kg)	$50	Ton	3,500	$175,000
11.	Shoreline Restoration	$95,000	Lump Sum	1	$95,000
12.	Bank Stabilization	$6.50	Square Feet	13,800	$89,700
13.	Contractor Health & Safety/Air Monitoring	$10,000	Month	5	$50,000
14.	Predesign Investigation	$40,000	Lump Sum	1	$40,000
				TOTAL CAPITAL COST	**$1,897,000**
	Long-Term Costs				
15.	Long-Term Monitoring	$15,000	Annually	1	$15,000
				ADDITIONAL LONG-TERM COST	**$15,000**
	Present Worth of Long-Term Costs				
16.	Years of Long-Term Program	30	Years		
17.	Discount Rate	7	%		
				PRESENT WORTH OF ANNUAL LONG-TERM COSTS (YEARS 1-30)	**$186,000**
	Administrative/Management				
				CONSTRUCTION BONDING (3% of Capital Cost)	**$57,000**
				PROJECT MANAGEMENT (5% of Capital Cost)	**$95,000**
				PROJECT MANAGEMENT (5% of Long-Term Cost)	**$9,000**
				ENGINEERING DESIGN/PERMITTING (6% of Capital Cost)	**$114,000**
				CONSTRUCTION MANAGEMENT (6% of Capital Cost)	**$114,000**
				SUBTOTAL	**$2,472,000**
	Contingency Costs				
				CONTINGENCY CAPITAL COSTS (15% scope + 15% bid)	**$569,000**
				CONTINGENCY LONG-TERM COSTS (10% scope + 10% bid)	**$37,000**
				TOTAL PRESENT WORTH	**$3,078,000**

General Notes:

- Cost estimate is based on past experience, cost estimating resources, and vendor estimates. Costs provided in 2016 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding the site investigation and the anticipated scope of the remedial alternative. Changes in cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. This cost estimate is expected to be within -30% to +50% of the actual projected cost.
- Cost factors based on *A Guide to Developing and Documenting Cost Estimates During Feasibility Study,* prepared by the United States Environmental Protection Agency (USEPA) and United States Army Corps of Engineers (USACE), July 2000.

Table 7-26
Estimated Costs for Remedial Alternative SED-4
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Assumptions:

1. Includes costs for mobilization/demobilization of labor, equipment, and materials to perform the remedial construction activities. The cost is estimated as 10% of the total capital cost for the alternative, excluding transportation/disposal costs. It is assumed that a single mobilization/demobilization will be necessary.
2. Includes costs for temporary facilities and utilities including project trailers, sanitation/waste facilities and services, field office services, and fuel storage.
3. Includes costs for labor, equipment, and materials to perform clearing, construct support facilities areas, install temporary gravel roads for access, and otherwise prepare the site for construction. Estimate assumes that 1.9 acres of upland area adjacent to Snow Creek will require clearing, construction of temporary access ways, and erosion/sedimentation control in order to access the various targeted sediment deposits throughout Snow Creek. The unit cost is based on site clearing ($10,000 per acre), erosion/sedimentation control ($4,000 per acre), and construction of temporary gravel access roads ($50,000 per acre).
4. Includes costs for labor, equipment, and materials to construct a temporary material staging pad for the sediment excavated from the creek. The cost estimate assumes a 75-foot by 150-foot material staging area constructed of a 6-inch gravel subbase and 6-inch asphalt pavement and equipped with a 12-inch berm and sloped to a sump.
5. Includes costs for labor, equipment, and materials to perform pre- and post-construction survey of the remedial areas to verify, confirm, and document pre- and post-construction elevations and conditions.
6. Includes costs for labor, equipment, and materials to remove sediment obstructing culverts and excavation of sediment from the OU-1/OU-2 portion of Snow Creek with concentrations greater than PRGs. The cost estimate assumes that this will include the removal of 2,500 cubic yards of sediment within a footprint of 35,000 square feet. Cost estimate assumes that a long-reach excavator and a smaller skidsteer unit will be used to excavate the targeted sediment deposits and load those materials into watertight trucks for transfer to a material staging area. Due to the isolated nature of the sediment deposits, this cost estimate assumes that the average sediment removal production rate will be 50 cubic yards per day.
7. Sediment dewatering and stabilization cost assumes handling of dredged soils and stabilization of dredged material with a stabilization agent (5% by volume). Water generated during dredged material staging and processing (including storm water) will be collected and treated prior to discharge to Snow Creek or to a local publicly owned treatment works.
8. Includes labor, equipment, and materials to purchase, import, and place a 1-foot backfill layer in the excavated areas.
9. Includes transportation and off-site disposal of excavated materials with PCB concentrations greater than or equal to 50 mg/kg at a Toxic Substances Control Act regulated landfill. Based on available PCB data, this cost estimate assumes that approximately 20% (320 cubic yards) of sediment within the Highway 202 culvert will have PCB concentrations exceeding 50 mg/kg. Cost estimate assumes a soil density of 1.5 tons per cubic yard plus additional weight (5% by volume) for applying stabilization agents.
10. Includes transportation and off-site disposal of excavated materials with PCB concentrations less than 50 mg/kg at a nonhazardous landfill. This cost estimate assumes that approximately 2,100 cubic yards of sediment will be less than 50 mg/kg. Cost estimate assumes a soil density of 1.5 tons per cubic yard plus additional weight (5% by volume) for applying stabilization agents.
11. Includes costs for labor, equipment, and materials for removing the temporary roads constructed to provide access to the creek, importing and placing 6 inches of topsoil in the disturbed upland areas, seeding the topsoil, and planting a limited number of shrubs/trees in the disturbed upland areas. This cost estimate also assumes that riprap will be used to stabilize the shoreline in approximately one-third of the areas where sediment deposits were removed.
12. Includes costs for labor, equipment, and materials to perform bank stabilization of unstable creek banks. For cost estimating purposes, it is assumed that 1,400 linear feet of creek banks will require either engineered stabilization measures or natural stabilization measures. This cost estimate assumes that bank stabilization measures will include one or more of the following: placing "dirty" riprap, planting live stakes, or installing articulated concrete mats to protect against continued bank erosion.
13. Includes costs for labor, equipment, and materials for contractor health and safety activities, monitoring dust and air emissions during intrusive activities, and dust control, as necessary.
14. Includes costs for labor, equipment, and materials to perform predesign investigation activities. Under this alternative, it is assumed that the predesign investigation will include sediment sampling to characterize sediment deposits that were not previously sampled.
15. Includes sediment and surface water sampling and analysis to monitor the effectiveness of the remedy. The cost estimate assumes that 10 surface water samples and 10 sediment samples will be collected and analyzed during sampling events that occur once every 5 years.
16. Assumes 30 years for implementation of long-term cover inspection and maintenance activities based on industry standard and guidance in the document titled *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.
17. Present worth is estimated based on a 7% beginning-of-year discount rate. Present cost factor based on *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study,* prepared by USEPA and USACE, July 2000.

Table 8-1a
Comparative Analysis of Remedial Alternatives for Residential Properties
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative ID	Description	Detailed Evaluation Criteria[1]						
		Protectiveness	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, and/or Volume	Short-Term Effectiveness	Implementability	Cost in millions ($M)
RS-1	No Further Action	Provides protection of human health and the environment, except for those properties where removals have not been conducted	Does not comply with ARARs	Previously conducted actions would be effective and permanent over the long-term. Properties where removals have not been conducted would have no long-term effectiveness or permanence. Does not provide soil management for residuals.	Does not include treatment, would not reduce toxicity, mobility, or volume	Effectiveness for completed removals is in place, no additional short-term impacts	Implementable	0
RS-2	Complete the NTC Removal of Residential Soils and Soil Management	Provides protection of human health and the environment	Complies with ARARs	Effective and permanent over the long term	Does not include treatment, would not reduce toxicity, mobility, or volume	Short-term impacts similar to previous removals and manageable	Implementable	7.3
RS-3	Removal of Residential Soils ≥1 mg/kg PCBs and Soil Management	Provides protection of human health and the environment	Complies with ARARs	Effective and permanent over the long term	Does not include treatment, would not reduce toxicity, mobility, or volume	Additonal short-term impacts as compared to the other alternatives including impacts to properties where surface soil removals previously occurred	Implementable	15.7

[1] National Contingency Plan evaluation criteria also include community and State acceptance, these will be evaluated by the USEPA.
ARAR: applicable or relevant and appropriate requirement
mg/kg: milligram(s) per kilogram
NTC: non-time-critical
PCB: polychlorinated biphenyl
PRG: preliminary remediation goal
USEPA: United States Environmental Protection Agency

Table 8-1b
Comparative Analysis of Remedial Alternatives for Special Use Properties
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative ID	Description	Detailed Evaluation Criteria[1]						
		Protectiveness	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, and/or Volume	Short-Term Effectiveness	Implementability	Cost in millions ($M)
SU-1	No Further Action	Provides protection of human health and the environment, except for those properties where removals have not been conducted	Does not comply with ARARs	Does not provide soil management for residuals	Does not include treatment, would not reduce toxicity, mobility, or volume	Effectiveness for completed removals is in place, no additional short-term impacts	Implementable	0
SU-2	NTC Removals in High Activity Areas and Soil Management	Provides protection of human health and the environment	Complies with ARARs	Provides long-term effectiveness and permanence	Does not include treatment, would not reduce toxicity, mobility, or volume	Minimal additional impacts	Implementable	0.5
SU-3	Complete the NTC Removals in High Activity Areas, Removal of Nonresidential Surface Soil from Low Activity Areas with PCBS ≥ 1 mg/kg and Soil Management	Provides protection of human health and the environment	Complies with ARARs	Provides long-term effectiveness and permanence	Does not include treatment, would not reduce toxicity, mobility, or volume	Short-term impacts similar to previous removals and manageable	Implementable	3.1
SU-4	Removal of Soils with PCBs ≥ 1 mg/kg from High Activity Areas and Removal of Nonresidential Soil from Low Activity Areas with PCBs ≥ 1 mg/kg	Provides protection of human health and the environment	Complies with ARARs	Provides long-term effectiveness and permanence	Does not include treatment, would not reduce toxicity, mobility, or volume	Additonal short-term impacts as compared to the other alternatives including impacts to properties where surface soil removals previously occurred	Implementable	3.9

[1] National Contingency Plan evaluation criteria also include community and State acceptance, these will be evaluated by the USEPA.
ARAR: applicable or relevant and appropriate requirement
mg/kg: milligram(s) per kilogram
NTC: non-time-critical
PCB: polychlorinated biphenyl
USEPA: United States Environmental Protection Agency

Table 8-1c
Comparative Analysis of Remedial Alternatives for Interim Measure Areas
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative ID	Description	Detailed Evaluation Criteria[1]						
		Protectiveness	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, and/or Volume	Short-Term Effectiveness	Implementability	Cost in millions ($M)
IM-1	No Further Action	Not protective in areas that have not been addressed	Does not comply with ARARs	Effective and permanent, except for areas that have not been addressed	Does not include treatment, would not reduce toxicity, mobility, or volume	No short-term actions or negative impacts	Implementable	0
IM-2	Expand Existing Measures, Address PTW if Present, and ICs	Provides protection of human health and the environment	Compliant with ARARs	Effective and permanent	Does not include treatment, would not reduce toxicity, mobility, or volume	Short-term impacts similar to other construction conducted for the Site	Implementable	2.6
IM-3	Expand Existing Measures, Address PTW if Present, Excavation and Off-Site Disposal of Soils at PB-RR-37, and ICs	Provides protection of human health and the environment	Compliant with ARARs	Effective and permanent	Does not include treatment, would not reduce toxicity, mobility, or volume	Short-term concerns with excavation of high-concentration materials in a drainage way	Short-term impacts similar to previous removals. May be difficult to implement the excavation of high-concentration materials adjacent to an active railroad line	2.6
IM-4	Excavate Soils to Nonresidential PRG Where Not Covered by Existing Measures and Dispose of Off-site, Address PTW if Present, and ICs	Provides protection of human health and the environment	Compliant with ARARs	Effective and permanent	Does not include treatment, would not reduce toxicity, mobility, or volume	Short-term concerns with excavation of high-concentration materials in a drainage way	Short-term impacts similar to previous removals. May be difficult to implement the excavation of high-concentration materials adjacent to an active railroad line	4.3

[1] National Contingency Plan evaluation criteria also include community and State acceptance, these will be evaluated by the USEPA.
ARAR: applicable or relevant and appropriate requirement
IC: institutional control
IM: Interim Measure
PTW: principal threat waste

Table 8-1d
Comparative Analysis of Remedial Alternatives for Dredge Spoil Piles

OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative ID	Description	Detailed Evaluation Criteria[1]						
		Protectiveness	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, and/or Volume	Short-Term Effectiveness	Implementability	Cost in millions ($M)
DSP-1	No Action	Provides protection of human health and the environment, but not as much as the other alternatives	Does not comply with ARARs	Not effective or permanent over the long term	Does not include treatment, would not reduce toxicity, mobility, or volume	Current conditions continue	Implementable	0
DSP-2	Excavation SC-8 and Off-Site Disposal	Provides protection of human health and the environment	Complies with ARARs	Effective and permanent over the long term	Does not include treatment, would not reduce toxicity, mobility, or volume	Short-term impacts that are manageable and similar to those already experienced for the Site but includes more over-the-road truck traffic to haul PCB-containing soils than the other active remedial alternative (DSP-3)	Implementable	0.9
DSP-3	Excavation SC-8 and On-Site and Off-Site Disposal	Provides protection of human health and the environment	Complies with ARARs	Effective and permanent over the long term	Does not include treatment, would not reduce toxicity, mobility, or volume	Short-term impacts that are manageable and similar to those already experienced for the Site, but less than DSP-2	Implementable	0.5
DSP-4	Excavation All Piles and Off-Site Disposal	Provides protection of human health and the environment	Complies with ARARs	Effective and permanent over the long term	Does not include treatment, would not reduce toxicity, mobility, or volume	Short-term impacts that are manageable, would involve more areas of construction and would be more disruptive than DSP-2 or DSP-3	Implementable	1.4
DSP-5	Excavation All Piles and On-Site and Off-Site Disposal	Provides protection of human health and the environment	Complies with ARARs	Effective and permanent over the long term	Does not include treatment, would not reduce toxicity, mobility, or volume	Short-term impacts that are manageable, would involve more areas of construction and would be more disruptive than DSP-2 or DSP-3, would involve less off-site truck traffic than DSP-4	Implementable	0.7

[1] National Contingency Plan evaluation criteria also include community and State acceptance, these will be evaluated by the USEPA.
ARAR: applicable or relevant and appropriate requirement
USEPA: United States Environmental Protection Agency

Table 8-1e
Comparative Analysis of Remedial Alternatives for Unapproved Waste Disposal Areas
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative ID	Description	Detailed Evaluation Criteria[1]						
		Protectiveness	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility and/or Volume	Short-Term Effectiveness	Implementability	Cost in millions ($M)
UWDA-1	No Action	Not protective of human health or the environment	Does not comply with ARARs since materials have been placed in an UWDA	Does not provide long-term protectiveness or permanence	Does not include treatment, would not reduce toxicity, mobility or volume	No short-term benefit or negative impacts	Implementable	0
UWDA-2	Stipulation Cap, Long-Term O&M, and ICs	Provides protection of human health and the environment	Complies with ARARs	Effective and permanent over the long term	Does not include treatment, would not reduce toxicity, mobility or volume	Short-term impacts from construction similar to other construction activities conducted for the Site	Implementable	1.6
UWDA-3	RCRA Subtitle D Cap, Long-Term O&M and ICs	Provides protection of human health and the environment	Complies with ARARs	Effective and permanent over the long term	Does not include treatment, would not reduce toxicity, mobility or volume	Short-term impacts from construction similar to other construction activities conducted for the Site	Implementable	2.8
UWDA-4	Excavation and Off-Site Disposal, Restore to Natural Grade	Provides protection of human health and the environment	Complies with ARARs	Effective and permanent over the long term	Does not include treatment, would not reduce toxicity, mobility or volume with the possible exception of the treatment of non-PCB compounds prior to disposal (if necessary)	Significant short-term impacts for the duration of removal. The size and duration are not certain but would be significantly larger and deeper than other removals conducted elsewhere on the Site.	Although probably implementable, would require significant predesign work, engineering planning, and controls to conduct in a manner that would be safe for the Site, the workers, and the public	41.2

[1] National Contingency Plan evaluation criteria also include community and State acceptance, these will be evaluated by the USEPA.
ARAR: applicable or relevant and appropriate requirement
IC: institutional control
O&M: operation and maintenance
RCRA: Resource Conservation and Recovery Act
UWDA: unapproved waste disposal area

Table 8-1f
Comparative Analysis of Remedial Alternatives for Nonresidential Soils
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative ID	Description	Detailed Evaluation Criteria[1]						
		Protectiveness	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, and/or Volume	Short-Term Effectiveness	Implementability	Cost in millions ($M)
NRS-1	No Action	Is not protective of human health or the environment	Does not comply with ARARs	Does not provide long-term protectiveness or permanence	Does not include treatment, would not reduce toxicity, mobility, or volume	Current conditions and associated impacts continue	Easy to implement	0
NRS-2	Soil Cover, Limited Excavation, On-Site/Off-Site Disposal, and Soil Management	Provides protection of human health and the environment	Complies with ARARs	Effective and permanent but slightly less so than NRS-3, NRS-4, and NRS-5	Does not include treatment, would not reduce toxicity, mobility, or volume	Time to reach objectives and the ability to manage local impacts are similar among the active alternatives	Alternative can be implemented with available technologies	7.9
NRS-3	Excavation of Surface Soils, On-Site/Off-Site Disposal, and Soil Management	Provides protection of human health and the environment	Complies with ARARs	Effective and permanent over the long term	Does not include treatment, would not reduce toxicity, mobility, or volume	Time to reach objectives and the ability to manage local impacts are similar among the active alternatives	Alternative can be implemented with available technologies	10.0
NRS-4	Excavation of Surface Soils, Off-Site Disposal, and Soil Management	Provides protection of human health and the environment	Complies with ARARs	Effective and permanent over the long term	Does not include treatment, would not reduce toxicity, mobility, or volume	Time to reach objectives and the ability to manage local impacts are similar among the active alternatives	Alternative can be implemented with available technologies	10.4
NRS-5	Excavation of Surface Soils, Off-Site Treatment, and Soil Management	Provides protection of human health and the environment	Complies with ARARs	Effective and permanent over the long term	Includes treatment to reduce the toxicity, mobility, and volume of PCBs	Time to reach objectives and the ability to manage impacts are similar to other alternatives with the exception of long-distance trucking under this alternative	Alternative can be implemented with available technologies recognizing the remote and limited nature of available off-site treatment (incineration) facilities	21.0
NRS-6	Excavation of Surface Soils, On-Site Treatment, and Soil Management	Provides protection of human health and the environment	Complies with ARARs	Effective and permanent over the long term	Includes treatment to reduce the toxicity, mobility, and volume of PCBs	Time to reach objectives would be similar to the other alternatives. The on-site treatment system would likely require additional community outreach and many of the elements of a traditional permitting and approval process would be necessary due to the potential for emissions from the treatment system. Because this alternative would involve both on-site and an off-site treatment components, logistics of both local and long-distance trucking would be needed.	Alternative can be implemented with available technologies, assuming that a thermal treatment vendor could be found that would meet operating requirements and recognizing the remote and limited nature of available off-site treatment (incineration) facilities	19.1

[1] National Contingency Plan evaluation criteria also include community and State acceptance, these will be evaluated by the USEPA.
ARAR: applicable or relevant and appropriate requirement
IC: institutional control
O&M: operation and maintenance
PCB: polychlorinated biphenyl
PRG: preliminary remediation goal
USEPA: United States Environmental Protection Agency

Table 8-1g
Comparative Analysis of Remedial Alternatives for Groundwater and Principal Threat Waste at T-11
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative ID	Description	Detailed Evaluation Criteria[1]						
		Protectiveness	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, and/or Volume	Short-Term Effectiveness	Implementability	Cost in millions ($M)
GW-1	No Action	Is not protective	Does not comply with ARARs (MCL)	Does not provide long-term protectiveness or permanence	Does not include treatment, would not reduce toxicity, mobility, or volume	Current conditions and associated impacts continue	Easy to implement	0
GW-2	Excavate Area, O&M, and ICs	Provides protection of human health and the environment	Will comply with ARARs in time	Effective over the long term and permanent	Does not include treatment, would not reduce toxicity, mobility, or volume	Impacts associated with construction are manageable and similar under GW-2 and GW-3	Can be implemented with available resources recognizing the challenges in working in this isolated area	2.2
GW-3	Excavate Area, Low-Permeability Cap, O&M, and ICs	Provides protection of human health and the environment	Will comply with ARARs in time	Effective over the long term and permanent	Does not include treatment, would not reduce toxicity, mobility, or volume	Impacts associated with construction are manageable and similar under GW-2 and GW-3	Can be implemented with available resources recognizing the challenges in working in this isolated area	3.3
GW-4	Excavate Area, Low-Permeability Cap, Pore Volume Removal, O&M and ICs	Provides protection of human health and the environment	Will comply with ARARs in time	Effective over the long term and permanent	Reduces volume and toxicity through the treatment of groundwater	Impacts associated with construction include those associated with GW-2 and GW-3, but the impacts would be more pronounced and persist longer than under GW-2 and GW-3	Moderate implementability challenges associated with constructing and temporarily operating a groundwater extraction and treatment system in this isolated location	4.2

[1] National Contingency Plan evaluation criteria also include community and State acceptance, these will be evaluated by the USEPA.
ARAR: applicable or relevant and appropriate requirement
IC: institutional control
MCL: maximum contaminant level
O&M: operation and maintenance
USEPA: United States Environmental Protection Agency

Table 8-1h
Comparative Analysis of Remedial Alternatives for Sediment and Creek Bank Soils
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative ID	Description	Detailed Evaluation Criteria[1]						
		Protectiveness	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, and/or Volume	Short-Term Effectiveness	Implementability	Cost in millions ($M)
SED-1	No Action	Is not protective	Does not comply with ARARs (AWQC)	Does not provide long-term protectiveness or permanence	Does not include treatment. Would not reduce toxicity, mobility, or volume.	Current condition and associated impacts continue	Easy to implement	0
SED-2	Excavation, On-Site/Off-Site Disposal, and MNR	Provides protection of human health and the environment	Complies with ARARs including the AWQC	Effective over the long term and permanent	Does not include treatment, would not reduce toxicity, mobility, or volume	Fewer impacts than SED-3 or SED-4 based on less expansive sediment removal	Some implementability challenges exist, especially for sediment in the Highway 202 culverts	2.7
SED-3	Excavation and On-Site/Off-Site Disposal	Provides protection of human health and the environment	Complies with ARARs including the AWQC	Effective over the long term and permanent	Does not include treatment, would not reduce toxicity, mobility, or volume	Potential impacts during construction can be managed	Some implementability challenges exist, especially for sediment in the Highway 202 culverts	2.9
SED-4	Excavation and Off-Site Disposal	Provides protection of human health and the environment	Complies with ARARs including the AWQC	Effective over the long term and permanent	Does not include treatment, would not reduce toxicity, mobility, or volume	Potential impacts during construction can be managed	Some implementability challenges exist, especially for sediment in the Highway 202 culverts	3.1

[1] National Contingency Plan evaluation criteria also include community and State acceptance, these will be evaluated by the USEPA.
ARAR: applicable or relevant and appropriate requirement
AWQC: Ambient Water Quality Criteria
MNR: monitored natural recovery
USEPA: United States Environmental Protection Agency

Table 8-2
Remedial Alternatives Cost Summary
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative		Capital Costs	Annual Long-Term Cost	Administrative / Management Costs	Contingency Costs	Total Net Present Worth Cost 7% Discount Rate
Residential Soils (RS)	RS-1	$0	$0	$0	$0	**$0**
	RS-2	$3,726,000	$113,000	$816,000	$1,398,000	**$7,342,000**
	RS-3	$9,918,000	$54,000	$2,018,000	$3,109,000	**$15,715,000**
Special Use Properties (SU)	SU-1	$0	$0	$0	$0	**$0**
	SU-2	$181,000	$22,000	$46,000	$93,000	**$517,000**
	SU-3	$1,890,000	$25,000	$390,000	$614,000	**$3,128,000**
	SU-4	$2,532,000	$14,000	$512,000	$780,000	**$3,922,000**
Interim Measures (IM)	IM-1	$0	$0	$0	$0	**$0**
	IM-2	$702,000	$100,000	$202,000	$459,000	**$2,604,000**
	IM-3	$721,000	$100,000	$206,000	$464,000	**$2,632,000**
	IM-4	$1,842,000	$100,000	$431,000	$801,000	**$4,315,000**
Dredge Spoil Piles (DSP)	DSP-1	$0	$0	$0	$0	**$0**
	DSP-2	$631,000	$0	$127,000	$189,000	**$947,000**
	DSP-3	$324,000	$0	$64,000	$97,000	**$485,000**
	DSP-4	$932,000	$0	$187,000	$280,000	**$1,399,000**
	DSP-5	$475,000	$0	$96,000	$143,000	**$714,000**
Unapproved Waste Disposal Areas (UWDA)	UWDA-1	$0	$0	$0	$0	**$0**
	UWDA-2	$570,000	$50,000	$145,000	$295,000	**$1,630,000**
	UWDA-3	$1,317,000	$50,000	$295,000	$519,000	**$2,751,000**
	UWDA-4	$27,486,000	$0	$5,497,000	$8,246,000	**$41,229,000**
Nonresidential Soil (NRS)	NRS-1	$0	$0	$0	$0	**$0**
	NRS-2	$1,004,000	$413,000	$456,000	$1,326,000	**$7,911,000**
	NRS-3	$2,391,000	$413,000	$734,000	$1,742,000	**$9,992,000**
	NRS-4	$2,679,000	$413,000	$792,000	$1,829,000	**$10,425,000**
	NRS-5	$9,729,000	$413,000	$2,202,000	$3,944,000	**$21,000,000**
	NRS-6	$8,464,000	$413,000	$1,949,000	$3,564,000	**$19,102,000**

Table 8-2
Remedial Alternatives Cost Summary
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative		Capital Costs	Annual Long-Term Cost	Administrative / Management Costs	Contingency Costs	Total Net Present Worth Cost 7% Discount Rate
Groundwater (GW)	GW-1	$0	$0	$0	$0	**$0**
	GW-2	$1,316,000	$15,000	$272,000	$432,000	**$2,206,000**
	GW-3	$2,023,000	$15,000	$413,000	$644,000	**$3,266,000**
	GW-4	$2,366,000	$40,000	$498,000	$809,000	**$4,169,000**
Sediment and Creek Bank (SED)	SED-1	$0	$0	$0	$0	**$0**
	SED-2	$1,619,000	$15,000	$333,000	$523,000	**$2,661,000**
	SED-3	$1,751,000	$15,000	$360,000	$562,000	**$2,859,000**
	SED-4	$1,897,000	$15,000	$389,000	$606,000	**$3,078,000**

Notes:
Cost estimates do not include costs for previously implemented remediation activities.

Table 8-3a
Remedial Alternatives Cost Summary (30 Years)
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative		Capital Costs	Annual Long-Term Cost	Administrative / Management Costs	Contingency Costs	Total Net Present Worth Cost 7% Discount Rate	Total Net Present Worth Cost 3% Discount Rate	Total Net Present Worth Cost 0% Discount Rate
Residential Soils (RS)	RS-1	$0	$0	$0	$0	**$0**	**$0**	**$0**
	RS-2	$3,726,000	$113,000	$816,000	$1,398,000	**$7,342,000**	**$8,359,000**	**$9,828,000**
	RS-3	$9,918,000	$54,000	$2,018,000	$3,109,000	**$15,715,000**	**$16,200,000**	**$16,902,000**
Special Use Properties (SU)	SU-1	$0	$0	$0	$0	**$0**	**$0**	**$0**
	SU-2	$181,000	$22,000	$46,000	$93,000	**$517,000**	**$616,000**	**$746,000**
	SU-3	$1,890,000	$25,000	$390,000	$614,000	**$3,128,000**	**$3,254,000**	**$3,423,000**
	SU-4	$2,532,000	$14,000	$512,000	$780,000	**$3,922,000**	**$3,948,000**	**$3,974,000**
Interim Measures (IM)	IM-1	$0	$0	$0	$0	**$0**	**$0**	**$0**
	IM-2	$702,000	$100,000	$202,000	$459,000	**$2,604,000**	**$3,503,000**	**$4,803,000**
	IM-3	$721,000	$100,000	$206,000	$464,000	**$2,632,000**	**$3,531,000**	**$4,831,000**
	IM-4	$1,842,000	$100,000	$431,000	$801,000	**$4,315,000**	**$5,214,000**	**$6,514,000**
Dredge Spoil Piles (DSP)	DSP-1	$0	$0	$0	$0	**$0**	**$0**	**$0**
	DSP-2	$631,000	$0	$127,000	$189,000	**$947,000**	**$947,000**	**$947,000**
	DSP-3	$324,000	$0	$64,000	$97,000	**$485,000**	**$485,000**	**$485,000**
	DSP-4	$932,000	$0	$187,000	$280,000	**$1,399,000**	**$1,399,000**	**$1,399,000**
	DSP-5	$475,000	$0	$96,000	$143,000	**$714,000**	**$714,000**	**$714,000**
Unapproved Waste Disposal Areas (UWDA)	UWDA-1	$0	$0	$0	$0	**$0**	**$0**	**$0**
	UWDA-2	$570,000	$50,000	$145,000	$295,000	**$1,630,000**	**$2,080,000**	**$2,730,000**
	UWDA-3	$1,317,000	$50,000	$295,000	$519,000	**$2,751,000**	**$3,201,000**	**$3,851,000**
	UWDA-4	$27,486,000	$0	$5,497,000	$8,246,000	**$41,229,000**	**$41,229,000**	**$41,229,000**
Nonresidential Soil (NRS)	NRS-1	$0	$0	$0	$0	**$0**	**$0**	**$0**
	NRS-2	$1,004,000	$413,000	$456,000	$1,326,000	**$7,911,000**	**$11,624,000**	**$16,993,000**
	NRS-3	$2,391,000	$413,000	$734,000	$1,742,000	**$9,992,000**	**$13,705,000**	**$19,074,000**
	NRS-4	$2,679,000	$413,000	$792,000	$1,829,000	**$10,425,000**	**$14,138,000**	**$19,507,000**
	NRS-5	$9,729,000	$413,000	$2,202,000	$3,944,000	**$21,000,000**	**$24,713,000**	**$30,082,000**
	NRS-6	$8,464,000	$413,000	$1,949,000	$3,564,000	**$19,102,000**	**$22,815,000**	**$28,184,000**

Table 8-3a
Remedial Alternatives Cost Summary (30 Years)
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative		Capital Costs	Annual Long-Term Cost	Administrative / Management Costs	Contingency Costs	Total Net Present Worth Cost 7% Discount Rate	Total Net Present Worth Cost 3% Discount Rate	Total Net Present Worth Cost 0% Discount Rate
Groundwater (GW)	GW-1	$0	$0	$0	$0	**$0**	**$0**	**$0**
	GW-2	$1,316,000	$15,000	$272,000	$432,000	**$2,206,000**	**$2,342,000**	**$2,537,000**
	GW-3	$2,023,000	$15,000	$413,000	$644,000	**$3,266,000**	**$3,402,000**	**$3,597,000**
	GW-4	$2,366,000	$40,000	$498,000	$809,000	**$4,169,000**	**$4,529,000**	**$5,049,000**
Sediment and Creek Bank (SED)	SED-1	$0	$0	$0	$0	**$0**	**$0**	**$0**
	SED-2	$1,619,000	$15,000	$333,000	$523,000	**$2,661,000**	**$2,797,000**	**$2,992,000**
	SED-3	$1,751,000	$15,000	$360,000	$562,000	**$2,859,000**	**$2,995,000**	**$3,190,000**
	SED-4	$1,897,000	$15,000	$389,000	$606,000	**$3,078,000**	**$3,214,000**	**$3,409,000**

Notes:
Cost estimates do not include costs for previously implemented remediation activities

Table 8-3b
Remedial Alternatives Cost Summary (60 Years)
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative		Capital Costs	Annual Long-Term Cost	Administrative / Management Costs	Contingency Costs	Total Net Present Worth Cost 7% Discount Rate	Total Net Present Worth Cost 3% Discount Rate	Total Net Present Worth Cost 0% Discount Rate
Residential Soils (RS)	RS-1	$0	$0	$0	$0	**$0**	**$0**	**$0**
	RS-2	$3,726,000	$113,000	$825,000	$1,435,000	**$7,572,000**	**$9,498,000**	**$14,065,000**
	RS-3	$9,918,000	$54,000	$2,022,000	$3,127,000	**$15,825,000**	**$16,745,000**	**$18,927,000**
Special Use Properties (SU)	SU-1	$0	$0	$0	$0	**$0**	**$0**	**$0**
	SU-2	$181,000	$22,000	$47,000	$96,000	**$534,000**	**$696,000**	**$1,046,000**
	SU-3	$1,890,000	$25,000	$391,000	$617,000	**$3,150,000**	**$3,364,000**	**$3,835,000**
	SU-4	$2,532,000	$14,000	$512,000	$780,000	**$3,922,000**	**$3,948,000**	**$3,974,000**
Interim Measures (IM)	IM-1	$0	$0	$0	$0	**$0**	**$0**	**$0**
	IM-2	$702,000	$100,000	$210,000	$492,000	**$2,808,000**	**$4,513,000**	**$8,553,000**
	IM-3	$721,000	$100,000	$214,000	$497,000	**$2,836,000**	**$4,541,000**	**$8,581,000**
	IM-4	$1,842,000	$100,000	$439,000	$834,000	**$4,519,000**	**$6,224,000**	**$10,264,000**
Dredge Spoil Piles (DSP)	DSP-1	$0	$0	$0	$0	**$0**	**$0**	**$0**
	DSP-2	$631,000	$0	$127,000	$189,000	**$947,000**	**$947,000**	**$947,000**
	DSP-3	$324,000	$0	$64,000	$97,000	**$485,000**	**$485,000**	**$485,000**
	DSP-4	$932,000	$0	$187,000	$280,000	**$1,399,000**	**$1,399,000**	**$1,399,000**
	DSP-5	$475,000	$0	$96,000	$143,000	**$714,000**	**$714,000**	**$714,000**
Unapproved Waste Disposal Areas (UWDA)	UWDA-1	$0	$0	$0	$0	**$0**	**$0**	**$0**
	UWDA-2	$570,000	$50,000	$149,000	$311,000	**$1,732,000**	**$2,585,000**	**$4,605,000**
	UWDA-3	$1,317,000	$50,000	$299,000	$535,000	**$2,853,000**	**$3,706,000**	**$5,726,000**
	UWDA-4	$27,486,000	$0	$5,497,000	$8,246,000	**$41,229,000**	**$41,229,000**	**$41,229,000**
Nonresidential Soil (NRS)	NRS-1	$0	$0	$0	$0	**$0**	**$0**	**$0**
	NRS-2	$1,004,000	$413,000	$490,000	$1,461,000	**$8,753,000**	**$15,793,000**	**$32,480,000**
	NRS-3	$2,377,000	$413,000	$766,000	$1,873,000	**$10,814,000**	**$17,854,000**	**$34,541,000**
	NRS-4	$2,665,000	$413,000	$823,000	$1,960,000	**$11,246,000**	**$18,286,000**	**$34,973,000**
	NRS-5	$9,715,000	$413,000	$2,233,000	$4,075,000	**$21,821,000**	**$28,861,000**	**$45,548,000**
	NRS-6	$8,449,000	$413,000	$1,979,000	$3,695,000	**$19,921,000**	**$26,961,000**	**$43,648,000**

Table 8-3b
Remedial Alternatives Cost Summary (60 Years)
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

Alternative		Capital Costs	Annual Long-Term Cost	Administrative / Management Costs	Contingency Costs	Total Net Present Worth Cost 7% Discount Rate	Total Net Present Worth Cost 3% Discount Rate	Total Net Present Worth Cost 0% Discount Rate
Groundwater (GW)	GW-1	$0	$0	$0	$0	**$0**	**$0**	**$0**
	GW-2	$1,316,000	$15,000	$274,000	$437,000	**$2,238,000**	**$2,493,000**	**$3,099,000**
	GW-3	$2,023,000	$15,000	$415,000	$649,000	**$3,298,000**	**$3,553,000**	**$4,159,000**
	GW-4	$2,366,000	$40,000	$501,000	$822,000	**$4,251,000**	**$4,932,000**	**$6,549,000**
Sediment and Creek Bank (SED)	SED-1	$0	$0	$0	$0	**$0**	**$0**	**$0**
	SED-2	$1,619,000	$15,000	$335,000	$528,000	**$2,693,000**	**$2,948,000**	**$3,554,000**
	SED-3	$1,751,000	$15,000	$362,000	$567,000	**$2,891,000**	**$3,146,000**	**$3,752,000**
	SED-4	$1,897,000	$15,000	$391,000	$611,000	**$3,110,000**	**$3,365,000**	**$3,971,000**

Notes:
Cost estimates do not include costs for previously implemented remediation activities.

Table 8-4

Environmental Footprint Analysis Summary
OU-1/OU-2 Feasibility Study Report
Anniston PCB Site, Anniston, Alabama

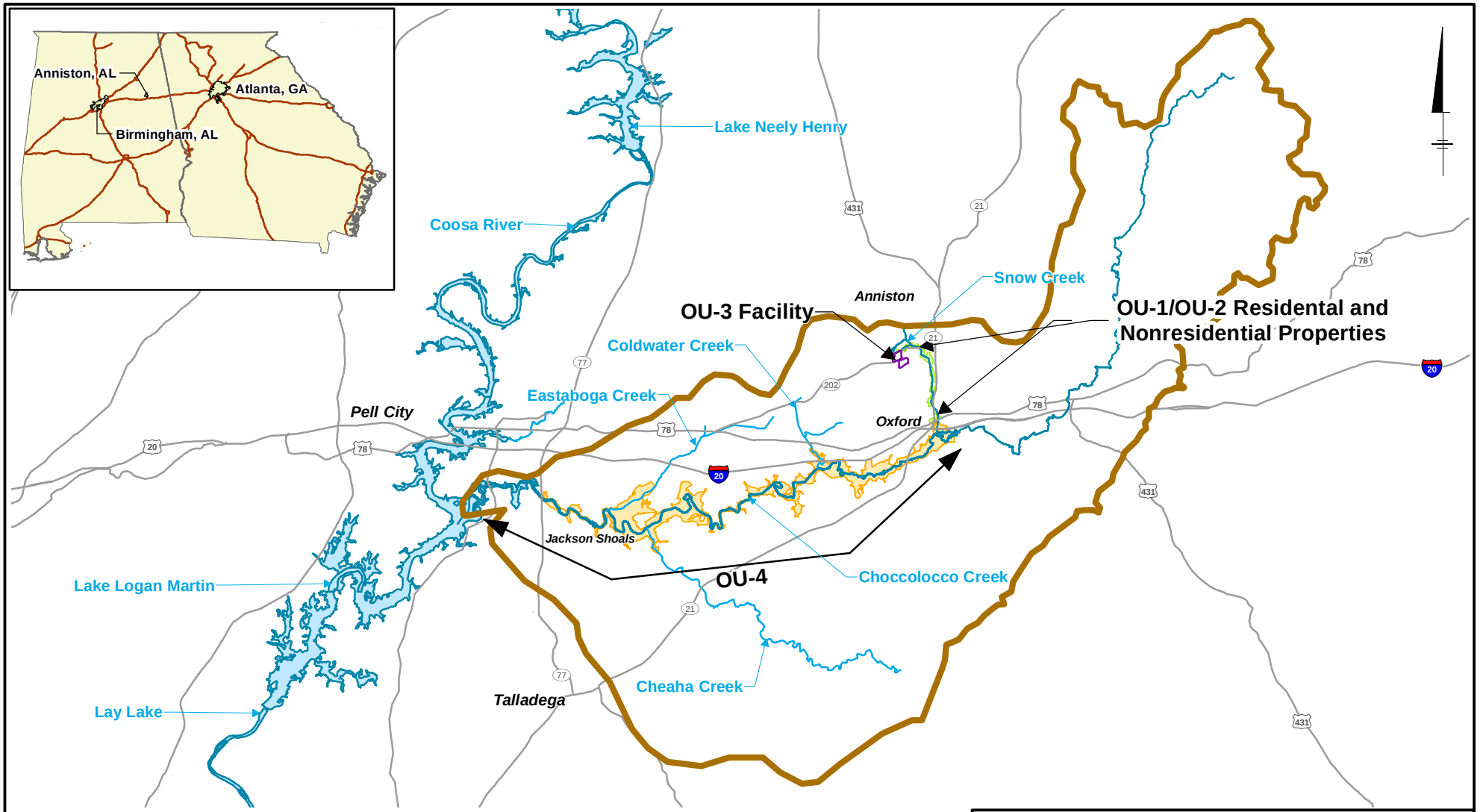
Alternative		MMBtu	Tons CO2e*
Residental Soils (RS)	RS-1	0	0
	RS-2	5,196	416
	RS-3	15,116	1,209
Special Use Properties (SU)	SU-1	0	0
	SU-2	277	22
	SU-3	2,805	224
	SU-4	3,801	304
Interim Measures (IM)	IM-1	0	0
	IM-2	691	55
	IM-3	745	60
	IM-4	3,616	298
Dredge Spoil Piles (DSP)	DSP-1	0	0
	DSP-2	1,195	96
	DSP-3	749	60
	DSP-4	1,782	143
	DSP-5	1,117	89
Unapproved Waste Disposal Area (UWDA)	UWDA-1	0	0
	UWDA-2	1,061	85
	UWDA-3	1,572	126
	UWDA-4	62,496	5,000
Nonresidential Soil (NRS)	NRS-1	0	0
	NRS-2	2,307	185
	NRS-3	5,504	440
	NRS-4	5,867	469
	NRS-5	502,570	35,745
	NRS-6	31,594	2,251
Groundwater (GW)	GW-1	0	0
	GW-2	2,245	180
	GW-3	3,220	258
	GW-4	3,371	262
Sediment and Creek Bank (SED)	SED-1	0	0
	SED-2	1,412	113
	SED-3	1,528	122
	SED-4	1,723	138

The calculations for this table were done using the USEPA tool "Spreadsheets for Environmental Footprint Analysis (SEFA)" available at the CLU-IN website located at https://clu-in.org/greenremediation/methodology/.

* Total greenhouse gases emissions (in CO2e) include consideration of carbon dioxide, methane, and nitrous oxide emissions.
MMBtu: million British thermal units
CO2e: carbon dioxide equivalent (greenhouse gas)

FIGURES

City: SYR Div/Group: SWG Created By: K.IVES Last Saved By: ldrum
Anniston (B0010291.2010.00001)
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Fig1-1_SitePlan.mxd 3/5/2016 8:45:20 AM



Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Site Location Map

Solutia

Figure
1-1

City: SYR Div/Group: SWG Created By: K.Ives Last Saved By: jbistrovich
Anniston
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Fig2-1_OperableUnitArea.mxd 3/25/2016 8:16:01 AM



Legend

- 100-Year Floodplain and Drainage Areas
- OU-3
- OU-4 100-Year Floodplain
- Exposure Unit
- Creek

0 2,200 4,400 Feet

Graphic Scale

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. OU: operable unit
   PCB: polychlorinated biphenyl

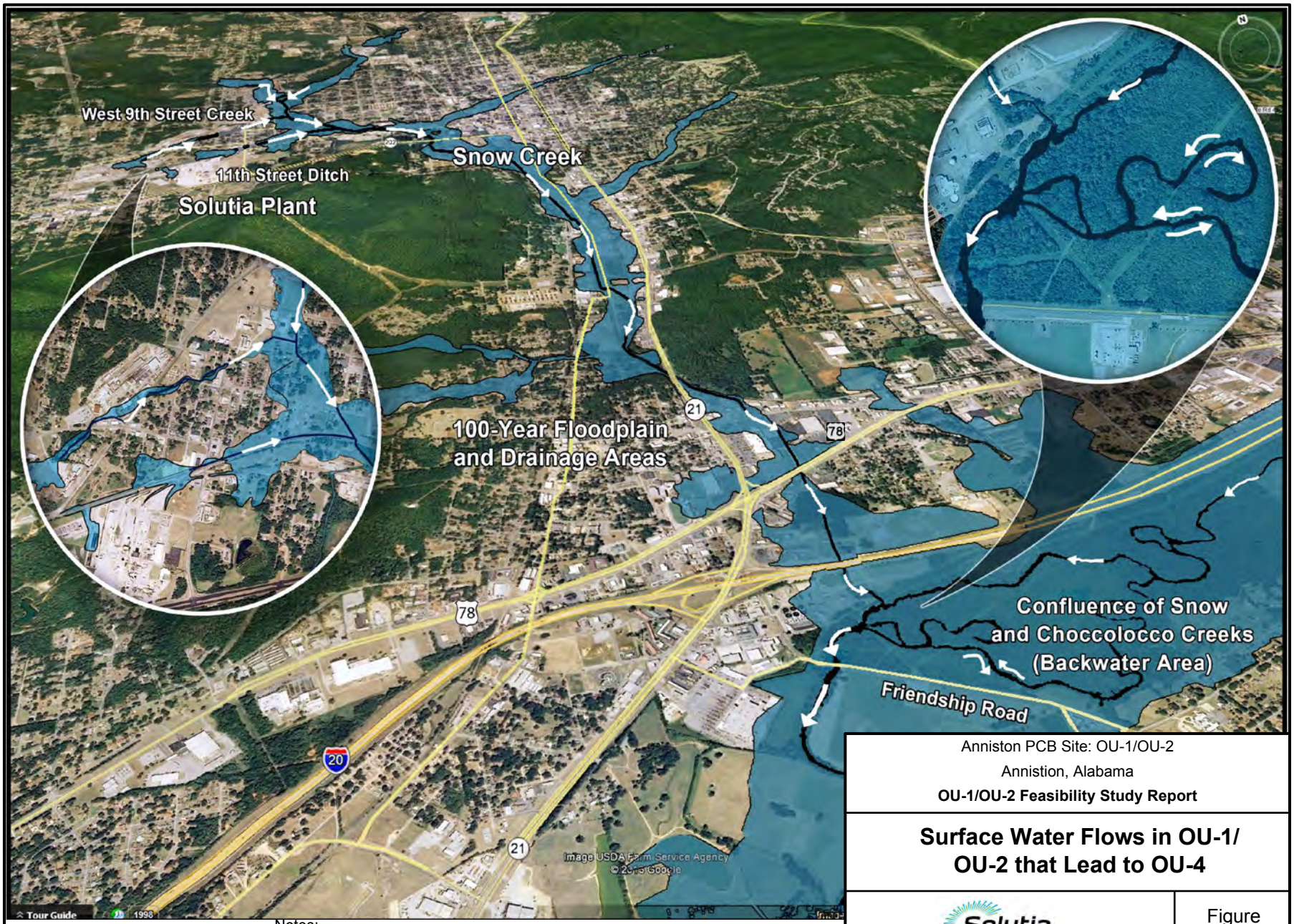
Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

OU-1/OU-2 Area

Solutia

Figure
2-1



Imagery Source: Google Earth
Imagery Date: 7/31/2011

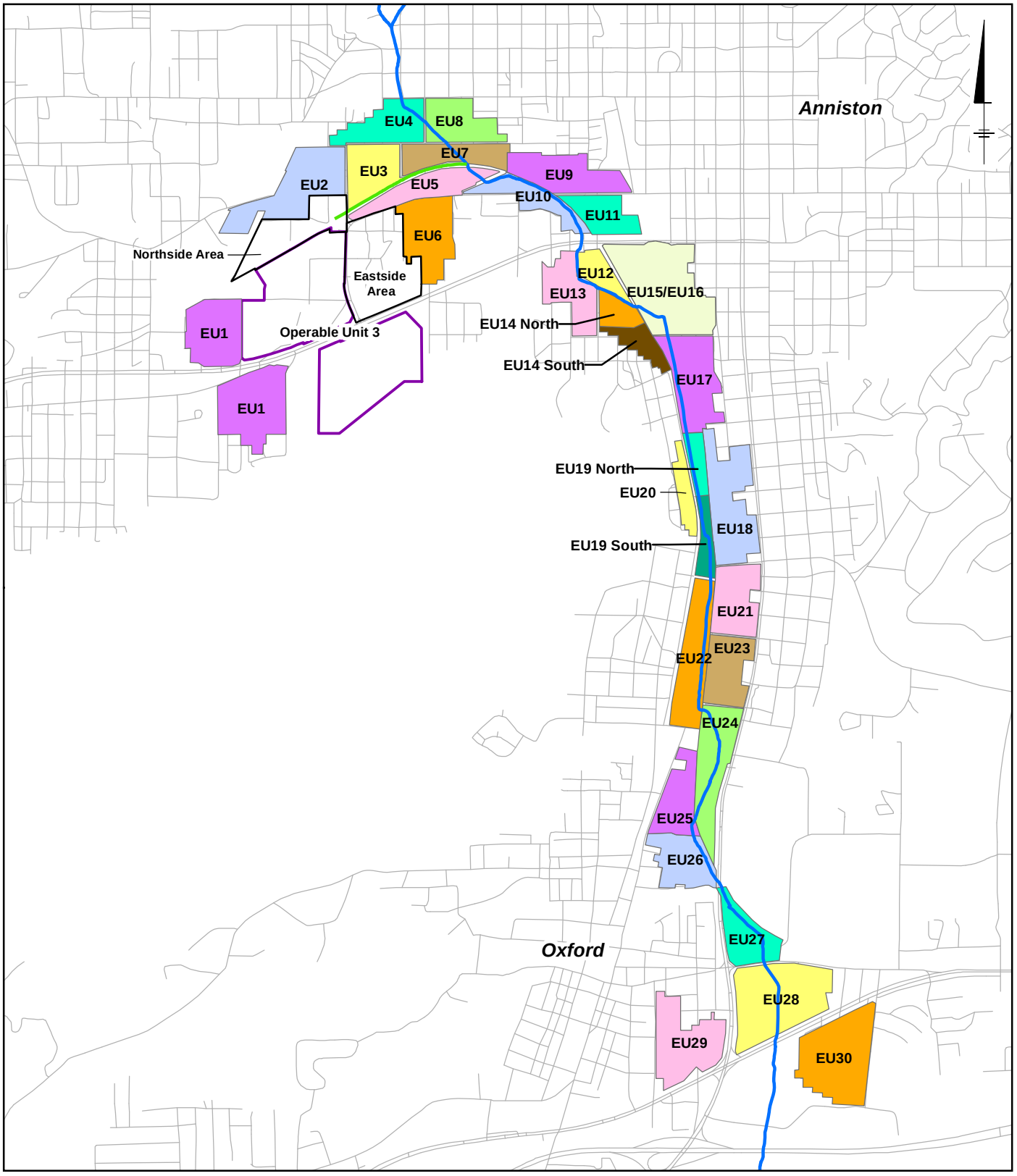
Notes:
OU: operable unit
PCB: polychlorinated biphenyl

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama
OU-1/OU-2 Feasibility Study Report

Surface Water Flows in OU-1/ OU-2 that Lead to OU-4

Solutia

Figure
2-2



0 2,750 5,500 Feet

GRAPHIC SCALE

Notes:
EU: exposure unit
OU: operable unit
PCB: polychlorinated biphenyl

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Exposure Units

Solutia

FIGURE
2-3

City: SYR Div/Group: SWG Created By: Kives Last Saved By: ldrum
Anniston
Q:\Anniston_PCB_site\AnnistonALLMXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-3_ExposureUnits.mxd 3/5/2016 8:51:48 AM

City: SYR Div/Group: SWG Created By: K.Ives Last Saved By: jbistrovich
Anniston
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-4_InterimMeasures_v2.mxd 3/30/2016 8:08:05 AM

11th Street Ditch
Northside Area
APCO Ditch (South Section)
Solutia Facility
Eastside Area
Dredge Spoil Piles Removed
Hall Street Properties
Quintard Mall Property
Snow Creek
Alexandria Rd
Cooper Ave
McIlroy Ave
Noble St
18Th St
15Th St
14Th St
Brynton Ave
Crawford Ave
Perron Ave
Christine Ave
10Th St
Eulaton Rd
Clydesdale Ave
Hunter St
Quintard Ave
Henry Rd
Fairway Dr
202
C St
Sunset Dr
Greenbrier Dear Rd
Coleman Rd
Chestnut St
Front St
Main St
Al Hwy 21
Choccolocco St
Snow St
78
Barry St
20
21
97Th St
78W
Caffey Dr
Hamric Dr

Legend

- Major Roads
- Creek
- Interim Measure Locations
- Dredge Spoil Pile Removed
- OU-3 Boundary
- OU-4 100-Year Floodplain
- OU-1/OU-2 Downgradient Floodplain
- Parcels

Notes:
1. Tax parcels provided by Cahoun County, 2014.

2. APCO: Alabama Power Company
OU: operable unit
PCB: polychlorinated biphenyl

0 2,200 4,400 Feet
Graphic Scale

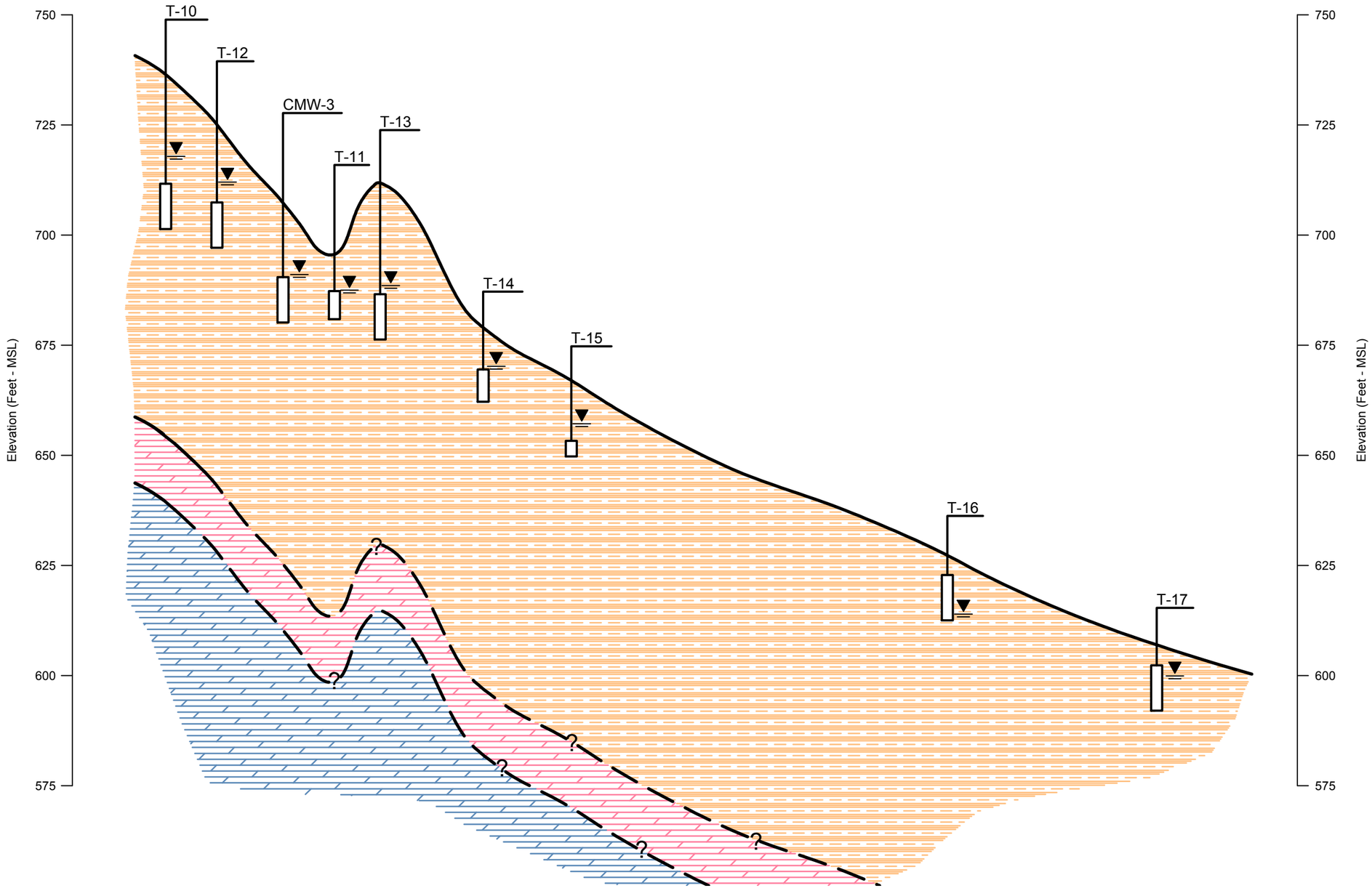
Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

OU-1/OU-2 Interim Measures

Solutia

Figure
2-4



Legend

- Interpreted Boundary
- Residual Clayey/Silty Soil
- Weathered Dolostone
- Dolostone
- T-14 — Well Designation
- Water Level
- Screened Interval

Notes

1.) Groundwater elevations measured in August 2010 for T-13, T-14, T-15, October 2011 for T-10, T-11, T-12, CMW-3, and February 2012 for T-16 and T-17.

2.) Shady dolomite depth is estimated from Operable Unit 3 and regional information.

MSL: mean sea level

0.5 0 0.5
Horizontal Scale Miles

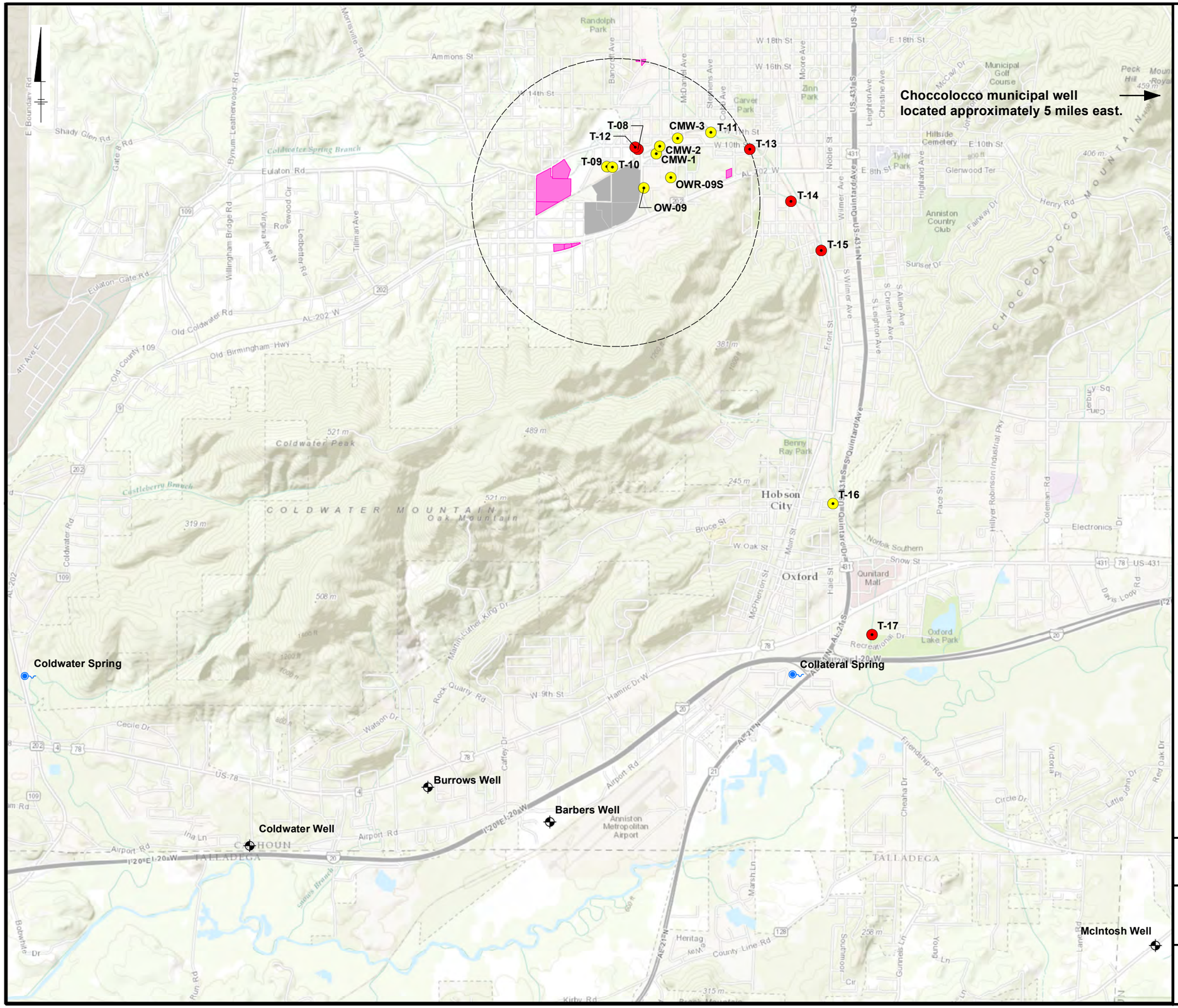
25 0 25
Vertical Scale Feet

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama
OU-1/OU-2 Feasibility Study Report

Geologic Cross Section
OU-1/OU-2 / Snow Creek

Solutia

Figure 2-5



Legend

- Abandoned OU-1/OU-2 Monitoring Well
- OU-1/OU-2 Monitoring Well
- Spring
- Municipal Well
- Well Search Area (1-Mile Radius Around Plant Site)
- Plant Site
- Parcel with Potable Well within Well Search

References

1. Monitoring Well Locations - Golder, 2013
2. Spring Locations - USGS National Water Information System
3. Municipal Well Locations - City of Oxford, 2013
4. Basemap - Sources: Esri, DeLorme, HERE, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

0 3,500 7,000 Feet

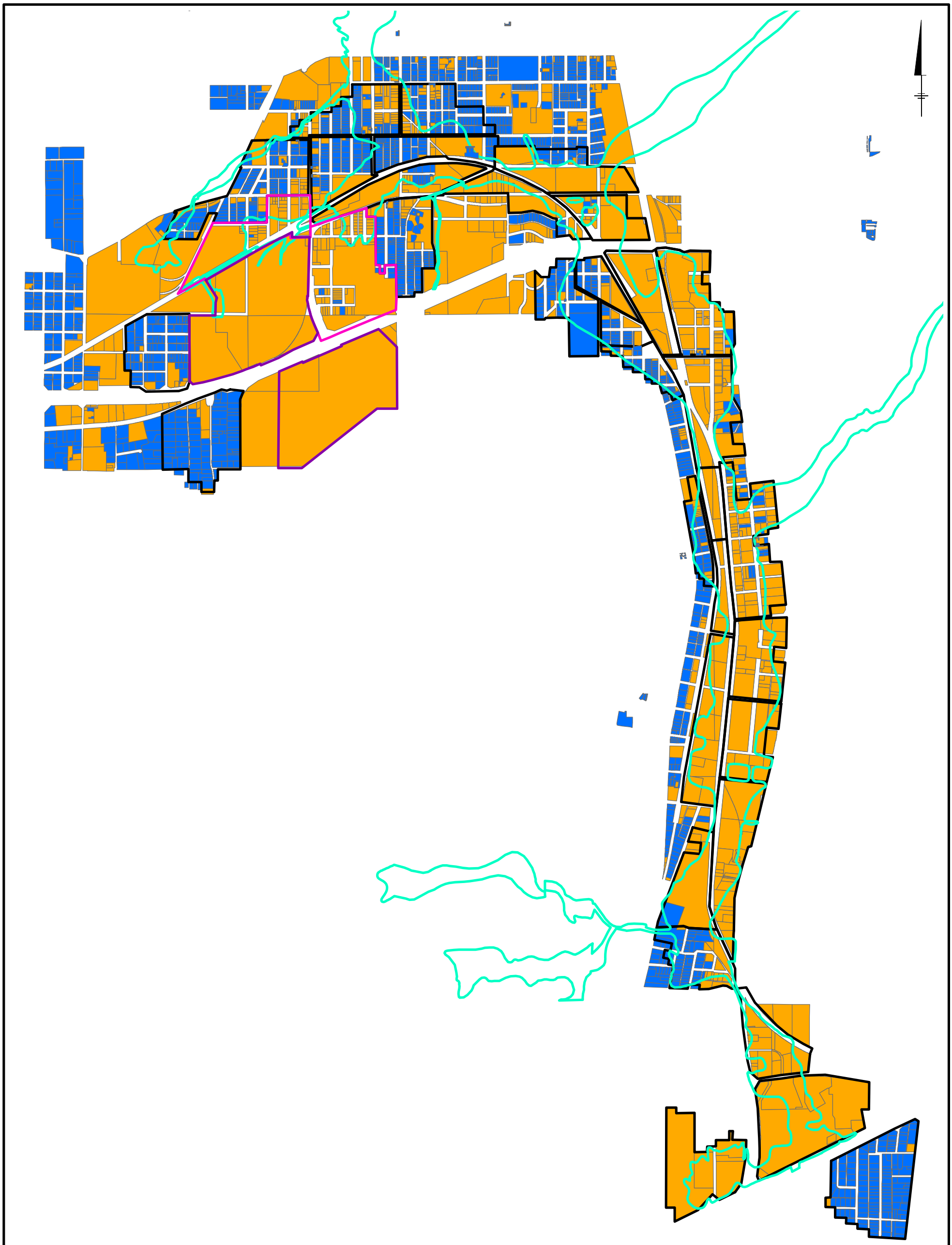
Anniston PCB Site: OU-1/OU-2
Anniston, Alabama
OU-1/OU-2 Feasibility Study Report

Well Radius, Municipal Well, and Spring Locations

Solutia

Figure 2-6

City: SYR Div/Group: SWG Created By: Last Saved By: ldrum
Anniston
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-7_LandUse.mxd 3/5/2016 8:54:44 AM



LEGEND

- Operable Unit 3
- Northside and Eastside Boundaries
- 100-Year Floodplain and Drainage Areas
- Exposure Unit
- Residential
- Nonresidential

Notes:
OU: operable unit
PCB: polychlorinated biphenyl

0 1,600 3,200 Feet
Graphic Scale

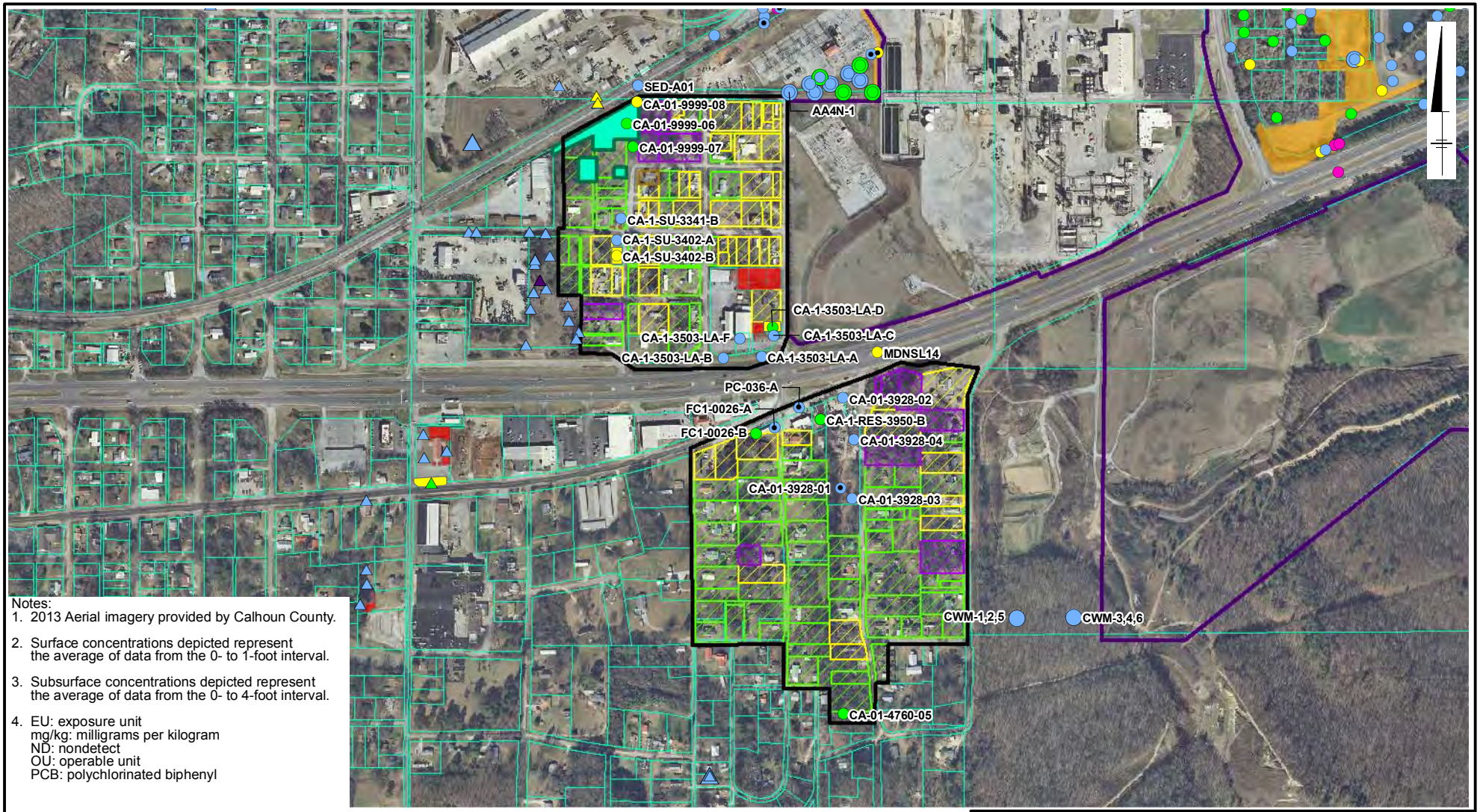
Anniston PCB Site: OU-1/OU-2
Anniston, Alabama
OU-1/OU-2 Feasibility Study Report

Land Use in OU-1/OU-2

Solutia

Figure
2-7

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-8_PCB_EU1_Labels.mxd 3/25/2016 11:55:03 AM



Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

Legend

Soil Sample Location
Surface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- Analytes other than PCB and Lead Analyzed

Soil Sample Location
Surface PCB Outside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- ≥ 500

Residential Parcels Sampled
- Residential < 1 (mg/kg)
- Removal Complete
- Residential Appendix 6
- Residential > 1 (mg/kg) (Removal Pending)
- Residential > 1 (mg/kg) (Unsuitable for Removal)

- Special Use: High Activity Area
- Special Use: Low Activity Area ≥ 1 mg/kg
- Unapproved Waste Disposal Area
- Interim Measure and Other Early Actions
- Exposure Unit
- Operable Unit 3
- All Parcels

Inner and outer shapes reflect surface and subsurface PCB concentrations, respectively.

0 700 1,400 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

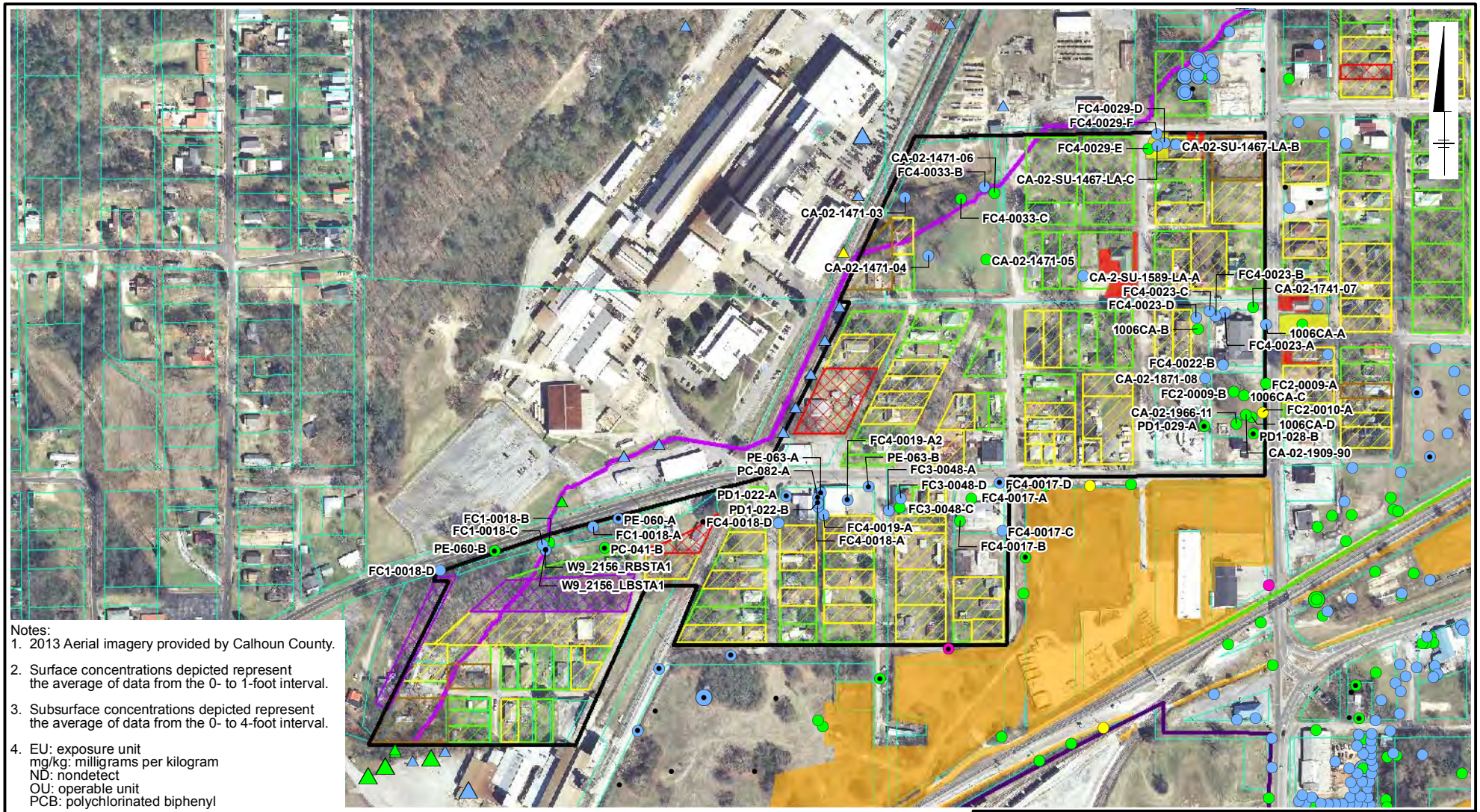
OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 1

Solutia

Figure **2-8**

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-9_PCB_EU2_Labels.mxd 3/25/2016 11:58:44 AM



Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

Legend

Soil Sample Location
Surface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- Analytes other than PCB and Lead Analyzed

Soil Sample Location
Surface PCB Outside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500

- 11th Street Ditch
- West 9th Street Creek

Residential Parcels Sampled
- Residential < 1 (mg/kg)
- Removal Complete
- Residential Appendix 6
- Residential > 1 (mg/kg) (Removal Pending)
- Residential > 1 (mg/kg) (Unsuitable for Removal)

- Special Use: High Activity Area
- Special Use: Low Activity Area ≥1 mg/kg
- Interim Measure and Other Early Actions
- Exposure Unit
- Operable Unit 3
- All Parcels

Inner and outer shapes reflect surface and subsurface PCB concentrations, respectively.

0 400 800 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

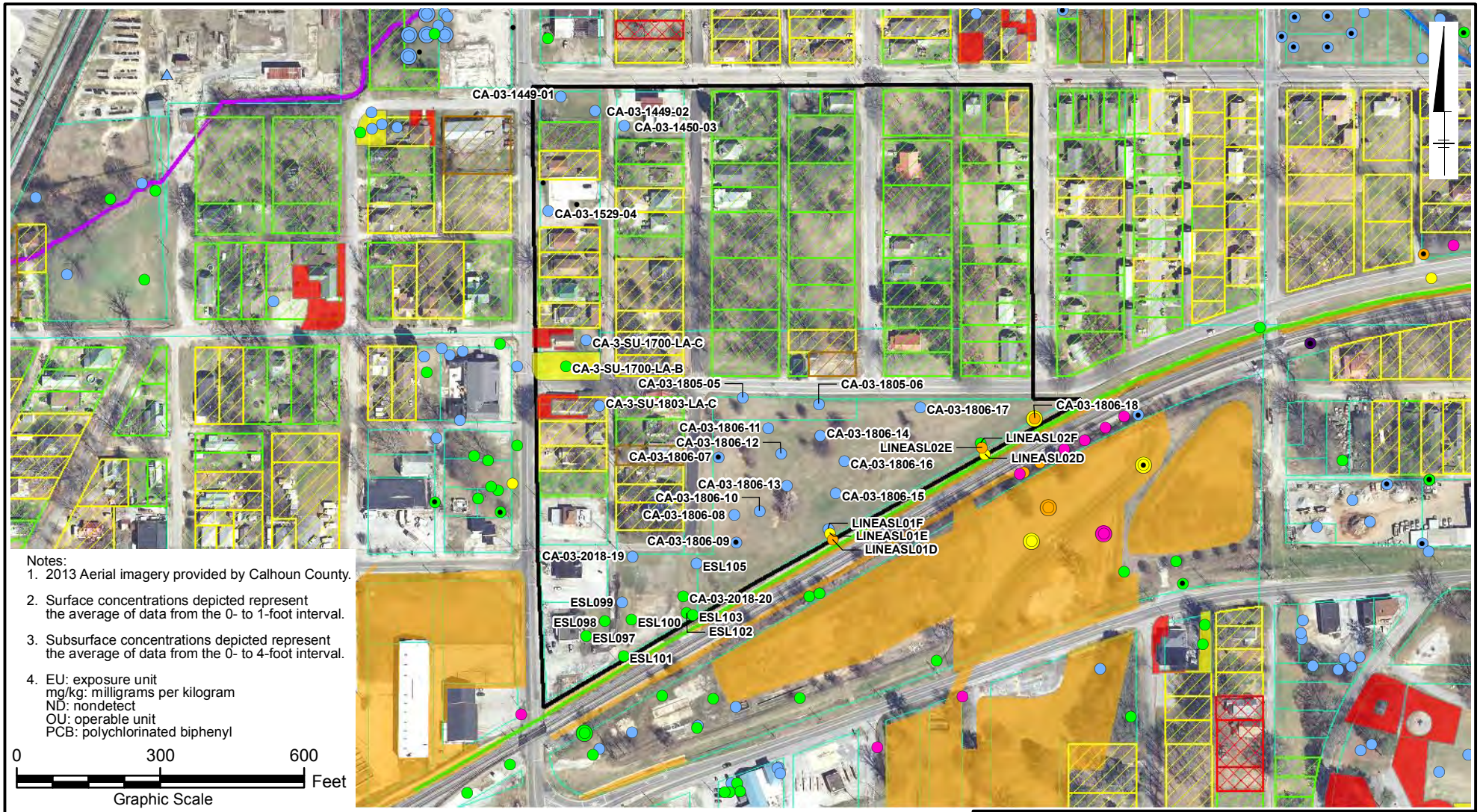
OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 2

Solutia
Ingenuity Productivity Performance

Figure
2-9

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

0 300 600 Feet
Graphic Scale

Legend

Soil Sample Location
Surface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- Analytes other than PCB and Lead Analyzed

Soil Sample Location
Surface PCB Outside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1

- Snow Creek
- 11th Street Ditch
- West 9th Street Creek

Residential Parcels Sampled
- Residential < 1 (mg/kg)
- Removal Complete
- Residential Appendix 6
- Residential > 1 (mg/kg) (Removal Pending)

- Exposure Unit
- Interim Measure and Other Early Actions
- All Parcels
- Special Use: High Activity Area
- Special Use: Low Activity Area ≥1 mg/kg

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

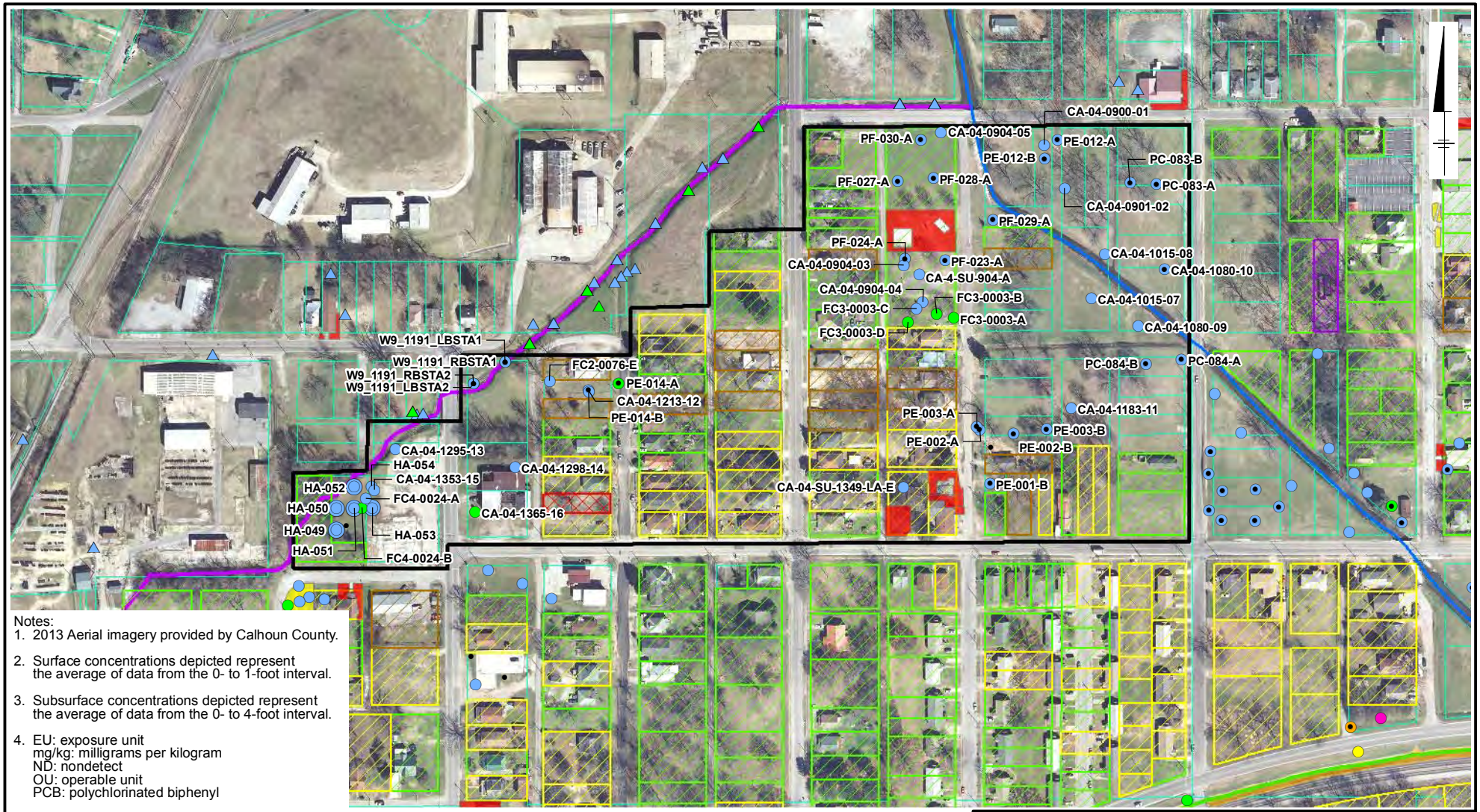
OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 3

Solutia

Figure 2-10

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

Legend

Soil Sample Location
Surface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- Analytes other than PCB and Lead Analyzed

Soil Sample Location
Surface PCB Outside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- Snow Creek
- 11th Street Ditch
- West 9th Street Creek

Residential Parcels Sampled
- Residential < 1 (mg/kg)
- Removal Complete
- Residential Appendix 6
- Residential > 1 (mg/kg) (Removal Pending)
- Residential > 1 (mg/kg) (Unsuitable for Removal)

- Exposure Unit
- Interim Measure and Other Early Actions
- All Parcels
- Special Use: High Activity Area
- Special Use: Low Activity Area ≥ 1 mg/kg
- Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

0 300 600 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

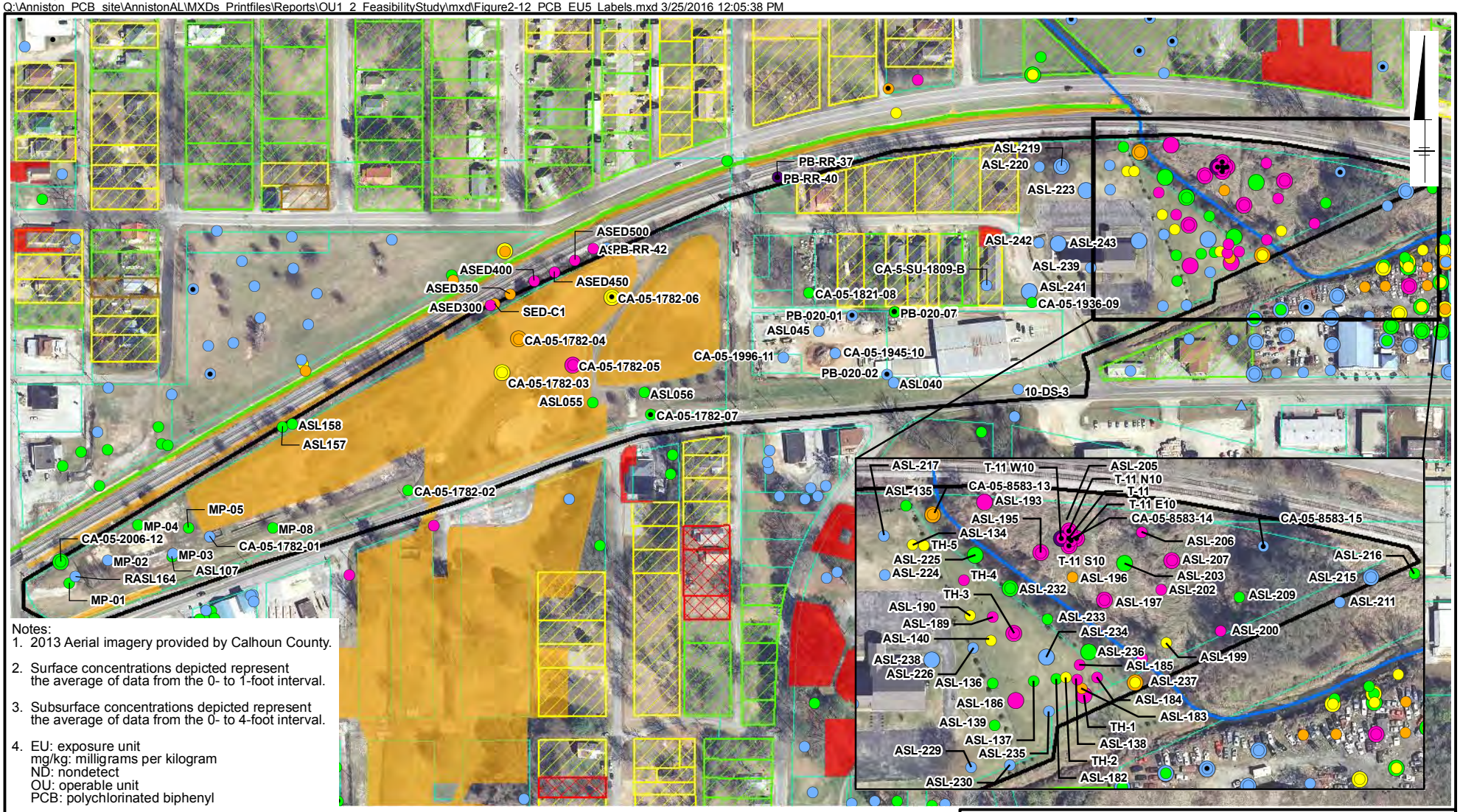
OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 4

Solutia
Ingenuity Productivity Performance

Figure
2-11

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
mg/kg: milligrams per kilogram
ND: nondetect
OU: operable unit
PCB: polychlorinated biphenyl

Legend

Soil Sample Location
Surface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- ≥ 500
- Analytes other than PCB and Lead Analyzed

Soil Sample Location
Surface PCB Outside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1

- Snow Creek
- 11th Street Ditch

Residential Parcels Sampled
- Residential < 1 (mg/kg)
- Removal Complete
- Residential Appendix 6
- Residential > 1 (mg/kg) (Removal Pending)

- Special Use: High Activity Area
- Interim Measure and Other Early Actions
- Exposure Unit
- All Parcels

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

0 300 600 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

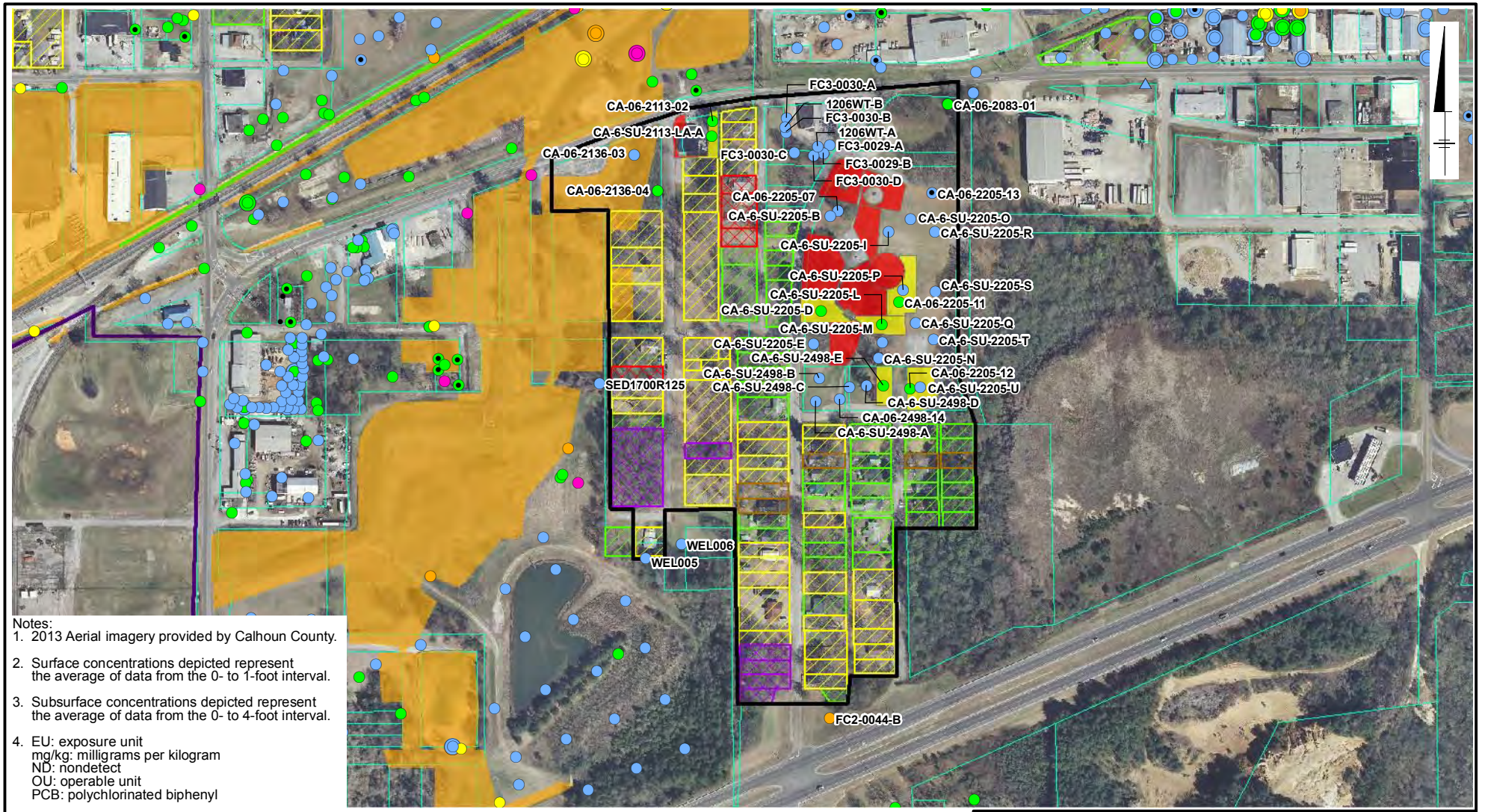
OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 5

Solutia
Ingenuity Productivity Performance

Figure
2-12

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

Legend

Soil Sample Location
Surface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- Analytes other than PCB and Lead Analyzed

Soil Sample Location
Surface PCB Outside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1

11th Street Ditch

Residential Parcels Sampled
- Residential < 1 (mg/kg)
- Removal Complete
- Residential Appendix 6
- Residential > 1 (mg/kg) (Removal Pending)
- Residential > 1 (mg/kg) (Unsuitable for Removal)

- Interim Measure and Other Early Actions
- Exposure Unit
- Operable Unit 3
- All Parcels
- Special Use: High Activity Area
- Special Use: Low Activity Area ≥ 1 mg/kg

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

0 400 800 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

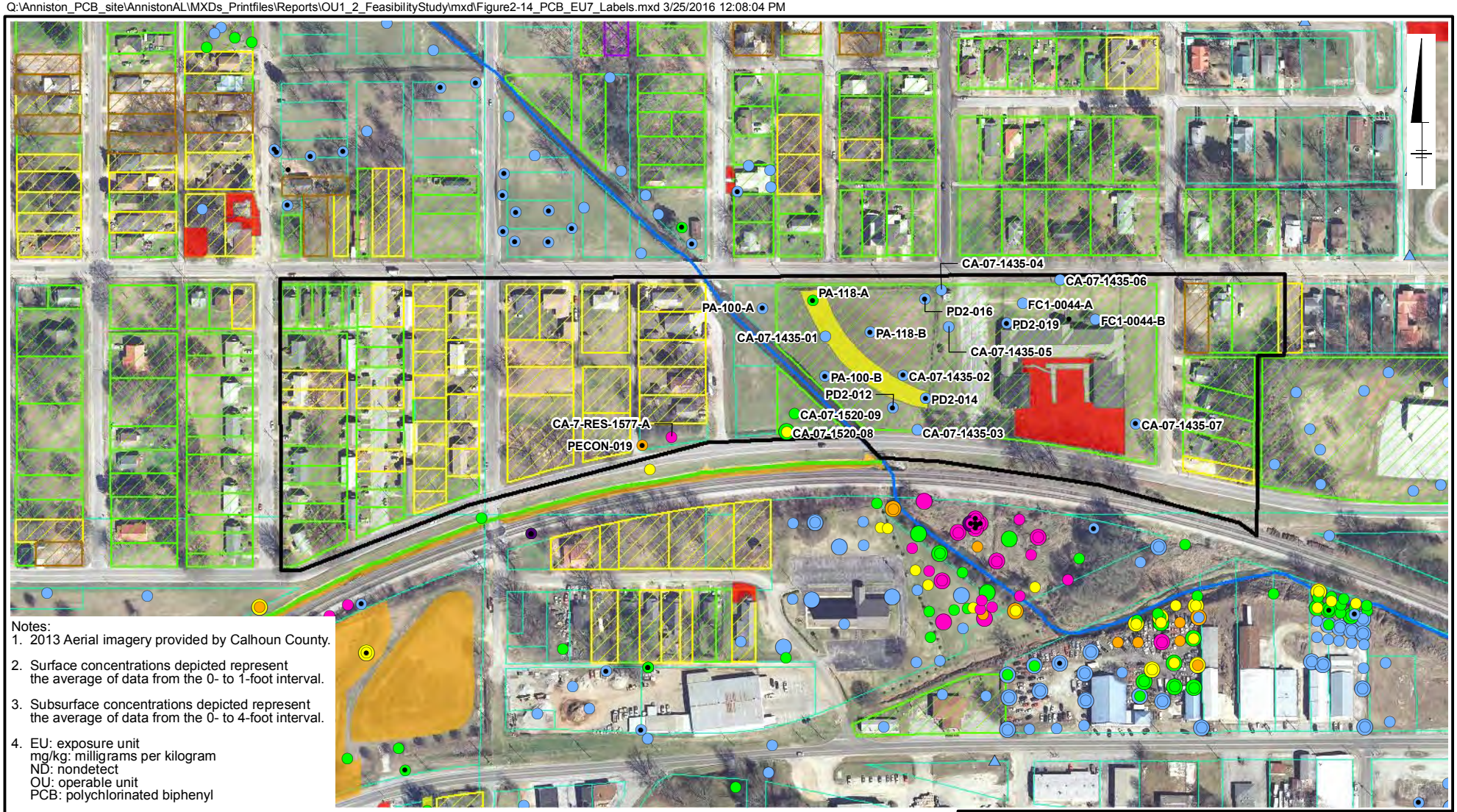
OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 6

Solutia
Ingenuity Productivity Performance

Figure
2-13

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

Legend

Soil Sample Location
Surface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- ≥ 500
- Analytes other than PCB and Lead Analyzed

Soil Sample Location
Surface PCB Outside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1

- Snow Creek
- 11th Street Ditch

Residential Parcels Sampled
- Residential < 1 (mg/kg)
- Removal Complete
- Residential Appendix 6
- Residential > 1 (mg/kg) (Unsuitable for Removal)

- Exposure Unit
- Interim Measure and Other Early Actions
- All Parcels
- Special Use: High Activity Area
- Special Use: Low Activity Area ≥ 1 mg/kg

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

0 300 600 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

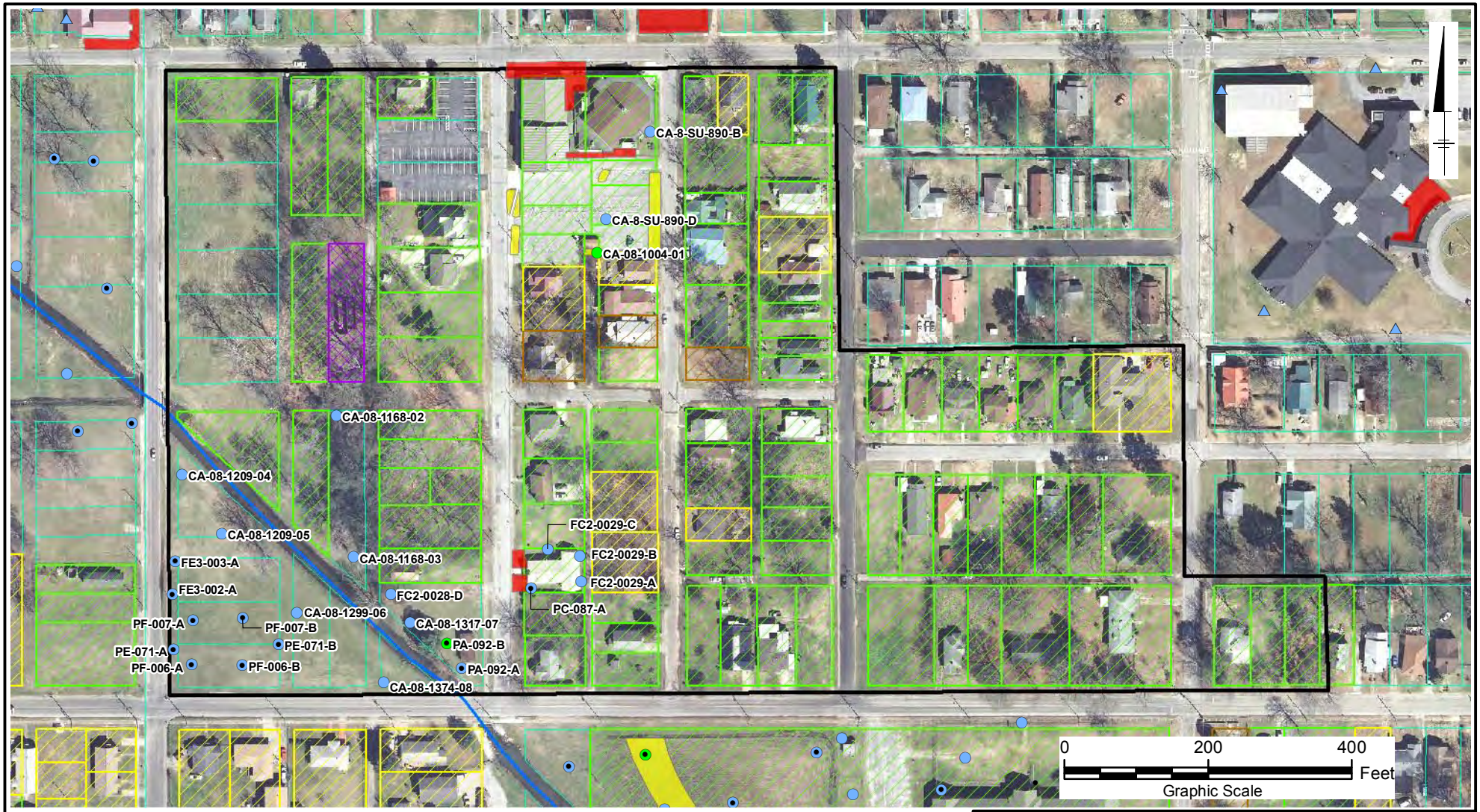
OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 7

Solutia
Ingenuity Productivity Performance

Figure
2-14

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Legend

Soil Sample Location
Surface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- Analytes other than PCB and Lead Analyzed

Soil Sample Location
Surface PCB Outside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1

Snow Creek

Residential Parcels Sampled
- Residential < 1 (mg/kg)
- Removal Complete
- Residential Appendix 6
- Residential > 1 (mg/kg) (Unsuitable for Removal)
- All Parcels
- Exposure Unit
- Special Use: High Activity Area
- Special Use: Low Activity Area ≥ 1 mg/kg

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

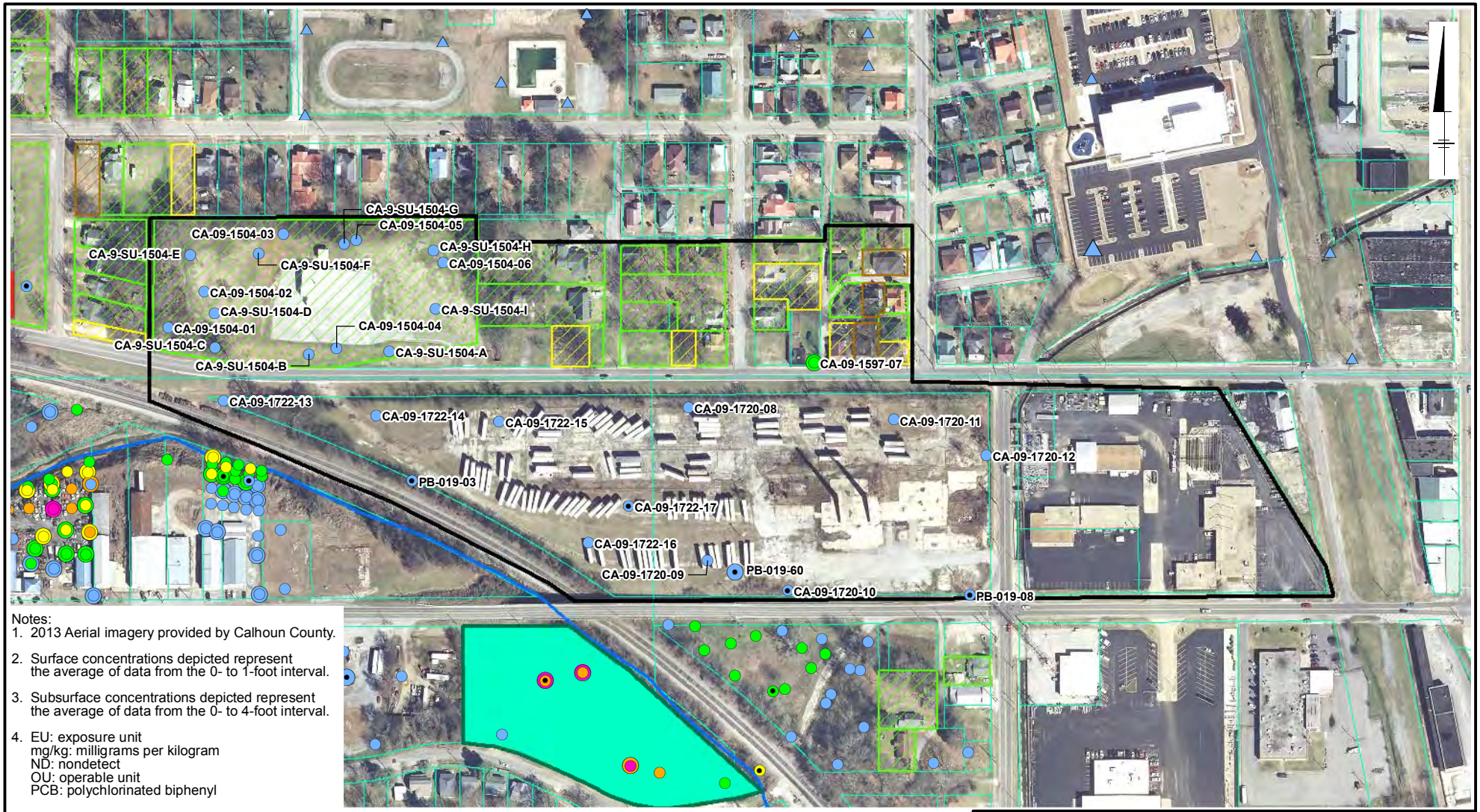
OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 8

Solutia
Ingenuity Productivity Performance

Figure
2-15

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

Legend

Soil Sample Location
Surface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- Analytes other than PCB and Lead Analyzed

Soil Sample Location
Surface PCB Outside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1

Snow Creek

Residential Parcels Sampled
- Residential < 1 (mg/kg)
- Removal Complete
- Residential Appendix 6

- Special Use: High Activity Area
- Unapproved Waste Disposal Area
- Exposure Unit
- All Parcels

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

0 300 600 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

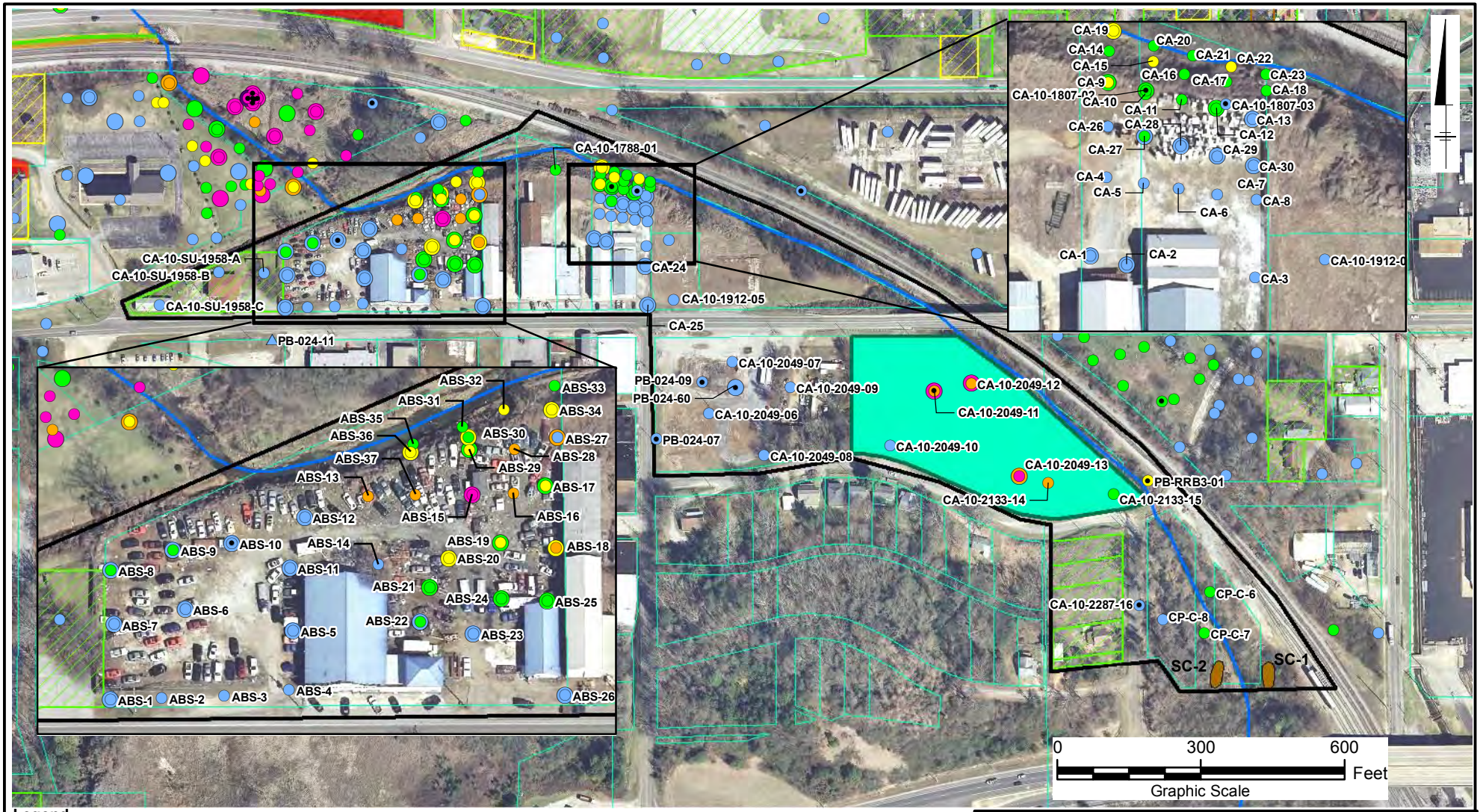
OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 9

Solutia

Figure
2-16

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Legend

Soil Sample Location
Surface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- ≥ 500
- Analytes other than PCB and Lead Analyzed

Soil Sample Location
Surface PCB Outside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1

Snow Creek
11th Street Ditch
Dredge Spoil Pile In-Place

Residential Parcels Sampled
- Residential < 1 (mg/kg)
- Removal Complete
- Residential Appendix 6

Special Use: High Activity Area
Unapproved Waste Disposal Area
Exposure Unit
Interim Measure and Other Early Actions
All Parcels

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
mg/kg: milligrams per kilogram
ND: nondetect
OU: operable unit
PCB: polychlorinated bipheny

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 10

Solutia
Ingenuity Productivity Performance

Figure
2-17

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Legend

Soil Sample Location
Surface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- Analytes other than PCB and Lead Analyzed

Snow Creek

Residential Parcels Sampled
- Residential < 1 (mg/kg)
- Unapproved Waste Disposal Area
- Exposure Unit
- All Parcels

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

0 200 400 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

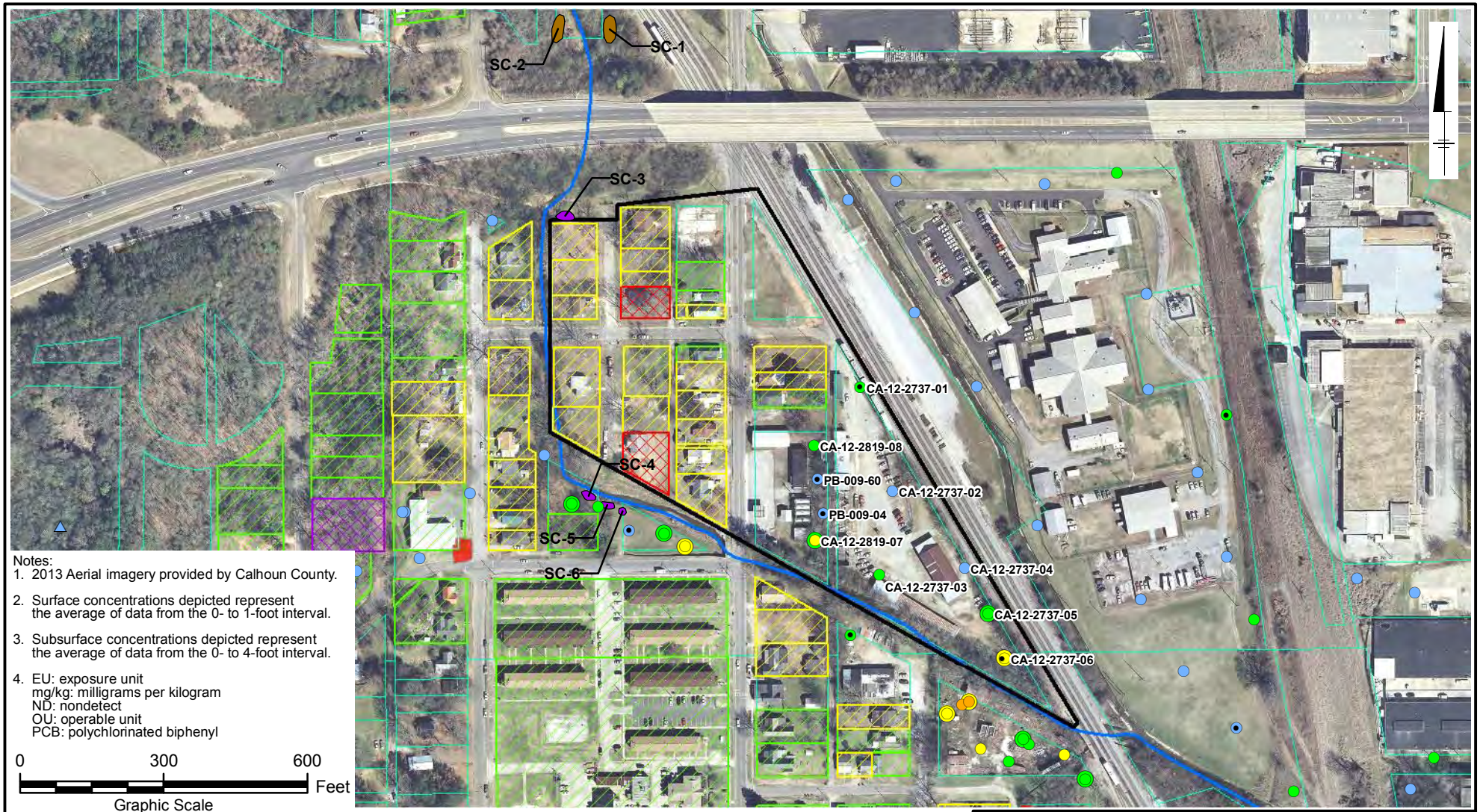
OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 11

Solutia
Ingenuity Productivity Performance

Figure
2-18

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

0 300 600 Feet
Graphic Scale

Legend

Soil Sample Location
Surface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- Analytes other than PCB and Lead Analyzed

Soil Sample Location
Surface PCB Outside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1

Snow Creek

Residential Parcels Sampled
- Residential < 1 (mg/kg)
- Removal Complete
- Residential > 1 (mg/kg) (Removal Pending)
- Residential > 1 (mg/kg) (Unsuitable for Removal)

- Dredge Spoil Pile In-Place
- Dredge Spoil Pile Removed
- Special Use: High Activity Area
- Exposure Unit
- All Parcels

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

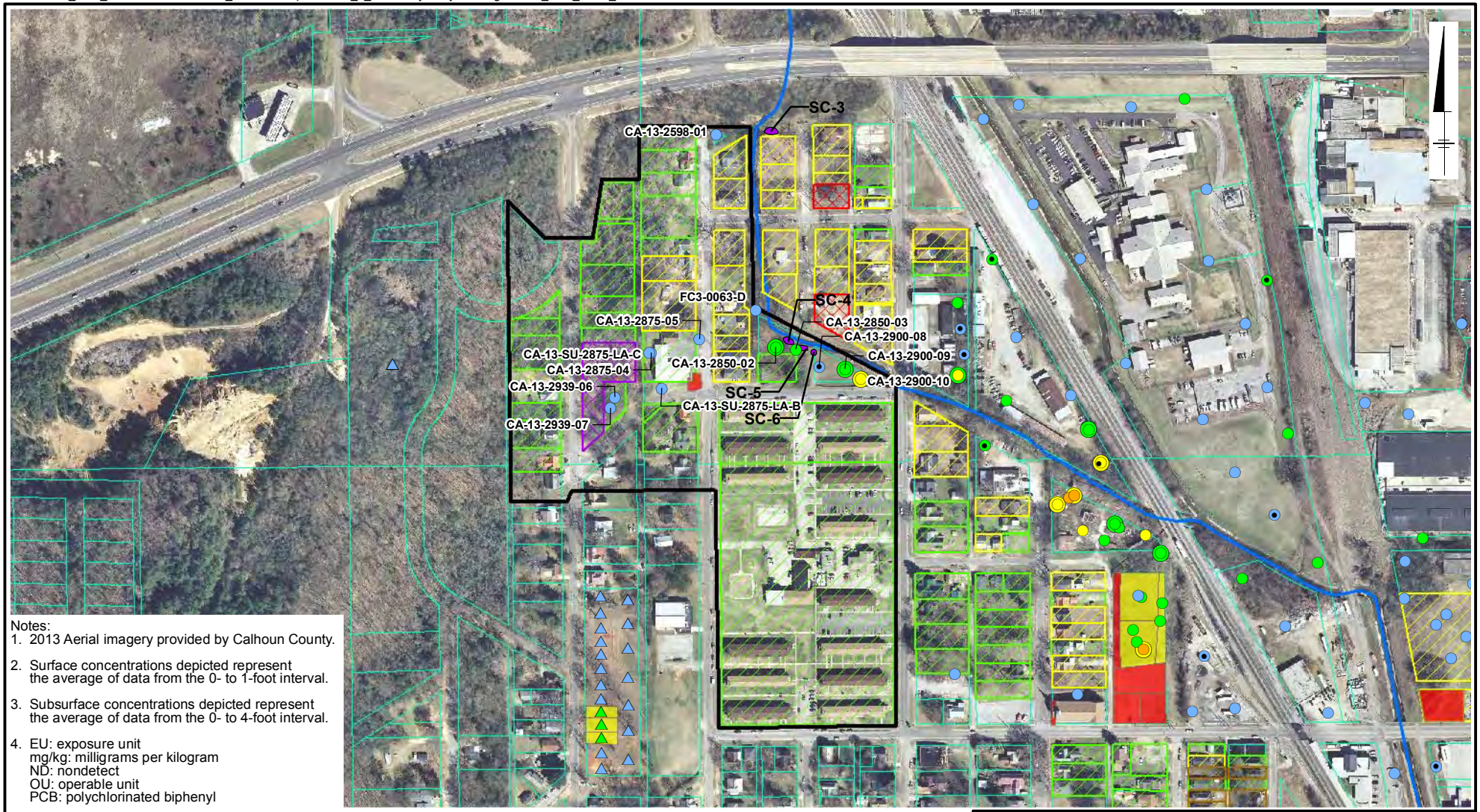
OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 12

Solutia
Ingenuity Productivity Performance

Figure 2-19

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

Legend

Soil Sample Location
Surface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- Analytes other than PCB and Lead Analyzed

Soil Sample Location
Surface PCB Outside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10

- Snow Creek

Residential Parcels Sampled
- Residential < 1 (mg/kg)
- Removal Complete
- Residential Appendix 6
- Residential > 1 (mg/kg) (Removal Pending)
- Residential > 1 (mg/kg) (Unsuitable for Removal)

- Dredge Spoil Pile Removed
- Exposure Unit
- All Parcels
- Special Use: High Activity Area
- Special Use: Low Activity Area ≥1 mg/kg
- Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

0 400 800 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 13

Solutia
Ingenuity Productivity Performance

Figure
2-20

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

Legend

Soil Sample Location
Surface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- Analytes other than PCB and Lead Analyzed

Snow Creek
Dredge Spoil Pile Removed
Residential Parcels Sampled
Residential < 1 (mg/kg)
Removal Complete
Residential > 1 (mg/kg) (Removal Pending)
Exposure Unit
All Parcels

Special Use: Low Activity Area ≥1 mg/kg
Special Use: High Activity Area

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

0 200 400 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

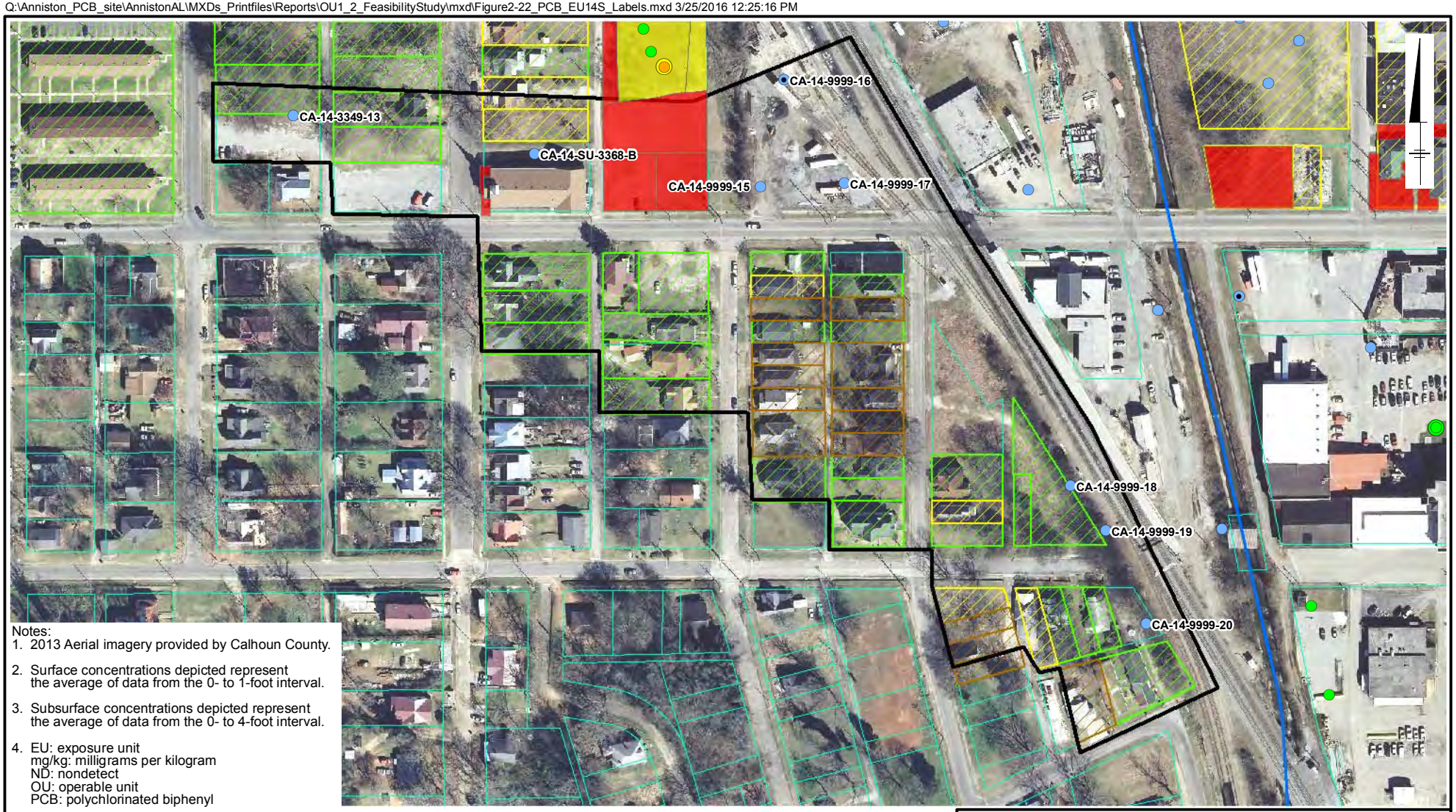
OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 14 North

Solutia

Figure
2-21

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
mg/kg: milligrams per kilogram
ND: nondetect
OU: operable unit
PCB: polychlorinated biphenyl

Legend

Soil Sample Location
Surface PCB Inside OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- Analytes other than PCB and Lead Analyzed

Snow Creek

Residential Parcels Sampled
- Residential < 1 (mg/kg)
- Removal Complete
- Residential Appendix 6

Exposure Unit
All Parcels
Special Use: High Activity Area
Special Use: Low Activity Area ≥1 mg/kg

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

0 200 400 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

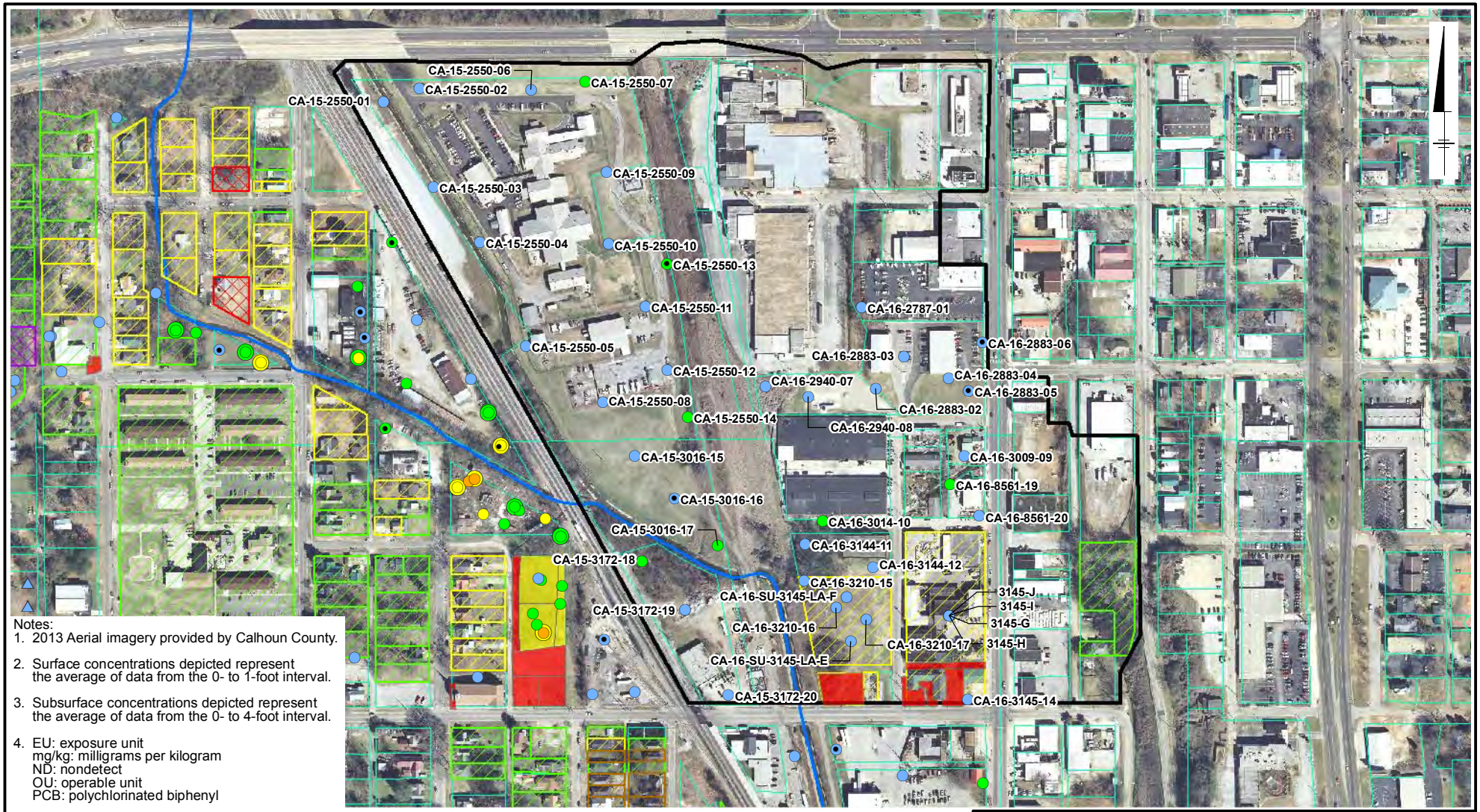
OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 14 South

Solutia
Ingenuity Productivity Performance

Figure
2-22

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

Legend

Soil Sample Location
Surface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- Analytes other than PCB and Lead Analyzed

Soil Sample Location
Surface PCB Outside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1

Snow Creek

Residential Parcels Sampled
- Residential < 1 (mg/kg)
- Removal Complete
- Residential Appendix 6
- Residential > 1 (mg/kg) (Removal Pending)
- Residential > 1 (mg/kg) (Unsuitable for Removal)

Exposure Unit
All Parcels
Special Use: High Activity Area
Special Use: Low Activity Area ≥1 mg/kg

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

0 400 800 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

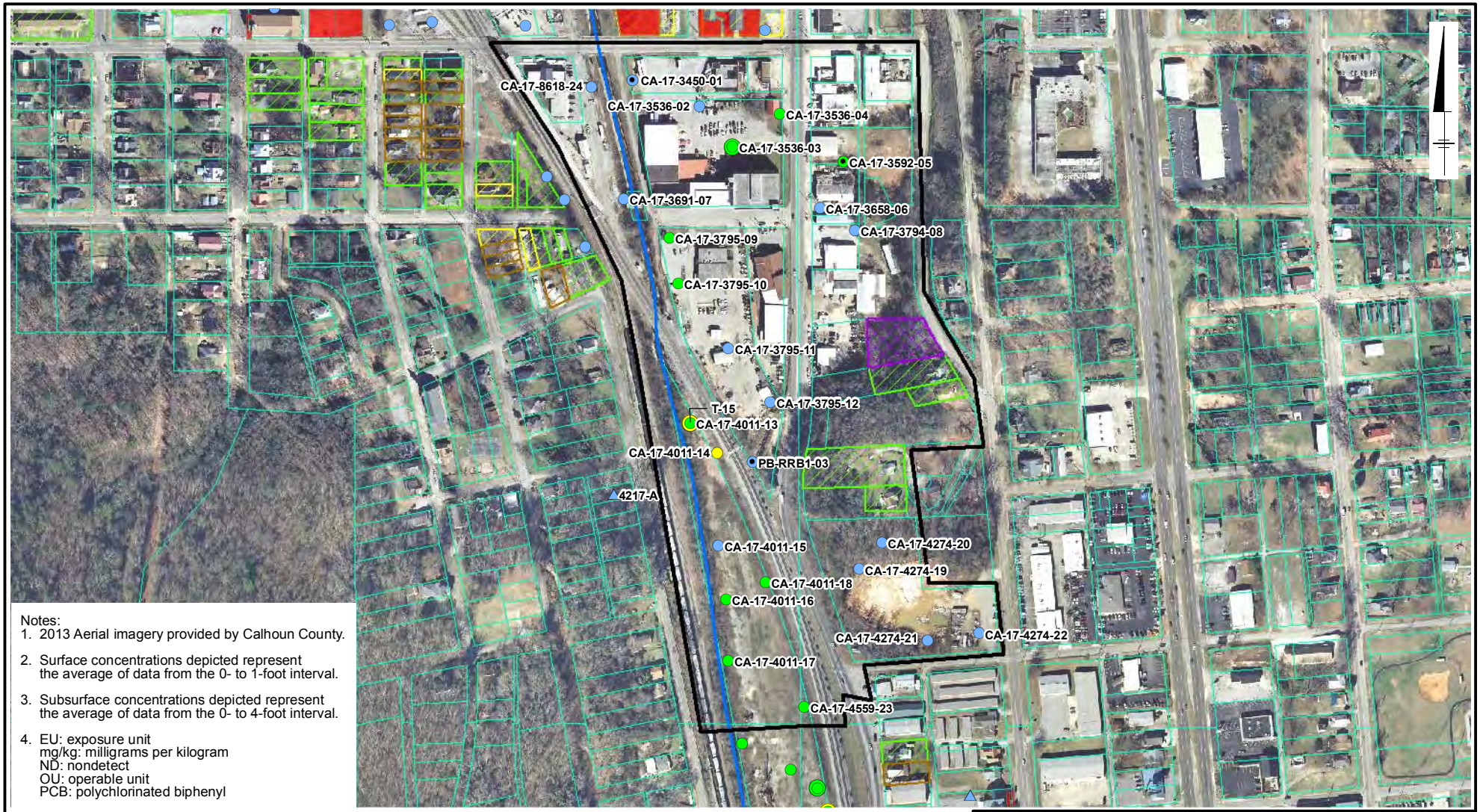
OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 15/16

Solutia
Ingenuity Productivity Performance

Figure
2-23

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

Legend

Soil Sample Location
Surface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- Analytes other than PCB and Lead Analyzed

Soil Sample Location
Surface PCB Outside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1

Snow Creek

Residential Parcels Sampled
- Residential < 1 (mg/kg)
- Removal Complete
- Residential Appendix 6
- Residential > 1 (mg/kg) (Unsuitable for Removal)

Special Use: High Activity Area

Exposure Unit

All Parcels

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

0 400 800 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 17

Solutia

Figure
2-24

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

Legend

Soil Sample Location
Surface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- ≥ 500
- Analytes other than PCB and Lead Analyzed

Soil Sample Location
Surface PCB Outside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1

Snow Creek

Residential Parcels Sampled
- Residential < 1 (mg/kg)
- Removal Complete
- Residential Appendix 6

- Special Use: High Activity Area
- Exposure Unit
- All Parcels

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

0 500 1,000 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 18

Solutia

Figure
2-25

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

Legend

Soil Sample Location
Surface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- ≥ 500
- Analytes other than PCB and Lead Analyzed

Soil Sample Location
Surface PCB Outside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1

Snow Creek

Residential Parcels Sampled
- Residential < 1 (mg/kg)
- Removal Complete
- Residential Appendix 6

Special Use: High Activity Area
Exposure Unit
All Parcels

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

0 300 600 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 19 North

Solutia
Ingenuity Productivity Performance

Figure
2-26

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

Legend

Soil Sample Location
Surface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- Analytes other than PCB and Lead Analyzed

Soil Sample Location
Surface PCB Outside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1

Snow Creek

Residential Parcels Sampled
- Residential < 1 (mg/kg)
- Removal Complete
- Residential Appendix 6

Special Use: High Activity Area
Exposure Unit
All Parcels

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

0 300 600 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 19 South

Solutia

Figure
2-27

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-28_PCB_EU20_Labels.mxd 3/25/2016 12:33:12 PM



Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

Legend

Soil Sample Location
Surface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- ≥ 500
- Analytes other than PCB and Lead Analyzed

Soil Sample Location
Surface PCB Outside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1

Snow Creek

Residential Parcels Sampled
- Residential < 1 (mg/kg)
- Removal Complete
- Residential Appendix 6

- Special Use: High Activity Area
- Exposure Unit
- All Parcels

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

0 400 800 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 20

Solutia
Ingenuity Productivity Performance

Figure
2-28

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-29_PCB_EU21_Labels.mxd 3/25/2016 12:34:33 PM



Legend

Soil Sample Location
Surface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- Analytes other than PCB and Lead Analyzed

Soil Sample Location
Surface PCB Outside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1

- Snow Creek
- Special Use: High Activity Area
- Exposure Unit
- All Parcels

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

0 400 800 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

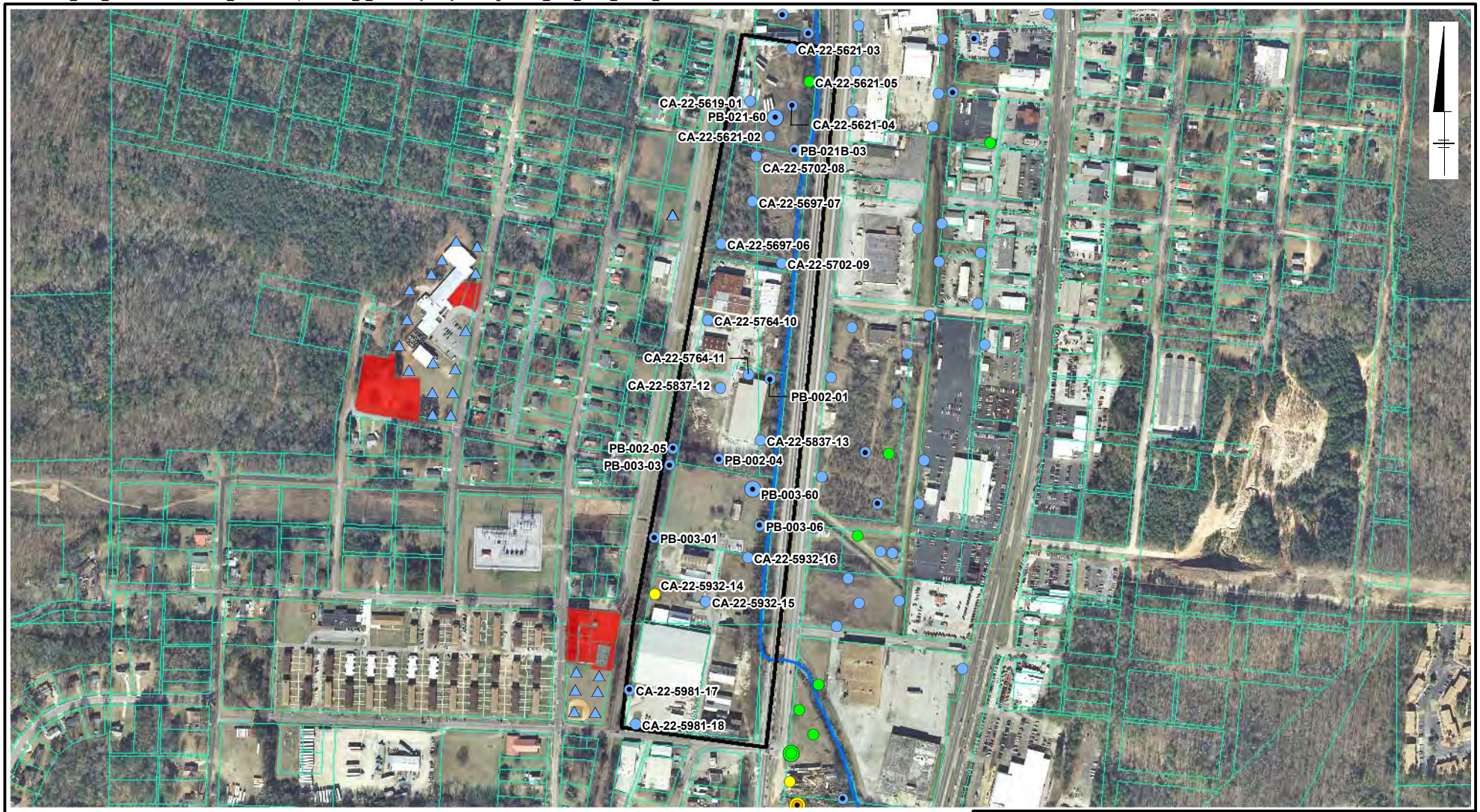
OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 21

Solutia
Ingenuity Productivity Performance

Figure
2-29

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Legend

Soil Sample Location
Surface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- Analytes other than PCB and Lead Analyzed

Soil Sample Location
Surface PCB Outside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1

- Snow Creek
- Special Use: High Activity Area
- Exposure Unit
- All Parcels

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

0 600 1,200 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 22

Solutia

Figure
2-30

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Legend

Soil Sample Location
Surface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- Analytes other than PCB and Lead Analyzed

Soil Sample Location
Surface PCB Outside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1

- Snow Creek
- Special Use: High Activity Area
- Exposure Unit
- All Parcels

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

0 400 800 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

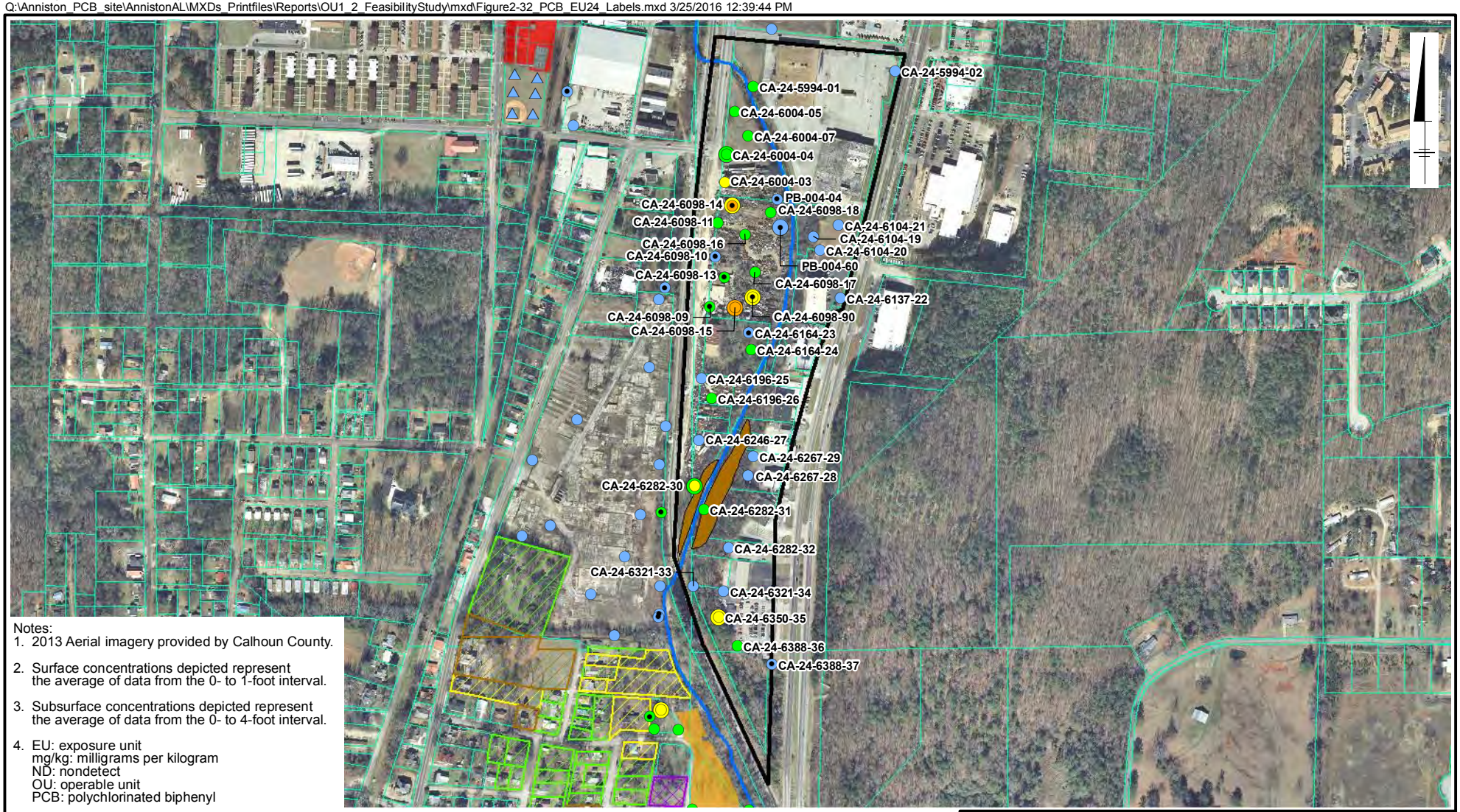
OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 23

Solutia

Figure
2-31

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

Legend

Soil Sample Location
Surface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- Analytes other than PCB and Lead Analyzed

Soil Sample Location
Surface PCB Outside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1

Snow Creek

Residential Parcels Sampled
- Residential < 1 (mg/kg)
- Removal Complete
- Residential Appendix 6
- Residential > 1 (mg/kg) (Unsuitable for Removal)

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

- Special Use: High Activity Area
- Exposure Unit
- Interim Measure and Other Early Actions
- All Parcels
- Dredge Spoil Pile In-Place

0 600 1,200 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 24

Solutia

Figure
2-32

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Legend

Soil Sample Location
Surface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- Analytes other than PCB and Lead Analyzed

Snow Creek
Dredge Spoil Pile In-Place
Residential Parcels Sampled
Residential < 1 (mg/kg)
Removal Complete
Residential Appendix 6

Exposure Unit
Interim Measure and Other Early Actions
All Parcels

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
mg/kg: milligrams per kilogram
ND: nondetect
OU: operable unit
PCB: polychlorinated biphenyl

0 400 800 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

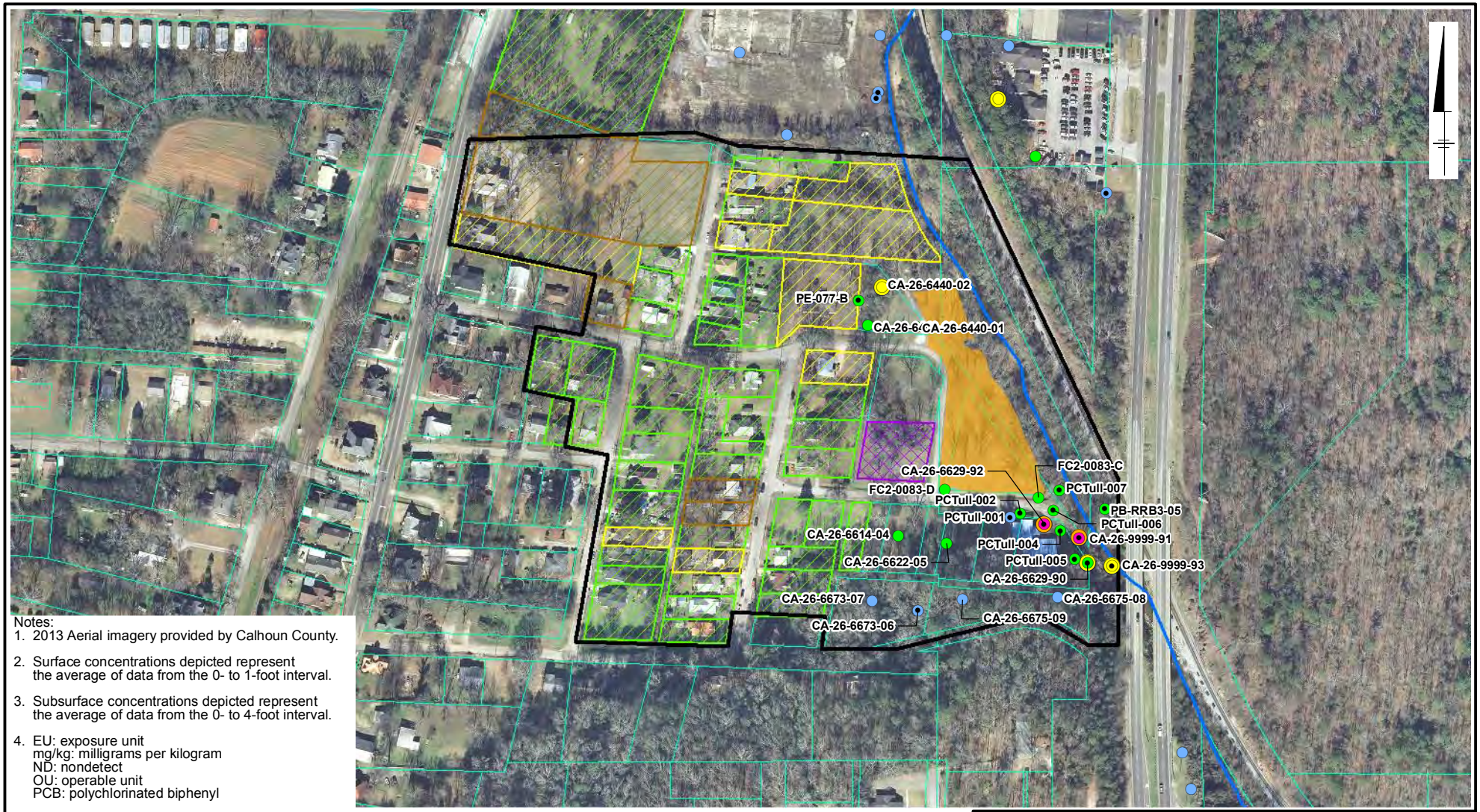
OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 25

Solutia

Figure
2-33

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

Legend

Soil Sample Location
Surface PCB Inside OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- Analytes other than PCB and Lead Analyzed

Snow Creek

Residential Parcels Sampled
- Residential < 1 (mg/kg)
- Removal Complete
- Residential Appendix 6
- Residential > 1 (mg/kg) (Unsuitable for Removal)

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

Exposure Unit
Interim Measure and Other Early Actions
All Parcels

0 300 600 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

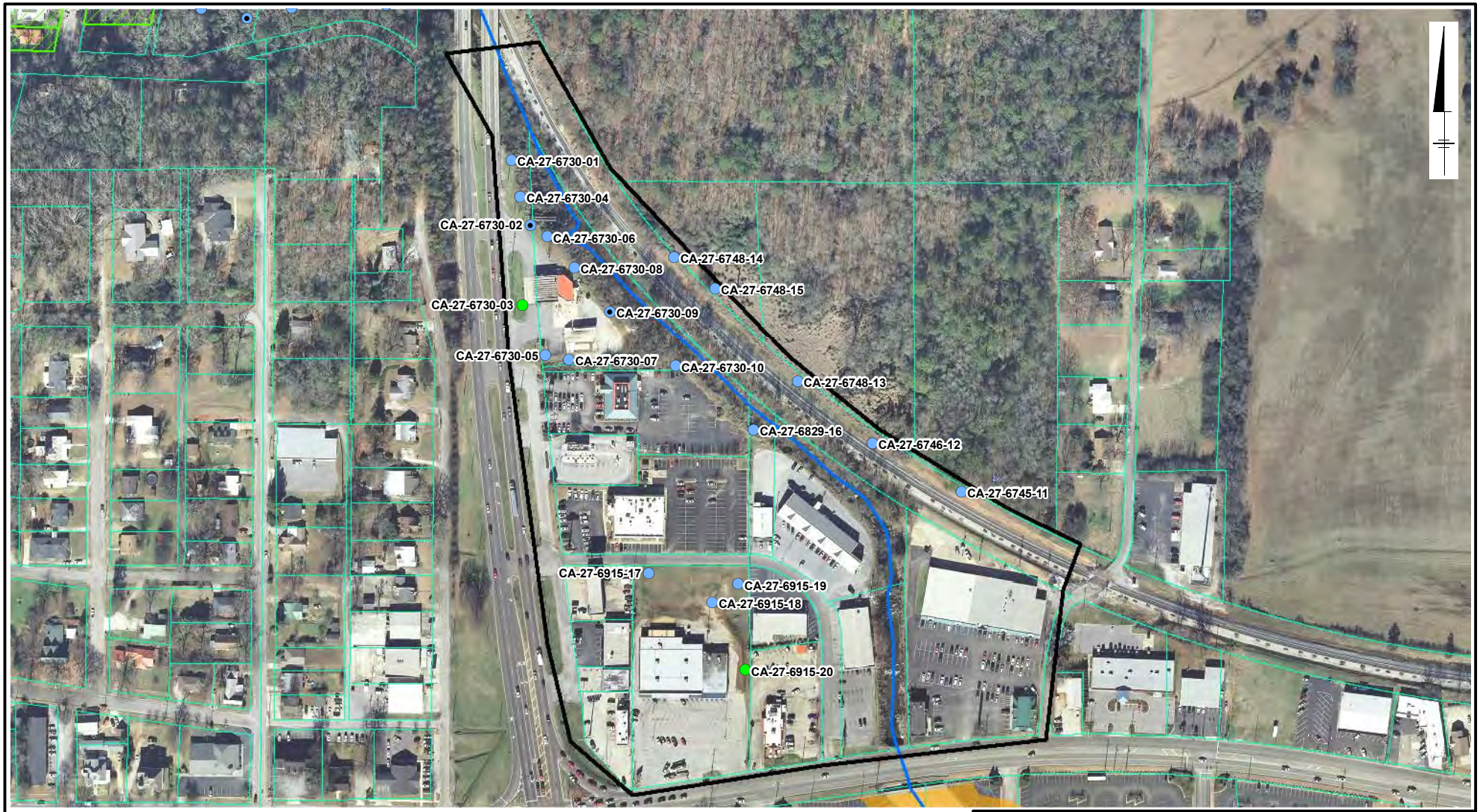
OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 26

Solutia

Figure 2-34

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Legend

Soil Sample Location
Surface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- Analytes other than PCB and Lead Analyzed

Snow Creek

Residential Parcels Sampled
- Residential < 1 (mg/kg)
- Exposure Unit
- Interim Measure and Other Early Actions
- All Parcels

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

0 300 600 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 27

Solutia
Ingenuity Productivity Performance

Figure
2-35

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

Legend

Soil Sample Location
Surface PCB Inside OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- Analytes other than PCB and Lead Analyzed

Snow Creek

Residential Parcels Sampled
- Residential < 1 (mg/kg)
- Removal Complete
- Residential Appendix 6

Exposure Unit

Interim Measure and Other Early Actions

All Parcels

0 400 800 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

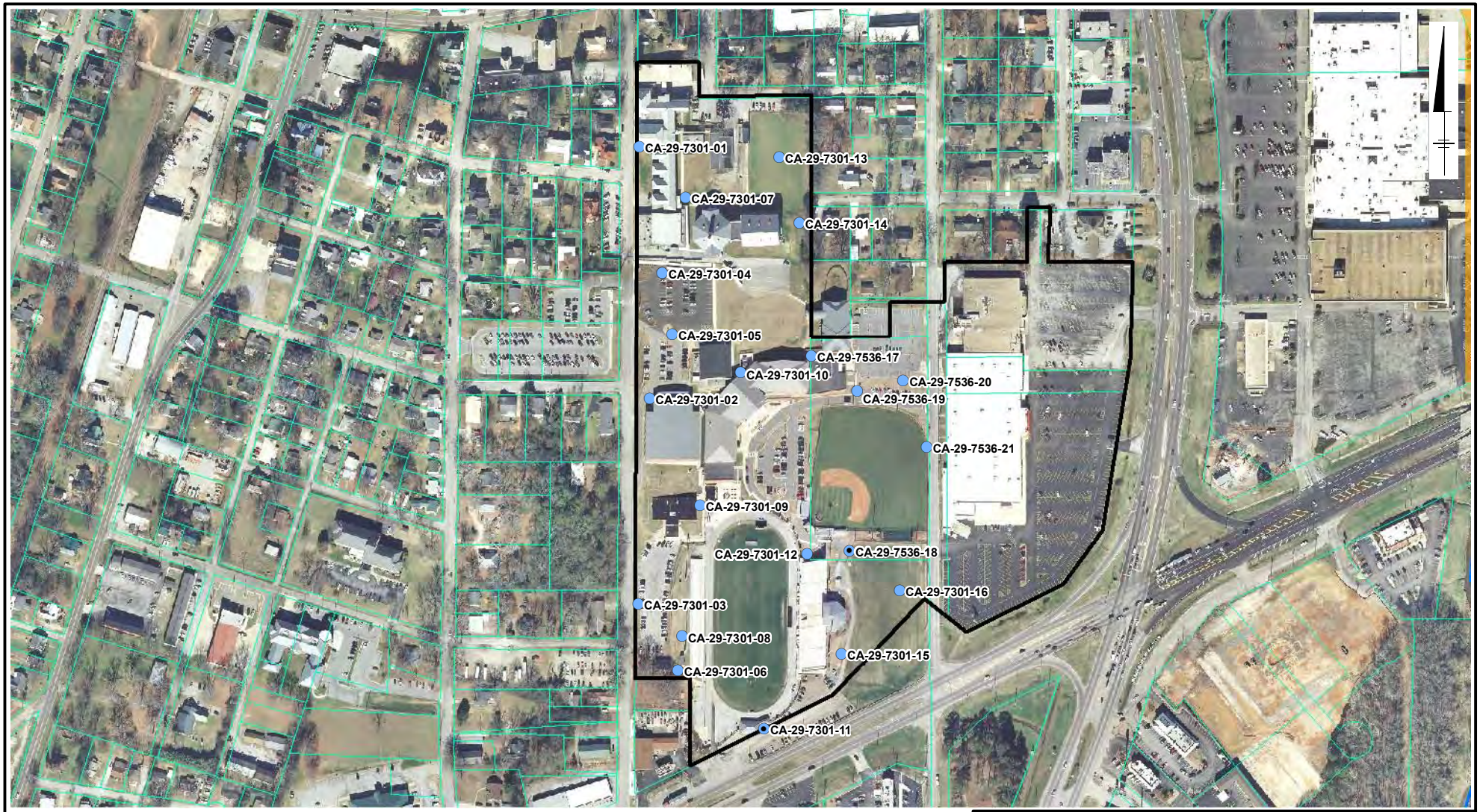
OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 28

Solutia

Figure
2-36

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-37_PCB_EU29_Labels_Set3.mxd 3/25/2016 12:47:26 PM



Legend

Soil Sample Location
Surface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- Analytes other than PCB and Lead Analyzed

Snow Creek
Exposure Unit
Interim Measure and Other Early Actions
All Parcels

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

0 400 800 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

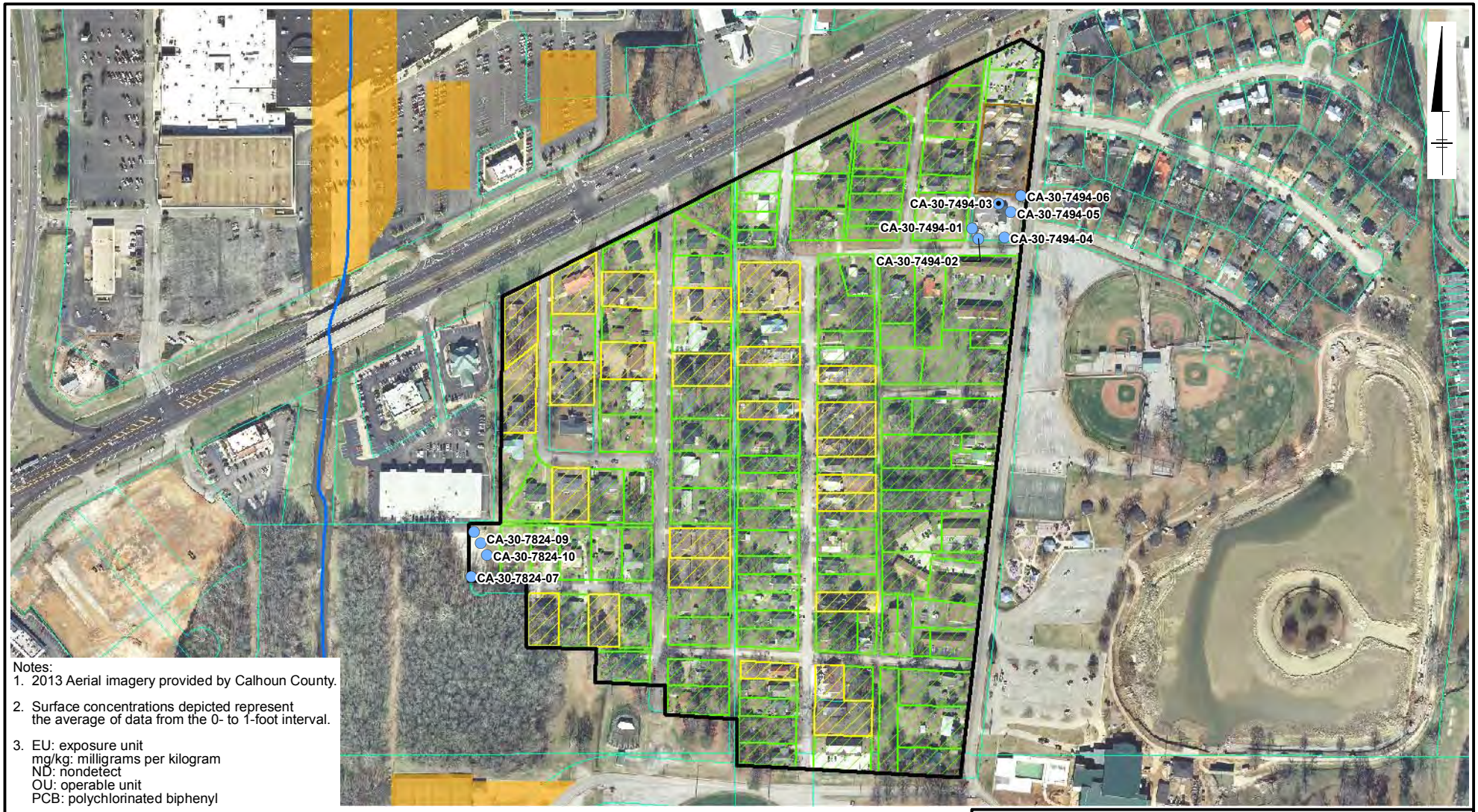
OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 29

Solutia
Ingenuity Productivity Performance

Figure
2-37

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-38_PCB_EU30_Labels.mxd 3/25/2016 12:48:38 PM



Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

Legend

Soil Sample Location
Surface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- Analytes other than PCB and Lead Analyzed

Snow Creek

Residential Parcels Sampled
- Residential < 1 (mg/kg)
- Removal Complete
- Residential Appendix 6
- Exposure Unit
- Interim Measure and Other Early Actions
- All Parcels

0 400 800 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Soil PCB Concentrations Exposure Unit 30

Solutia

Figure **2-38**

City: SYR Div/Group: SWG Created By: K.Ives Last Saved By: jbistrovich
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-39_NonResidentialSurfaceSoilPCB.mxd 3/25/2016 8:39:19 AM

Notes:
1. 2013 Aerial imagery provided by Calhoun and Talladega Counties.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. OU-1/OU-2 EU Area includes EU1-30, Northside Area, and Eastside Area.
4. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

0 4,400 8,800 Feet

Graphic Scale

Legend

Soil Sample Location Surface PCB Inside OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- ≥ 500

Soil Sample Location Surface PCB Outside OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- ≥ 500

- Analytes other than PCB and Lead Analyzed
- Snow Creek
- 11th Street Ditch
- West 9th Street Creek
- Operable Unit 3
- Northside and Eastside Areas
- 100-Year Floodplain and Drainage Areas
- Exposure Unit
- Zone B Boundary
- Choccoloco Creek

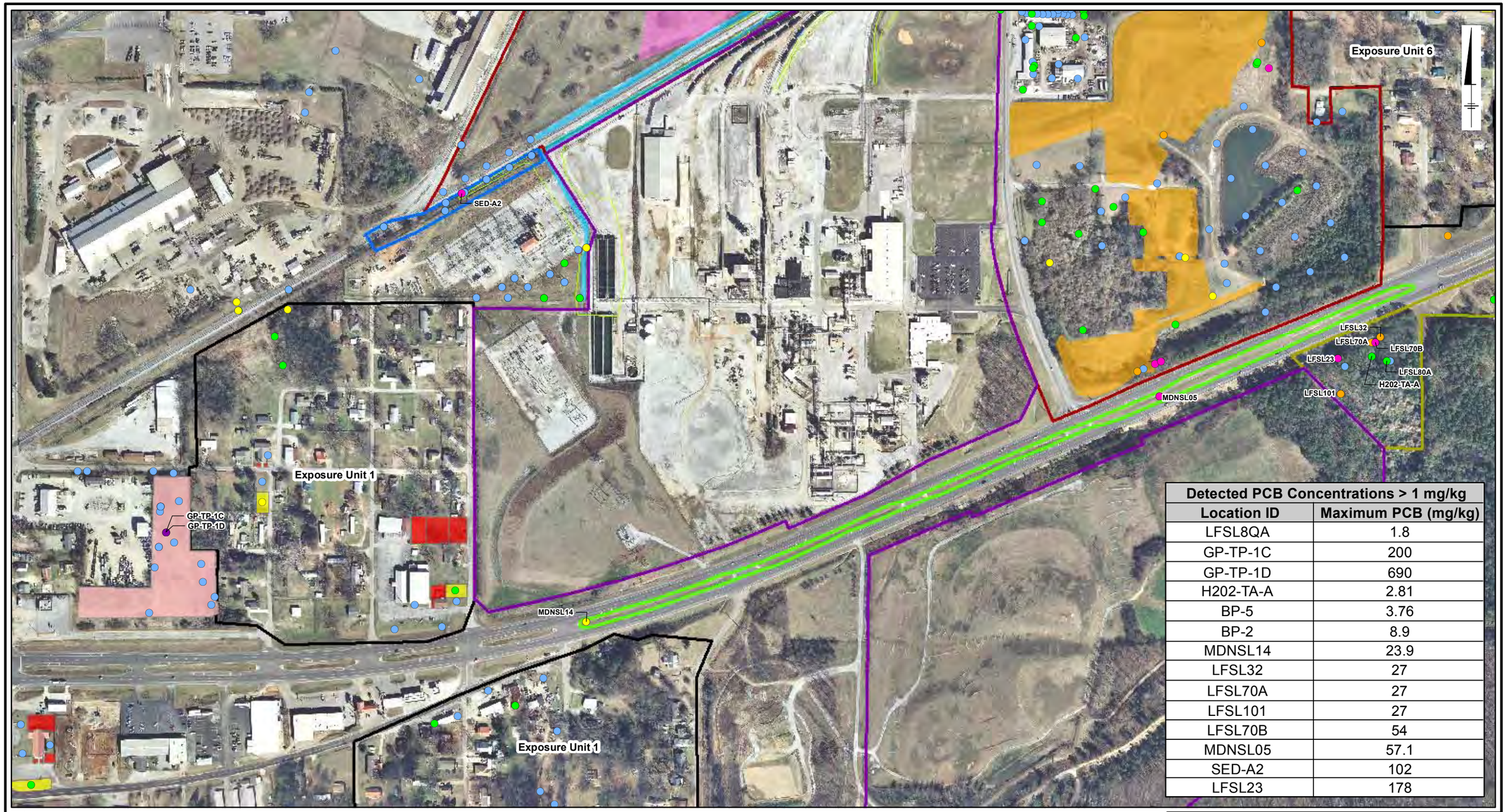
Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Nonresidential Surface Soil PCB Results

Solutia

Figure
2-39



Detected PCB Concentrations > 1 mg/kg	
Location ID	**Maximum PCB (mg/kg)**
LFSL8QA	1.8
GP-TP-1C	200
GP-TP-1D	690
H202-TA-A	2.81
BP-5	3.76
BP-2	8.9
MDNSL14	23.9
LFSL32	27
LFSL70A	27
LFSL101	27
LFSL70B	54
MDNSL05	57.1
SED-A2	102
LFSL23	178

Legend

Surface Sample Location

Maximum PCB Concentration (mg/kg)
- ND or < 1
- ≥ 1 or <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- ≥ 500
- Area West of EU-1

- 11th Street Ditch Removal Action
- Eastside Area Interim Measures
- Northside Area Interim Measures
- OU-1/OU-2 Downgradient Floodplain
- Exposure Unit

- Northside/Eastside Area
- Operable Unit 3
- South of Highway 202 Area
- Highway 202 Median Area
- North of APCO Area
- Area West of EU-1
- Special Use: Low Activity Area ≥1 mg/kg
- Special Use: High Activity Area

0 350 700 Feet

Graphic Scale

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface samples represent samples collected from depths 0 to 12 inches below the surface.
3. PCB concentrations are based on the maximum value from the 0 to 12-inch interval.
4. APCO: Alabama Power Company
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

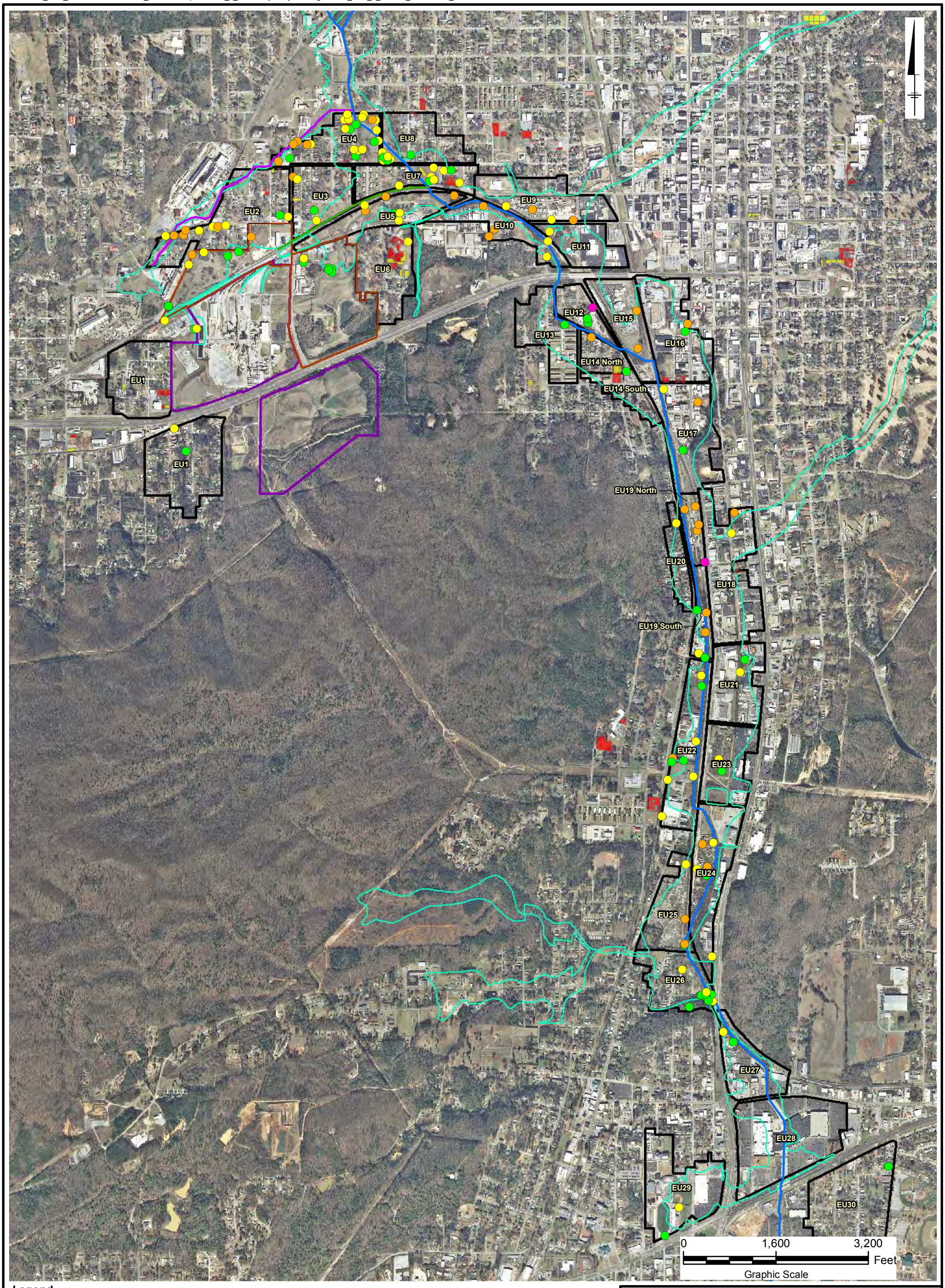
Surface Soil PCB Results for North of APCO, Highway 202 Median, South of Highway 202 and West of EU1

Solutia

Figure **2-40**

City: SYR Div/Group: SWG Created By: K.Ives Last Saved By: jbistrovich
Anniston
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-40_OU1_2_PCB_OutsideData.mxd 3/30/2016 8:13:47 AM

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: jbistrovich
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-41_OU1_2_Arsenic_SurfaceSoil_HHRA.mxd 3/30/2016 8:15:33 AM



Legend

Soil Sample Location
Arsenic Concentration (mg/kg)
- ND to <1
- 1 to 5
- 5 to 10
- 10 to 50
- > 50

- Snow Creek
- 11th Street Ditch
- West 9th Street Creek
- 100-Year Floodplain and Drainage Areas
- Northside and Eastside Areas
- Operable Unit 3
- Exposure Unit
- Special Use: Low Activity Area ≥1 mg/kg
- Special Use: High Activity Area

Note:
1. 2013 Aerial imagery provided by Calhoun County.
2. No surface soil sample results exceeded PRG for arsenic (382 mg/kg).
3. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl
   PRG: preliminary remediation goal

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

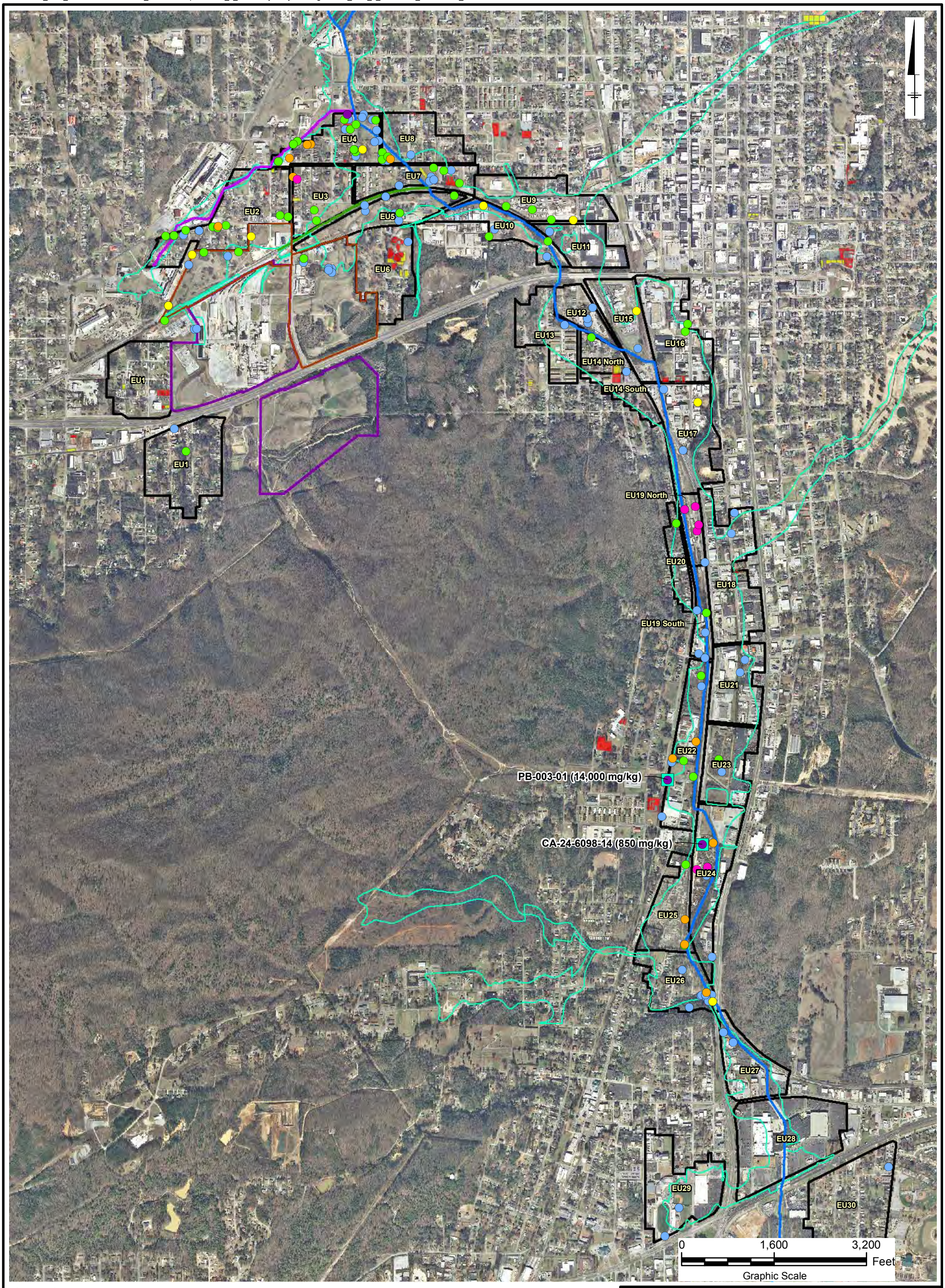
OU-1/OU-2 Feasibility Study Report

Arsenic Concentrations in Surface Soil

Solutia

Figure
2-41

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: jbistrovich
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-42_OU1_2_Chromium_SurfaceSoil_HHRA.mxd 3/30/2016 12:52:43 PM



Legend

Soil Sample Location
Chromium Concentration (mg/kg)
- 0 to 20
- 20 to 38
- 38 to 50
- 50 to 100
- 100 to 500
- >500
- Location with a sample exceeding the PRG of 568 mg/kg for chromium

- Snow Creek
- 11th Street Ditch
- West 9th Street Creek
- 100-Year Floodplain and Drainage Areas
- Northside and Eastside Areas
- Operable Unit 3
- Exposure Unit
- Special Use: Low Activity Area ≥1 mg/kg
- Special Use: High Activity Area

Note:
1. 2013 Aerial imagery provided by Calhoun County.

2. Two sample locations had results that exceeded the PRG for chromium (568 mg/kg).

3. EU: exposure unit
mg/kg: milligrams per kilogram
OU: operable unit
PCB: polychlorinated biphenyl
PRG: preliminary remediation goal

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

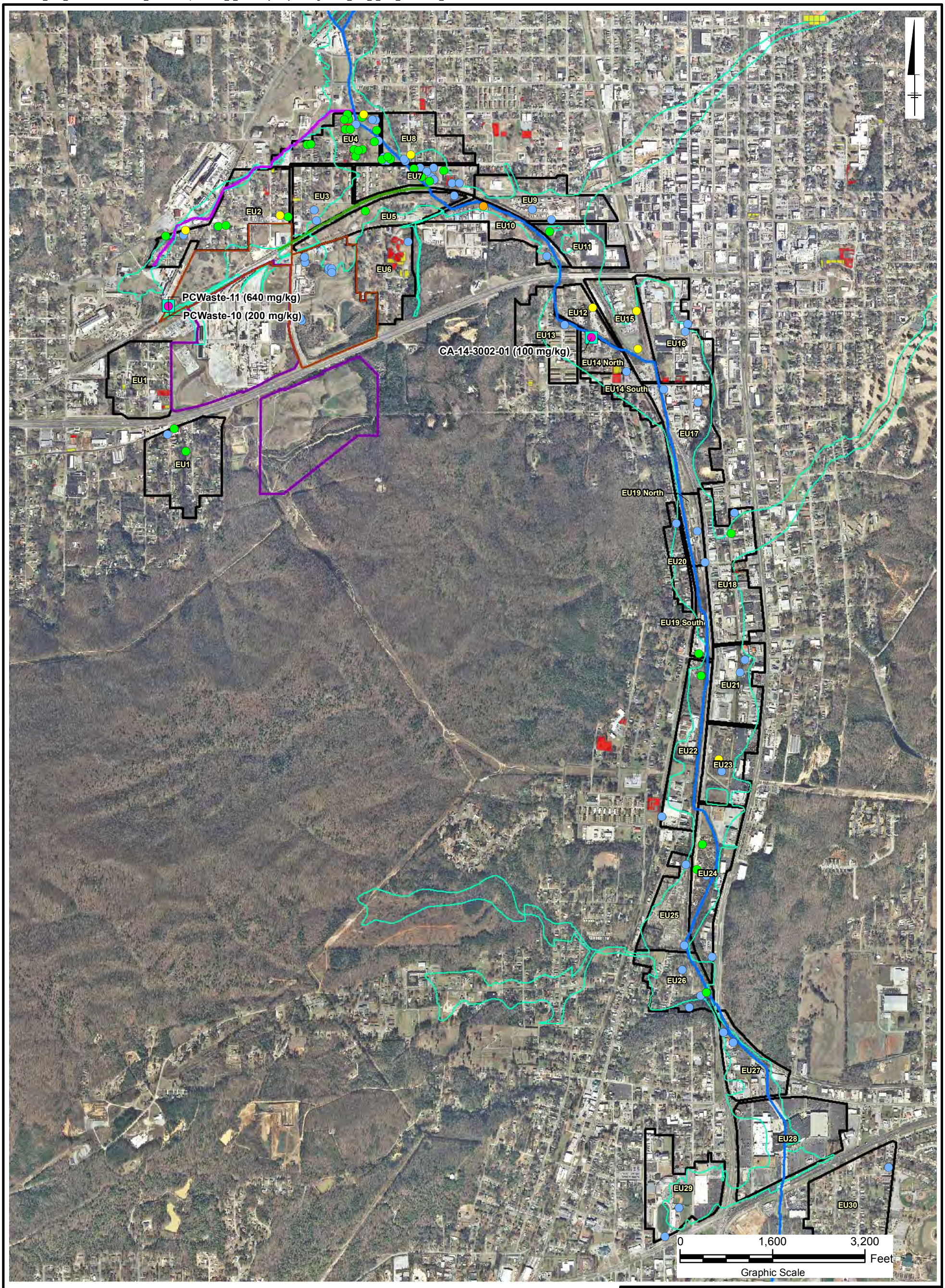
OU-1/OU-2 Feasibility Study Report

Chromium Concentrations in Surface Soil

Solutia

Figure
2-42

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: jbistrovich
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-43_OU1_2_PAH_SurfaceSoil_HHRA.mxd 3/25/2016 8:57:44 AM



Legend

Soil Sample Location

Benzo(a)pyrene Equivalent (mg/kg)

- ND to < 1
- 1 to 5
- 5 to 10
- 10 to 100
- > 100
- Location with a sample exceeding the concentration of 21 mg/kg for BaPE

- Snow Creek
- 11th Street Ditch
- West 9th Street Creek
- Operable Unit 3
- Northside and Eastside Areas
- 100-Year Floodplain and Drainage Areas
- Exposure Unit
- Special Use: Low Activity Area ≥1 mg/kg
- Special Use: High Activity Area

Note:
1. 2013 Aerial imagery provided by Calhoun County.
2. Three sample locations had results that exceeded the PRG for BaPE (21 mg/kg).
3. BaPE: benzo(a)pyrene equivalent
   EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

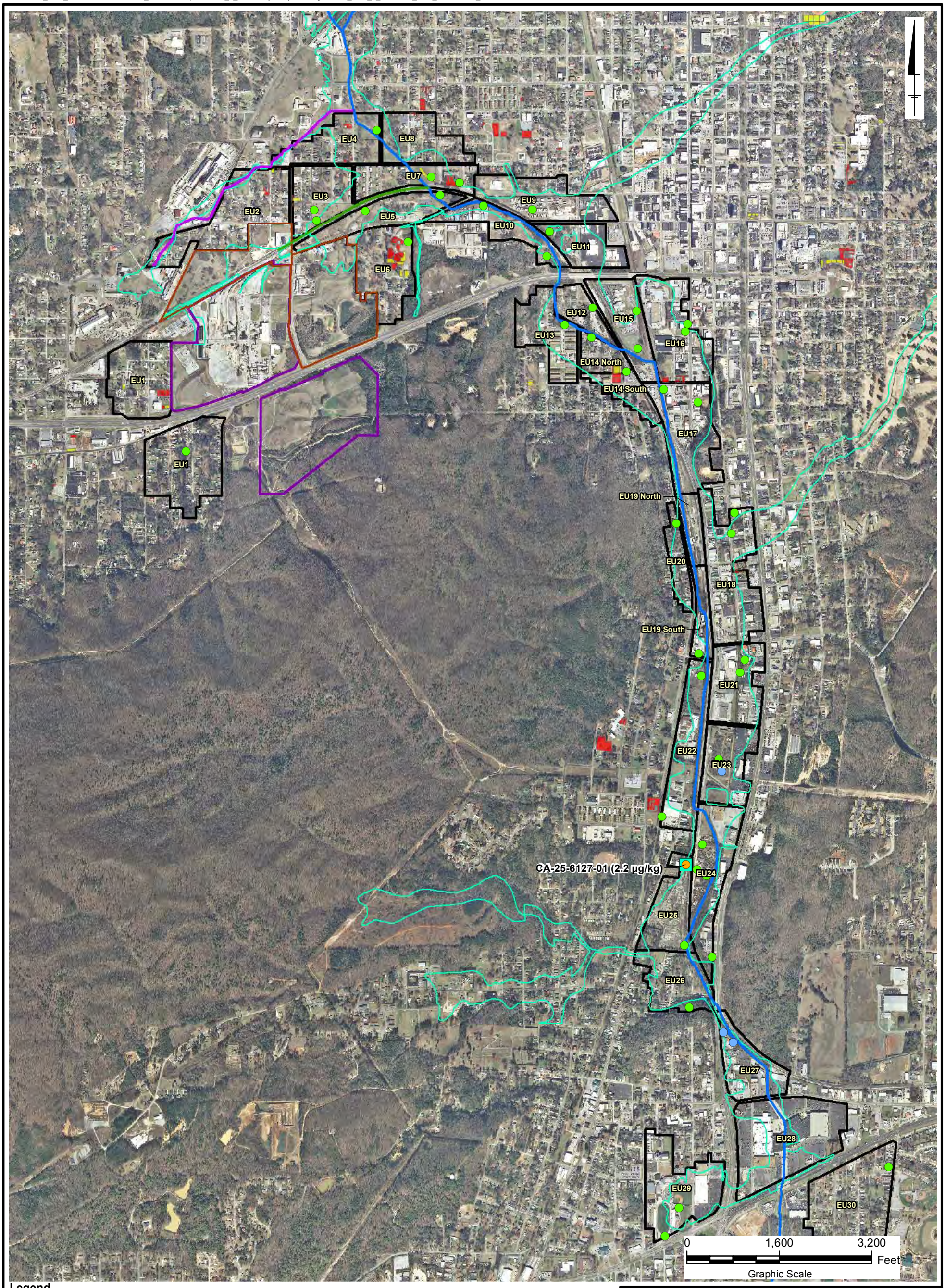
OU-1/OU-2 Feasibility Study Report

PAH as Benzo(a)pyrene Equivalent (BaPE) Concentrations in Surface Soil

Solutia

Figure
2-43

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: jbistrovich
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-44_OU1_2_PCDDDF_TEQ_SurfaceSoil_HHRA.mxd 3/25/2016 9:01:10 AM



Legend

Soil Sample Location

PCDD/DF TEQ Concentration (µg/kg)

- < 0.001
- 0.001 to 0.25
- 0.25 to 2
- > 2

Location with a sample exceeding the concentration of 0.6 µg/kg for PCDD/DF TEQ

- Snow Creek
- 11th Street Ditch
- West 9th Street Creek
- Northside and Eastside Areas
- Operable Unit 3
- 100-Year Floodplain and Drainage Areas
- Exposure Unit
- Special Use: Low Activity Area ≥1 mg/kg
- Special Use: High Activity Area

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. One sample had a result that exceeded the PRG for PCDD/DF TEQ (0.6 µg/kg).
3. EU: exposure unit
   mg/kg: milligrams per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl
   PCDD/DF: polychlorinated dibenzo-p-dioxin/dibenzofurans
   TEQ: toxic equivalent
   µg/kg: micrograms per kilogram

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

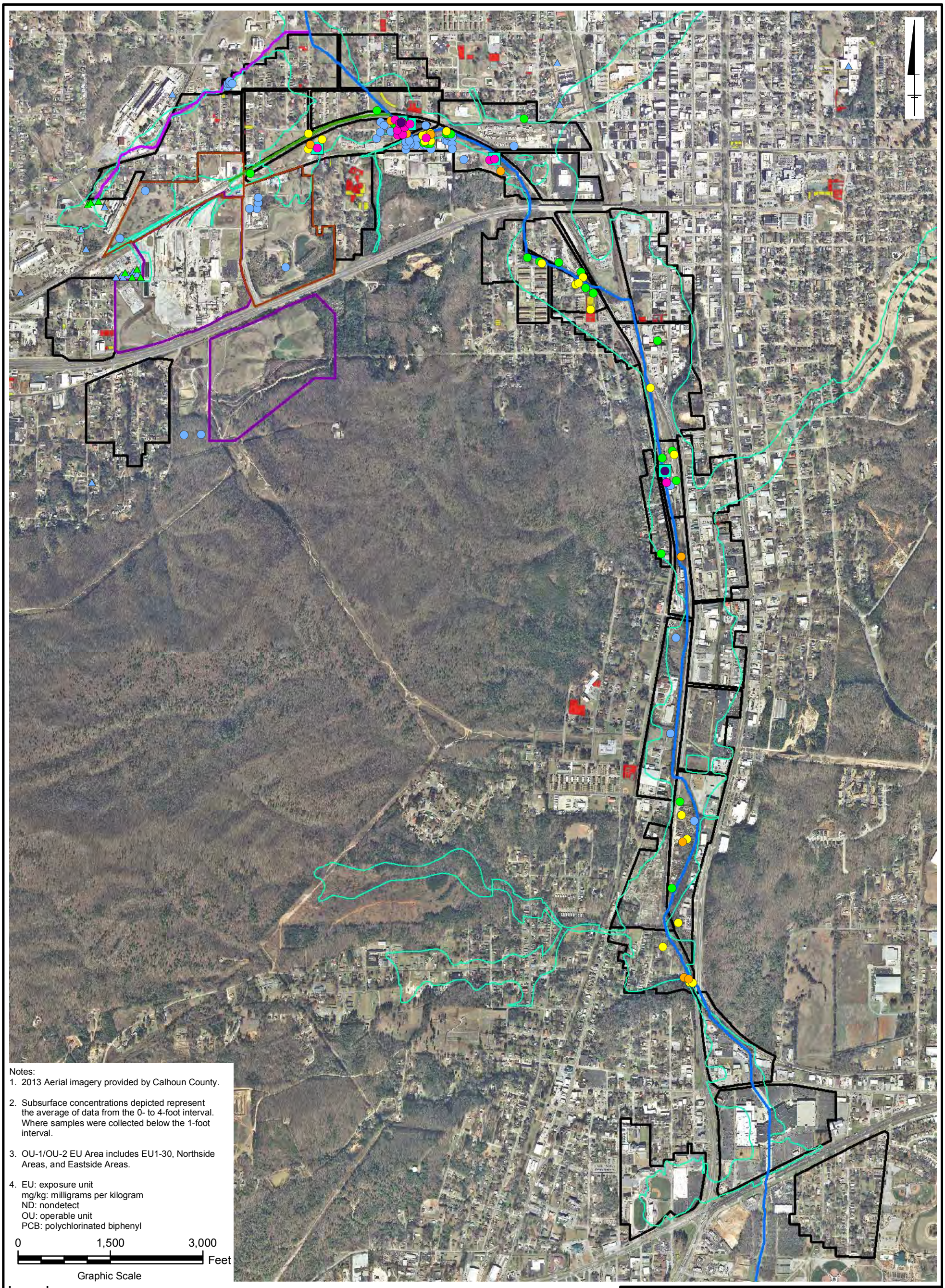
OU-1/OU-2 Feasibility Study Report

PCDD/DF TEQ Concentrations in Surface Soil

Solutia

Figure
2-44

City: SYR Div/Group: SWG Created By: K.Ives Last Saved By: jbistrovich
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-45_NonResidentialSubSurfaceSoilPCB.mxd 3/30/2016 8:44:45 AM



Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval. Where samples were collected below the 1-foot interval.
3. OU-1/OU-2 EU Area includes EU1-30, Northside Areas, and Eastside Areas.
4. EU: exposure unit
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

0 1,500 3,000 Feet
Graphic Scale

Legend

Soil Sample Location
Subsurface PCB Inside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- ≥ 500

Soil Sample Location
Subsurface PCB Outside
OU-1/OU-2 EU Area (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- ≥ 500
- > 97 mg/kg

- Snow Creek
- 11th Street Ditch
- West 9th Street Creek
- Operable Unit 3
- 100-Year Floodplain and Drainage Areas
- Exposure Unit
- Choccoloco Creek
- Northside and Eastside Areas
- Special Use: High Activity Area
- Special Use: Low Activity Area ≥1 mg/kg

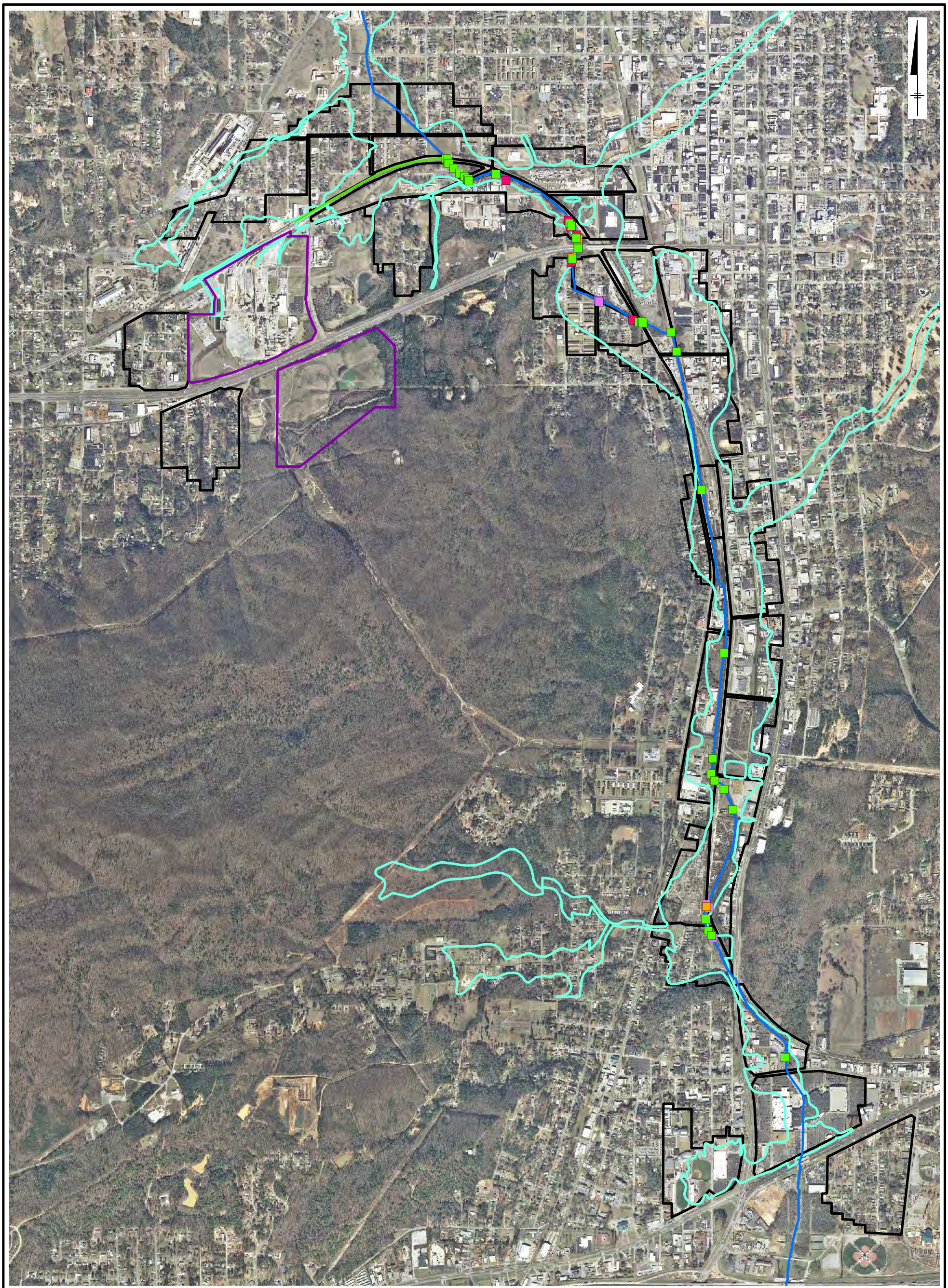
Anniston PCB Site: OU-1/OU-2
Anniston, Alabama
OU-1/OU-2 Feasibility Study Report

Nonresidential Subsurface Soil PCB Results

Solutia

Figure
2-45

City: SYR Div/Group: SWG Created By: K.Ives Last Saved By: jbistrovich
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-46_SedimentLocations_1.mxd 3/25/2016 9:15:47 AM



Legend

Sediment Sample Location Program
- USEPA Programs
- Miscellaneous Programs
- Nonresidential OU-1/OU-2 FSP
- RFI Sediment

- Snow Creek
- 11th Street Ditch
- Operable Unit 3
- 100-Year Floodplain and Drainage Areas
- Exposure Unit

Notes:
1. 2013 Aerial imagery provided by Calhoun County.

2. FSP: field sampling plan
OU: operable unit
RFI: RCRA Facility Investigation
PCB: polychlorinated biphenyl
USEPA: United States Environmental Protection Agency

0 1,600 3,200 Feet

Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama
OU-1/OU-2 Feasibility Study Report

Snow Creek Sediment Sample Locations Downstream of the 11th St. Ditch

Solutia

Figure
2-46

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: kives
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-47AtoJ_SnowCreek_Sediment_PCBData_surface_v2.mxd 3/30/2016 4:41:49 PM

SED-BG1		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
SED-BG1	0-3	ND

S-1-01		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10021	0-2	3.76
S10022	2-8	30.5

S-1-02		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10023	0-2	8

S-1-04		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10024	0-2	14
S10025	2-5	16.5

S-1-05		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10026	0-2	11.2

S-1-07		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10027	0-2	16.2
S10028	2-12	1.21
S10029	12-23	0.17

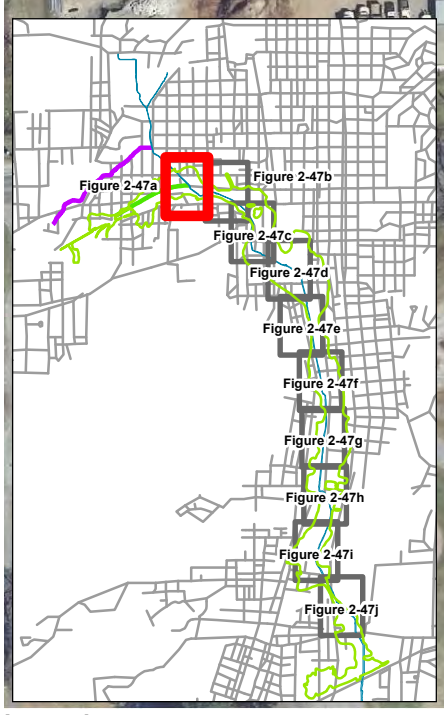
S-1-08		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10030	0-2	31.5
S10031	2-12	12.3
S10032 [duplicate]	2-12	4.3
S10033	12-14.5	37

S-1-10		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10034	0-2	11.6
S10035	2-12	28.5
S10036	12-16.5	18.3

S-1-11a		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10037	0-2	2.23
S10038	2-12	ND
S10039	12-24	0.39

S-1-11b		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10040	0-2.5	11.8

S-1-12		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10041	0-2	0.67
S10042	2-5	2.08



Legend

Sediment Sample Location
Maximum PCB Result (mg/kg)
- ND to < 1.0
- ≥ 1 to < 5
- ≥ 5 to < 10
- ≥ 10 to < 50
- ≥ 50

11th Street Ditch
Snow Creek
OU-1/OU-2 Downgradient Floodplain

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. in: inches
   mg/kg: milligram per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

0 150 300 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Sample Locations and PCB Concentrations in Snow Creek Sediment Downstream of the 11th St. Ditch

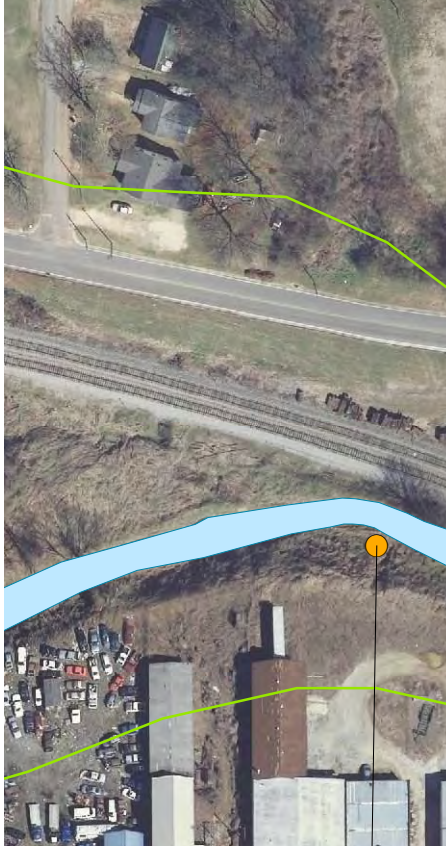
Solutia

Figure
2-47a

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: kives
ANNISTON
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SED-A09		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
SED-A9	0-3	7.8

S-1-16		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10043	0-2	28
S10044	2-5	31.5



Legend

Sediment Sample Location

Maximum PCB Result (mg/kg)

- ND to < 1.0
- ≥ 1 to < 5
- ≥ 5 to < 10
- ≥ 10 to < 50
- ≥ 50

Snow Creek

OU-1/OU-2 Downgradient Floodplain

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. in: inches
   mg/kg: milligram per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

0 150 300 Feet

Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Sample Locations and PCB Concentrations in Snow Creek Sediment Downstream of the 11th St. Ditch

Solutia

Figure
2-47b

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: kives
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-47AtoJ_SnowCreek_Sediment_PCBData_surface_v2.mxd 3/30/2016 4:41:49 PM

CP-C-9		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
CP-C-9-0-4"	0-4	2.04

S-2-02		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10045	0-3.5	18.9

CP-C-10		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
CP-C-10-0-2"	0-2	2.89
CP-C-10-2-6"	2-6	3.55
CP-C-10-6-12"	6-12	12.2

SED-A10		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
SED-A10	0-3	6.9

CP-C-11		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
CP-C-11-0-2"	0-2	1.55
CP-C-11-2-6"	2-6	1.18
CP-C-11-6-12"	6-12	7.51

S-2-03a		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10046	0-3	3.82

S-2-05		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10048	0-2	5.35
S10049	2-5	6.4

S-MED-1		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10134	0-8	60

S-2-06A		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10060	0-2	21.7
S10061	2-5	8.9

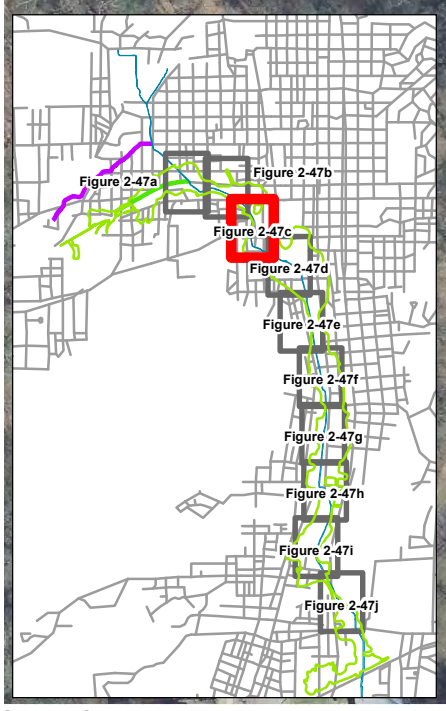
S-2-06B		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10053	0-2	12.8
S10054	2-12	11.4
S10055	12-20.5	34.3
S10131 [duplicate]	12-20.5	60

S-HIGH-1		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10135	0-18	4.22
S10137 [duplicate]	0-18	2.32

S-2-06C		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10056	0-2	30.1
S10057	2-12	13.9
S10058	12-24	23.2
S10059	24-27	15.3

S-2-08		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10050	0-2	20.3
S10051	2-12	19.9
S10052	12-16	4

SED-A11		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
SED-A11	0-3	15.6



PECON-011		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
PECON-011	0-3	4.29

PECON-012		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
PECON-012	0-3	8.46

Legend

Sediment Sample Location
Maximum PCB Result (mg/kg)
- ND to < 1.0
- ≥ 1 to < 5
- ≥ 5 to < 10
- ≥ 10 to < 50
- ≥ 50

Snow Creek
OU-1/OU-2 Downgradient Floodplain

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. in: inches
   mg/kg: milligram per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

0 150 300 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Sample Locations and PCB Concentrations in Snow Creek Sediment Downstream of the 11th St. Ditch

Solutia

Figure
2-47c

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: kives
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-47AtoJ_SnowCreek_Sediment_PCBData_surface_v2.mxd 3/30/2016 4:41:49 PM

SED-A12		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
SED-A12	0-3	3.9

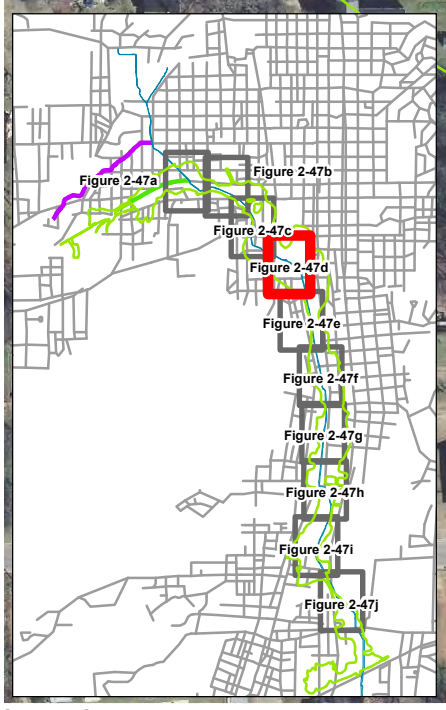
S-2-16		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10062	0-2	4
S10063	2-4	3.33

S-3-02		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10066	0-2	8.1
S10067	2-12	10.7
S10068	12-15.5	16.8

S-3-01		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10064	0-2	3.32
S10065	2-8	4.8

S-3-05		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10069	0-2	1.38
S10070	2-10.5	2.13

S-3-07		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10071	0-2	0.66
S10072	2-8	0.76



Legend

Sediment Sample Location
Maximum PCB Result (mg/kg)
- ND to < 1.0
- ≥ 1 to < 5
- ≥ 5 to < 10
- ≥ 10 to < 50
- ≥ 50

Snow Creek
OU-1/OU-2 Downgradient Floodplain

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. in: inches
   mg/kg: milligram per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

0 150 300 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Sample Locations and PCB Concentrations in Snow Creek Sediment Downstream of the 11th St. Ditch

Solutia

Figure
2-47d

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: kives
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-47AtoJ_SnowCreek_Sediment_PCBData_surface_v2.mxd 3/30/2016 4:41:49 PM



S-4-02		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10073	0-2	1.09
S10074	2-4	0.576

Legend

Sediment Sample Location
Maximum PCB Result (mg/kg)
- ND to < 1.0
- ≥ 1 to < 5
- ≥ 5 to < 10
- ≥ 10 to < 50
- ≥ 50

Snow Creek
OU-1/OU-2 Downgradient Floodplain

Notes:
1. 2013 Aerial imagery provided by Calhoun County.

2. in: inches
mg/kg: milligram per kilogram
ND: nondetect
OU: operable unit
PCB: polychlorinated biphenyl

0 150 300 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Sample Locations and PCB Concentrations in Snow Creek Sediment Downstream of the 11th St. Ditch

Solutia

Figure
2-47e

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: kives
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-47AtoJ_SnowCreek_Sediment_PCBData_surface_v2.mxd 3/30/2016 4:41:49 PM



Legend

Sediment Sample Location
Maximum PCB Result (mg/kg)
- ND to < 1.0
- ≥ 1 to < 5
- ≥ 5 to < 10
- ≥ 10 to < 50
- ≥ 50

Snow Creek
OU-1/OU-2 Downgradient Floodplain

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. in: inches
   mg/kg: milligram per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

0 150 300 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Sample Locations and PCB Concentrations in Snow Creek Sediment Downstream of the 11th St. Ditch

Solutia

Figure
2-47f

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: kives
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-47AtoJ_SnowCreek_Sediment_PCBData_surface_v2.mxd 3/30/2016 4:41:49 PM

S-5-01		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10075	0-3.5	0.65
S10076 [duplicate]	0-3.5	0.76



Legend

Sediment Sample Location
Maximum PCB Result (mg/kg)
- ND to < 1.0
- ≥ 1 to < 5
- ≥ 5 to < 10
- ≥ 10 to < 50
- ≥ 50

Snow Creek
OU-1/OU-2 Downgradient Floodplain

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. in: inches
   mg/kg: milligram per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

0 150 300 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Sample Locations and PCB Concentrations in Snow Creek Sediment Downstream of the 11th St. Ditch

Solutia

Figure
2-47g

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: kives
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-47AtoJ_SnowCreek_Sediment_PCBData_surface_v2.mxd 3/30/2016 4:41:49 PM

S-5-02		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10077	0-3.5	4.5

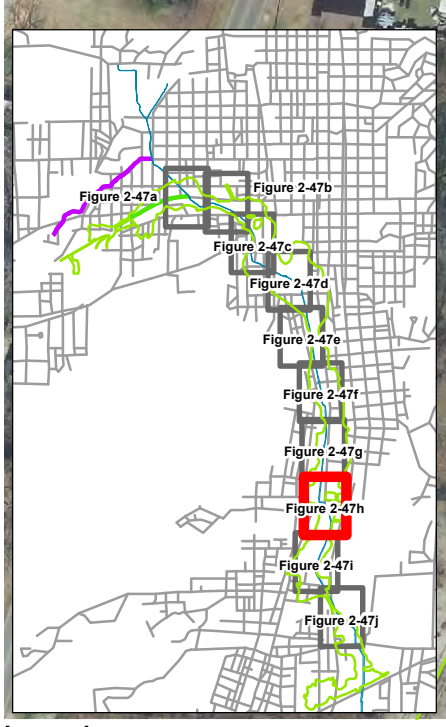
S-5-03		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10078	0-2	5.8
S10079	2-4	1.59

S-LOW-1		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10136	0-6	1.7

S-5-04		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10080	0-2	1.78
S10081	2-6	1.93

S-5-05		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10082	0-2	1.17
S10083	2-4	1.86

S-5-06		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10084	0-2	2.66
S10085	2-5	2.31



Legend

Sediment Sample Location
Maximum PCB Result (mg/kg)
- ND to < 1.0
- ≥ 1 to < 5
- ≥ 5 to < 10
- ≥ 10 to < 50
- ≥ 50

Snow Creek
OU-1/OU-2 Downgradient Floodplain

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. in: inches
   mg/kg: milligram per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

0 150 300 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Sample Locations and PCB Concentrations in Snow Creek Sediment Downstream of the 11th St. Ditch

Solutia

Figure
2-47h

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: kives
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-47AtoJ_SnowCreek_Sediment_PCBData_surface_v2.mxd 3/30/2016 4:41:49 PM

PECON-020		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
PECON-020	0-3	0.75

CA-25-9999-90		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
PCWASTE-004-A	0-3	11
S70746	6-12	0.757

FE2-001-A		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
FE2-001-A	0-3	0.9

FE2-001-C		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
FE2-001-C	0-3	2.5

S-5-13		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10086	0-3.5	1.32

S-5-14A		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10087	0-2	1.47
S10088	2-5	0.92

S-5-14B		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10089	0-2	1.64
S10090	2-5.5	1.57

PCWaste-004-B		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
PCWaste-004-B	0-3	1.22



Legend

Sediment Sample Location
Maximum PCB Result (mg/kg)
- ND to < 1.0
- ≥ 1 to < 5
- ≥ 5 to < 10
- ≥ 10 to < 50
- ≥ 50

Snow Creek
OU-1/OU-2 Downgradient Floodplain

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. in: inches
   mg/kg: milligram per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

0 150 300 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Sample Locations and PCB Concentrations in Snow Creek Sediment Downstream of the 11th St. Ditch

Solutia

Figure
2-47i

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: kives
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-47AtoJ_SnowCreek_Sediment_PCBData_surface_v2.mxd 3/30/2016 4:41:49 PM



S-5-24		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10091	0-2	1.15
S10092	2-12	1.22

Legend

Sediment Sample Location
Maximum PCB Result (mg/kg)
- ND to < 1.0
- ≥ 1 to < 5
- ≥ 5 to < 10
- ≥ 10 to < 50
- ≥ 50

Snow Creek
OU-1/OU-2 Downgradient Floodplain

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. in: inches
   mg/kg: milligram per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

0 150 300 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

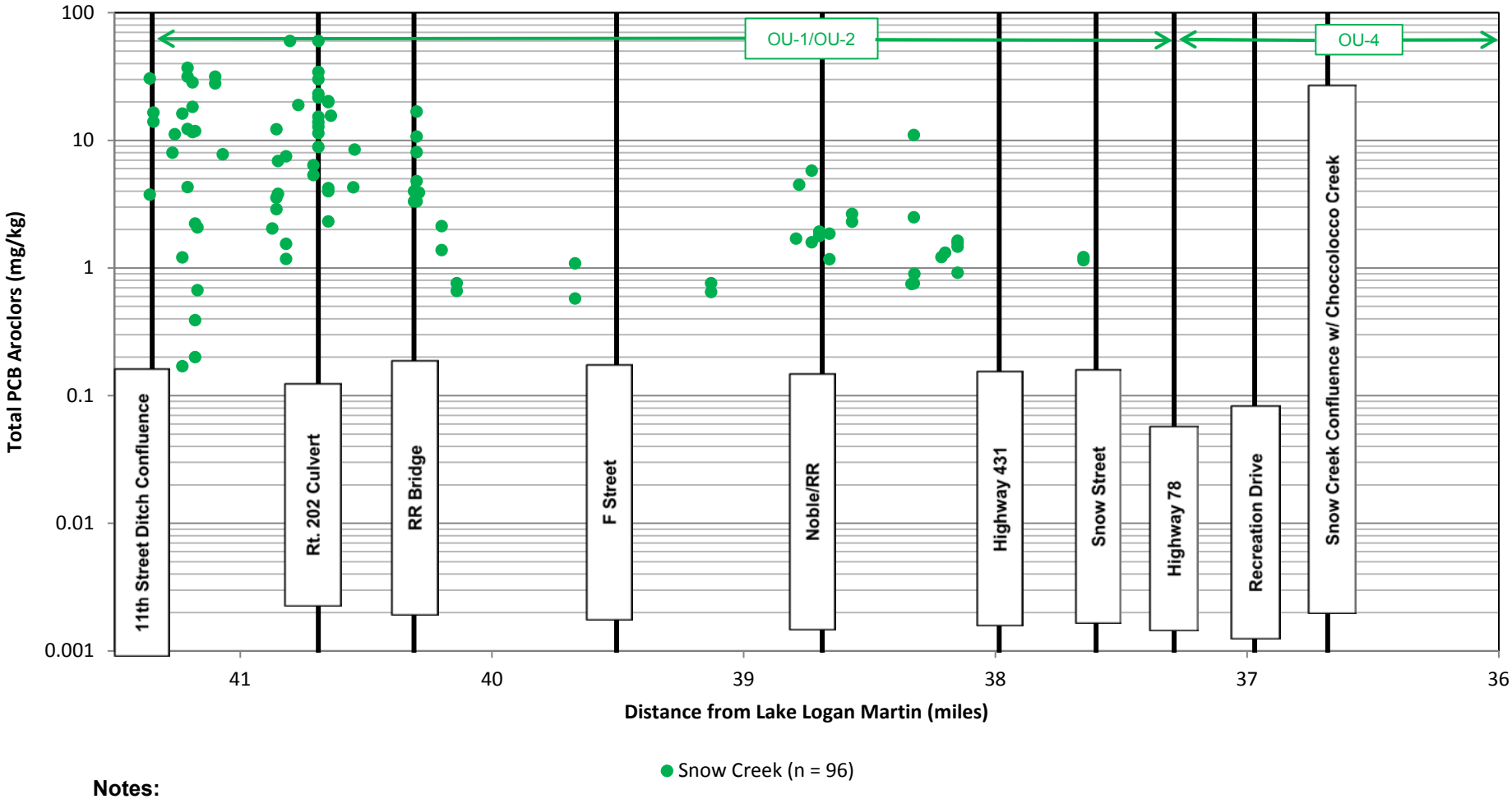
OU-1/OU-2 Feasibility Study Report

Sample Locations and PCB Concentrations in Snow Creek Sediment Downstream of the 11th St. Ditch

Solutia

Figure
2-47j

C:\Users\bbutterly\Documents\Anniston\OU1-2 FS\FEB 2016 Revisions\Figures\03252016_FS Figures\Figure 2-48_20160324.xlsx
3/24/2016



Notes:

1. Data include results from Snow Creek OU-1/OU-2 (n = 96) downstream of the 11th Street Ditch and upstream of Highway 78.

mg/kg: milligrams per kilogram
n: sample count
OU: operable unit
PCB: polychlorinated biphenyl
RR: railroad
Rt.: route

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Total PCB Concentrations in Snow Creek Sediment with Distance from Lake Logan Martin

Solutia
Ingenuity Productivity Performance

FIGURE
2-48

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: jbistrovich
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-49_SnowCreek_Sediment_MetalsData_surface_1.mxd 3/22/2016 12:27:13 PM

CP-C-9									
Sample Name	Depth Interval (in)	Inorganic Analytical Results (mg/kg)							
		Barium	Chromium	Cobalt	Lead	Manganese	Mercury	Nickel	Vanadium
CP-C-9-0-4"	0-4	NA	NA	NA	22	NA	NA	NA	NA

S-1-01									
Sample Name	Depth Interval (in)	Inorganic Analytical Results (mg/kg)							
		Barium	Chromium	Cobalt	Lead	Manganese	Mercury	Nickel	Vanadium
S10021	0-2	190	670	12	57	1400	ND	18	64

S-1-04									
Sample Name	Depth Interval (in)	Inorganic Analytical Results (mg/kg)							
		Barium	Chromium	Cobalt	Lead	Manganese	Mercury	Nickel	Vanadium
S10024	0-2	190	280	18	72	1100	0.26	27	54

CP-C-10									
Sample Name	Depth Interval (in)	Inorganic Analytical Results (mg/kg)							
		Barium	Chromium	Cobalt	Lead	Manganese	Mercury	Nickel	Vanadium
CP-C-10-0-2"	0-2	NA	NA	NA	28	NA	NA	NA	NA

S-2-03a									
Sample Name	Depth Interval (in)	Inorganic Analytical Results (mg/kg)							
		Barium	Chromium	Cobalt	Lead	Manganese	Mercury	Nickel	Vanadium
S10046/S10047*	0-3	270	140	110	66	5200	3.2	110	50

CP-C-11									
Sample Name	Depth Interval (in)	Inorganic Analytical Results (mg/kg)							
		Barium	Chromium	Cobalt	Lead	Manganese	Mercury	Nickel	Vanadium
CP-C-11-0-2"	0-2	NA	NA	NA	23	NA	NA	NA	NA

S-MED-1									
Sample Name	Depth Interval (in)	Inorganic Analytical Results (mg/kg)							
		Barium	Chromium	Cobalt	Lead	Manganese	Mercury	Nickel	Vanadium
S10134	0-8	577	42.8	34.7	49.4	4610	0.093	55.7	23.9

S-HIGH-1									
Sample Name	Depth Interval (in)	Inorganic Analytical Results (mg/kg)							
		Barium	Chromium	Cobalt	Lead	Manganese	Mercury	Nickel	Vanadium
S10135	0-18	85.5	78.9	24.6	52.1	950	0.029	30.6	23.6

PECON-011									
Sample Name	Depth Interval (in)	Inorganic Analytical Results (mg/kg)							
		Barium	Chromium	Cobalt	Lead	Manganese	Mercury	Nickel	Vanadium
PECON-011	0-3	59	32	13	35	800	0.41	13	15

PECON-012									
Sample Name	Depth Interval (in)	Inorganic Analytical Results (mg/kg)							
		Barium	Chromium	Cobalt	Lead	Manganese	Mercury	Nickel	Vanadium
PECON-012	0-3	94	28	14	69	910	0.2	23	20

S-LOW-1									
Sample Name	Depth Interval (in)	Inorganic Analytical Results (mg/kg)							
		Barium	Chromium	Cobalt	Lead	Manganese	Mercury	Nickel	Vanadium
S10136	0-6	109	29.6	18.9	14.6	2150	0.049	11.7	19.7

FE2-001-C									
Sample Name	Depth Interval (in)	Inorganic Analytical Results (mg/kg)							
		Barium	Chromium	Cobalt	Lead	Manganese	Mercury	Nickel	Vanadium
FE2-001-C	0-3	74	57	5.9	33	340	0.19	12	18

PECON-020									
Sample Name	Depth Interval (in)	Inorganic Analytical Results (mg/kg)							
		Barium	Chromium	Cobalt	Lead	Manganese	Mercury	Nickel	Vanadium
PECON-020	0-3	160	150	ND	510	2200	ND	86	23

CA-25-9999-90									
Sample Name	Depth Interval (in)	Inorganic Analytical Results (mg/kg)							
		Barium	Chromium	Cobalt	Lead	Manganese	Mercury	Nickel	Vanadium
PCWASTE-004-A	0-3	54	28	2	49	720	0.26	12	5.7

FE2-001-A									
Sample Name	Depth Interval (in)	Inorganic Analytical Results (mg/kg)							
		Barium	Chromium	Cobalt	Lead	Manganese	Mercury	Nickel	Vanadium
FE2-001-A	0-3	81	54	9.3	120	660	0.86	20	22

PCWaste-004-B									
Sample Name	Depth Interval (in)	Inorganic Analytical Results (mg/kg)							
		Barium	Chromium	Cobalt	Lead	Manganese	Mercury	Nickel	Vanadium
PCWaste-004-B	0-3	52	48	7.7	23	540	0.19	13	12

Legend:

- Sediment Sample Location
- Snow Creek
- 11th Street Ditch

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. in: inches
   mg/kg: milligrams per kilogram
   NA: not analyzed
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

0 1,350 2,700 Feet

Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Sample Locations and Metal Concentrations in Snow Creek Sediment Downstream of the 11th St. Ditch

Solutia

Figure
2-49

City: SYR Div/Group: SWG Created By: Last Saved By: ldrum
Anniston (B0010291.2010.00005)
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-50_SnowCreek_Sediment_DioxinPCBTEQ_SERASummary.mxd 3/5/2016 10:45:23 AM

LOCATION: S-MED-1 SAMPLE ID: S10134 DEPTH: 0-6 in	
TEQ CALCULATION APPROACH	TEQ (µg/kg)
Total PCDD/DF TEQ (ND = 0) [Avian]	0.094
Total TEQ (ND=0) [Avian]	0.24
Total PCDD/DF TEQ (ND = 0) [Mammalian/Human]	0.036
Total TEQ (ND=0) [Mammalian/Human]	0.14
Total PCDD/DF TEQ (ND = RL) [Avian]	0.24
Total TEQ (ND=RL[PCDD/DF]; 0.5 RL[DL-PCB]) [Avian]	30
Total PCDD/DF TEQ (ND = RL) [Mammalian/Human]	0.070
Total TEQ (ND=RL[PCDD/DF]; 0.5 RL[DL-PCB]) [Mammalian/Human]	11

LOCATION: S-LOW-1 SAMPLE ID: S10136 DEPTH: 0-6 in	
TEQ CALCULATION APPROACH	TEQ (µg/kg)
Total PCDD/DF TEQ (ND = 0) [Avian]	0.0090
Total TEQ (ND=0) [Avian]	0.005
Total PCDD/DF TEQ (ND = 0) [Mammalian/Human]	0.0019
Total TEQ (ND=0) [Mammalian/Human]	0.0040
Total PCDD/DF TEQ (ND = RL) [Avian]	0.018
Total TEQ (ND=RL[PCDD/DF]; 0.5 RL[DL-PCB]) [Avian]	0.76
Total PCDD/DF TEQ (ND = RL) [Mammalian/Human]	0.0076
Total TEQ (ND=RL[PCDD/DF]; 0.5 RL[DL-PCB]) [Mammalian/Human]	0.28

Legend

- Sediment Sample Location
- Snow Creek

0 750 1,500 Feet

Graphic Scale

Notes:
1. Shading indicates avian toxic equivalency factors (TEF).
2. 2013 Aerial imagery provided by Calhoun County.
3. in: inches
   DL-PCB: dioxin like - polychlorinated biphenyls
   ND: nondetect
   OU: operable unit
   PCDD/DF: polychlorinated dibenzo-p-dioxin/dibenzofurans
   RL: reporting limit
   TEQ: toxic equivalents for PCDD/DF and DL-PCB
   µg/kg: microgram per kilogram

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

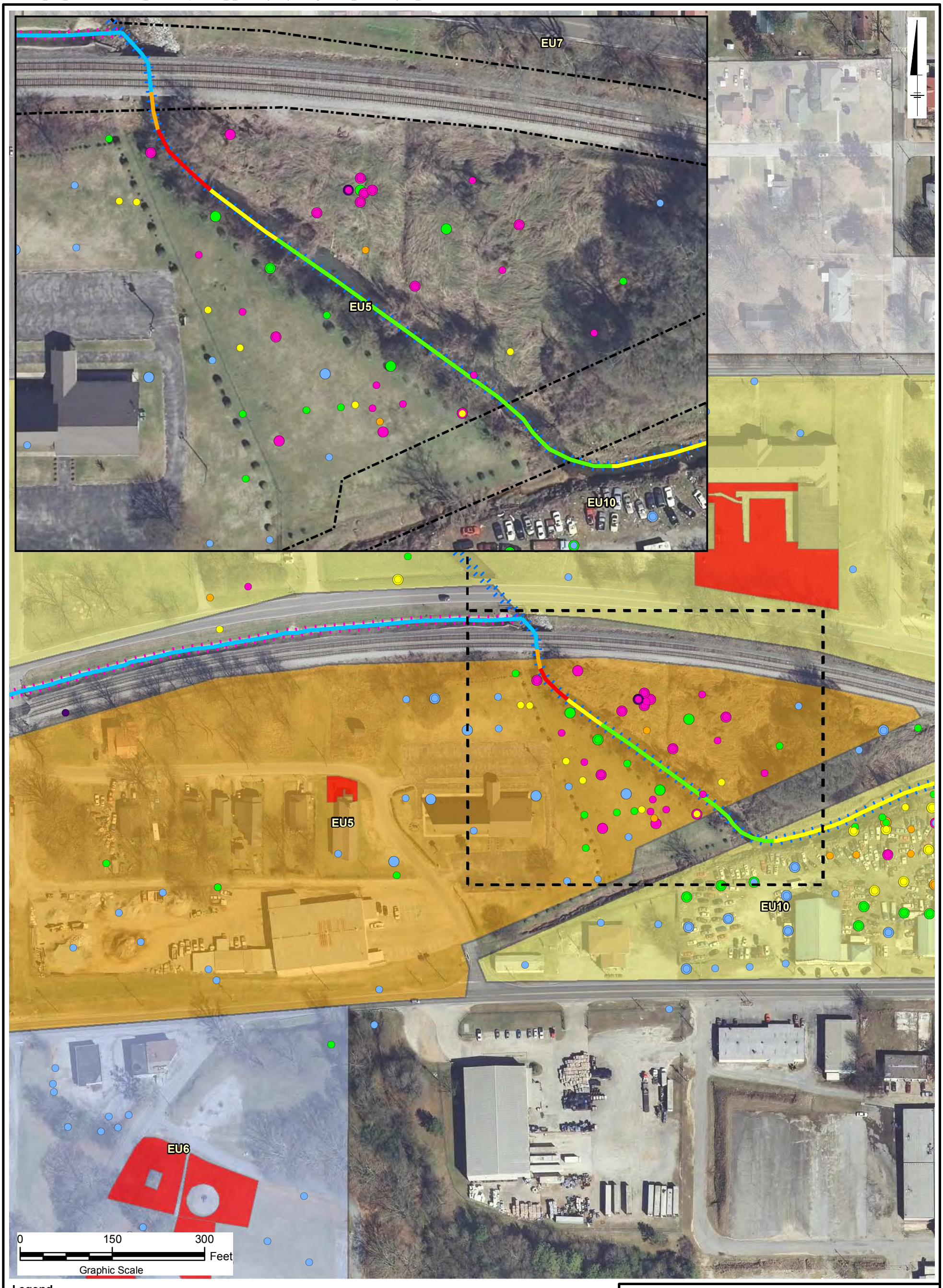
OU-1/OU-2 Feasibility Study Report

Sample Locations and PCDD/DF and PCB TEQ in OU-1/OU-2 Sediment

Solutia

Figure
2-50

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: ksinsabaugh
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-51A_BankStabilityOU1_OU2.mxd 3/2/2016 10:06:38 AM



Legend

Soil Sample Location
Maximum PCB Result (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- ≥ 500

Bank Stability Designation
- Stable
- Relatively Stable
- Minor Erosion
- Moderate Erosion
- Severe Erosion

Snow Creek Channel Type
- Approximate Extent of Lined Channel
- Natural

- Special Use: Low Activity Area ≥1 mg/kg
- Special Use: High Activity Area

Exposure Unit
Average Nonresidential
Surface Soil PCB
Concentration (mg/kg)
- 0 to 0.99
- 1.0 to 4.99
- 5.0 to 9.99
- 10 to 19.99
- > 20

Notes:
1. Bank stability designations based on field observations by Golder Associates, Inc.

2. 2013 Aerial imagery provided by Calhoun County.

3. EU: exposure unit
mg/kg: milligrams per kilogram
OU: operable unit
PCB: polychlorinated biphenyl

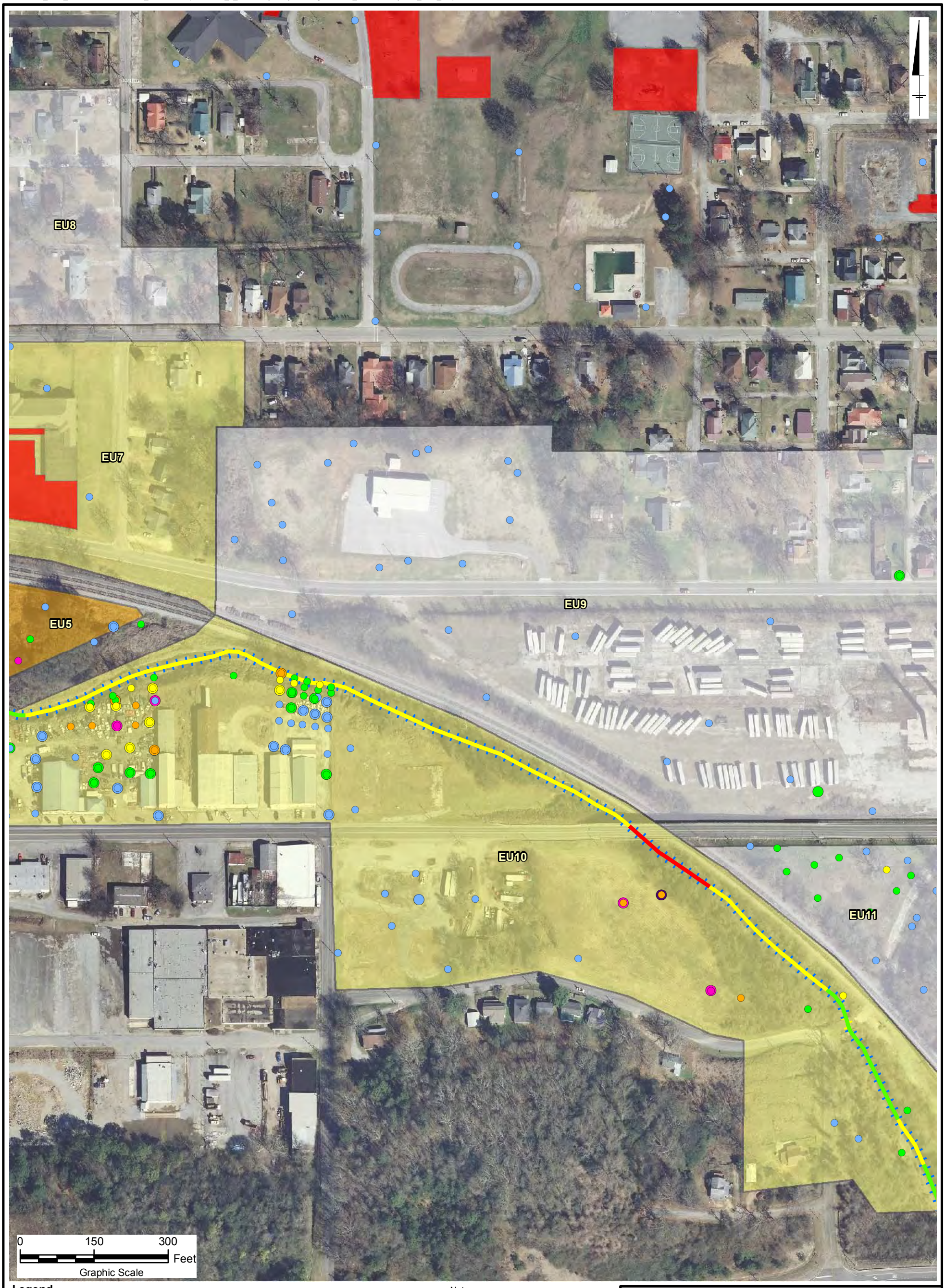
Anniston PCB Site: OU-1/OU-2
Anniston, Alabama
OU-1/OU-2 Feasibility Study Report

Snow Creek Bank Stability

Solutia

Figure
2-51a

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: ksinsabaugh
ANNISTON
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Legend

Soil Sample Location
Maximum PCB Result (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- ≥ 500

Bank Stability Designation
- Relatively Stable
- Minor Erosion
- Severe Erosion

Snow Creek Channel Type
- Culvert
- Natural

- Special Use: Low Activity Area ≥1 mg/kg
- Special Use: High Activity Area

Exposure Unit
Average Nonresidential
Surface Soil PCB
Concentration (mg/kg)
- 0 to 0.99
- 1.0 to 4.99
- 5.0 to 9.99
- 10 to 19.99
- > 20

Notes:
1. Bank stability designations based on field observations by Golder Associates, Inc.
2. 2013 Aerial imagery provided by Calhoun County.
3. EU: exposure unit
   mg/kg: milligrams per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl

Inner and outer shapes reflect surface and subsurface PCB concentrations, respectively.

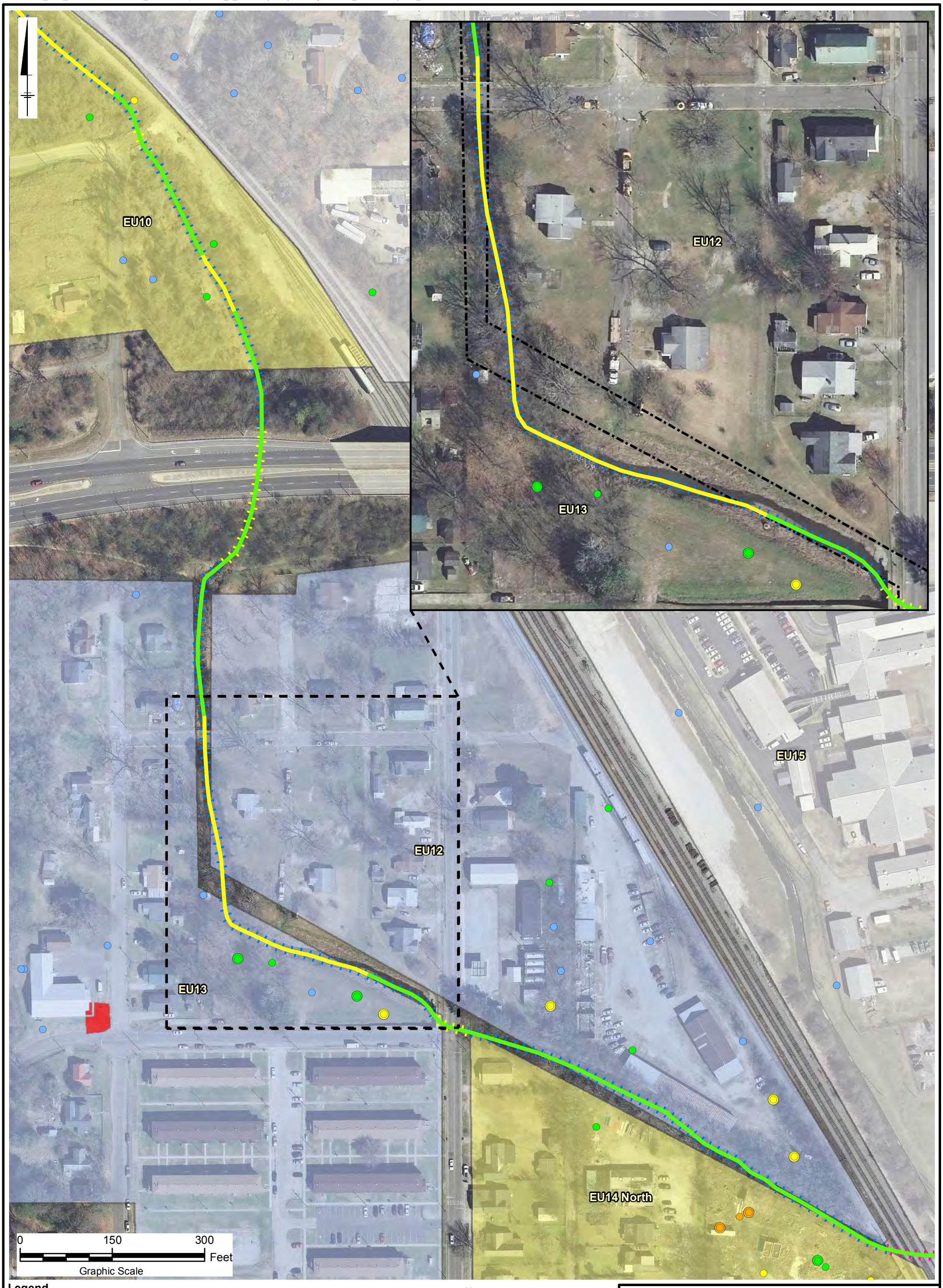
Anniston PCB Site: OU-1/OU-2
Anniston, Alabama
OU-1/OU-2 Feasibility Study Report

Snow Creek Bank Stability

Solutia

Figure
2-51b

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: ksinsabaugh
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-51C_BankStabilityOU1_OU2.mxd 3/2/2016 10:10:20 AM



Legend

Soil Sample Location
Maximum PCB Result (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50

Bank Stability Designation
- Relatively Stable
- Minor Erosion

Snow Creek Channel Type
- Approximate Extent of Lined Channel
- Culvert
- Natural

Special Use: High Activity Area

Exposure Unit
Average Nonresidential Surface Soil PCB Concentration (mg/kg)
- 0 to 0.99
- 1.0 to 4.99
- 5.0 to 9.99
- 10 to 19.99
- > 20

Notes:
1. Bank stability designations based on field observations by Golder Associates, Inc.
2. 2013 Aerial imagery provided by Calhoun County.
3. EU: exposure unit
   mg/kg: milligrams per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl

Inner and outer shapes reflect surface and subsurface PCB concentrations, respectively.

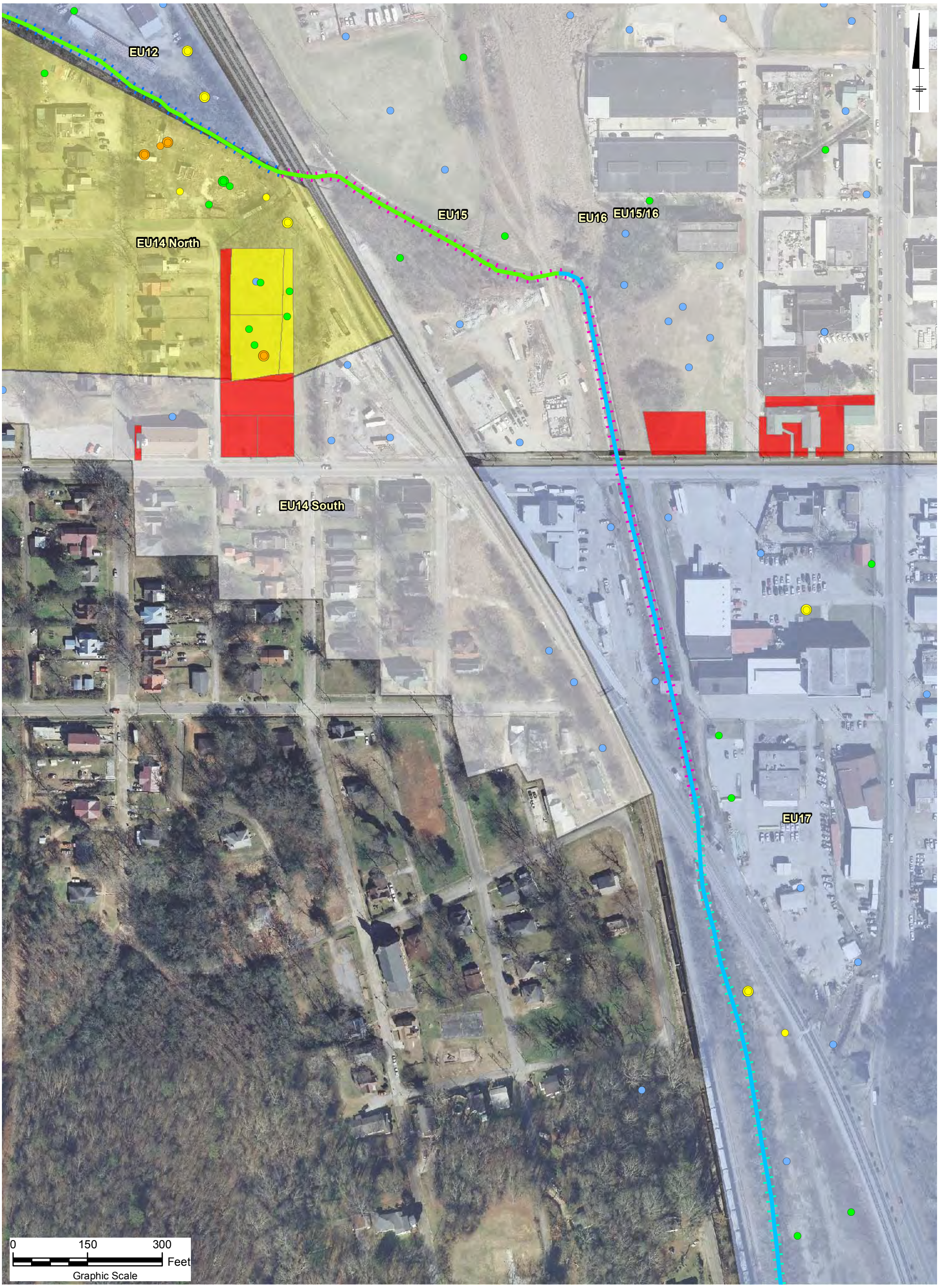
Anniston PCB Site: OU-1/OU-2
Anniston, Alabama
OU-1/OU-2 Feasibility Study Report

Snow Creek Bank Stability

Solutia

Figure
2-51c

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: ksinsabaugh
ANNISTON
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Legend

Soil Sample Location
Maximum PCB Result (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50

Bank Stability Designation
- Stable
- Relatively Stable

Snow Creek Channel Type
- Approximate Extent of Lined Channel
- Natural
- Natural Bottom East Wall Concrete

- Special Use: Low Activity Area ≥1 mg/kg
- Special Use: High Activity Area

Exposure Unit
Average Nonresidential Surface Soil PCB Concentration (mg/kg)
- 0 to 0.99
- 1.0 to 4.99
- 5.0 to 9.99
- 10 to 19.99
- > 20

Notes:

1. Bank stability designations based on field observations by Golder Associates, Inc.
2. 2013 Aerial imagery provided by Calhoun County.
3. EU: exposure unit
   mg/kg: milligrams per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl

Inner and outer shapes reflect surface and subsurface PCB concentrations, respectively.

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama
OU-1/OU-2 Feasibility Study Report

Snow Creek Bank Stability

Solutia

Figure
2-51d

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: jbistrovich
ANNISTON
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Legend

Soil Sample Location
Maximum PCB Result (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- ≥ 500

Bank Stability Designation
- Stable
- Relatively Stable
- Minor Erosion

Snow Creek Channel Type
- Culvert
- Natural
- Natural Bottom
- East Wall Concrete

Special Use: High Activity Area

Exposure Unit
Average Nonresidential
Surface Soil PCB
Concentration (mg/kg)
- 0 to 0.99
- 1.0 to 4.99
- 5.0 to 9.99
- 10 to 19.99
- > 20

Inner and outer shapes reflect surface and subsurface PCB concentrations, respectively.

Notes:
1. Bank stability designations based on field observations by Golder Associates, Inc.
2. 2013 Aerial imagery provided by Calhoun County.
3. EU: exposure unit
   mg/kg: milligrams per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama
OU-1/OU-2 Feasibility Study Report

Snow Creek Bank Stability

Solutia

Figure
2-51e

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: ksinsabaugh
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-51F_BankStabilityOU1_OU2.mxd 3/2/2016 10:41:05 AM



Legend

Soil Sample Location
Maximum PCB Result (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500

Bank Stability Designation
- Relatively Stable
- Minor Erosion
- Severe Erosion

Snow Creek Channel Type
- Natural

Special Use: High Activity Area

Exposure Unit
Average Nonresidential
Surface Soil PCB
Concentration (mg/kg)
- 0 to 0.99
- 1.0 to 4.99
- 5.0 to 9.99
- 10 to 19.99
- > 20

Notes:

1. Bank stability designations based on field observations by Golder Associates, Inc.
2. Aerial imagery provided by Calhoun County.
3. EU: exposure unit
   mg/kg: milligrams per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl

Inner and outer shapes reflect surface and subsurface PCB concentrations, respectively.

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Snow Creek Bank Stability

Solutia

Figure
2-51f

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: jbistrovich
ANNISTON
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Legend

Soil Sample Location
Maximum PCB Result (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 25 to < 50

Bank Stability Designation
- Relatively Stable

Snow Creek Channel Type
- Natural

- Special Use: High Activity Area

Exposure Unit
Average Nonresidential
Surface Soil PCB
Concentration (mg/kg)
- 0 to 0.99
- 1.0 to 4.99
- 5.0 to 9.99
- 10 to 19.99
- > 20

Notes:
1. Bank stability designations based on field observations by Golder Associates, Inc.
2. 2013 Aerial imagery provided by Calhoun County.
3. EU: exposure unit
   mg/kg: milligrams per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl

Inner and outer shapes reflect surface and subsurface PCB concentrations, respectively.

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama
OU-1/OU-2 Feasibility Study Report

Snow Creek Bank Stability

Solutia

Figure
2-51g

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: jbistrovich
ANNISTON
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Legend

Soil Sample Location
Maximum PCB Result (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500

Bank Stability Designation
- Stable
- Relatively Stable

Snow Creek Channel Type
- Natural

Special Use: High Activity Area

Exposure Unit
Average Nonresidential
Surface Soil PCB
Concentration (mg/kg)
- 0 to 0.99
- 1.0 to 4.99
- 5.0 to 9.99
- 10 to 19.99
- > 20

Notes:
1. Bank stability designations based on field observations by Golder Associates, Inc.
2. 2013 Aerial imagery provided by Calhoun County.
3. EU: exposure unit
   mg/kg: milligrams per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl

Inner and outer shapes reflect surface and subsurface PCB concentrations, respectively.

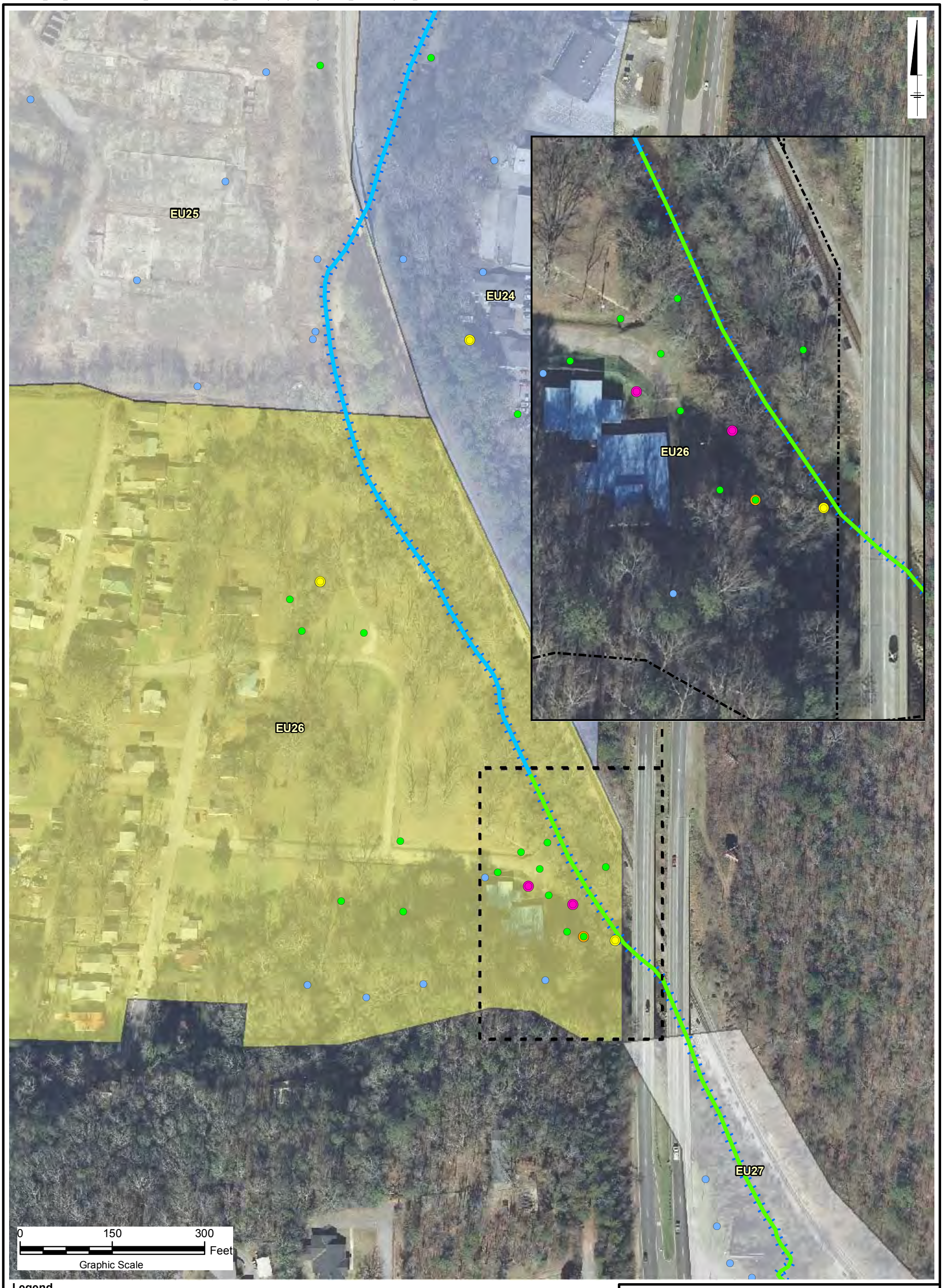
Anniston PCB Site: OU-1/OU-2
Anniston, Alabama
OU-1/OU-2 Feasibility Study Report

Snow Creek Bank Stability

Solutia

Figure
2-51h

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: ksinsabaugh
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-51I_BankStabilityOU1_OU2.mxd 3/2/2016 10:30:36 AM



Legend

Soil Sample Location
Maximum PCB Result (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500

Bank Stability Designation
- Stable
- Relatively Stable

Snow Creek Channel Type
- Natural

Exposure Unit
Average Nonresidential Surface Soil PCB Concentration (mg/kg)
- 0 to 0.99
- 1.0 to 4.99
- 5.0 to 9.99
- 10 to 19.99
- > 20

Notes:

1. Bank stability designations based on field observations by Golder Associates, Inc.
2. 2013 Aerial imagery provided by Calhoun County.
3. EU: exposure unit
   mg/kg: milligrams per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama
OU-1/OU-2 Feasibility Study Report

Snow Creek Bank Stability

Solutia

Figure
2-51i

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: ksinsabaugh
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-51J_BankStabilityOU1_OU2_mapbook.mxd 3/2/2016 10:38:17 AM



Legend

Soil Sample Location
Maximum PCB Result (mg/kg)
- ND to < 1
- ≥ 1 to <10

Bank Stability Designation
- Stable
- Relatively Stable

Snow Creek Channel Type
- Culvert
- Natural

Exposure Unit
Average Nonresidential Surface Soil PCB Concentration (mg/kg)
- 0 to 0.99
- 1.0 to 4.99
- 5.0 to 9.99
- 10 to 19.99
- > 20

Notes:

1. Bank stability designations based on field observations by Golder Associates, Inc.
2. 2013 Aerial imagery provided by Calhoun County.
3. EU: exposure unit
   mg/kg: milligrams per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl

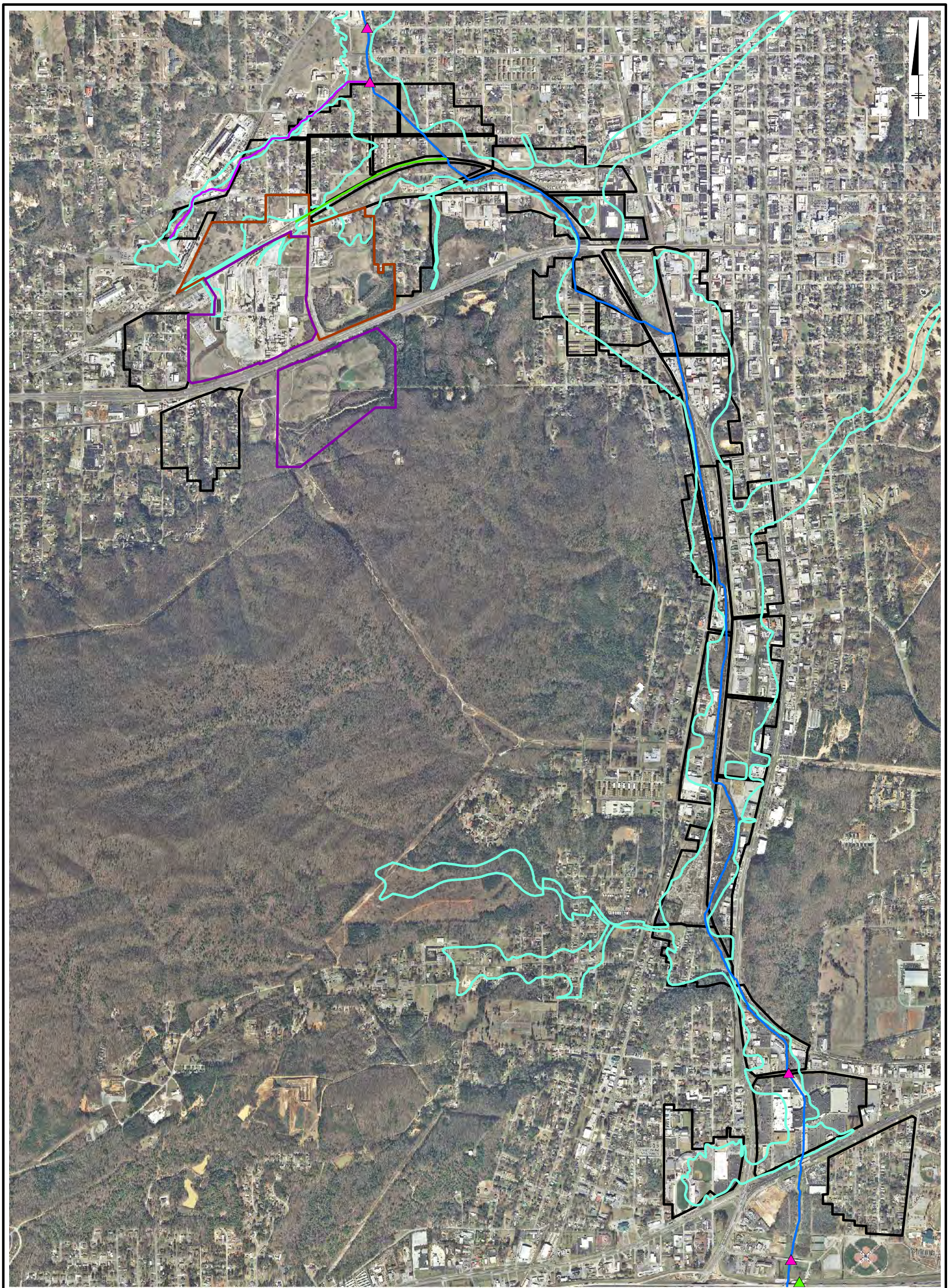
Anniston PCB Site: OU-1/OU-2
Anniston, Alabama
OU-1/OU-2 Feasibility Study Report

Snow Creek Bank Stability

Solutia

Figure
2-51j

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: ldrum
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-52_SurfaceWaterLocations.mxd 3/5/2016 10:47:23 AM



Legend

Surface Water Sample Location Program
- RCRA
- RI/FS

- Snow Creek
- 11th Street Ditch
- West 9th Street Creek
- Operable Unit 3
- Northside and Eastside Areas
- 100-Year Floodplain and Drainage Areas
- Exposure Unit

0 1,600 3,200 Feet

Graphic Scale

Notes:
1. Aerial imagery provided by Calhoun County.
2. OU: operable unit
   PCB: polychlorinated biphenyl
   RCRA: Resource Conservation and Recovery Act
   RI/FS: Remedial Investigation / Feasibility Study

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

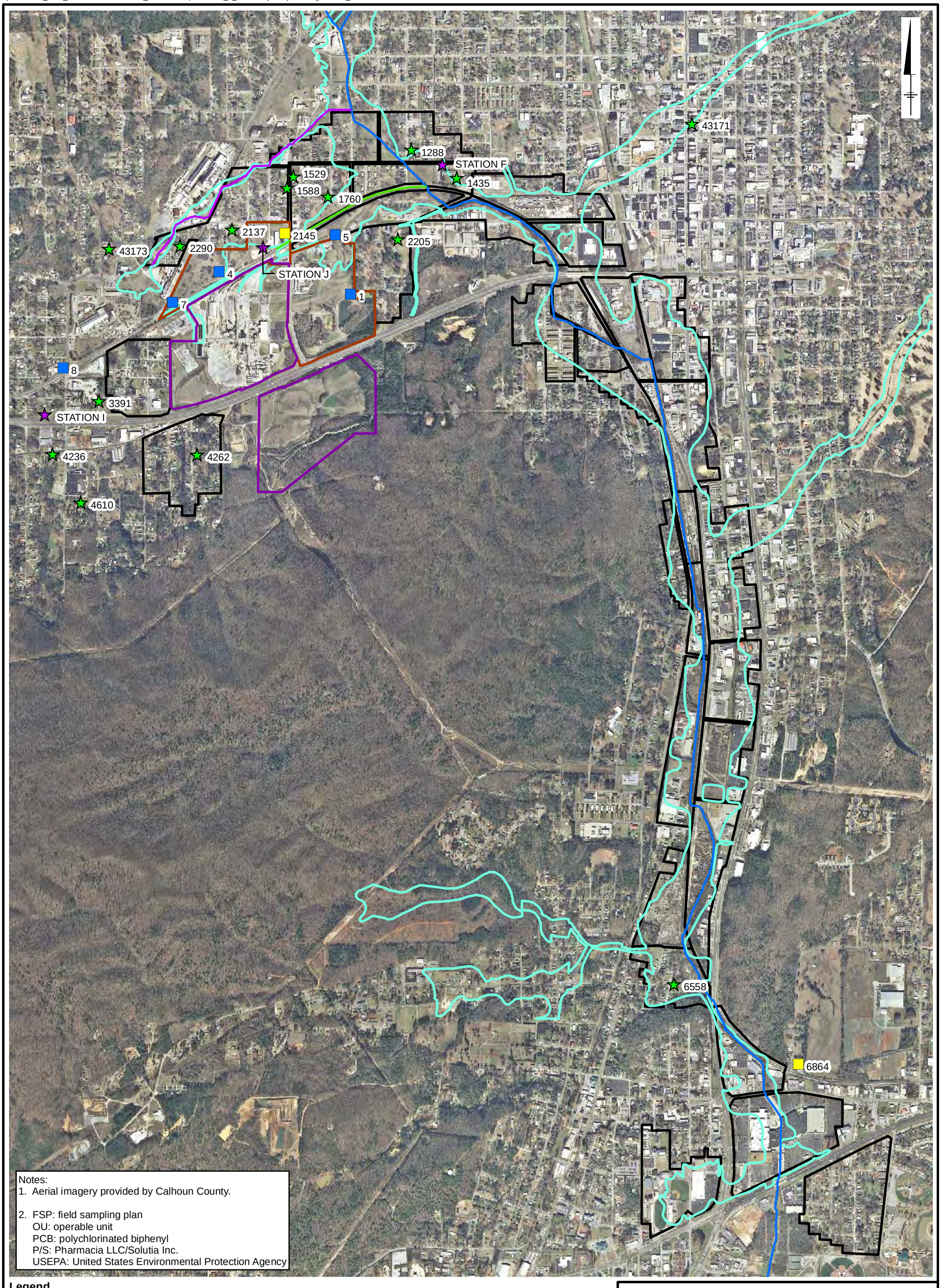
OU-1/OU-2 Feasibility Study Report

Surface Water Sample Locations

Solutia

Figure
2-52

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: ldrum
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-53_AirLocations.mxd 3/5/2016 10:48:43 AM



Notes:
1. Aerial imagery provided by Calhoun County.

2. FSP: field sampling plan
OU: operable unit
PCB: polychlorinated biphenyl
P/S: Pharmacia LLC/Solutia Inc.
USEPA: United States Environmental Protection Agency

Legend

- USEPA 2012 Air Study Location
- USEPA 2000 Air Monitoring Location
- 2003/2004 ENSR Air Monitoring Location (for P/S)
- 2006 Nonresidential FSP Air Sampling Location (for P/S)
- Snow Creek
- 11th Street Ditch
- West 9th Street Creek
- Operable Unit 3
- Northside and Eastside Areas
- 100-Year Floodplain and Drainage Areas
- Exposure Unit

0 1,600 3,200 Feet
Graphic Scale

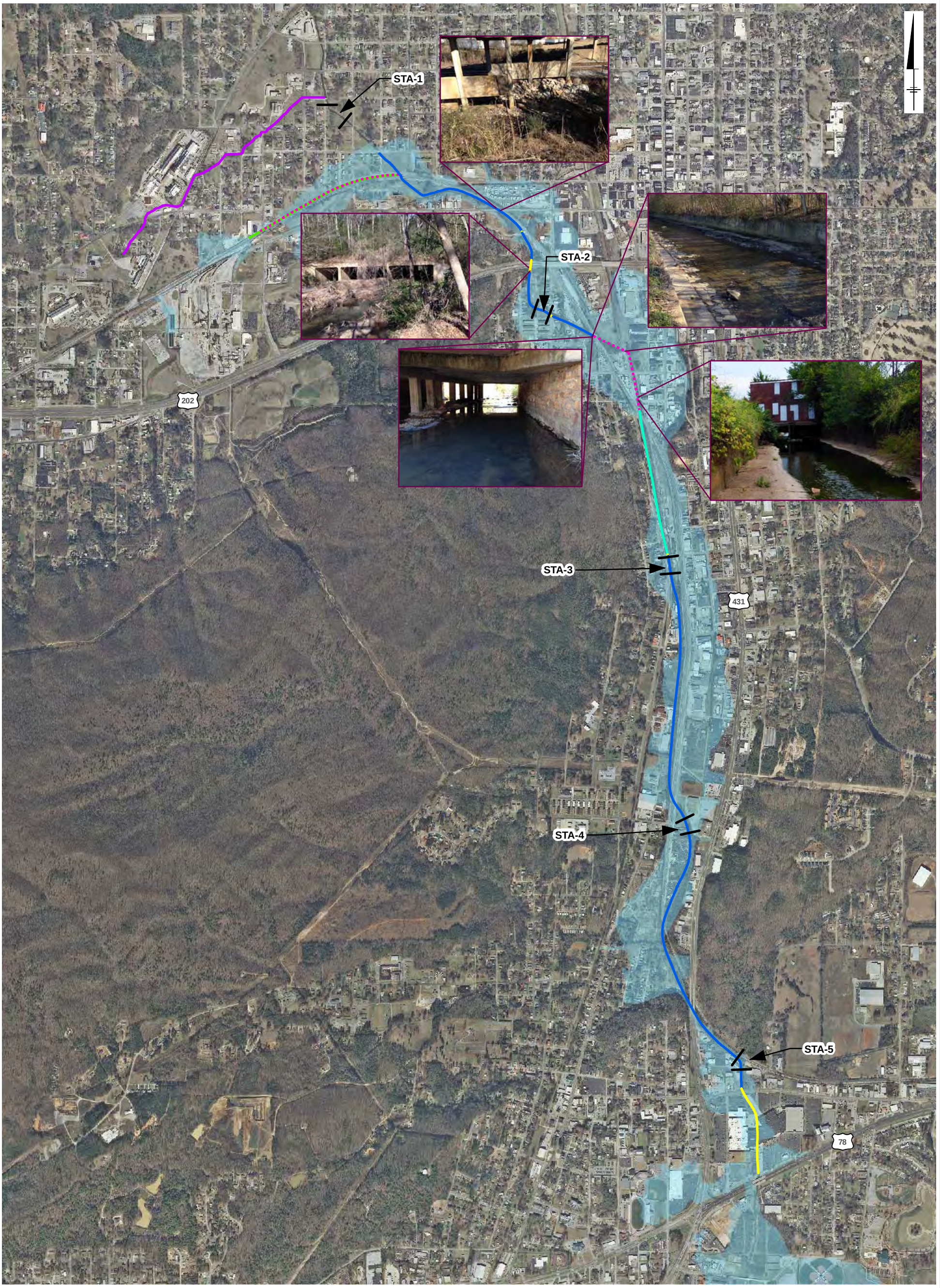
Anniston PCB Site: OU-1/OU-2
Anniston, Alabama
OU-1/OU-2 Feasibility Study Report

Air Monitoring Locations

Solutia

Figure
2-53

City: SYR Div/Group: SWG Created By: Last Saved By: ldrum
Anniston (B0010291.2010.00005)
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure2-54_SnowCreekChannelType1.mxd 3/5/2016 10:50:10 AM



Legend

- Snow Creek Biological Survey Station Boundary
- Approximate Extent of Lined Channel
- Culvert
- Natural
- Natural Bottom East Wall Concrete
- 11th Street Ditch
- West 9th Street Creek
- OU-1/OU-2 100-Year Flooplain
- **STA-5** Biological Sampling Station Locations

Notes:
1. Aerial imagery provided by Calhoun County.
2. OU: operable unit
   PCB: polychlorinated biphenyl

0 1,600 3,200 Feet
Graphic Scale

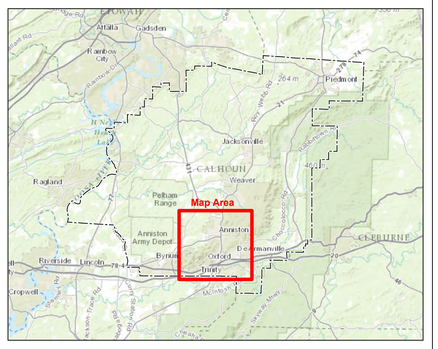
Anniston PCB Site: OU-1/OU-2
Anniston, Alabama
OU-1/OU-2 Feasibility Study Report

Snow Creek Channel Type

Solutia

Figure
2-54

OVERVIEW - CALHOUN COUNTY



LEGEND

- Surface Soil with PCBs ≥ 1 mg/kg (No Access) - 19 properties
- Surface Soil with PCBs ≥ 1 mg/kg (Unsuitable) - 43 properties
- Completed Removal Property with Structure(s) - 313 properties
- PCB Residuals at Depth - 28 properties
- Completed Removal Property with Structure(s) and PCB Residuals at Depth - 67 properties
- Calhoun County Parcels
- EPA Zone B
- OU-3 Boundary
- OU-1/OU-2 Downgradient Floodplain
- County Boundary
- Anniston City Limits
- Hobson City Limits
- Oxford City Limits

NOTES

1. The extent of the grid in this figure includes EPA Zone B as defined in the Lead Site AOC and the Stipulation and Agreement.
2. Properties identified as PCBs residuals at depth are properties where residual PCB concentrations (between 1 mg/kg and 10 mg/kg) remain in subsurface soil underlying areas that were previously remediated.
3. One property characterized as Surface Soil with PCBs ≥ 1 mg/kg (No Access) has a previously remediated area adjacent to a structure.
4. Six properties characterized as Surface Soil with PCBs ≥ 1 mg/kg (Unsuitable) have previously remediated areas adjacent to structures.
5. Secondary parcels are shown on the figure but are not included in counts.

AOC: Administrative Order on Consent
mg/kg: milligram per kilogram
P/S: Pharmacia LLC and Solutia Inc.
PCB: polychlorinated biphenyl

REFERENCE

1. Parcel Boundaries - Calhoun County, 2014
2. Baselayer Source: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

0.5 0.25 0 0.5 Miles

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

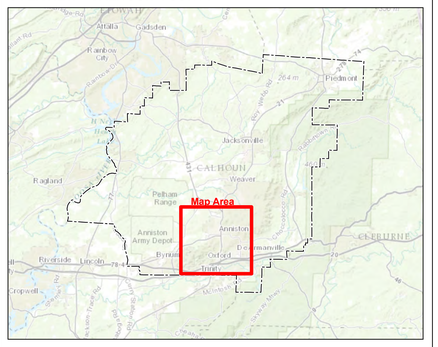
Residential Properties: Candidate Remedial Areas and Long-Term Soil Management Areas

Solutia
Ingenuity
Productivity
Performance

Figure 4-1

Path: \\Atl-vfs1\gis\PROJECTS\2013\13-02562 - Anniston PCB Site\01 - P\S Anniston Off-Site OU1\OU2 FS Aprx\F - OU1 FS\13025622\MF001.mxd

OVERVIEW - CALHOUN COUNTY



LEGEND

- Surface Soil with PCBs ≥ 1 mg/kg in Low Activity Areas - 13 properties
- PCB Residuals at Depth and Surface Soil with PCBs ≥ 1 mg/kg in Low Activity Areas - 1 property
- Completed Removal Property with Structure(s) - 7 properties
- Completed Removal Property with Structure(s) and Surface Soil with PCBs ≥ 1 mg/kg in Low Activity Areas - 3 properties
- Completed Removal Property with Structure(s), PCB Residuals at Depth, and Surface Soil with PCBs ≥ 1 mg/kg in Low Activity Areas - 2 properties
- Calhoun County Parcels
- EPA Zone B
- OU-3 Boundary
- OU-1/OU-2 Downgradient Floodplain
- County Boundary
- Anniston City Limits
- Hobson City Limits
- Oxford City Limits

NOTES

1. The extent of the grid in this figure includes EPA Zone B as defined in the Lead Site AOC and the Stipulation and Agreement.
2. Removals were completed in high activity areas.
3. Properties identified as PCB residuals at depth are properties where residual PCB concentrations (between 1 mg/kg and 10 mg/kg) remain in subsurface soil underlying areas that were previously remediated.
4. Secondary parcels are shown on the figure but are not included in the counts.

AOC: Administrative Order on Consent
mg/kg: milligram per kilogram
P/S: Pharmacia LLC and Solutia Inc.
PCB: polychlorinated biphenyl

REFERENCE

1. Parcel Boundaries - Calhoun County, 2014
2. Baselayer Source: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

0.5 0.25 0 0.5 Miles

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Special Use Properties: Candidate Remedial Areas and Long-Term Soil Management Areas

Solutia
Ingenuity
Productivity
Performance

Figure 4-2

Path: A:\Arc\gis\PROJECTS\2013\13-02960_Anniston PCB Site\Fi...2FS\Anniston Off-Site OU1\OU2 FS.aprx\FF - OU1\2 FS\1:30000\2FSF002.mxd

Interim Measure	Frequency[1] Detected		Minimum Detected PCB[2] (mg/kg)	Maximum Detected PCB (mg/kg)	Mean PCB[3] (mg/kg)	Median PCB[3] (mg/kg)
Northside Area	**213/234**	**91%**	**0.031**	**2800**	**102.71**	**15**
Not Under Cap	*46/59*	*78%*	*0.031*	*156*	*6.26*	*0.72*
Under Cap	*167/175*	*95%*	*0.045*	*2800*	*135.22*	*23*
Soil and geotextile cover	*107/114*	*94%*	*0.068*	*1900*	*75.13*	*21*
Concrete cover	*31/31*	*100%*	*0.045*	*380*	*41.60*	*19*
Soil HDPE geomembrane multi-layer cover	*10/11*	*91%*	*3.4*	*2800*	*479.13*	*260*
Asphalt non-woven geotextile multi-layer cover	*6/6*	*100%*	*4*	*79*	*30.67*	*21.5*
Asphalt HDPE geomembrane multi-layer cover	*13/13*	*100%*	*75*	*1600*	*642.69*	*580*

[1] Screening data are not summarized in the above table. Includes data from original and duplicate samples.

[2] Does not include nondetect samples

[3] A zero was substituted for nondetect samples

Figure 4-3b

Figure 4-3c

Figure 4-3d

Commerce St
Duncan Ave
Parkwin Ave
Bancroft Ave
Lehman St
9Th St
7Th St
Clydesdale Ave
EU3
EU5
EU6
10Th St
202
8Th st
Fernon Ave
Crawford Ave

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Maximum PCB concentration at any depth in analysis profile shown for each location. Screening data are presented where no analytical data are available. Analytical and screening data are presented in the OU-1/OU-2 Remedial Investigation Report.
3. Data associated with the 11th Street/APCO Ditch project are shown on separate figures.
4. Where IM cover systems were constructed, the data shown represent conditions below the cover.
5. Mean and median PCB concentrations were calculated using a replacement value of zero for nondetect samples.
6. APCO: Alabama Power Company
CSSMA: Central Staging and Soil Management Area
HDPE: high density polyethylene
IM: interim measure
mg/kg: milligrams per kilogram
OU: operable unit
PCB: polychlorinated biphenyl
ppm: parts per million

0 250 500 Feet
Graphic Scale

Legend

Total PCB Aroclor Concentration in Soil (mg/kg) (See Note 2)
- <1 (Including nondetects)
- ≥1 to <10
- ≥10 to <25
- ≥25 to <50
- ≥50 to <500
- ≥500
- Abandoned Groundwater Monitoring Well
- Active Groundwater Monitoring Well

Total PCB Screening Result (Immunoassay) (ppm) (See Note 2)
- < 1; < 5; < 10
- > 1; > 5
- > 10; > 25
- <50
- >50
- Outlet/Manhole Cover
- Fence
- Creek

- DrainageDitch
- 42" Diameter HDPE Pipe
- Storm Water Piping
- Box Culvert
- Berm
- Concrete Cover
- Emergency Spillway
- Soil-HDPE Geomembrane Liner
- Soil-HDPE Geomembrane Multilayer Cover

- 11th Street/APCO Ditch Cover
- 1997 IM Cover Limits
- Asphalt and HDPE Geomembrane Multilayer Cover
- Asphalt and Nonwoven Geotextile Multilayer Cover; Asphalt Cover Repair Area
- Closed CSSMA Cells
- Concrete Lined APCO Ditch
- Outfall
- Soil-Geotextile Cover

- Solutia-Owned Parcels
- OU-1/OU-2 Residential Property
- Northside/Eastside Area Boundary
- OU-3 Boundary
- Exposure Unit
- OU-1 and OU-2 Downgradient Floodplain

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Northside Area (Overall Area) Interim Measures

Solutia

Figure **4-3a**

City: SYR Div/Group: SWG Created By: K.Ives Last Saved By: jbistrovich
Anniston
Q:\Anniston_PCB_site\AnnistonALMXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-3A_InterimMeasures_PCB_NorthsideKeyMap.mxd 3/25/2016 1:22:00 PM

City: SYR Div/Group: SWG Created By: K.Ives Last Saved By: jbistrovich
Anniston Q:\Anniston_PCB_site\AnnistonALMXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-3BtoD_InterimMeasures_PCB_Northside_MapBook.mxd 3/7/2016 10:40:03 AM

10Th St
9Th St
8Th St
Duncan Ave
Parkwin Ave
Clydesdale Ave
EU2
EU3
EU5
202

ESL43 ESL10 ESL09 ESL04 ESL01 ESL63 ESL62 ESL65 ESL64 ESL81 PB-ASP-16 ESL91 ESL80 T-12 ESL82 ESL117 ESL118
ESL14 ESL11 PF-020-A ESL08 ESL05 ESL03 ESL78 ESL79 ESL123 ESL92
ESL15 ESL12 ESL07 ESL06 ESL02 ESL77
ESL16 ESED23 ESED24 ESED21 ESL17 ESL18 ESL19 ESL20 ESL85 ESL122 ESL120 T-08
ESL76 ESL61 ESL117-98 ESL118-98 ESL71 ESL70 ESL121 ESL119 ESL119-98 ESL83
PB-ASP-11 ESED22 ESL50 ESL49 ESL48 ESL84
ESL69 ESL60 ESL90
ESL43 ESED37 ESL89
ESL52 ESL44 ESL72 ESL93
ESL68 ESL45 ESL59 ESL88
ESL55 ESL73
CSED33 ESL47 ESL67 ESL87 ESL95
ESL42 ESL41 ESL74
ESL51 ESL46 ESL58
CSED32L30 CSED32L15 CSED32 CSED32R30 CSED32R15 ESL75 ESL86 11SDD3STA0
CSED32L45 CSED31L30 GASCOSL05
CSED31L15 ESL66 GASCOSL01
CSED30L30 CSED31 ESL54 ESL57 ESL53 11SDD3STA1
CSED30L15 CSED31R15 CSED31R30 CSED30
CSED0505 CSL08 CSL12 PB-ASP-08 CSED30R25 CSL36 CSL37 CSED31R75 11SDD2STA0
CSED0450 CSL09
CSED0400 CSL10 CSL13 CSL01
CSED0350 CSL34 11SDD1STA0
CSL26 CSL11 CSL02 CSL35
CSED0300 CSL25 CSL03 11SDD1STA1
CSL16
CSED0250 CSL04 HA-71 HA-69 HA-70 CSL20 CSL07 11SDCSTA0 SV-2 SV-5 SV-4 SV-6 SV-7 SV-3 SV-8 SV-1
CSL17 11SDBSTA0 FC1-0034-A
CSED0200 CSL05 11SDCSTA1

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Maximum PCB concentration at any depth in analysis profile shown for each location. Screening data are presented where no analytical data are available. Analytical and screening data are presented in the OU-1/OU-2 Remedial Investigation Report.
3. Where IM cover systems were constructed, the data shown represent conditions below the cover.
4. Data associated with the 11th Street/APCO Ditch project are shown on separate figures.
5. APCO: Alabama Power Company
CSSMA: Central Staging and Soil Management Area
HDPE: high density polyethylene
IM: interim measure
mg/kg: milligrams per kilogram
OU: operable unit
PCB: polychlorinated biphenyl
ppm: parts per million

0 100 200 Feet
Graphic Scale

Legend

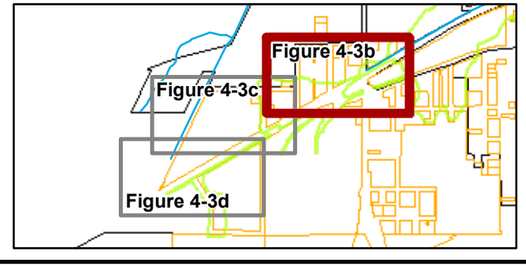
Total PCB Aroclor Concentration in Soil (mg/kg) (See Note 2)
- <1 (Including nondetects)
- ≥1 to <10
- ≥10 to <25
- ≥25 to <50
- ≥50 to <500
- ≥500
- Abandoned Groundwater Monitoring Well
- Active Groundwater Monitoring Well

Total PCB Screening Result (Immunoassay) (ppm) (See Note 2)
- < 1; < 5; < 10
- Outlet/Manhole Cover
- Fence
- Creek

- DrainageDitch
- 42" Diameter HDPE Pipe
- Exposure Unit
- Solutia-Owned Parcels
- Box Culvert
- Berm
- Concrete Cover
- Emergency Spillway
- Soil-HDPE Geomembrane Multilayer Cover

- 11th Street/APCO Ditch Cover
- Asphalt and HDPE Geomembrane Multilayer Cover
- Asphalt and Nonwoven Geotextile Multilayer Cover; Asphalt Cover Repair Area
- Closed CSSMA Cells
- Soil-Geotextile Cover
- Northside Area Boundary
- OU-3 Boundary

- OU-1/OU-2 Residential Property
- OU-1 and OU-2 Downgradient Floodplain



Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Northside Area Interim Measures

Solutia

Figure **4-3b**



Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Maximum PCB concentration at any depth in analysis profile shown for each location. Screening data are presented where no analytical data are available. Analytical and screening data are presented in the OU-1/OU-2 Remedial Investigation Report.
3. Where IM cover systems were constructed, the data shown represent conditions below the cover.
4. Data associated with the 11th Street/APCO Ditch project are shown on separate figures.
5. APCO: Alabama Power Company
   CSSMA: Central Staging and Soil Management Area
   HDPE: high density polyethylene
   IM: interim measure
   mg/kg: milligrams per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl
   ppm: parts per million

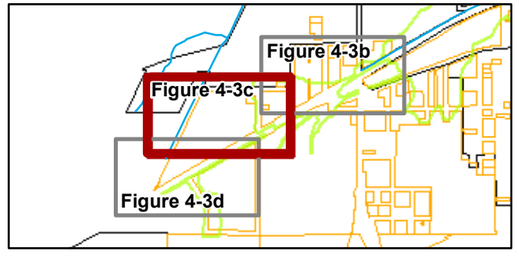
0 100 200 Feet
Graphic Scale

Legend

Total PCB Aroclor Concentration in Soil (mg/kg) (See Note 2)
- <1 (Including nondetects)
- ≥1 to <10
- ≥10 to <25
- ≥25 to <50
- ≥50 to <500
- ≥500
- Active Groundwater Monitoring Well

Total PCB Screening Result (Immunoassay) (ppm) (See Note 2)
- < 1; < 5; < 10
- > 10; > 25
- Outlet/Manhole Cover
- Fence
- Creek

- DrainageDitch
- 42" Diameter HDPE Pipe
- Exposure Unit
- Solutia-Owned Parcels
- 11th Street/APCO Ditch Cover
- Soil-Geotextile Cover
- Northside Area Boundary
- OU-3 Boundary
- OU-1/OU-2 Residential Property
- OU-1 and OU-2 Downgradient Floodplain



Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

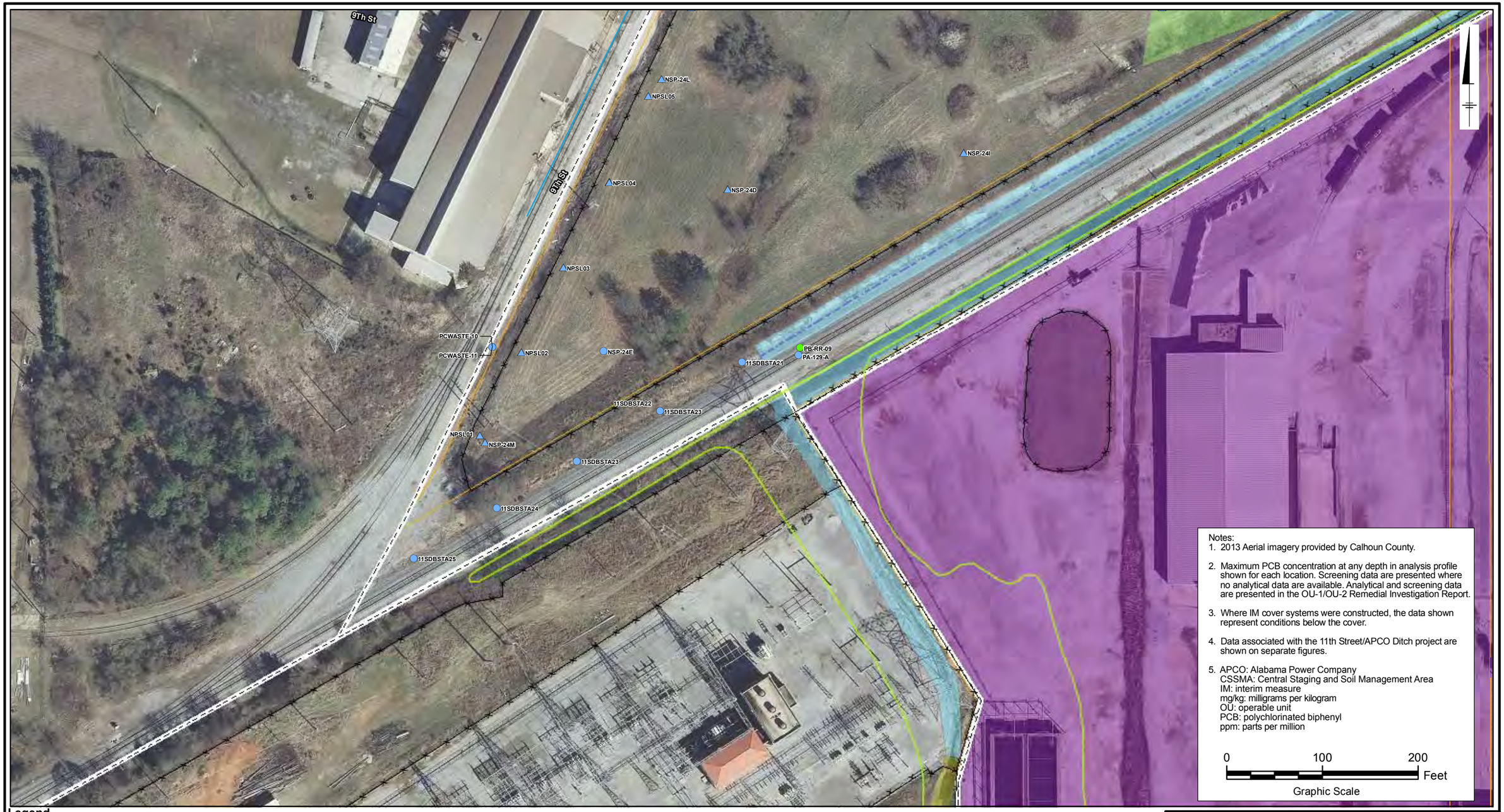
OU-1/OU-2 Feasibility Study Report

Northside Area Interim Measures

Solutia

Figure **4-3c**

City: SYR Div/Group: SWG Created By: KLives Last Saved By: jbistrovich
Anniston
Q:\Anniston_PCB_site\AnnistonALL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-3BtoD_InterimMeasures_PCB_Northside_MapBook.mxd 3/7/2016 3:37:48 PM



Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Maximum PCB concentration at any depth in analysis profile shown for each location. Screening data are presented where no analytical data are available. Analytical and screening data are presented in the OU-1/OU-2 Remedial Investigation Report.
3. Where IM cover systems were constructed, the data shown represent conditions below the cover.
4. Data associated with the 11th Street/APCO Ditch project are shown on separate figures.
5. APCO: Alabama Power Company
   CSSMA: Central Staging and Soil Management Area
   IM: interim measure
   mg/kg: milligrams per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl
   ppm: parts per million

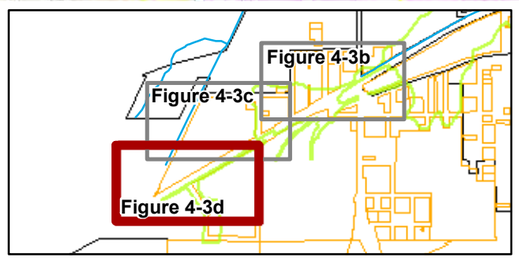
0 100 200 Feet
Graphic Scale

Legend

Total PCB Aroclor Concentration in Soil (mg/kg) (See Note 2)
- <1 (Including nondetects)
- ≥1 to <10

Total PCB Screening Result (Immunoassay) (ppm) (See Note 2)
- < 1; < 5; < 10
- Fence
- Creek
- DrainageDitch
- Exposure Unit
- Solutia-Owned Parcels

- 11th Street/APCO Ditch Cover
- Concrete Lined APCO Ditch
- Soil-Geotextile Cover
- Northside Area Boundary
- OU-3 Boundary
- OU-1 and OU-2 Downgradient Floodplain



Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

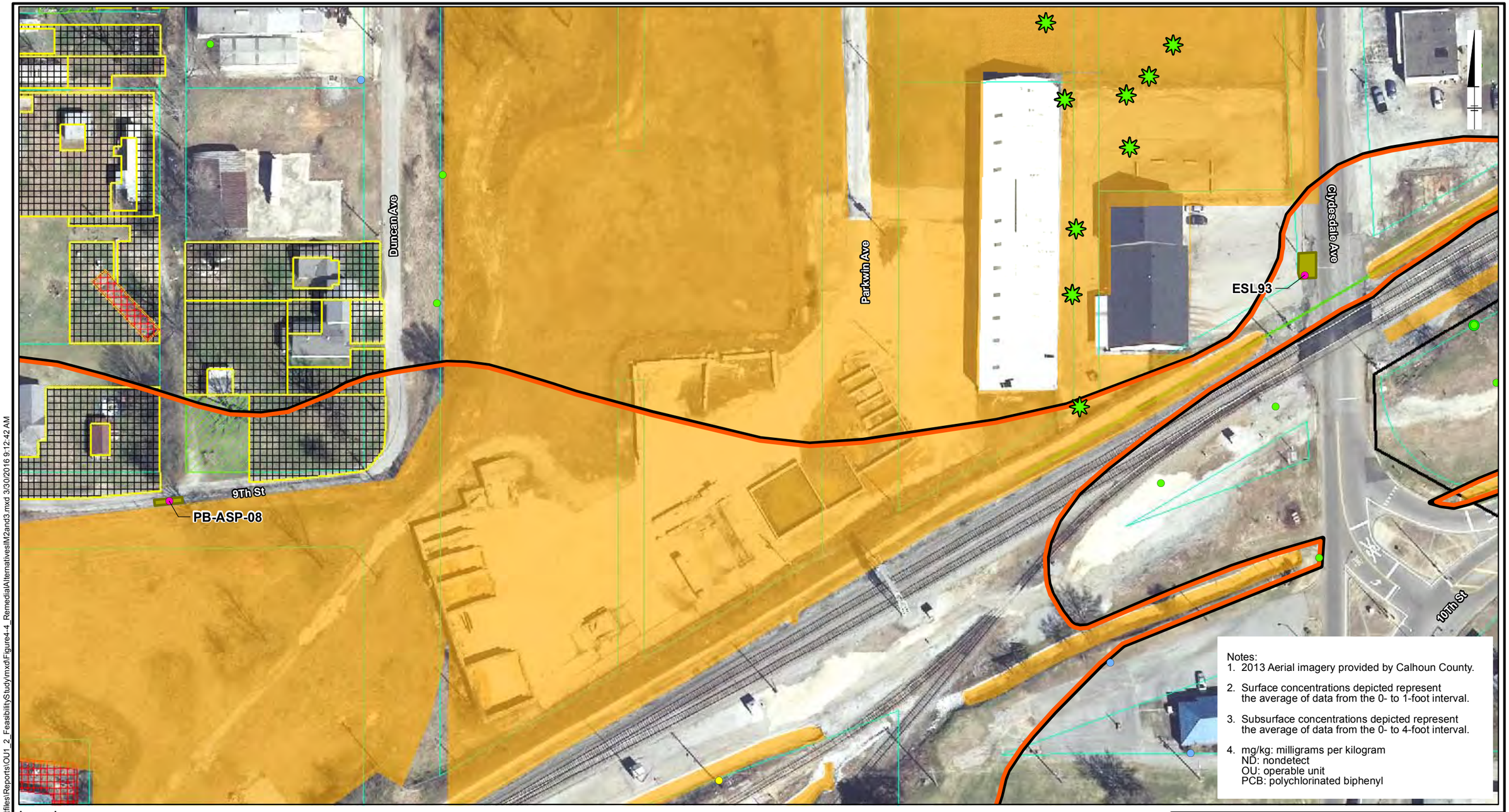
OU-1/OU-2 Feasibility Study Report

Northside Area Interim Measures

Solutia

Figure **4-3d**

City: SYR Div/Group: SWG Created By: K.Ives Last Saved By: jbistrovich
Anniston
Q:\Anniston_PCB_site\AnnistonALL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-3BtoD_InterimMeasures_PCB_Northside_MapBook.mxd 3/7/2016 10:40:03 AM



Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

Legend

Soil Sample Location
Surface PCB (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50

- Locations Beneath Cover System with Maximum PCB Results ≥ 500 mg/kg
- 11th Street Ditch
- Residential >1 (mg/kg) - Not removed
- Completed Removal Area
- Residential < 1 (mg/kg)

- OU-1/OU-2 Downgradient Floodplain
- Exposure Unit
- Parcel Boundaries
- Interim Measure and Other Early Actions
- Remedial Alternatives IM-2 and IM-3

0 75 150 Feet
Graphic Scale

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Northside Area: Candidate Remedial Areas

Solutia

Figure 4-4

City: SYR Div/Group: SWG Created By: K.IVES Last Saved By: jbistrovich
Anniston
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-4_RemedialAlternativesIM2and3.mxd 3/30/2016 9:12:42 AM

Interim Measure	Frequency[1] Detected		Minimum Detected PCB[2] (mg/kg)	Maximum Detected PCB (mg/kg)	Mean PCB[3] (mg/kg)	Median PCB[3] (mg/kg)
Eastside Area	**301/409**	**74%**	**0.037**	**200000 [4]**	**1514.92**	**1.7**
Not Under Cap	*114/177*	*64%*	*0.037*	*261*	*6.67*	*0.32*
Under Cap	*187/232*	*81%*	*0.098*	*200000 [4]*	*2665.61*	*8.25*
Soil and geotextile cover/Soil Berm	*124/165*	*75%*	*0.098*	*430*	*27.77*	*2.8*
Soil HDPE geomembrane multi-layer cover	*63/67*	*94%*	*1.2*	*200000 [4]*	*9161.77*	*350*

[1] Screening data are not summarized in the above table. Includes data from original and duplicate samples.

[2] Does not include nondetect samples

[3] A zero was substituted for nondetect samples

[4] A soil removal action was conducted in this area prior to placing a geomembrane liner.

EU1 EU3 EU5 EU6 EU7 EU9 EU10

Figure 4-5b Figure 4-5c Figure 4-5d

Pipe St Bancroft Ave Duncan Ave Parkwin Ave Clydesdale Ave Ferron Ave Fernon Ave Crawford Ave Boynton Ave 10Th St 9Th St 8Th St 7Th St 6Th St Mcdaniel Ave Zinn Dr Washer Hill Ave Moses St Montrose Ave Brockman St Natalie Ln Edward Ave 202

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Maximum PCB concentration at any depth in analysis profile shown for each location. Screening data are presented where no analytical data are available. Analytical and screening data are presented in the OU-1/OU-2 Remedial Investigation Report.
3. HDPE liner is interpreted to be present based on field observations and discussions with parties involved in the IM construction.
4. Where IM cover systems were constructed, the data shown represent conditions below the cover, except for samples: PC-023-A, PC-023-B, PC-024-B, 2506-3A, CA-06-2136-03, PA-126-A, PA-126-B, and CA-05-1782-03, -04, -05 and -06.
5. Mean and median PCB concentrations were calculated using a replacement value of zero for nondetect samples.
6. APCO: Alabama Power Company
CSSMA: Central Staging and Soil Management Area
HDPE: high density polyethylene
IM: interim measure
mg/kg: milligrams per kilogram
OU: operable unit
PCB: polychlorinated biphenyl
ppm: parts per million

0 400 800 Feet
Graphic Scale

Legend

Total PCB Aroclor Concentration in Soil (mg/kg) (See Note 2)
- <1 (Including nondetects)
- ≥1 to <10
- ≥10 to <25
- ≥25 to <50
- ≥50 to <500
- ≥500
- Abandoned Groundwater Monitoring Well
- Active Groundwater Monitoring Well

Total PCB Screening Result (Immunoassay) (ppm) (See Note 2)
- < 1; < 5; < 10
- > 1; > 5
- > 10; > 25
- <50
- >50
- Outlet/Manhole Cover
- Fence
- Creek

- DrainageDitch
- 42" Diameter HDPE Pipe
- Storm Water Piping
- Box Culvert
- Berm
- Concrete Cover
- Emergency Spillway
- Soil-HDPE Geomembrane Liner
- Soil-HDPE Geomembrane Multilayer Cover

- 11th Street/APCO Ditch Cover
- 1997 IM Cover Limits
- Asphalt and HDPE Geomembrane Multilayer Cover
- Asphalt and Nonwoven Geotextile Multilayer Cover; Asphalt Cover Repair Area
- Closed CSSMA Cells
- Concrete Lined APCO Ditch
- Outfall
- Soil-Geotextile Cover

- Solutia-Owned Parcels
- Northside/Eastside Area Boundary
- OU-3 Boundary
- Exposure Unit
- OU-1 and OU-2 Downgradient Floodplain

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

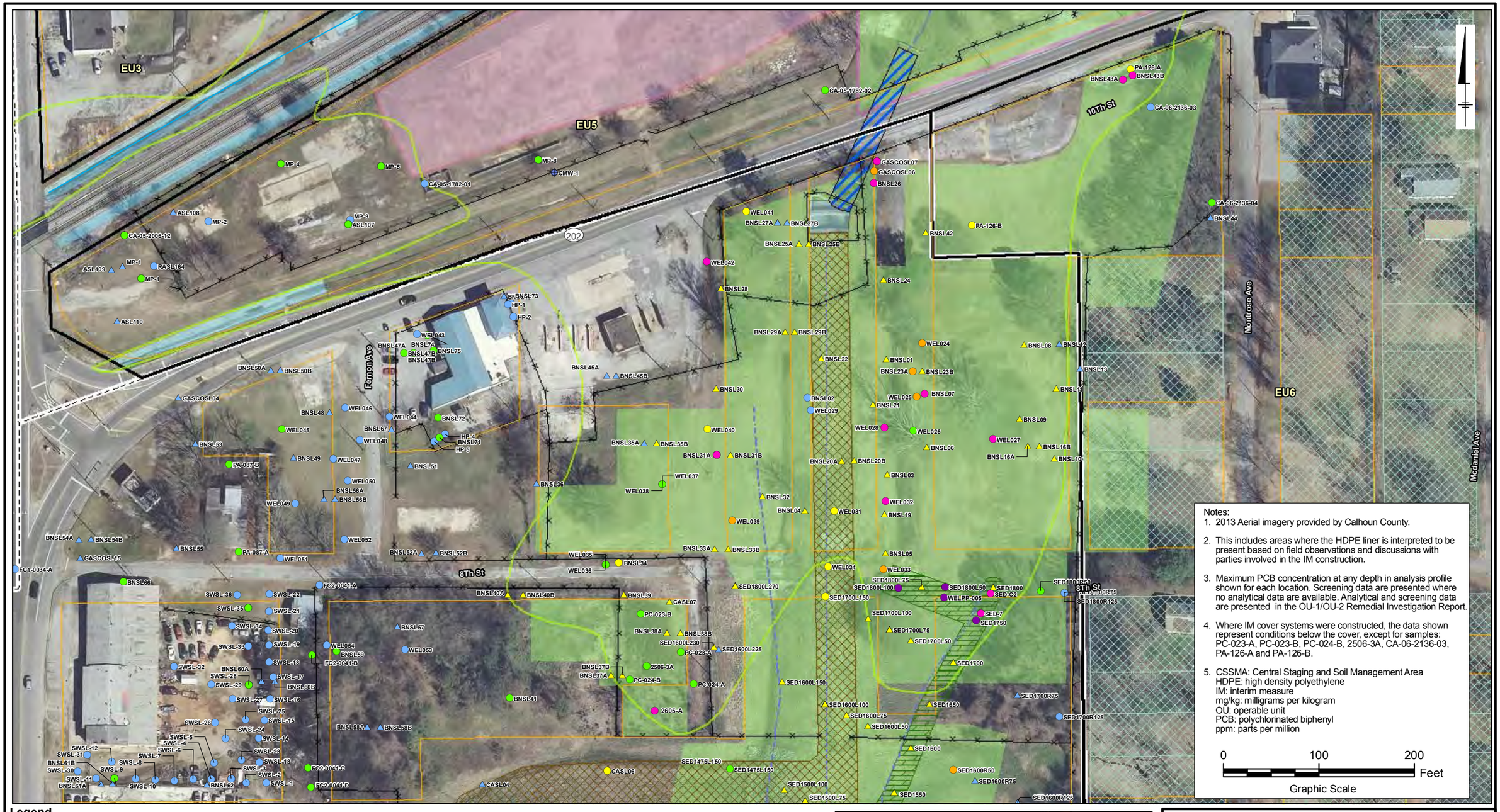
OU-1/OU-2 Feasibility Study Report

Eastside Area (Overall Area): Interim Measures

Solutia

Figure **4-5a**

City: SYR Div/Group: SWG Created By: KIves Last Saved By: jbistrovich
Anniston Q:\Anniston_PCB_site\AnnistonALMXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-5A_InterimMeasures_PCB_EastsideKeyMap_v2.mxd 3/25/2016 1:25:25 PM



Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. This includes areas where the HDPE liner is interpreted to be present based on field observations and discussions with parties involved in the IM construction.
3. Maximum PCB concentration at any depth in analysis profile shown for each location. Screening data are presented where no analytical data are available. Analytical and screening data are presented in the OU-1/OU-2 Remedial Investigation Report.
4. Where IM cover systems were constructed, the data shown represent conditions below the cover, except for samples: PC-023-A, PC-023-B, PC-024-B, 2506-3A, CA-06-2136-03, PA-126-A and PA-126-B.
5. CSSMA: Central Staging and Soil Management Area
HDPE: high density polyethylene
IM: interim measure
mg/kg: milligrams per kilogram
OU: operable unit
PCB: polychlorinated biphenyl
ppm: parts per million

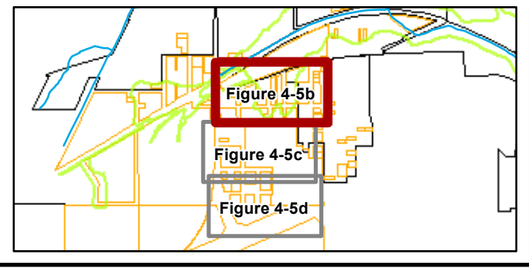
0 100 200 Feet
Graphic Scale

Legend

Total PCB Aroclor Concentration in Soil (mg/kg) (See Note 3)
- <1 (Including nondetects)
- ≥1 to <10
- ≥10 to <25
- ≥25 to <50
- ≥50 to <500
- ≥500
- Active Groundwater Monitoring Well

Total PCB Screening Result (Immunoassay) (ppm) (See Note 3)
- < 1; < 5; < 10
- > 10; > 25
- Fence
- Creek

- DrainageDitch
- Storm Water Piping
- Exposure Unit
- Solutia-Owned Parcels Box
- Culvert
- Berm
- Soil-HDPE Geomembrane Liner (See Note 2)
- 11th Street/APCO Ditch Cover
- 1997 IM Cover Limits
- Closed CSSMA Cells
- Outfall
- Soil-Geotextile Cover
- Northside Area Boundary
- OU-1 and OU-2 Downgradient Floodplain



Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Eastside Area: Interim Measures

Solutia

Figure **4-5b**

City: SYR Div/Group: SWG Created By: K.Ives Last Saved By: jbistrovich
Anniston
Q:\Anniston_PCB_site\AnnistonALM\XDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-5BtoD_InterimMeasures_PCB_Eastside_MapBook_v2.mxd 3/24/2016 8:55:14 AM



Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. This includes areas where the HDPE liner is interpreted to be present based on field observations and discussions with parties involved in the IM construction.
3. Maximum PCB concentration at any depth in analysis profile shown for each location. Screening data are presented where no analytical data are available. Analytical and screening data are presented in the OU-1/OU-2 Remedial Investigation Report.
4. HDPE: high density polyethylene
   mg/kg: milligrams per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl
   ppm: parts per million

0 100 200 Feet

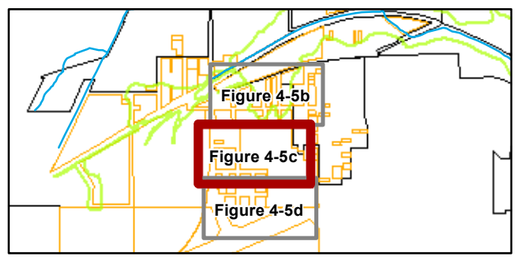
Graphic Scale

Legend

Total PCB Aroclor Concentration in Soil (mg/kg) (See Note 3)
- <1 (Including nondetects)
- ≥1 to <10
- ≥10 to <25
- ≥25 to <50
- ≥50 to <500
- ≥500
- Active Groundwater Monitoring Well

Total PCB Screening Result (Immunoassay) (ppm) (See Note 3)
- < 1; < 5; < 10
- > 10; > 25
- Fence

- DrainageDitch
- Storm Water Piping
- Exposure Unit
- Solutia-Owned Parcels
- Berm
- Emergency Spillway Soil-HDPE Geomembrane Liner (See Note 2)
- OU-3 Boundary
- Soil-Geotextile Cover
- Northside Area Boundary



Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

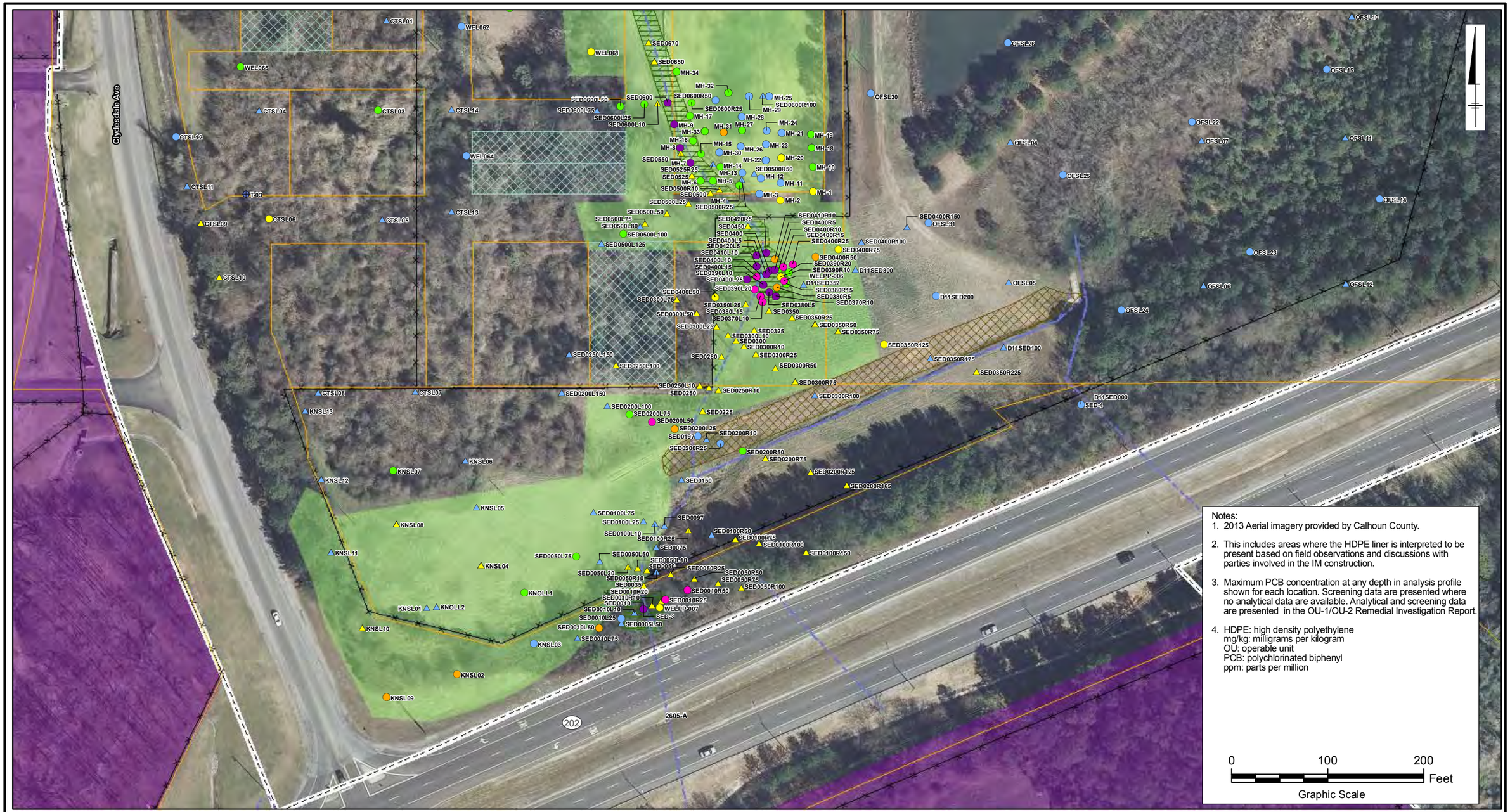
OU-1/OU-2 Feasibility Study Report

Eastside Area: Interim Measures

Solutia

Figure **4-5c**

City: SYR Div/Group: SWG Created By: KIves Last Saved By: jbistrovich
Anniston
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Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. This includes areas where the HDPE liner is interpreted to be present based on field observations and discussions with parties involved in the IM construction.
3. Maximum PCB concentration at any depth in analysis profile shown for each location. Screening data are presented where no analytical data are available. Analytical and screening data are presented in the OU-1/OU-2 Remedial Investigation Report.
4. HDPE: high density polyethylene
mg/kg: milligrams per kilogram
OU: operable unit
PCB: polychlorinated biphenyl
ppm: parts per million

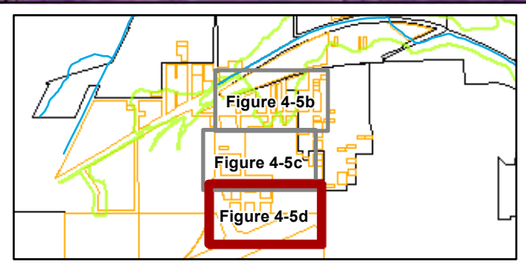
0 100 200 Feet
Graphic Scale

Legend

Total PCB Aroclor Concentration in Soil (mg/kg) (See Note 3)
- <1 (Including nondetects)
- ≥1 to <10
- ≥10 to <25
- ≥25 to <50
- ≥50 to <500
- ≥500
- Active Groundwater Monitoring Well

Total PCB Screening Result (Immunoassay) (ppm) (See Note 3)
- < 1; < 5; < 10
- > 10; > 25
- Fence

- DrainageDitch
- Exposure Unit
- Solutia-Owned Parcels
- Berm
- Soil-HDPE Geomembrane Liner (See Note 2)
- OU-3 Boundary
- Soil-Geotextile Cover
- Northside Area Boundary



Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Eastside Area: Interim Measures

Solutia

Figure **4-5d**

City: SYR Div/Group: SWG Created By: K.Ives Last Saved By: jbistrovich
Anniston Q:\Anniston_PCB_site\AnnistonALMXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-5BtoD_InterimMeasures_PCB_Eastside_MapBook_v2.mxd 3/25/2016 1:39:47 PM



Legend

Soil Sample Location

Surface PCB (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- ≥ 500

- 11th Street Ditch
- Completed Removal Area
- Residential < 1 (mg/kg)
- Exposure Unit
- Parcel Boundaries
- OU-1/OU-2 Downgradient Floodplain

- Special Use: High Activity Area Removed
- Interim Measure and Other Early Actions
- Interim Measures Expansion Area – Alternatives IM-2, IM-3, and IM-4

0 100 200 Feet
Graphic Scale

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

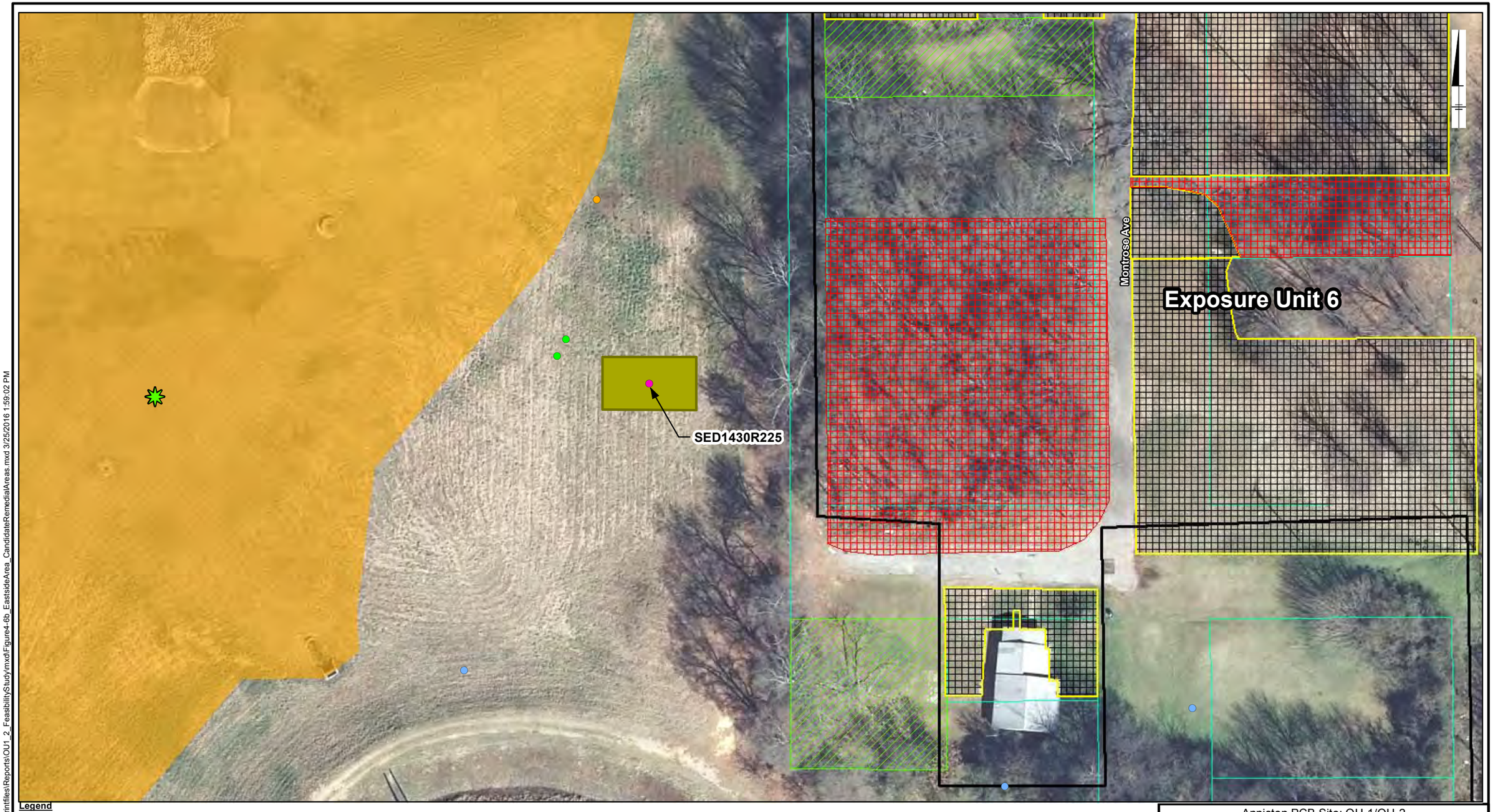
OU-1/OU-2 Feasibility Study Report

Eastside Area: Candidate Remedial Areas

Solutia

Figure **4-6a**

City: SYR Div/Group: SWG Created By: K.IVES Last Saved By: jbistrovich
Anniston
Q:\Anniston_PCB_site\AnnistonALL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-6a_EastsideArea_CandidateRemedialAreas.mxd 3/25/2016 1:44:46 PM



Legend

Soil Sample Location

Surface PCB (mg/kg)

- ND to < 1
- ≥ 1 to <10
- ≥ 25 to < 50
- ≥ 50 to < 500

Locations Beneath Cover System with Maximum PCB Results ≥ 500 mg/kg

- Residential >1 (mg/kg) - Not removed
- Completed Removal Area
- Residential < 1 (mg/kg)
- Exposure Unit
- Parcel Boundaries
- Interim Measure and Other Early Actions

Interim Measures Expansion Area – Alternatives IM-2, IM-3, and IM-4

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

0 100 200 Feet

Graphic Scale

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

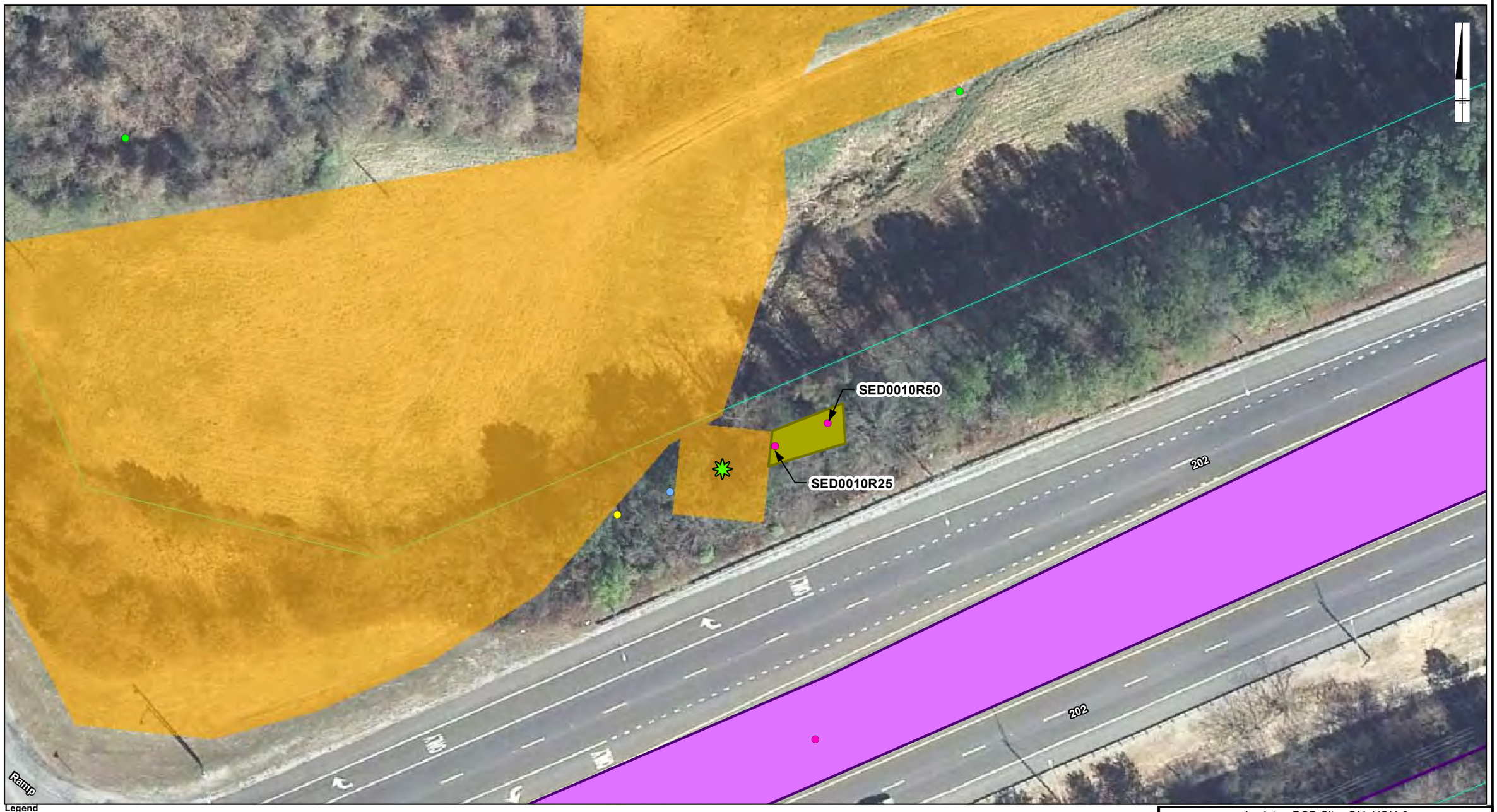
OU-1/OU-2 Feasibility Study Report

Eastside Area: Candidate Remedial Areas

Solutia

Figure **4-6b**

City: SYR Div/Group: SWG Created By: K.IVES Last Saved By: jbistrovich
Anniston
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Legend

Soil Sample Location
Surface PCB (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 50 to < 500

Operable Unit 3
Parcel Boundaries
Interim Measure and Other Early Actions

Interim Measures Expansion Area – Alternatives IM-2, IM-3, and IM-4
Target Remedial Area - Alternatives NRS-2, NRS-3, NRS-4, NRS-5, and NRS-6
Locations Beneath Cover System with Maximum PCB Results ≥ 500 mg/kg

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

0 100 200 Feet
Graphic Scale

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Eastside Area: Candidate Remedial Areas

Solutia

Figure
4-6c

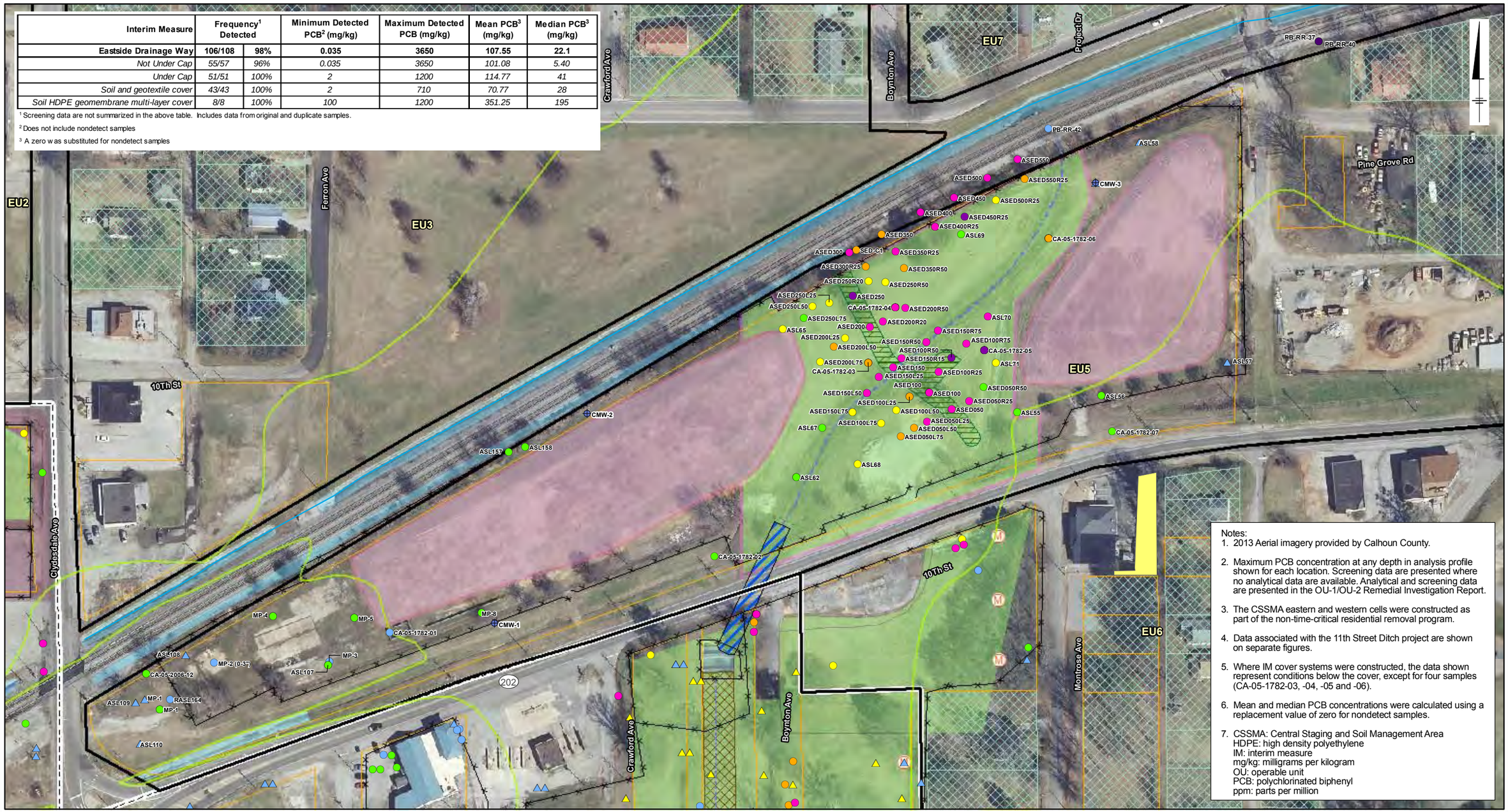
City: SYR Div/Group: SWG Created By: K.IVES Last Saved By: jbistrovich
Anniston
Q:\Anniston_PCB_site\Anniston\ALM\XDs_Printfiles\Reports\OU1_2_Feasibility\Study\mxd\Figure4-6c_EastsideArea_CandidateRemedialAreas.mxd 3/25/2016 2:03:52 PM

Interim Measure	Frequency[1] Detected		Minimum Detected PCB[2] (mg/kg)	Maximum Detected PCB (mg/kg)	Mean PCB[3] (mg/kg)	Median PCB[3] (mg/kg)
Eastside Drainage Way	**106/108**	**98%**	**0.035**	**3650**	**107.55**	**22.1**
Not Under Cap	*55/57*	*96%*	*0.035*	*3650*	*101.08*	*5.40*
Under Cap	*51/51*	*100%*	*2*	*1200*	*114.77*	*41*
Soil and geotextile cover	*43/43*	*100%*	*2*	*710*	*70.77*	*28*
Soil HDPE geomembrane multi-layer cover	*8/8*	*100%*	*100*	*1200*	*351.25*	*195*

[1] Screening data are not summarized in the above table. Includes data from original and duplicate samples.

[2] Does not include nondetect samples

[3] A zero was substituted for nondetect samples



Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Maximum PCB concentration at any depth in analysis profile shown for each location. Screening data are presented where no analytical data are available. Analytical and screening data are presented in the OU-1/OU-2 Remedial Investigation Report.
3. The CSSMA eastern and western cells were constructed as part of the non-time-critical residential removal program.
4. Data associated with the 11th Street Ditch project are shown on separate figures.
5. Where IM cover systems were constructed, the data shown represent conditions below the cover, except for four samples (CA-05-1782-03, -04, -05 and -06).
6. Mean and median PCB concentrations were calculated using a replacement value of zero for nondetect samples.
7. CSSMA: Central Staging and Soil Management Area
   HDPE: high density polyethylene
   IM: interim measure
   mg/kg: milligrams per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl
   ppm: parts per million

Legend

Total PCB Aroclor Concentration in Soil (mg/kg) (See Note 2)
- <1 (Including nondetects)
- ≥1 to <10
- ≥10 to <25
- ≥25 to <50
- ≥50 to <500
- ≥500
- Active Groundwater Monitoring Well

Total PCB Screening Result (Immunoassay) (ppm) (See Note 2)
- < 1; < 5; < 10
- > 10; > 25
- Outlet/Manhole Cover
- Fence
- Creek
- DrainageDitch
- Storm Water Piping

- Solutia-Owned Parcels
- Box Culvert
- Berm
- Soil-HDPE Geomembrane Liner

- 11th Street Ditch Cover
- 1997 IM Cover Limits Asphalt and Nonwoven Geotextile Multilayer Cover; Asphalt Cover Repair Area
- Closed CSSMA Cells
- Outfall
- Soil-Geotextile Cover
- Special Use: Low Activity Area ≥ 1 mg/kg

- OU-1/OU-2 Residential Property
- Northside/Eastside Area Boundary
- Exposure Unit
- OU-1 and OU-2 Downgradient Floodplain

0 125 250 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Eastside Drainage Way: Interim Measures

Solutia

Figure **4-7**

City: SYR Div/Group: SWG Created By: K.Ives Last Saved By: jbistrovich
Anniston Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-7_EastsideDrainageWay_InterimMeasures_MillerProperty.mxd 3/25/2016 2:23:42 PM



Legend

Soil Sample Location
Surface PCB (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- ≥ 500

- Analytes other than PCB and Lead Analyzed
- 11th Street Ditch
- Exposure Unit
- Parcel Boundaries
- Completed Removal Area
- Residential < 1 (mg/kg)
- OU-1/OU-2 Downgradient Floodplain
- Interim Measure and Other Early Actions
- Special Use: High Activity Area
- Special Use: Low Activity Area ≥ 1 mg/kg
- Interim Measures Expansion Area – Alternatives IM-2, IM-3, and IM-4
- Locations with Maximum PCB Results ≥ 500 mg/kg
- Locations Beneath Cover System with Maximum PCB Results ≥ 500 mg/kg

0 100 200 Feet
Graphic Scale

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Eastside Drainage Way: Candidate Remedial Areas

Solutia

Figure
4-8

City: SYR Div/Group: SWG Created By: K.IVES Last Saved By: jbistrovich
Anniston
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Interim Measure	Frequency[1] Detected		Minimum Detected PCB[2] (mg/kg)	Maximum Detected PCB (mg/kg)	Mean PCB[3] (mg/kg)	Median PCB[3] (mg/kg)
Hall Street Properties	**30/31**	**97%**	**0.056**	**84**	**16.33**	**11.7**
Not Under Cap	-	-	-	-	-	-
Under Cap - Soil and geotextile cover	*30/31*	*97%*	*0.056*	*84*	*16.33*	*11.7*

[1] Screening data are not summarized in the above table. Includes data from original and duplicate samples.

[2] Does not include nondetect samples

[3] A zero was substituted for nondetect samples



Legend

Total PCB Aroclor Concentration in Soil (mg/kg)
- <1 (Including nondetects)
- ≥1 to <10
- ≥10 to <25
- ≥25 to <50
- ≥50 to <500
- ≥500

- Creek
- Drainage Outlet
- Gravel Road
- Cover Limits
- Parcel Boundary
- OU-1/OU-2 Residential Property
- Exposure Unit
- OU-1 and OU-2 Downgradient Floodplain

Notes:
1. 2013 Aerial imagery and parcels provided by Calhoun County.
2. IM cover construction occurred between 2004 and 2006. The cover consists of a nominal 12-inch vegetated soil cover that comprises approximately 1.34 acres.
3. Figure presents analytical PCB data for the Hall Street properties. Maximum PCB concentration at any depth in analysis profile shown for each location. Analytical data are presented in the OU-1/OU-2 Remedial Investigation Report.
4. Mean and median PCB concentrations were calculated using a replacement value of zero for nondetect samples.
5. Where IM cover systems were constructed, the data shown represent conditions below the cover.
6. IM: interim measure
   mg/kg: milligrams per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

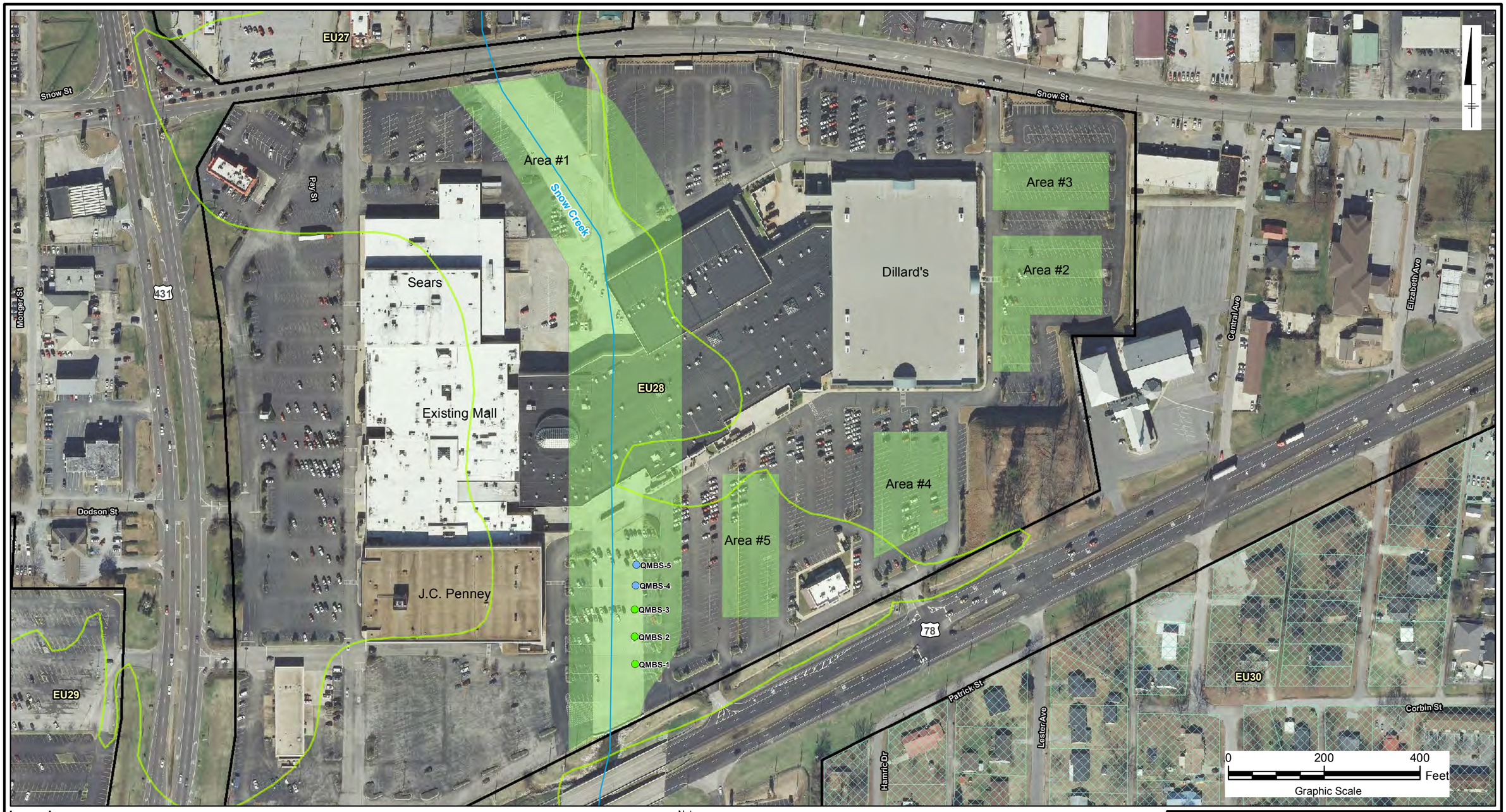
OU-1/OU-2 Feasibility Study Report

Hall Street: Interim Measures

Solutia

Figure **4-9**

City: SYR Div/Group: SWG Created By: K.Ives Last Saved By: jbistrovich
Anniston Q:\Anniston_PCB_site\AnnistonALMXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-9_InterimMeasures_PCB_HallSt.mxd 3/25/2016 2:40:38 PM



Legend

Total PCB Aroclor Concentration in Soil (mg/kg)

- <1 (Including nondetects)
- ≥1 to <10

- Creek
- Cover Limits
- OU-1/OU-2 Residential Property
- Exposure Unit
- OU-1 and OU-2 Downgradient Floodplain

Notes:

1. 2013 Aerial imagery provided by Calhoun County.
2. The soils under isolation covers were consolidated from various excavations at the property and contain <50 mg/kg (or ppm) PCBs based on laboratory analytical data and/or field screening.
3. Temporary channel was backfilled with stockpiled soils originally excavated from Snow Creek and temporary channel, then covered with either the foundation for the mall expansion or with asphalt as part of the parking lot.
4. Figure presents analytical PCB data for the Quintard Mall properties. Maximum PCB concentration at any depth in analysis profile shown for each location. Analytical data are presented in the OU-1/OU-2 Remedial Investigation Report.
5. Soil samples shown were prior to installation of the isolation covers.
6. mg/kg: milligrams per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl
   ppm: parts per million

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Quintard Mall: Interim Measures

Solutia

Figure **4-10**

City: SYR Div/Group: SWG Created By: K.Ives Last Saved By: kgpeters
Anniston
Q:\Anniston_PCB_site\Anniston\ALM\XDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-10_InterimMeasures_PCB_Quintard Mall.mxd 3/6/2016 12:30:57 PM

Interim Measure	Frequency[1] Detected		Minimum Detected PCB[2] (mg/kg)	Maximum Detected PCB (mg/kg)	Mean PCB[3] (mg/kg)	Median PCB[3] (mg/kg)
11st Street Ditch/APCO Ditch Segment A1	**91/106**	**86%**	**0.045**	**590**	**39.91**	**3.9**
Not Under Cap	-	-	-	-	-	-
Under Cap	*91/106*	*86%*	*0.045*	*590*	*39.91*	*3.9*
Concrete cover	*74/85*	*87%*	*0.045*	*590*	*41.13*	*5.4*
Ballast and Geotextile Cover	*12/12*	*100%*	*0.42*	*5.6*	*2.43*	*1.95*
Riprap and Geotextile	*5/9*	*60%*	*0.061*	*500*	*78.30*	*0.06*
APCO Ditch (South Section))	**5/7**	**71%**	**41**	**239**	**64.29**	**49**
Not Under Cap	-	-	-	-	-	-
Concrete cover	*5/7*	*71%*	*41*	*239*	*64.29*	*49*

[1] Screening data are not summarized in the above table. Includes data from original and duplicate samples.

[2] Does not include nondetect samples

[3] A zero was substituted for nondetect samples

Northside Properties IM Cover

Eastside Properties IM Cover

CSSMA (Former Miller Property) IM Cover

APCO Ditch Segment A1

APCO Ditch (OU-3)

Figure 4-11b

Figure 4-11c

Figure 4-11d

Figure 4-11e

EU3 EU4 EU5 EU6 EU7 EU8 EU9 EU10

0 375 750 Feet

Graphic Scale

Legend

Total PCB Aroclor Concentration in Soil (mg/kg)

- <1 (Including nondetects)
- ≥1 to <10
- ≥10 to <25
- ≥25 to <50
- ≥50 to <500
- ≥500

- Creek
- OU-1 / OU-2 Interim Measures Isolation Covers
- APCO Ditch Concrete Cover (OU-3)
- 11th Street/APCO Ditch Cover
- OU-1/OU-2 Residential Property
- Northside/Eastside Area Boundary
- OU-3 Boundary
- Exposure Unit
- OU-1 and OU-2 Downgradient Floodplain

Notes:

1. 2013 Aerial imagery provided by Calhoun County.
2. Maximum PCB concentration at any depth in analysis profile shown for each location.
3. Data represent conditions below the cover limits, where constructed.
4. PCB data associated with soil excavated as part of the 11th Street Ditch are not shown on this figure.
5. The APCO Ditch Segment A1 cover system was constructed as part of the 11th Street Ditch Project.
6. The APCO Ditch South Section cover system was constructed as part of the OU-3 West End Landfill construction work in 1996.
7. APCO: Alabama Power Company
   CSSMA: Central Staging and Soil Management Area
   IM: interim measure
   mg/kg: milligrams per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

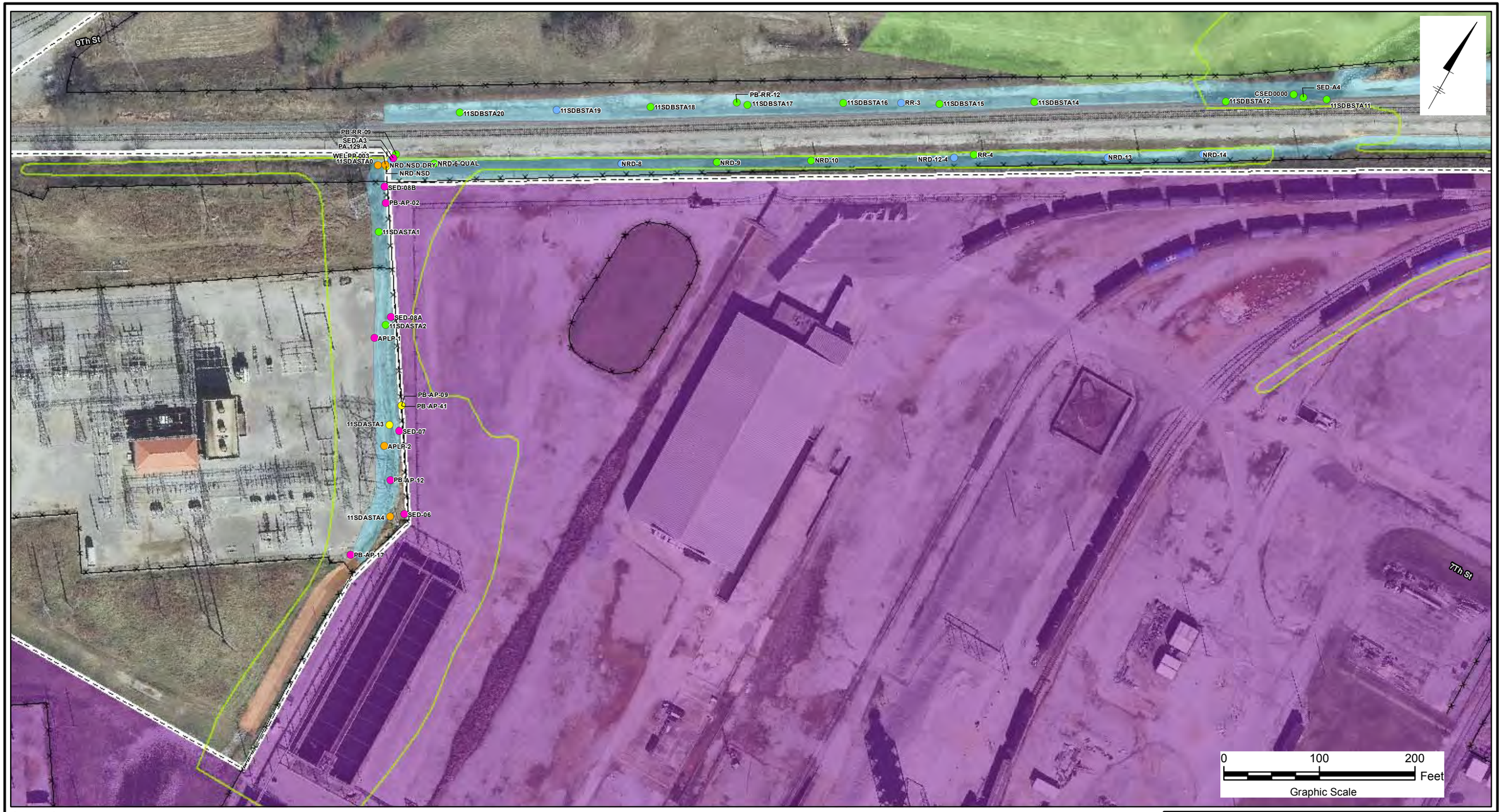
11th Street Ditch Removal Action

Solutia

Figure **4-11a**

City: SYR Div/Group: SWG Created By: K.Ives Last Saved By: jbistrovich
Anniston
Q:\Anniston_PCB_site\AnnistonALMXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-11A_InterimMeasures_PCB_11thSt_KeyMap.mxd 3/25/2016 2:44:17 PM

City: SYR Div/Group: SWG Created By: K.Ives Last Saved By: jbistrovich
Anniston Q:\Anniston_PCB_site\AnnistonALLMXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-11BtoE_InterimMeasures_PCB_11thSt_MapBook1.mxd 3/25/2016 2:45:48 PM



Legend

Total PCB Aroclor

Concentration in Soil (mg/kg)

- <1
- ≥1 to <10
- ≥10 to <25
- ≥25 to <50
- ≥50 to <500

- Creek
- OU-1 / OU-2 Interim Measures Isolation Covers
- APCO Ditch Concrete Cover (OU-3)
- 11th Street/APCO Ditch Cover
- Northside/Eastside Area Boundary
- OU-3 Boundary
- OU-1 and OU-2 Downgradient Floodplain

Notes:

1. 2013 Aerial imagery provided by Calhoun County.
2. Maximum PCB concentration at any depth in analysis profile shown for each location. Screening data are presented where no analytical data are available.
3. Data represent conditions below the cover limits, where constructed.
4. PCB data associated with soil excavated as part of the 11th Street Ditch are not shown on this figure.
5. The APCO Ditch Segment A1 cover system was constructed as part of the 11th Street Ditch Project.
6. The APCO Ditch South Section cover system was constructed as part of the OU-3 West End Landfill construction work in 1996.
7. APCO: Alabama Power Company
   mg/kg: milligrams per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

11th Street Ditch Removal Action

Solutia

Figure
4-11b



Legend

Total PCB Aroclor

Concentration in Soil (mg/kg)

- <1
- ≥1 to <10
- ≥10 to <25

- Creek
- OU-1 / OU-2 Interim Measures Isolation Covers
- 11th Street/APCO Ditch Cover
- OU-1/OU-2 Residential Property
- Northside/Eastside Area Boundary
- OU-3 Boundary
- Exposure Unit
- OU-1 and OU-2 Downgradient Floodplain

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Maximum PCB concentration at any depth in analysis profile shown for each location. Screening data are presented where no analytical data are available.
3. Data represent conditions below the cover limits, where constructed.
4. PCB data associated with soil excavated as part of the 11th Street Ditch are not shown on this figure.
5. The APCO Ditch Segment A1 cover system was constructed as part of the 11th Street Ditch Project.
6. The APCO Ditch South Section cover system was constructed as part of the OU-3 West End Landfill construction work in 1996.
7. APCO: Alabama Power Company
   mg/kg: milligrams per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

11th Street Ditch Removal Action

Solutia

Figure
4-11c

City: SYR Div/Group: SWG Created By: K.Ives Last Saved By: jbistrovich
Anniston
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City: SYR Div/Group: SWG Created By: K.Ives Last Saved By: jbistrovich
Anniston
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Legend

Total PCB Aroclor

Concentration in Soil (mg/kg)

- <1
- ≥1 to <10
- ≥10 to <25

- Creek
- OU-1 / OU-2 Interim Measures Isolation Covers
- 11th Street/APCO Ditch Cover
- OU-1/OU-2 Residential Property
- Northside/Eastside Area Boundary
- Exposure Unit
- OU-1 and OU-2 Downgradient Floodplain

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Maximum PCB concentration at any depth in analysis profile shown for each location. Screening data are presented where no analytical data are available.
3. Data represent conditions below the cover limits, where constructed.
4. PCB data associated with soil excavated as part of the 11th Street Ditch are not shown on this figure.
5. The APCO Ditch Segment A1 cover system was constructed as part of the 11th Street Ditch Project.
6. The APCO Ditch South Section cover system was constructed as part of the OU-3 West End Landfill construction work in 1996.
7. APCO: Alabama Power Company
   mg/kg: milligrams per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

11th Street Ditch Removal Action

Solutia

Figure
4-11d



Legend

Total PCB Aroclor

Concentration in Soil (mg/kg)

- <1
- ≥1 to <10
- ≥10 to <25
- ≥50 to <500
- ≥500

- Creek
- OU-1 / OU-2 Interim Measures Isolation Covers
- 11th Street/APCO Ditch Cover
- OU-1/OU-2 Residential Property
- Exposure Unit
- OU-1 and OU-2 Downgradient Floodplain

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Maximum PCB concentration at any depth in analysis profile shown for each location. Screening data are presented where no analytical data are available.
3. Data represent conditions below the cover limits, where constructed.
4. PCB data associated with soil excavated as part of the 11th Street Ditch are not shown on this figure.
5. The APCO Ditch Segment A1 cover system was constructed as part of the 11th Street Ditch Project.
6. The APCO Ditch South Section cover system was constructed as part of the OU-3 West End Landfill construction work in 1996.
7. APCO: Alabama Power Company
   mg/kg: milligrams per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

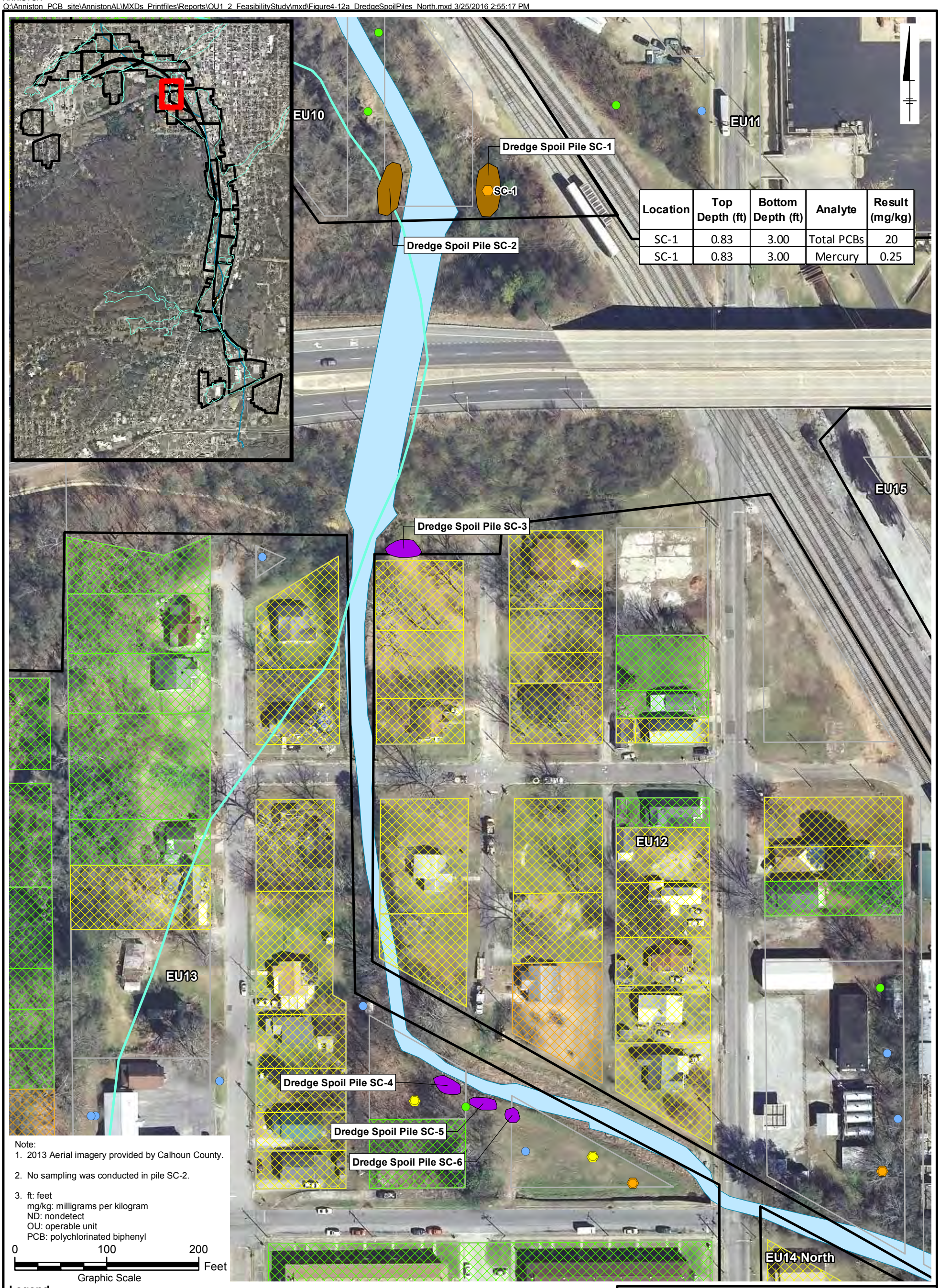
11th Street Ditch Removal Action

Solutia

Figure 4-11e

City: SYR Div/Group: SWG Created By: K.Ives Last Saved By: jbistrovich
Anniston
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City: SYR Div/Group: SWG Created By: K.IVES Last Saved By: jbistrovich
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-12a_DredgeSpoilPiles_North.mxd 3/25/2016 2:55:17 PM



Location	Top Depth (ft)	Bottom Depth (ft)	Analyte	Result (mg/kg)
SC-1	0.83	3.00	Total PCBs	20
SC-1	0.83	3.00	Mercury	0.25

Note:
1. 2013 Aerial imagery provided by Calhoun County.
2. No sampling was conducted in pile SC-2.
3. ft: feet
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

0 100 200 Feet
Graphic Scale

Legend

Surface Soil Sample Location
Maximum PCB (mg/kg)
- ND to < 1
- ≥ 1 to < 5
- ≥ 5 to < 10
- ≥ 10 to < 50

Subsurface Soil Sample Location
Maximum PCB (mg/kg)
- ≥ 5 to < 10
- ≥ 10 to < 50

- Dredge Spoil Pile In-Place
- Dredge Spoil Pile Previously Removed
- 100-Year Floodplain and Drainage Areas
- Exposure Unit
- Snow Creek
- Parcel Boundary

Residential Parcels Sampled
- Residential > 1 mg/kg
- Removal Conducted
- Residential < 1 mg/kg

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

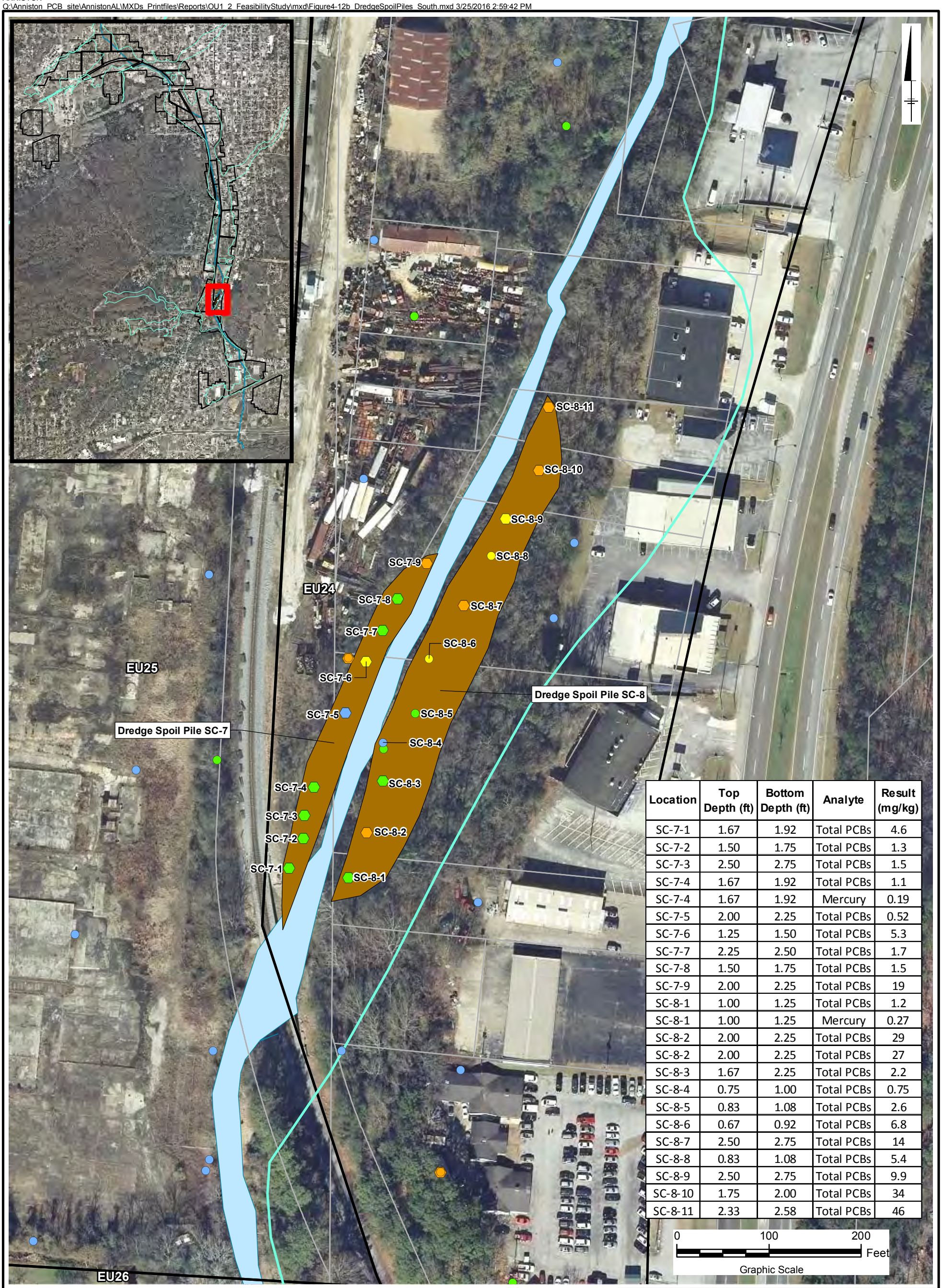
OU-1/OU-2 Feasibility Study Report

Dredge Spoil Piles 1 and 2

Solutia

Figure
4-12a

City: SYR Div/Group: SWG Created By: K.IVES Last Saved By: jbistrovich
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-12b_DredgeSpoilPiles_South.mxd 3/25/2016 2:59:42 PM



Location	Top Depth (ft)	Bottom Depth (ft)	Analyte	Result (mg/kg)
SC-7-1	1.67	1.92	Total PCBs	4.6
SC-7-2	1.50	1.75	Total PCBs	1.3
SC-7-3	2.50	2.75	Total PCBs	1.5
SC-7-4	1.67	1.92	Total PCBs	1.1
SC-7-4	1.67	1.92	Mercury	0.19
SC-7-5	2.00	2.25	Total PCBs	0.52
SC-7-6	1.25	1.50	Total PCBs	5.3
SC-7-7	2.25	2.50	Total PCBs	1.7
SC-7-8	1.50	1.75	Total PCBs	1.5
SC-7-9	2.00	2.25	Total PCBs	19
SC-8-1	1.00	1.25	Total PCBs	1.2
SC-8-1	1.00	1.25	Mercury	0.27
SC-8-2	2.00	2.25	Total PCBs	29
SC-8-2	2.00	2.25	Total PCBs	27
SC-8-3	1.67	2.25	Total PCBs	2.2
SC-8-4	0.75	1.00	Total PCBs	0.75
SC-8-5	0.83	1.08	Total PCBs	2.6
SC-8-6	0.67	0.92	Total PCBs	6.8
SC-8-7	2.50	2.75	Total PCBs	14
SC-8-8	0.83	1.08	Total PCBs	5.4
SC-8-9	2.50	2.75	Total PCBs	9.9
SC-8-10	1.75	2.00	Total PCBs	34
SC-8-11	2.33	2.58	Total PCBs	46

Legend

Surface Soil Sample Location
Maximum PCB (mg/kg)
- ND to < 1
- ≥ 1 to < 5
- ≥ 10 to < 50

Subsurface Soil Sample Location
Maximum PCB (mg/kg)
- ≥ 10 to < 50

- Dredge Spoil Pile In-Place
- 100-Year Floodplain and Drainage Areas
- Exposure Unit
- Snow Creek
- Parcel Boundary

Note:
1. 2013 Aerial imagery provided by Calhoun County.
2. ft: feet
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Dredge Spoil Piles 7 and 8

Solutia

Figure
4-12b

City: SYR Div/Group: SWG Created By: K.IVES Last Saved By: jbistrovich
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-13_DredgeSpoilPiles_CandidateRemedialAreas.mxd 3/26/2016 8:42:56 AM



Legend

- Dredge Spoil Pile In-Place
- Dredge Spoil Pile Previously Removed
- Exposure Unit

Residential Parcels Sampled

- Removal Conducted
- Parcel Boundary
- Snow Creek

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Under alternatives DSP-2 and DSP-3, dredge spoil pile SC-8 would be removed and pile SC-2 would undergo a predesign investigation to determine if removal is necessary to achieve a nonresidential PRG of 21 mg/kg for the pile. Under alternatives DSP-4 and DSP-5, SC-1, SC-2, SC-7 and SC-8 would all be removed.
3. EU: exposure unit
   mg/kg: milligrams per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl
   PRG: preliminary remediation goal

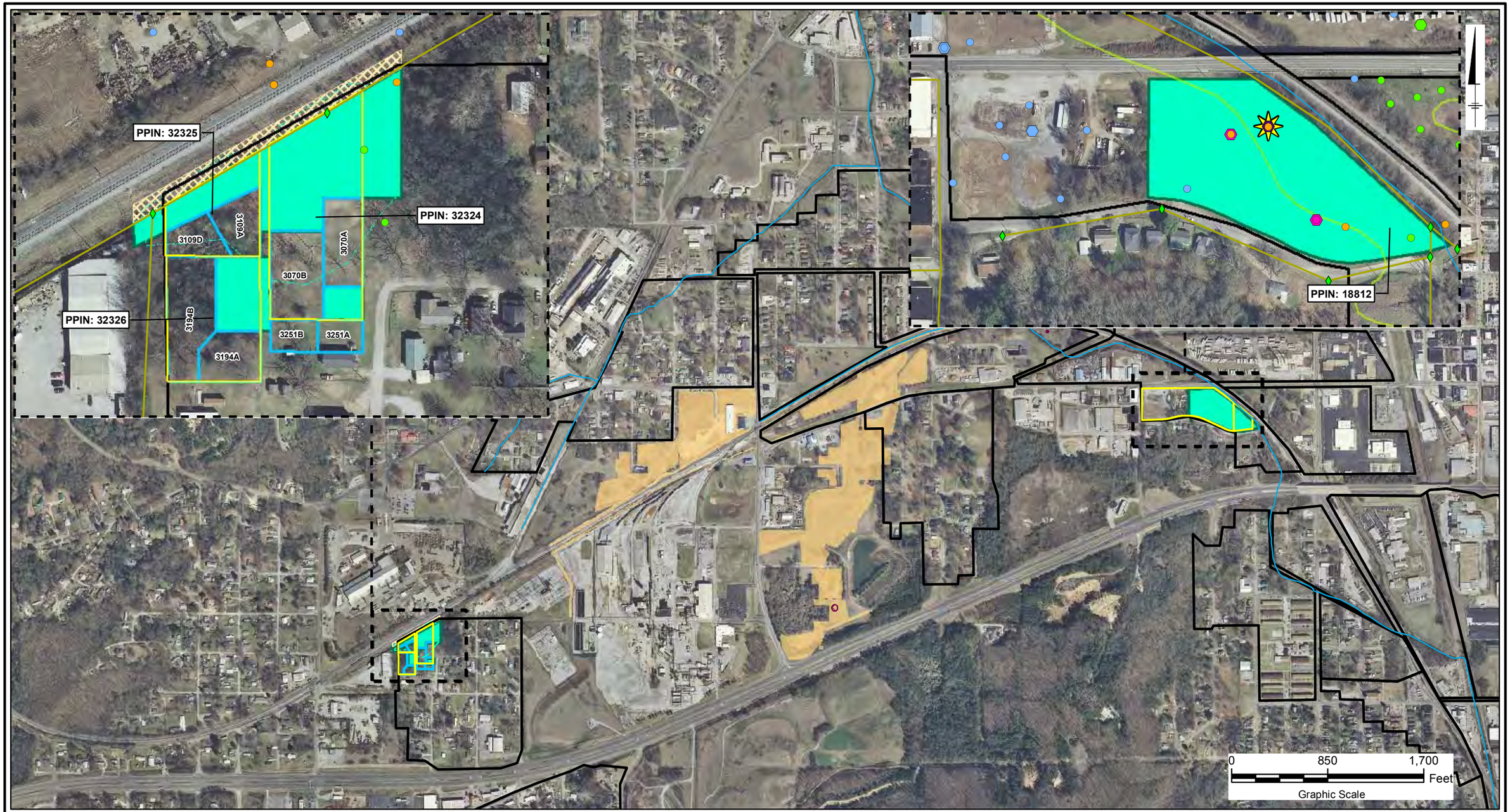
Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Dredge Spoil Piles: Candidate Remedial Areas

Solutia

Figure
4-13



Legend

Surface Soil Sample Location
Maximum PCB (mg/kg)
- ND or < 1
- ≥ 1 or < 5
- ≥ 5 to < 10
- ≥ 10 to < 50
- ≥ 50 to < 500
- ≥ 500

Subsurface Soil Sample Location
Maximum PCB (mg/kg)
- ND or < 1
- ≥ 1 or < 5
- ≥ 5 to < 10
- ≥ 10 to < 50
- ≥ 50 to < 500
- ≥ 500

- Locations with Maximum PCB Results ≥ 500 mg/kg
- Anniston Sewer Manhole/Lift Station/Clean Out/Junction Box
- Anniston Sewer Line
- Creek
- Principle Threat Waste Area
- OU-3 Boundary
- Exposure Unit
- OU-1 and OU-2 Downgradient Floodplain
- Residential Areas Not Targeted
- Railroad Right-of-Way Not Targeted
- Interim Measure Location
- Estimated Landfill Limits
- Unapproved Waste Disposal Area Parcel Boundaries
- Unapproved Waste Disposal Area

Notes:
1. Aerial imagery provided by Calhoun County.
2. The landfill limits were estimated based on the existing topography at the site, sample borings, and hand augers.
3. Delineation of impacted areas follows the Stipulation and Agreement of the parties clarifying the PCD between the USEPA and P/S for the Anniston PCB Site.
4. Conditions in Parcels 3070F and 3070G represent post-demolition sampling areas.
5. Removal in Caldwell Ave. ROW north of properties not proposed due to conflicts with a water main, sanitary sewer line, and encroachment on the southern railroad ROW.
6. mg/kg: milligrams per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl
   PCD: Partial Consent Decree
   PPIN: Property Parcel Identification Number
   P/S: Pharmacia LLC and Solutia Inc.
   ROW: right-of-way
   USEPA: United States Environmental Protection Agency

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

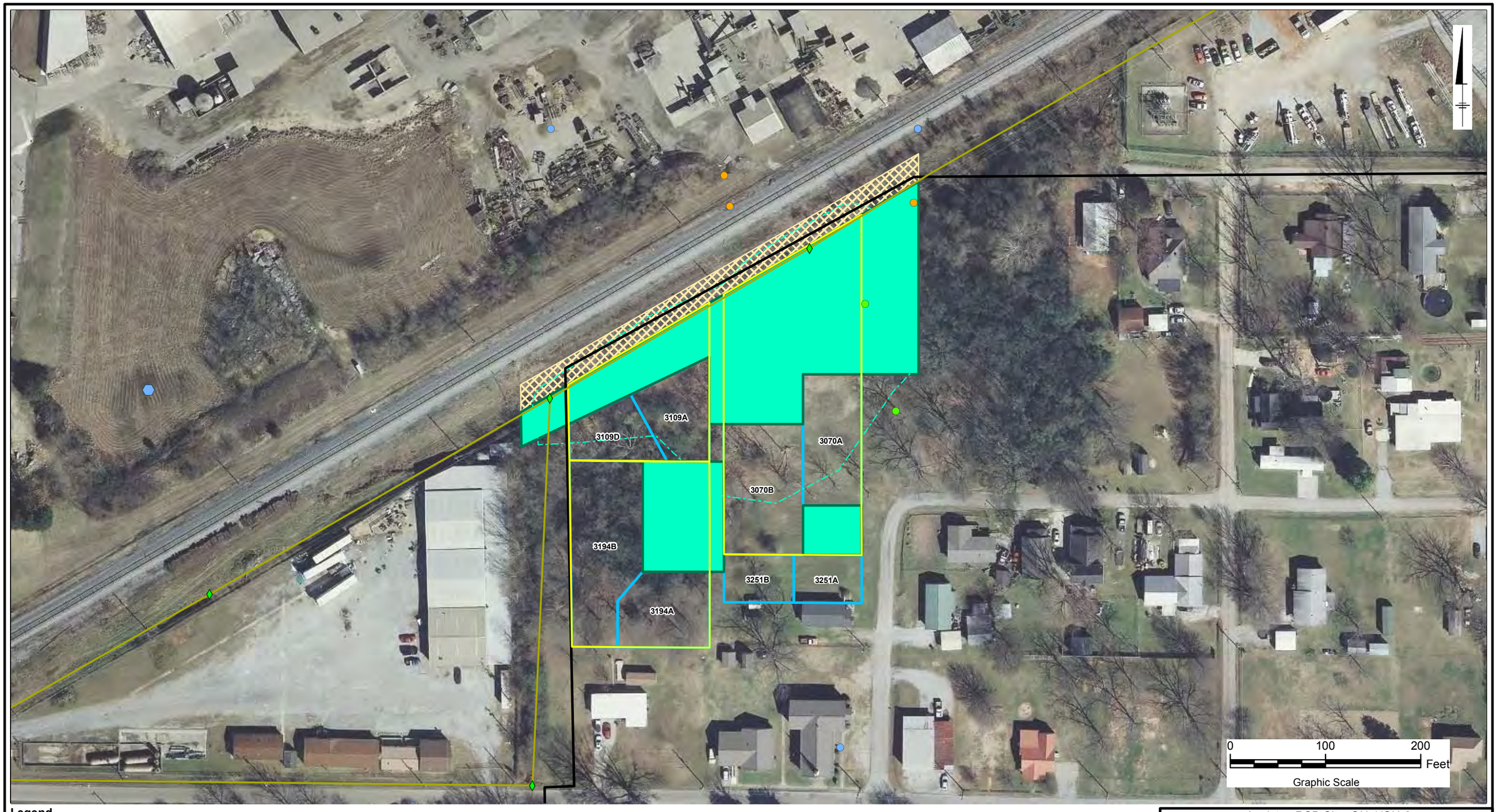
OU-1/OU-2 Feasibility Study Report

Unapproved Waste Disposal Areas

Solutia

Figure
4-14

City: SYR Div/Group: SWG Created By: K.Ives Last Saved By: jbistrovich
Anniston
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Legend

Surface Soil Sample Location
Maximum PCB (mg/kg)
- ND to < 1
- ≥ 1 to < 5
- ≥ 5 to < 10
- ≥ 10 to < 50
- ≥ 50 to < 500
- ≥ 500

Subsurface Soil Sample Location
Maximum PCB (mg/kg)
- ND to < 1
- ≥ 1 to < 5
- ≥ 5 to < 10
- ≥ 10 to < 50
- ≥ 50 to < 500
- ≥ 500

- Anniston Sewer Line
- Manhole
- Exposure Unit
- Residential Areas Not Targeted
- Estimated Landfill Limits
- Railroad Right-of-Way Not Targeted
- Unapproved Waste Disposal Area
- Unapproved Waste Disposal Area Parcel Boundary

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. The landfill limits were estimated based on the existing topography at the site, sample borings, and hand augers.
3. Delineation of impacted areas follows the Stipulation and Agreement of the parties clarifying the PCD between the USEPA and P/S for the Anniston PCB Site.
4. Conditions in Parcels 3070F and 3070G represent post-demolition sampling areas.
5. Removal in Caldwell Ave. ROW north of properties not proposed due to conflicts with a water main, sanitary sewer line, and encroachment on the southern railroad ROW.
6. mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl
   PCD: Partial Consent Decree
   P/S: Pharmacia LLC and Solutia Inc.
   ROW: right-of-way
   USEPA: United States Environmental Protection Agency

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Candidate Remedial Area for Ashley and Legrande UWDA

Solutia

Figure
4-15

City: SYR Div/Group: SWG Created By: K.Ives Last Saved By: jbistrovich
Anniston Q:\Anniston_PCB_site\AnnistonALMXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-15_CandidateRemedialAreaforAshleyandLegrandeUWDA.mxd 3/25/2016 4:08:48 PM



Legend

Surface Soil Sample Location
Maximum PCB (mg/kg)
- ND to < 1
- ≥ 1 to < 5
- ≥ 5 to < 10
- ≥ 10 to < 50
- ≥ 50 to < 500
- ≥ 500

Subsurface Soil Sample Location
Maximum PCB (mg/kg)
- ND to < 1
- ≥ 1 to < 5
- ≥ 5 to < 10
- ≥ 10 to < 50
- ≥ 50 to < 500
- ≥ 500

- Snow Creek
- Exposure Unit
- Sewer Manhole/Lift Station/ Clean Out/Junction Box
- Anniston Sewer Line
- OU-1 and OU-2 Downgradient Floodplain
- Unapproved Waste Disposal Area – UWDA-2, UWDA-3, and UWDA-4
- Locations with Maximum PCB Results ≥ 500 mg/kg

Notes:
1. Aerial imagery provided by Calhoun County.
2. The landfill limits were estimated based on the existing topography at the site, sample borings, and hand augers.
3. Delineation of impacted areas follows the Stipulation and Agreement of the parties clarifying the PCD between the USEPA and P/S for the Anniston PCB Site.
4. Conditions in Parcels 3070F and 3070G represent post-demolition sampling areas.
5. Removal in Caldwell Ave. ROW north of properties not proposed due to conflicts with a water main, sanitary sewer line, and encroachment on the southern railroad ROW.
6. mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl
   PCD: Partial Consent Decree
   PPIN: Property Parcel Identification Number
   P/S: Pharmacia LLC and Solutia Inc.
   ROW: right-of-way
   USEPA: United States Environmental Protection Agency

0 100 200 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

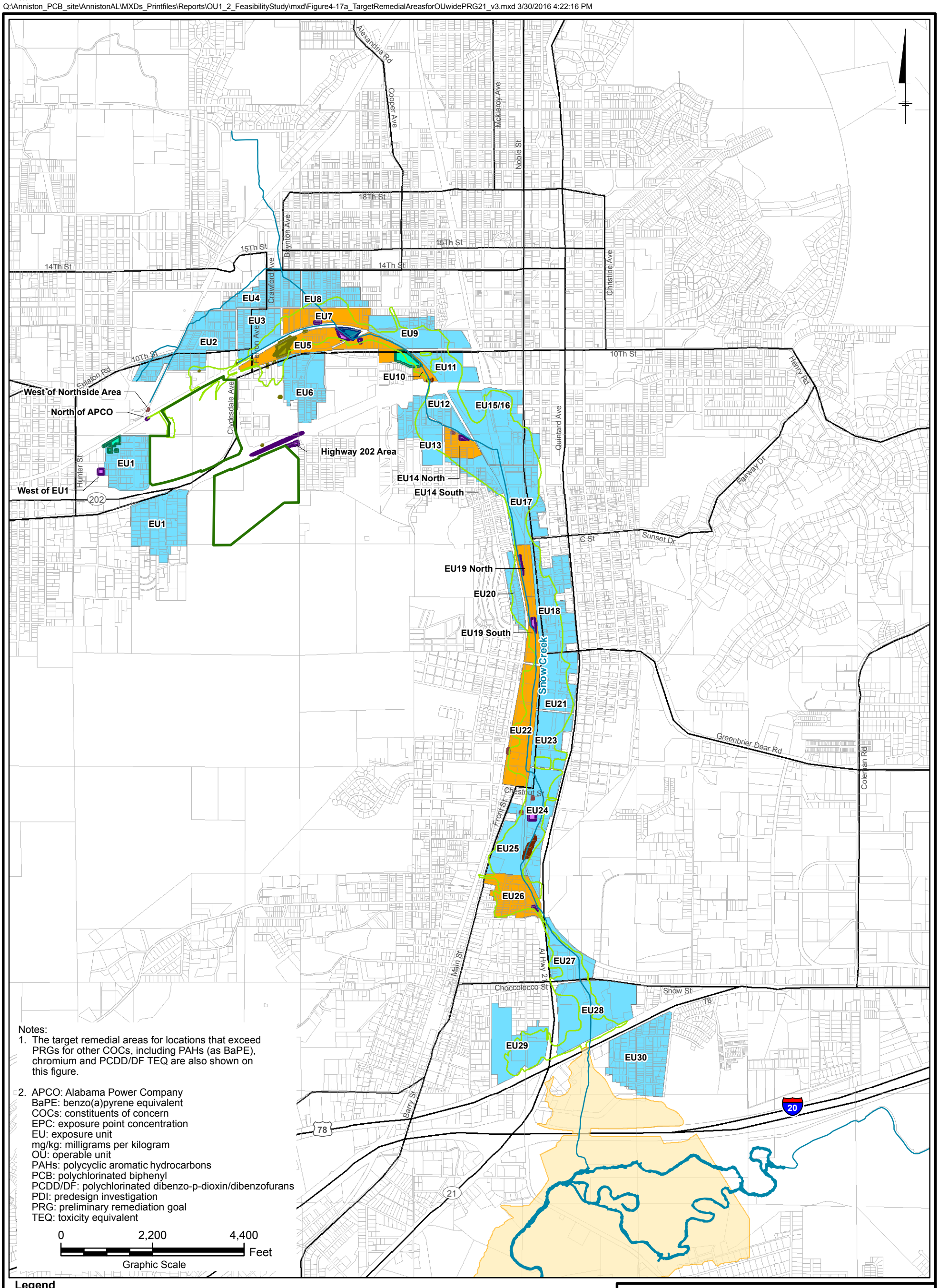
Candidate Remedial Area For Wilborn I UWDA

Solutia

Figure 4-16

City: SYR Div/Group: SWG Created By: K.Ives Last Saved By: jbistrovich
Anniston Q:\Anniston_PCB_site\Anniston\ALIMXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-16_CandidateRemedialAreafor WilbornIUWDA_v2.mxd 3/26/2016 8:12:41 AM

City: SYR Div/Group: SWG Created By: K.Ives Last Saved By: kives
Anniston
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-17a_TargetRemedialAreasforOUwidePRG21_v3.mxd 3/30/2016 4:22:16 PM



Notes:
1. The target remedial areas for locations that exceed PRGs for other COCs, including PAHs (as BaPE), chromium and PCDD/DF TEQ are also shown on this figure.

2. APCO: Alabama Power Company
BaPE: benzo(a)pyrene equivalent
COCs: constituents of concern
EPC: exposure point concentration
EU: exposure unit
mg/kg: milligrams per kilogram
OU: operable unit
PAHs: polycyclic aromatic hydrocarbons
PCB: polychlorinated biphenyl
PCDD/DF: polychlorinated dibenzo-p-dioxin/dibenzofurans
PDI: predesign investigation
PRG: preliminary remediation goal
TEQ: toxicity equivalent

0 2,200 4,400 Feet
Graphic Scale

Legend

- Creek
- Major Roads
- OU-3 Boundary
- OU-4 100-Year Floodplain
- OU-1/OU-2 Downgradient Floodplain
- Parcels
- Exposure Unit with PCB EPC < 21 mg/kg or a maximum PCB concentration < 50 mg/kg
- EU with PCB EPC ≥ 21 mg/kg or a maximum PCB concentration ≥ 50 mg/kg
- Interim Measures Expansion Area – Alternatives IM-2, IM-3, and IM-4
- Target Remedial Area – Alternatives GW-2, GW-3, and GW-4
- Target Remedial Area for PCBs - Alternatives NRS-2, NRS-3, NRS-4, NRS-5, and NRS-6
- Unapproved Waste Disposal Area – Alternatives UWDA-2, UWDA-3, and UWDA-4
- Dredge Spoil Pile In-Place Subject to PDI Sampling - Alternative DSP-2 and DSP-3
- Target Remedial Areas for Other COCs - Alternatives NRS-2, NRS-3, NRS-4, NRS-5, and NRS-6

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

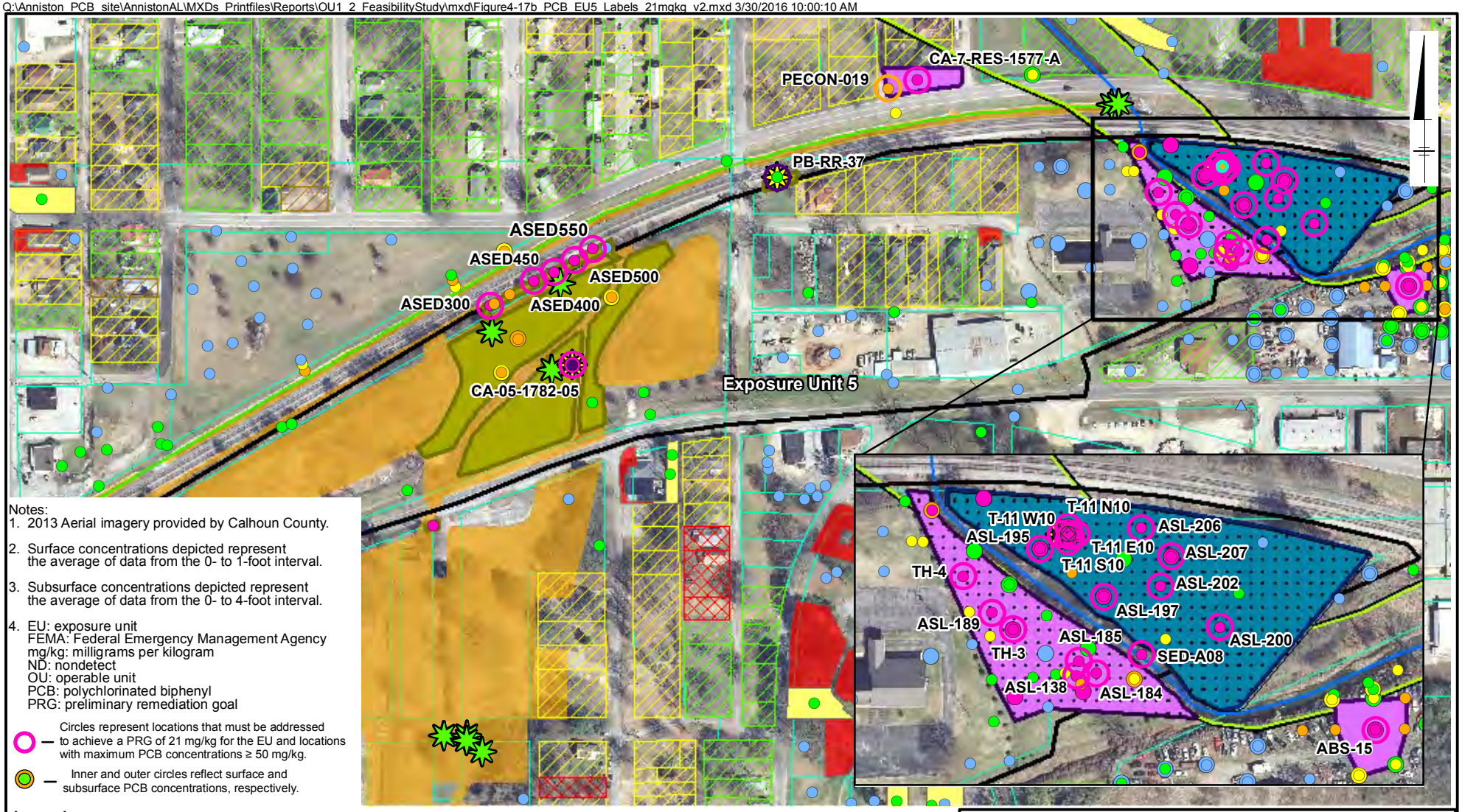
OU-1/OU-2 Feasibility Study Report

Candidate Remedial Areas for Nonresidential Surface Soil with a PCB PRG of 21 mg/kg

Solutia

Figure
4-17a

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-17b_PCB_EU5_Labels_21mgkg_v2.mxd 3/30/2016 10:00:10 AM



Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
   FEMA: Federal Emergency Management Agency
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl
   PRG: preliminary remediation goal

Circles represent locations that must be addressed to achieve a PRG of 21 mg/kg for the EU and locations with maximum PCB concentrations ≥ 50 mg/kg.

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

Legend

Soil Sample Location
Surface PCB (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- ≥ 500

Snow Creek
11th Street Ditch
Exposure Unit

Interim Measure and Other Early Actions
FEMA Floodway
All Parcels

Residential Parcels Sampled
- Residential < 1 (mg/kg)
- Removal Complete
- Residential Appendix 6
- Residential > 1 (mg/kg) (Removal Pending)
- Special Use: High Activity Area
- Principal Threat Waste Area

Special Use: Low Activity Area ≥ 1 mg/kg
Interim Measures Expansion Area – Alternatives IM-2, IM-3, and IM-4
Target Remedial Area – Alternatives GW-2, GW-3, and GW-4
Target Remedial Area for PCBs - Alternatives NRS-2, NRS-3, NRS-4, NRS-5, and NRS-6
Area Not Suitable for Cover Placement without Excavation Due to Potential Local Flooding Impacts

Locations with Maximum PCB Results ≥ 500 mg/kg
Locations Beneath Cover System with Maximum PCB Results ≥ 500 mg/kg

0 300 600 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

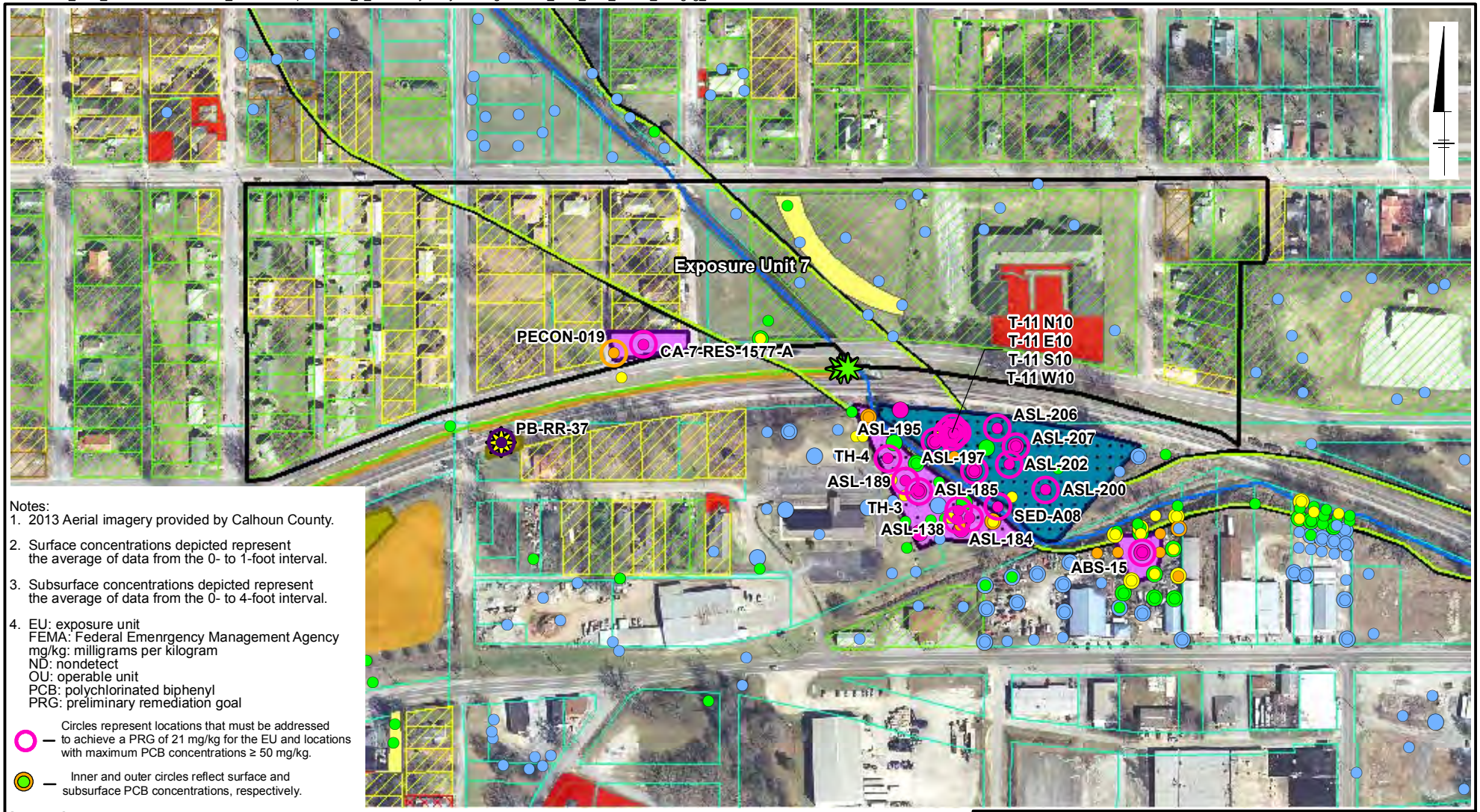
OU-1/OU-2 Feasibility Study Report

Candidate Remedial Areas for Nonresidential Surface Soil with a PCB PRG of 21 mg/kg Exposure Unit 5

Solutia

Figure
4-17b

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-17c_PCB_EU7_Labels_21mgkg_v2.mxd 3/30/2016 10:01:43 AM



Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
   FEMA: Federal Emenrgency Management Agency
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl
   PRG: preliminary remediation goal

Circles represent locations that must be addressed to achieve a PRG of 21 mg/kg for the EU and locations with maximum PCB concentrations ≥ 50 mg/kg.

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

Legend

Soil Sample Location
Surface PCB (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- ≥ 500
- Snow Creek
- 11th Street Ditch
- Exposure Unit

- Interim Measure and Other Early Actions
- FEMA Floodway
- All Parcels

Residential Parcels Sampled
- Residential < 1 (mg/kg)
- Removal Complete
- Residential Appendix 6
- Residential > 1 (mg/kg) (Removal Pending)
- Special Use: High Activity Area

- Special Use: Low Activity Area ≥ 1 mg/kg
- Interim Measures Expansion Area – Alternatives IM-2, IM-3, and IM-4
- Target Remedial Area – Alternatives GW-2, GW-3, and GW-4
- Target Remedial Area for PCBs - Alternatives NRS-2, NRS-3, NRS-4, NRS-5, and NRS-6
- Area Not Suitable for Cover Placement without Excavation Due to Potential Local Flooding Impacts

- Locations with Maximum PCB Results ≥ 500 mg/kg
- Locations Beneath Cover System with Maximum PCB Results ≥ 500 mg/kg

0 300 600 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

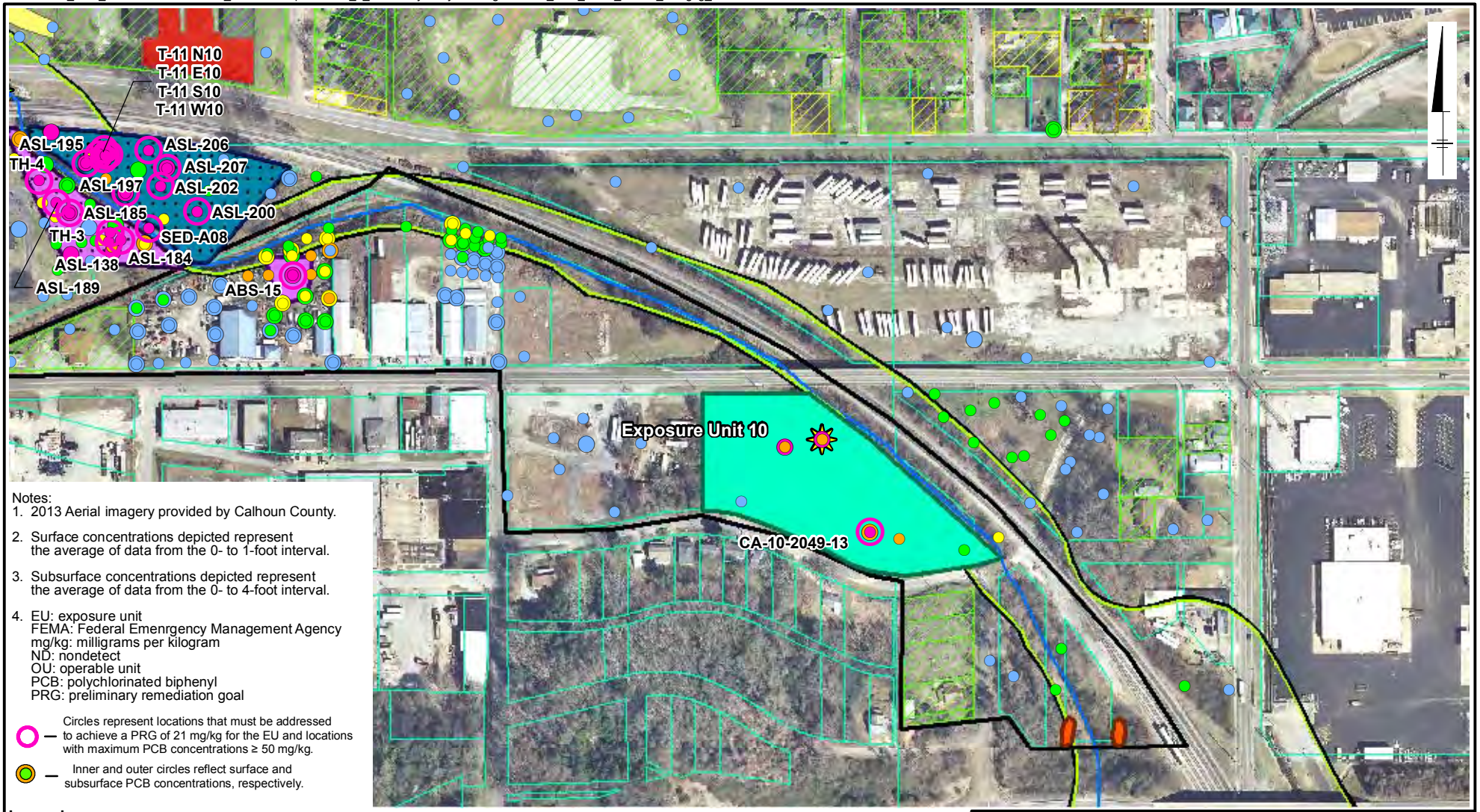
OU-1/OU-2 Feasibility Study Report

Candidate Remedial Areas for Nonresidential Surface Soil with a PCB PRG of 21 mg/kg Exposure Unit 7

Solutia

Figure
4-17c

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-17d_PCB_EU10_Labels_21mgkg_v2.mxd 3/30/2016 10:03:00 AM



Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
   FEMA: Federal Emenrgency Management Agency
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl
   PRG: preliminary remediation goal

Circles represent locations that must be addressed to achieve a PRG of 21 mg/kg for the EU and locations with maximum PCB concentrations ≥ 50 mg/kg.

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

Legend

Soil Sample Location
Surface PCB (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- ≥ 500

Snow Creek
Exposure Unit
Interim Measure and Other Early Actions

FEMA Floodway
All Parcels
Residential Parcels Sampled
Residential < 1 (mg/kg)
Removal Complete
Residential Appendix 6

Special Use: High Activity Area
Special Use: Low Activity Area ≥ 1 mg/kg
Target Remedial Area – Alternatives GW-2, GW-3, and GW-4
Target Remedial Area for PCBs - Alternatives NRS-2, NRS-3, NRS-4, NRS-5, and NRS-6
Unapproved Waste Disposal Area – Alternatives UWDA-2, UWDA-3, and UWDA-4
Dredge Spoil Pile In-Place

Area Not Suitable for Cover Placement without Excavation Due to Potential Local Flooding Impacts
Locations with Maximum PCB Results ≥ 500 mg/kg
Locations Beneath Cover System with Maximum PCB Results ≥ 500 mg/kg

0 300 600 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

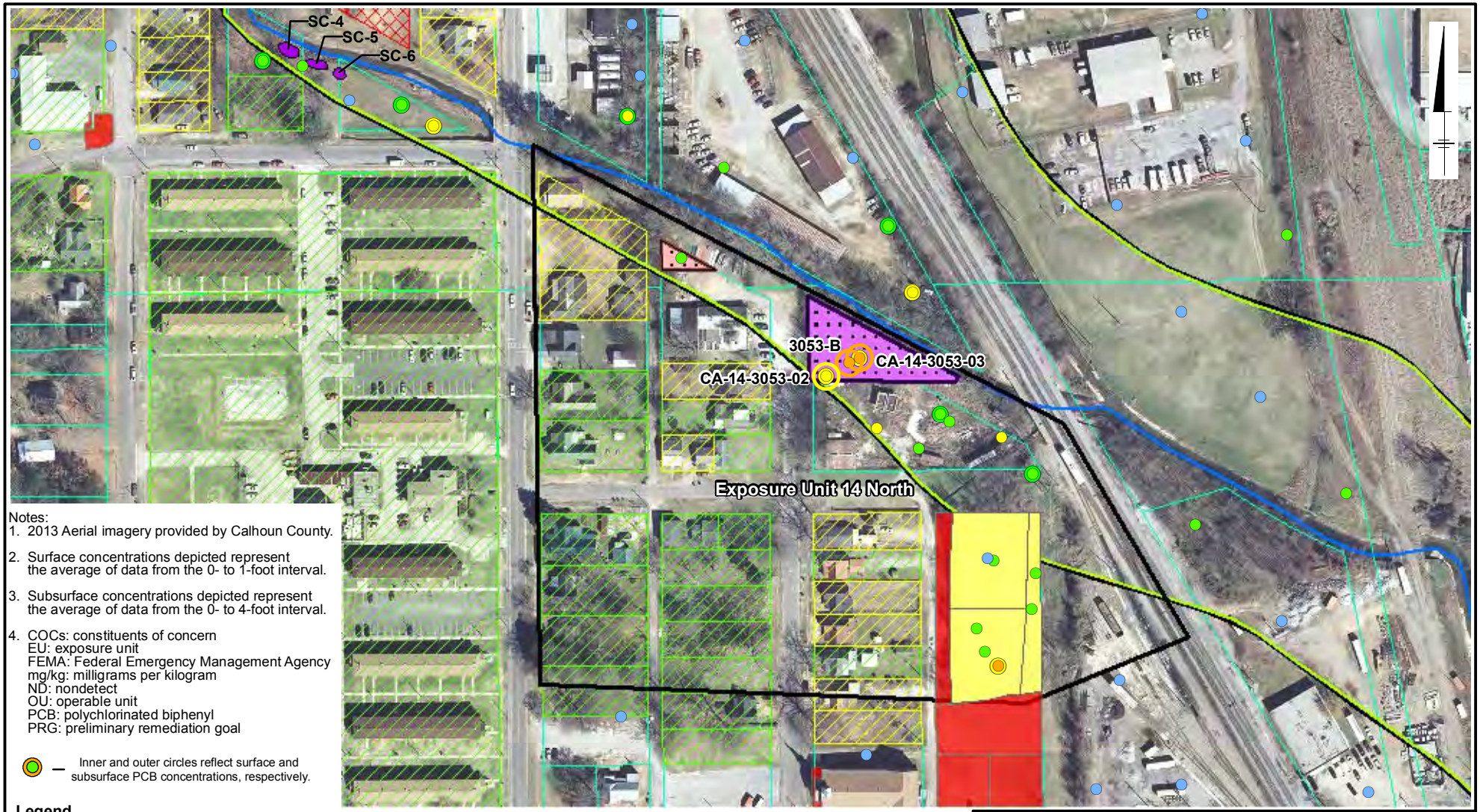
OU-1/OU-2 Feasibility Study Report

Candidate Remedial Areas for Nonresidential Surface Soil with a PCB PRG of 21 mg/kg Exposure Unit 10

Solutia

Figure
4-17d

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. COCs: constituents of concern
   EU: exposure unit
   FEMA: Federal Emergency Management Agency
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl
   PRG: preliminary remediation goal

— Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

Legend

Soil Sample Location
Surface PCB (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50

Snow Creek
Exposure Unit
FEMA Floodway
Dredge Spoil Pile Removed

All Parcels
Residential Parcels Sampled
Residential < 1 (mg/kg)
Removal Complete
Residential > 1 (mg/kg) (Removal Pending)

Special Use: High Activity Area
Special Use: Low Activity Area ≥ 1 mg/kg
Target Remedial Area for PCBs - Alternatives NRS-2, NRS-3, NRS-4, NRS-5, and NRS-6
Target Remedial Areas for Other COCs - Alternatives NRS-2, NRS-3, NRS-4, NRS-5, and NRS-6
Area Not Suitable for Cover Placement without Excavation Due to Potential Local Flooding Impacts

— Circles represent locations that must be addressed to achieve a PRG of 21 mg/kg for the EU and locations with maximum PCB concentrations ≥ 50 mg/kg.

0 200 400
Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

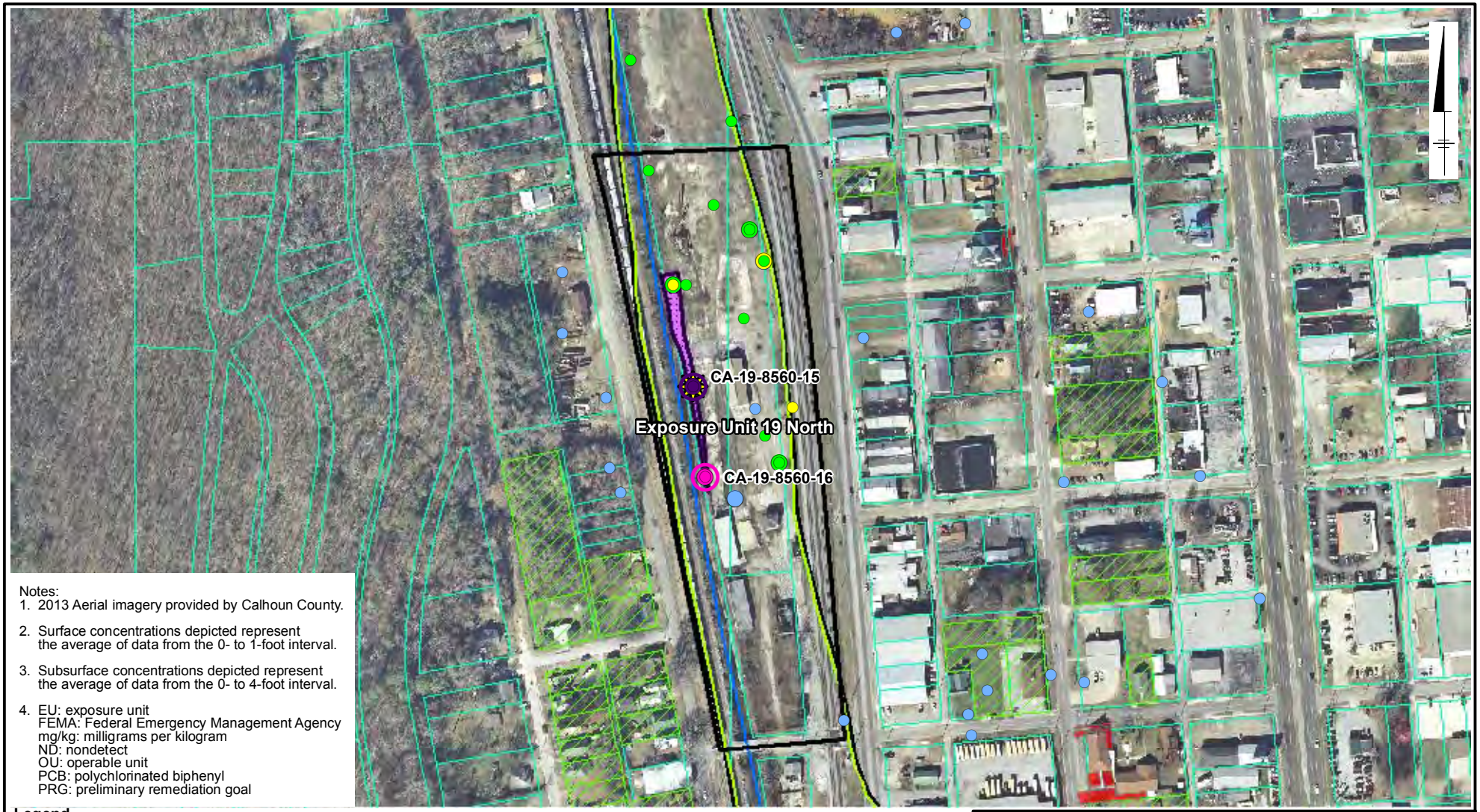
OU-1/OU-2 Feasibility Study Report

Candidate Remedial Areas for Nonresidential Surface Soil with a PCB PRG of 21 mg/kg Exposure Unit 14 North

Solutia

Figure
4-17e

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
   FEMA: Federal Emergency Management Agency
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl
   PRG: preliminary remediation goal

Legend

Soil Sample Location
Surface PCB (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- ≥ 500

Snow Creek

Exposure Unit
FEMA Floodway
All Parcels
Residential Parcels Sampled
Residential < 1 (mg/kg)

Special Use: High Activity Area
Target Remedial Area for PCBs - Alternatives NRS-2, NRS-3, NRS-4, NRS-5, and NRS-6
Area Not Suitable for Cover Placement without Excavation Due to Potential Local Flooding Impacts
Locations with Maximum PCB Results ≥ 500 mg/kg

Circles represent locations that must be addressed to achieve a PRG of 21 mg/kg for the EU and locations with maximum PCB concentrations ≥ 50 mg/kg.
Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

0 300 600 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

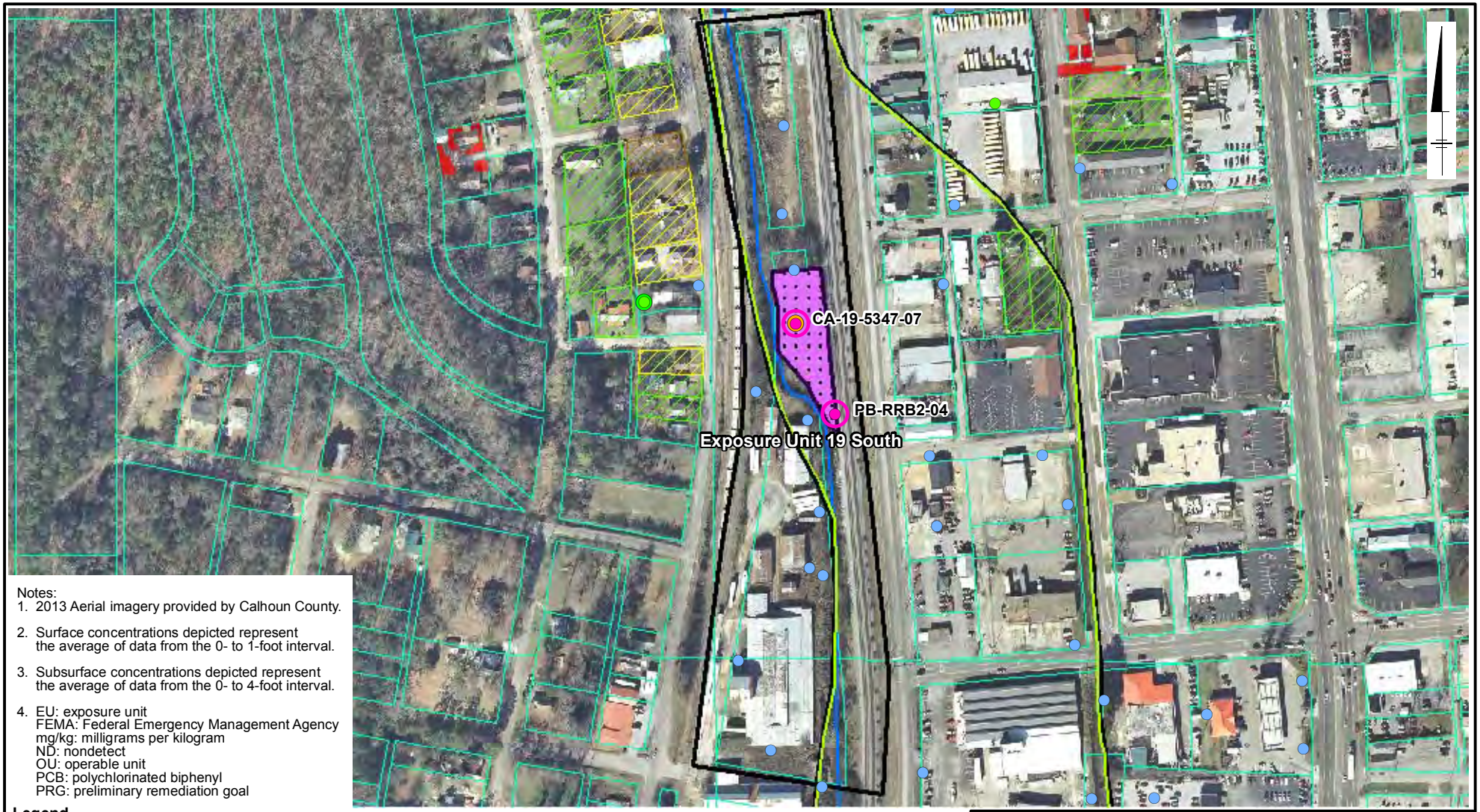
OU-1/OU-2 Feasibility Study Report

Candidate Remedial Areas for Nonresidential Surface Soil with a PCB PRG of 21 mg/kg Exposure Unit 19 North

Solutia
Ingenuity Productivity Performance

Figure
4-17f

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
   FEMA: Federal Emergency Management Agency
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl
   PRG: preliminary remediation goal

Legend

Soil Sample Location
Surface PCB (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500

Snow Creek
Exposure Unit
FEMA Floodway

All Parcels
Residential Parcels Sampled
- Residential < 1 (mg/kg)
- Removal Complete
- Residential Appendix 6
- Special Use: High Activity Area

Target Remedial Area for PCBs - Alternatives NRS-2, NRS-3, NRS-4, NRS-5, and NRS-6
Area Not Suitable for Cover Placement without Excavation Due to Potential Local Flooding Impacts

Circles represent locations that must be addressed to achieve a PRG of 21 mg/kg for the EU and locations with maximum PCB concentrations ≥ 50 mg/kg.
Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

0 300 600 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Candidate Remedial Areas for Nonresidential Surface Soil with a PCB PRG of 21 mg/kg Exposure Unit 19 South

Solutia

Figure
4-17g

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. COCs: constituents of concern
EU: exposure unit
FEMA: Federal Emergency Management Agency
mg/kg: milligrams per kilogram
ND: nondetect
OU: operable unit
PCB: polychlorinated biphenyl
PRG: preliminary remediation goal

Legend

Soil Sample Location
Surface PCB (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500

Snow Creek
Exposure Unit
FEMA Floodway

All Parcels
Special Use: High Activity Area
Target Remedial Area for PCBs - Alternatives NRS-2, NRS-3, NRS-4, NRS-5, and NRS-6
Dredge Spoil Pile In-Place
Target Remedial Areas for Other COCs - Alternatives NRS-2, NRS-3, NRS-4, NRS-5, and NRS-6
Area Not Suitable for Cover Placement without Excavation Due to Potential Local Flooding Impacts

Circles represent locations that must be addressed to achieve a PRG of 21 mg/kg for the EU and locations with maximum PCB concentrations ≥ 50 mg/kg.

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

0 300 600 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

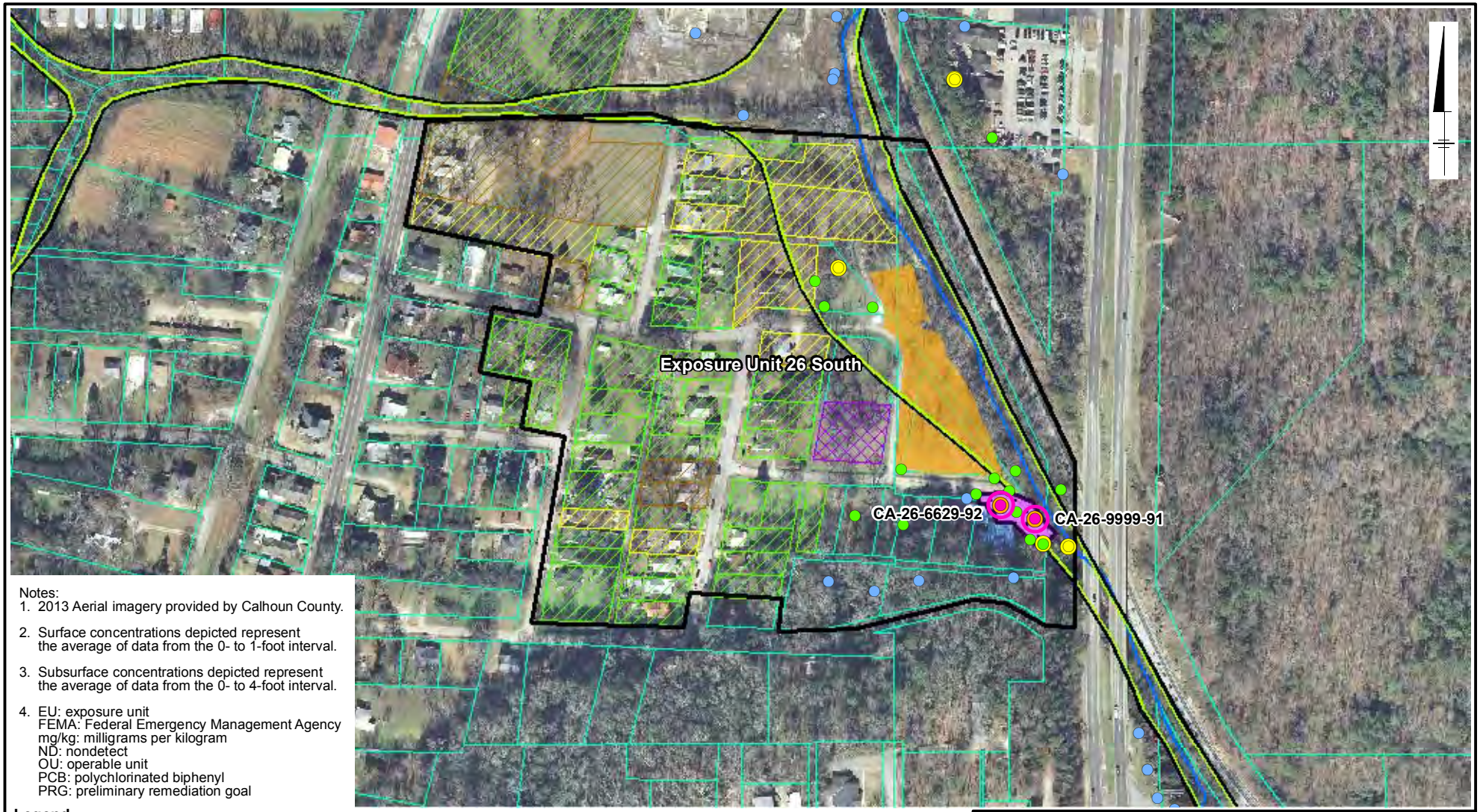
OU-1/OU-2 Feasibility Study Report

Candidate Remedial Areas for Nonresidential Surface Soil with a PCB PRG of 21 mg/kg Exposure Unit 24

Solutia

Figure
4-17h

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. EU: exposure unit
   FEMA: Federal Emergency Management Agency
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl
   PRG: preliminary remediation goal

Legend

Soil Sample Location
Surface PCB (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500

Snow Creek
Exposure Unit
Interim Measure and Other Early Actions
FEMA Floodway
All Parcels
Residential Parcels Sampled
Residential < 1 (mg/kg)
Removal Complete
Residential Appendix 6
Residential > 1 (mg/kg)
Target Remedial Area for PCBs - Alternatives NRS-2, NRS-3, NRS-4, NRS-5, and NRS-6
Area Not Suitable for Cover Placement without Excavation Due to Potential Local Flooding Impacts

Circles represent locations that must be addressed to achieve a PRG of 21 mg/kg for the EU and locations with maximum PCB concentrations ≥ 50 mg/kg.

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

0 300 600 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Candidate Remedial Areas for Nonresidential Surface Soil with a PCB PRG of 21 mg/kg Exposure Unit 26

Solutia

Figure
4-17i

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. Target remedial areas were based on lowering PCB exposure concentrations for the area below 21 mg/kg and addressing surface soil with PCBs ≥ 50 mg/kg.
5. mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl
   PRG: preliminary remediation goal

Legend

Soil Sample Location
Surface PCB (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500

Exposure Unit
Operable Unit 3

Interim Measure and Other Early Actions
All Parcels
Residential Parcels Sampled
Residential < 1 (mg/kg)
Removal Complete
Residential > 1 (mg/kg) (Unsuitable for Removal)

Interim Measures Expansion Area – Alternatives IM-2, IM-3, and IM-4
Target Remedial Area for PCBs - Alternatives NRS-2, NRS-3, NRS-4, NRS-5, and NRS-6
Locations Beneath Cover System with Maximum PCB Results ≥ 500 mg/kg

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

Circles represent locations that must be addressed to achieve a PRG of 21 mg/kg for the area and locations with maximum PCB concentrations ≥ 50 mg/kg.

0 300 600 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Candidate Remedial Areas for Nonresidential Surface Soil with a PCB PRG of 21 mg/kg Highway 202 Area

Solutia

Figure
4-17j

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. The target remedial area west of the northside area was identified to address PAHs, not PCBs.
5. Target remedial areas were based on lowering PCB exposure concentrations for the area below 21 mg/kg and addressing surface soil with PCBs ≥ 50 mg/kg.
6. FEMA: Federal Emergency Management Agency
mg/kg: milligrams per kilogram
ND: nondetect
OU: operable unit
PAHs: polycyclic aromatic hydrocarbons
PCB: polychlorinated biphenyl
PRG: preliminary remediation goal
UWDA: unapproved waste disposal area

Legend

Soil Sample Location
Surface PCB (mg/kg)
- ND to < 1
- ≥ 1 to < 10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500
- ≥ 500

Exposure Unit
Operable Unit 3

All Parcels
Residential Parcels Sampled
Residential < 1 (mg/kg)
Removal Complete
Residential Appendix 6
Residential > 1 (mg/kg) (Removal Pending)
Residential > 1 (mg/kg) (Unsuitable for Removal)

Special Use: High Activity Area
Special Use: Low Activity Area ≥ 1 mg/k
Target Remedial Area for PCBs - Alternatives NRS-2, NRS-3, NRS-4, NRS-5, and NRS-6
Unapproved Waste Disposal Area – Alternatives UWDA-2, UWDA-3, and UWDA-4
Locations with Maximum PCB Results ≥ 500 mg/kg

Circles represent locations that must be addressed to achieve a PRG of 21 mg/kg for the area and locations with maximum PCB concentrations ≥ 50 mg/kg.

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

0 300 600 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

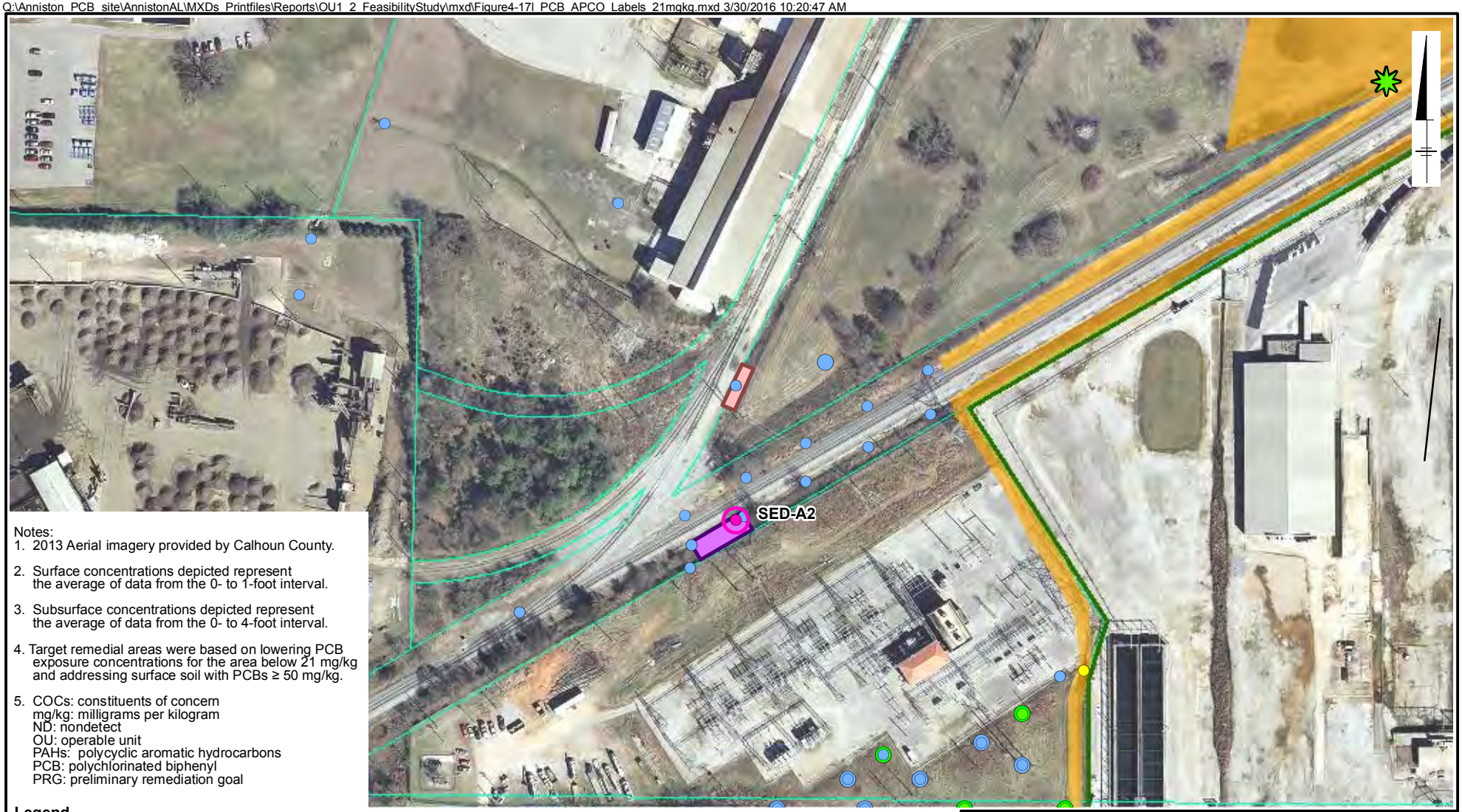
OU-1/OU-2 Feasibility Study Report

Candidate Remedial Areas for Nonresidential Surface Soil with a PCB PRG of 21 mg/kg West of Exposure Unit 1

Solutia

Figure
4-17k

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. Target remedial areas were based on lowering PCB exposure concentrations for the area below 21 mg/kg and addressing surface soil with PCBs ≥ 50 mg/kg.
5. COCs: constituents of concern
mg/kg: milligrams per kilogram
ND: nondetect
OU: operable unit
PAHs: polycyclic aromatic hydrocarbons
PCB: polychlorinated biphenyl
PRG: preliminary remediation goal

Legend

Soil Sample Location
Surface PCB (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500

- Exposure Unit
- Interim Measure and Other Early Actions
- Operable Unit 3
- All Parcels
- Target Remedial Area for PCBs - Alternatives NRS-2, NRS-3, NRS-4, NRS-5, and NRS-6
- Target Remedial Areas for Other COCs - Alternatives NRS-2, NRS-3, NRS-4, NRS-5, and NRS-6
- Locations Beneath Cover System with Maximum PCB Results ≥ 500 mg/kg

Circles represent locations that must be addressed to achieve a PRG of 21 mg/kg for the area and locations with maximum PCB concentrations ≥ 50 mg/kg.
Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

0 200 400 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

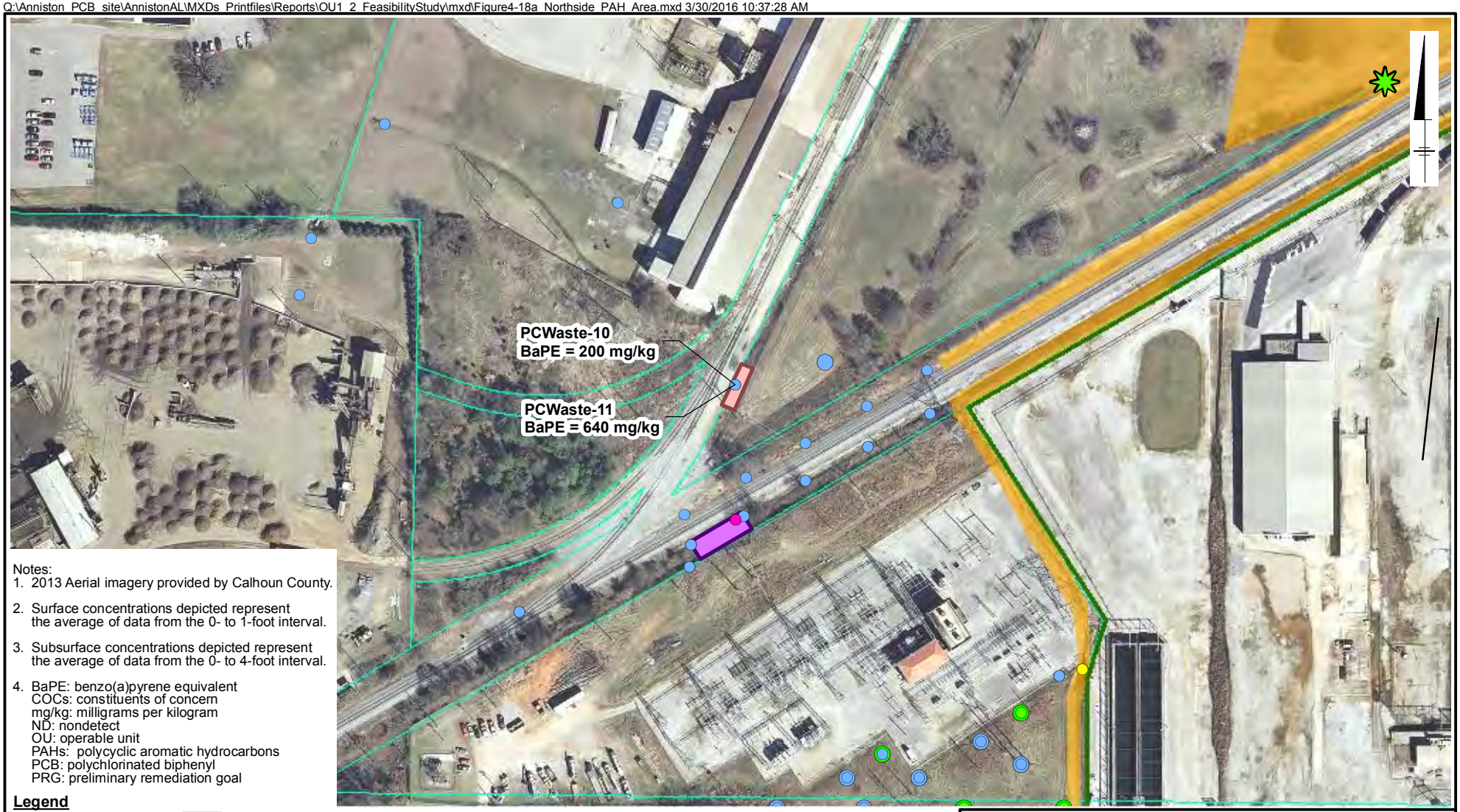
OU-1/OU-2 Feasibility Study Report

Candidate Remedial Areas for Nonresidential Surface Soil with a PCB PRG of 21 mg/kg North of APCO

Solutia

Figure
4-17l

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-18a_Northside_PAH_Area.mxd 3/30/2016 10:37:28 AM



Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. BaPE: benzo(a)pyrene equivalent
   COCs: constituents of concern
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PAHs: polycyclic aromatic hydrocarbons
   PCB: polychlorinated biphenyl
   PRG: preliminary remediation goal

Legend

Soil Sample Location
Surface PCB (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500

- Exposure Unit
- Interim Measure and Other Early Actions
- Operable Unit 3
- All Parcels
- Target Remedial Area for PCBs - Alternatives NRS-2, NRS-3, NRS-4, NRS-5, and NRS-6
- Target Remedial Areas for Other COCs - Alternatives NRS-2, NRS-3, NRS-4, NRS-5, and NRS-6

Locations Beneath Cover System with Maximum PCB Results ≥ 500 mg/kg

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

0 200 400 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

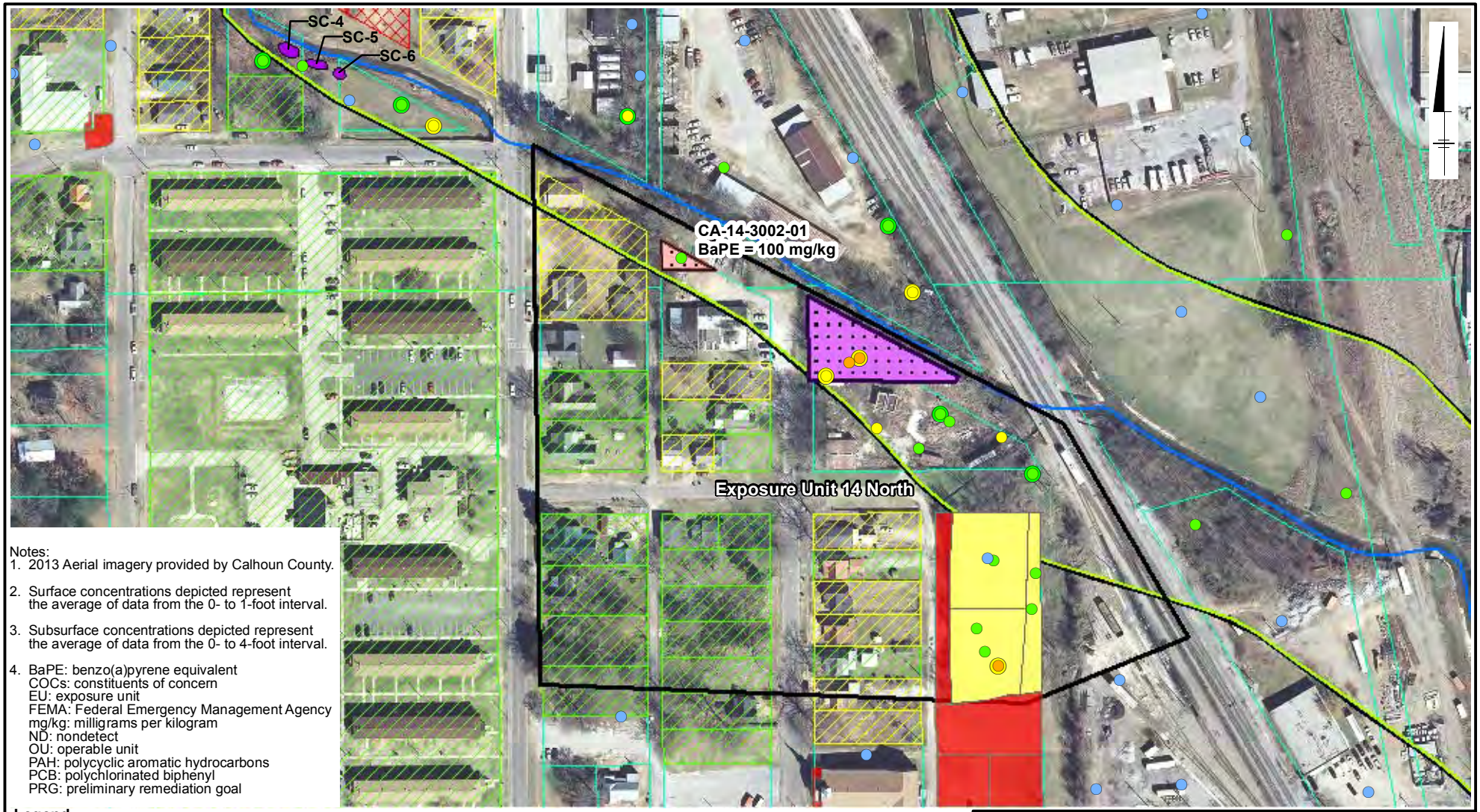
OU-1/OU-2 Feasibility Study Report

Candidate Remedial Area for Nonresidential Surface Soil Exceeding PAH (as BaPE) PRG of 21 mg/kg West of Northside Area

Solutia

Figure
4-18a

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-18b_EU14N_PAH_Area.mxd 3/28/2016 8:16:49 AM



Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. BaPE: benzo(a)pyrene equivalent
COCs: constituents of concern
EU: exposure unit
FEMA: Federal Emergency Management Agency
mg/kg: milligrams per kilogram
ND: nondetect
OU: operable unit
PAH: polycyclic aromatic hydrocarbons
PCB: polychlorinated biphenyl
PRG: preliminary remediation goal

Legend

Soil Sample Location
Surface PCB (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50

Snow Creek
Dredge Spoil Pile Removed

Exposure Unit
FEMA Floodway
All Parcels
Residential Parcels Sampled
Residential < 1 (mg/kg)
Removal Complete
Residential > 1 (mg/kg) (Removal Pending)

Special Use: High Activity Area
Special Use: Low Activity Area ≥ 1 mg/kg
Target Remedial Area for PCBs - Alternatives NRS-2, NRS-3, NRS-4, NRS-5, and NRS-6
Target Remedial Areas for Other COCs - Alternatives NRS-2, NRS-3, NRS-4, NRS-5, and NRS-6

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

0 200 400 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Candidate Remedial Area for Nonresidential Surface Soil Exceeding PAH (as BaPE) PRG of 21 mg/kg EU14 North

Solutia

Figure
4-18b

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-19a_EU22_Chromium_Area.mxd 3/28/2016 8:19:08 AM



Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. Chromium exceedance is located in EU22.
5. COCs: constituents of concern
EU: exposure unit
FEMA: Federal Emergency Management Agency
mg/kg: milligrams per kilogram
ND: nondetect
OU: operable unit
PCB: polychlorinated biphenyl
PRG: preliminary remediation goal

Legend

Soil Sample Location
Surface PCB (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500

Snow Creek

Exposure Unit
Special Use: High Activity Area
FEMA Floodway
All Parcels
Target Remedial Areas for Other COCs - Alternatives NRS-2, NRS-3, NRS-4, NRS-5, and NRS-6

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

0 150 300 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

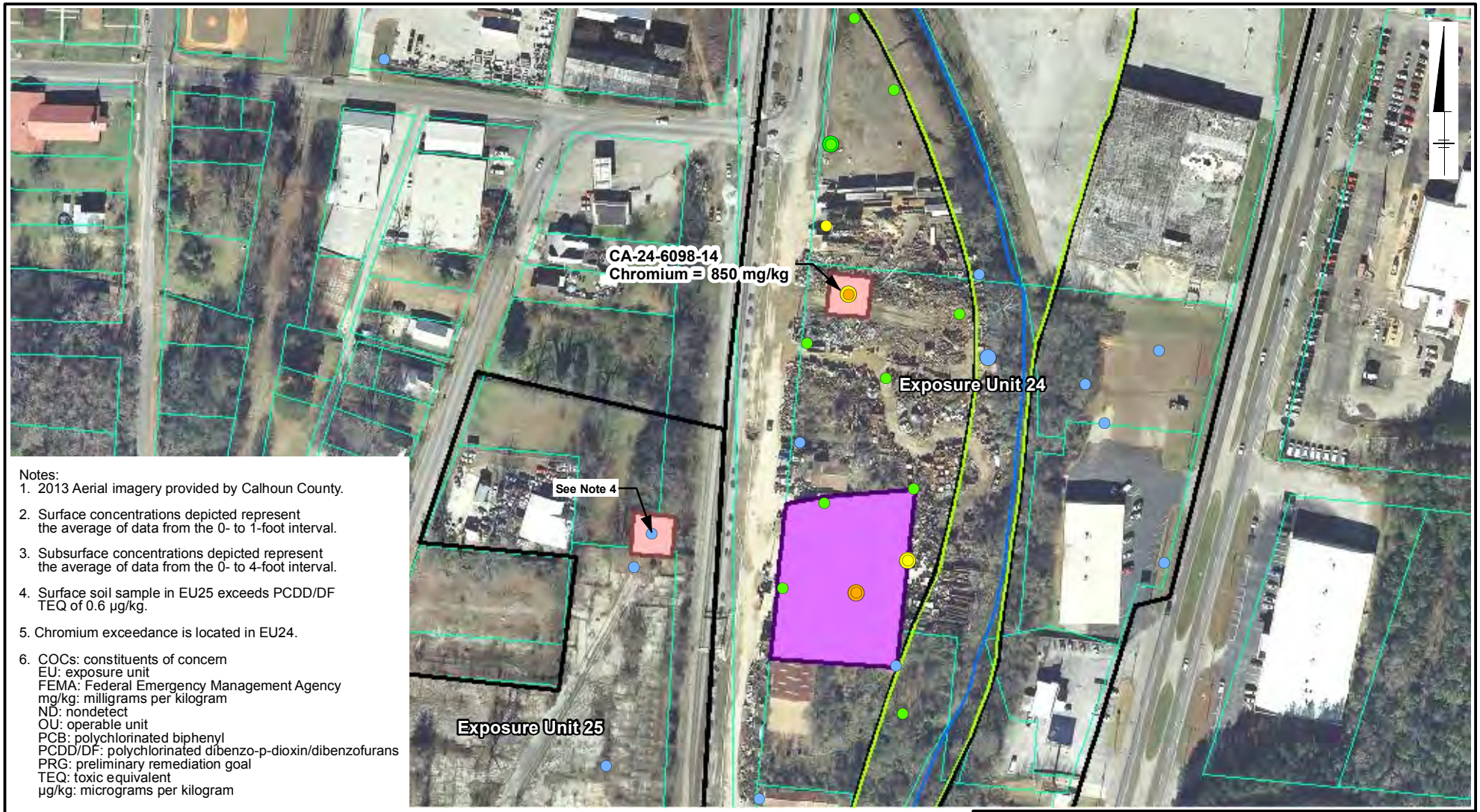
OU-1/OU-2 Feasibility Study Report

Candidate Remedial Area for Nonresidential Surface Soil Exceeding Chromium PRG of 568 mg/kg EU22

Solutia

Figure
4-19a

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
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Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. Surface soil sample in EU25 exceeds PCDD/DF TEQ of 0.6 µg/kg.
5. Chromium exceedance is located in EU24.
6. COCs: constituents of concern
   EU: exposure unit
   FEMA: Federal Emergency Management Agency
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl
   PCDD/DF: polychlorinated dibenzo-p-dioxin/dibenzofurans
   PRG: preliminary remediation goal
   TEQ: toxic equivalent
   µg/kg: micrograms per kilogram

Legend

Soil Sample Location
Surface PCB (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500

Snow Creek

Exposure Unit
FEMA Floodway
All Parcels
Target Remedial Area for PCBs - Alternatives NRS-2, NRS-3, NRS-4, NRS-5, and NRS-6
Target Remedial Areas for Other COCs - Alternatives NRS-2, NRS-3, NRS-4, NRS-5, and NRS-6

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

0 150 300 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

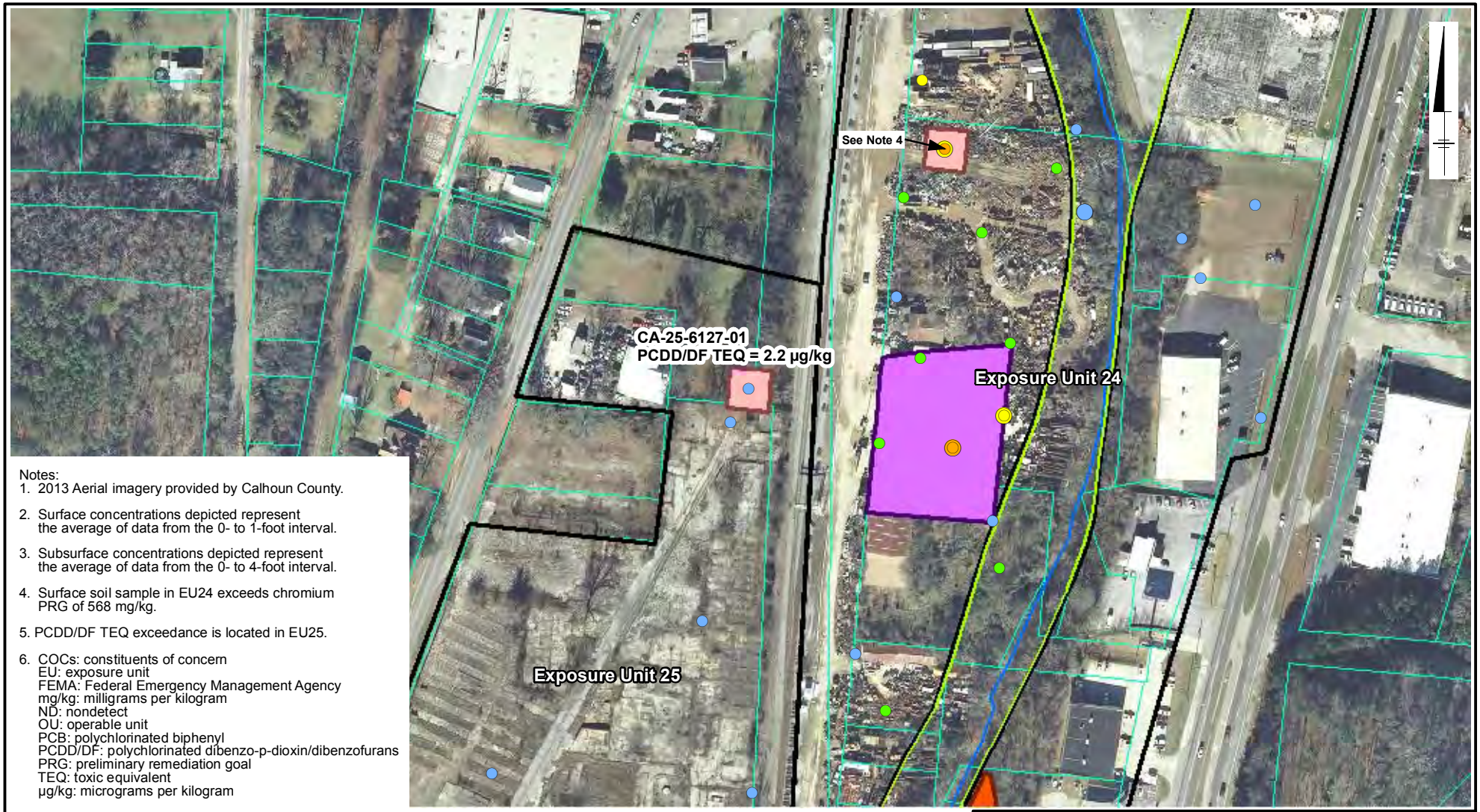
OU-1/OU-2 Feasibility Study Report

Candidate Remedial Area for Nonresidential Surface Soil Exceeding Chromium PRG of 568 mg/kg EU24

Solutia

Figure
4-19b

CITY: SYR DIV/GROUP: 40 DB: KES EAL LD: PIC: PM: TM: TR:
Anniston (B0010291.2010.00001)
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-20_EU25_PCDD_DF_Area.mxd 3/30/2016 10:30:14 AM



Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. Surface soil sample in EU24 exceeds chromium PRG of 568 mg/kg.
5. PCDD/DF TEQ exceedance is located in EU25.
6. COCs: constituents of concern
EU: exposure unit
FEMA: Federal Emergency Management Agency
mg/kg: milligrams per kilogram
ND: nondetect
OU: operable unit
PCB: polychlorinated biphenyl
PCDD/DF: polychlorinated dibenzo-p-dioxin/dibenzofurans
PRG: preliminary remediation goal
TEQ: toxic equivalent
µg/kg: micrograms per kilogram

Legend

Soil Sample Location
Surface PCB (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500

Snow Creek

Exposure Unit
FEMA Floodway
All Parcels
Target Remedial Area for PCBs - Alternatives NRS-2, NRS-3, NRS-4, NRS-5, and NRS-6
Dredge Spoil Pile In-Place
Target Remedial Areas for Other COCs - Alternatives NRS-2, NRS-3, NRS-4, NRS-5, and NRS-6

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

0 150 300 Feet
Graphic Scale

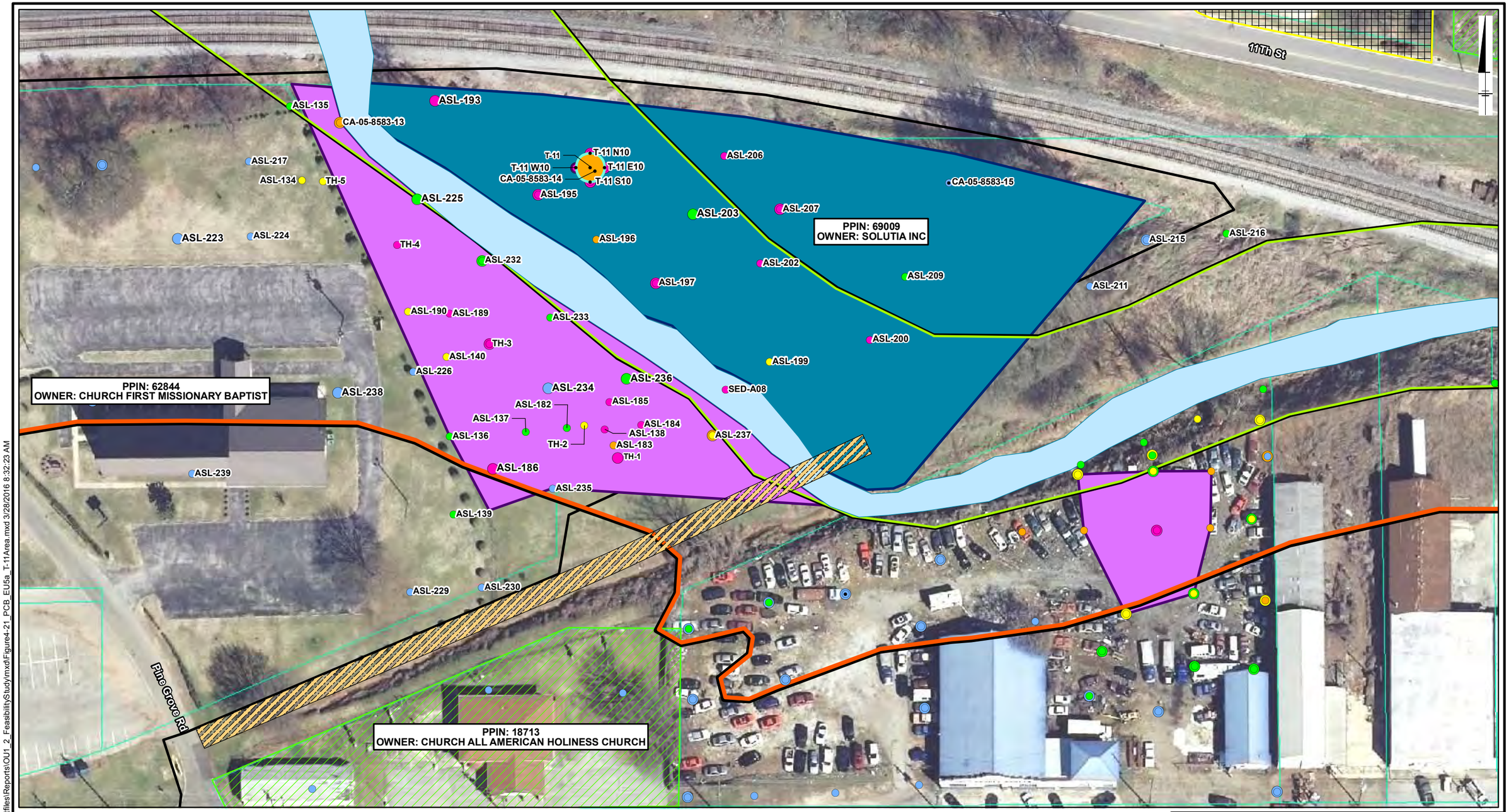
Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Candidate Remedial Area for Nonresidential Surface Soil Exceeding PCDD/DF TEQ PRG of 0.6 µg/kg EU25

Solutia

Figure
4-20



City: SYR Div/Group: SWG Created By: K.IVES Last Saved By: jbistrovich
Anniston
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Legend

Soil Sample Location
Surface PCB (mg/kg)
- ND or < 1
- ≥ 1 or <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500

- Snow Creek
- Analytes other than PCB and Lead Analyzed
- Potential Access Road
- Exposure Unit
- FEMA Floodway
- OU-1/OU-2 Downgradient Floodplain
- Parcel Boundaries
- Completed Removal Area
- Residential < 1 (mg/kg)
- Principal Threat Waste Area
- Target Remedial Area - Alternatives NRS-2, NRS-3, NRS-4, NRS-5, and NRS-6
- Target Remedial Area – Alternatives GW-2, GW-3, and GW-4

0 75 150 Feet
Graphic Scale

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. Bridge location is not finalized.
5. FEMA: Federal Emergency Management Agency
mg/kg: milligrams per kilogram
ND: nondetect
OU: operable unit
PCB: polychlorinated biphenyl
PPIN: Property Parcel Identification Number

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Target Remedial Area in Exposure Unit 5 - T-11 Area

Solutia

Figure
4-21

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: jbistrovich
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-22AtoJ_SnowCreek_SedimentDeposits_WithData1.mxd 3/28/2016 8:44:17 AM

S-1-01		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10021	0-2	3.8
S10022	2-8	31

S-1-02		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10023	0-2	8.0

S-1-04		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10024	0-2	14
S10025	2-5	17

S-1-05		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10026	0-2	11

S-1-07		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10027	0-2	16
S10028	2-12	1.2
S10029	12-23	ND

S-1-08		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10030	0-2	32
S10031	2-12	12
S10032 [duplicate]	2-12	4.3
S10033	12-14.5	37

S-1-10		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10034	0-2	12
S10035	2-12	29
S10036	12-16.5	18

S-1-11a		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10037	0-2	2.2
S10038	2-12	ND
S10039	12-24	0.39

S-1-11b		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10040	0-2.5	12

S-1-12		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10041	0-2	0.67
S10042	2-5	2.1

S-1-01 S-1-02 S-1-03 S-1-04 S-1-05 S-1-06 S-1-07 S-1-08 S-1-09 S-1-10 S-1-11A S-1-11B S-1-12 S-1-13 S-1-14

Figure 4-22a
Figure 4-22b
Figure 4-22c
Figure 4-22d
Figure 4-22e
Figure 4-22f
Figure 4-22g
Figure 4-22h
Figure 4-22i
Figure 4-22j
202
78

Legend

- Sediment Sample Location
- Engineered Bank Stability Measures
- Natural Bank Stability Measures
- 11th Street Ditch
- Snow Creek
- OU-1/OU-2 Downgradient Floodplain

Sediment Deposit
Average PCB Concentration (mg/kg)
- < 3
- ≥ 3 and < 10
- ≥ 10

Sediment Deposit
Estimated PCB Concentration (mg/kg) (see Note 4)
- ≥ 10

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Sediment sample locations are approximate.
3. Snow Creek deposits are based on field probing conducted in 1999.
4. Estimated PCB concentrations for sediment deposits with no sampling data were interpreted based on PCB data for nearby sediment samples.
5. in: inches
   mg/kg: milligram per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl
   PRG: preliminary remediation goal

0 150 300 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Candidate Remedial Areas for Sediment/ Creek Banks with a PCB PRG of 3 mg/kg

Solutia

Figure 4-22a

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: jbistrovich
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-22AtoJ_SnowCreek_SedimentDeposits_WithData1.mxd 3/28/2016 8:39:36 AM

S-1-16		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10043	0-2	28
S10044	2-5	32

SED-A09		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
SED-A9	0-3	7.8

S-1-14
S-1-15
S-1-16
S-1-17
S-2

Figure 4-22a
Figure 4-22b
Figure 4-22c
Figure 4-22d
Figure 4-22e
Figure 4-22f
Figure 4-22g
Figure 4-22h
Figure 4-22i
Figure 4-22j
202
78

Legend

- Sediment Sample Location
- Snow Creek
- OU-1/OU-2 Downgradient Floodplain
- Sediment Deposit Average PCB Concentration (mg/kg) ≥ 10
- Sediment Deposit Estimated PCB Concentration (mg/kg) (see Note 4) ≥ 10

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Sediment sample locations are approximate.
3. Snow Creek deposits are based on field probing conducted in 1999.
4. Estimated PCB concentrations for sediment deposits with no sampling data were interpreted based on PCB data for nearby sediment samples.
5. in: inches
   mg/kg: milligram per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl
   PRG: preliminary remediation goal

0 150 300 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Candidate Remedial Areas for Sediment/ Creek Banks with a PCB PRG of 3 mg/kg

Solutia

Figure
4-22b

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: jbistrovich
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-22AtoJ_SnowCreek_SedimentDeposits_WithData1.mxd 3/28/2016 8:44:17 AM

S-1-17

CP-C-9		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
CP-C-9-0-4"	0-4	2.0

S-2-02		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10045	0-3.5	19

CP-C-10		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
CP-C-10-0-2"	0-2	2.9
CP-C-10-2-6"	2-6	3.6
CP-C-10-6-12"	6-12	12

SED-A10		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
SED-A10	0-3	6.9

CP-C-11		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
CP-C-11-0-2"	0-2	1.6
CP-C-11-2-6"	2-6	1.2
CP-C-11-6-12"	6-12	7.5

S-2-03a		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10046	0-3	3.8

S-2-05		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10048	0-2	5.4
S10049	2-5	6.4

S-MED-1		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10134	0-8	60

S-2-06A		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10060	0-2	22
S10061	2-5	8.9

S-HIGH-1		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10135	0-18	4.2
S10137 [duplicate]	0-18	2.3

S-2-06B		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10053	0-2	13
S10054	2-12	11
S10055	12-20.5	34
S10131 [duplicate]	12-20.5	60

S-2-08		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10050	0-2	20
S10051	2-12	20
S10052	12-16	4.0

S-2-06C		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10056	0-2	30
S10057	2-12	14
S10058	12-24	23
S10059	24-27	15

SED-A11		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
SED-A11	0-3	16

PECON-011		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
PECON-011	0-3	4.3

PECON-012		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
PECON-012	0-3	8.5

S-2-01
S-2-02
S-2-3B
S-2-3A
S-2-4A
S-2-4B
S-2-05
S-2-06
S-2-07
S-2-08
S-2-09
S-2-10
S-2-11
S-2-12
S-2-13
S-2-14

Figure 4-22a
Figure 4-22b
Figure 4-22c
Figure 4-22d
Figure 4-22e
Figure 4-22f
Figure 4-22g
Figure 4-22h
Figure 4-22i
Figure 4-22j
202
78

Legend

- Sediment Sample Location
- Natural Bank Stability Measures
- Snow Creek
- OU-1/OU-2 Downgradient Floodplain
- Deposit with Metals Exceedance and PCB < 10 mg/kg

Sediment Deposit
Average PCB Concentration (mg/kg)
- ≥ 3 and < 10
- ≥ 10

Sediment Deposit
Estimated PCB Concentration (mg/kg) (see Note 4)
- ≥ 3 and < 10
- ≥ 10

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Sediment sample locations are approximate.
3. Snow Creek deposits are based on field probing conducted in 1999.
4. Estimated PCB concentrations for sediment deposits with no sampling data were interpreted based on PCB data for nearby sediment samples.
5. in: inches
   mg/kg: milligram per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl
   PRG: preliminary remediation goal

0 150 300 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Candidate Remedial Areas for Sediment/ Creek Banks with a PCB PRG of 3 mg/kg

Solutia

Figure
4-22c

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: jbistrovich
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-22AtoJ_SnowCreek_SedimentDeposits_WithData1.mxd 3/28/2016 8:44:17 AM

S-3-01		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10064	0-2	3.3
S10065	2-8	4.8

SED-A12		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
SED-A12	0-3	3.9

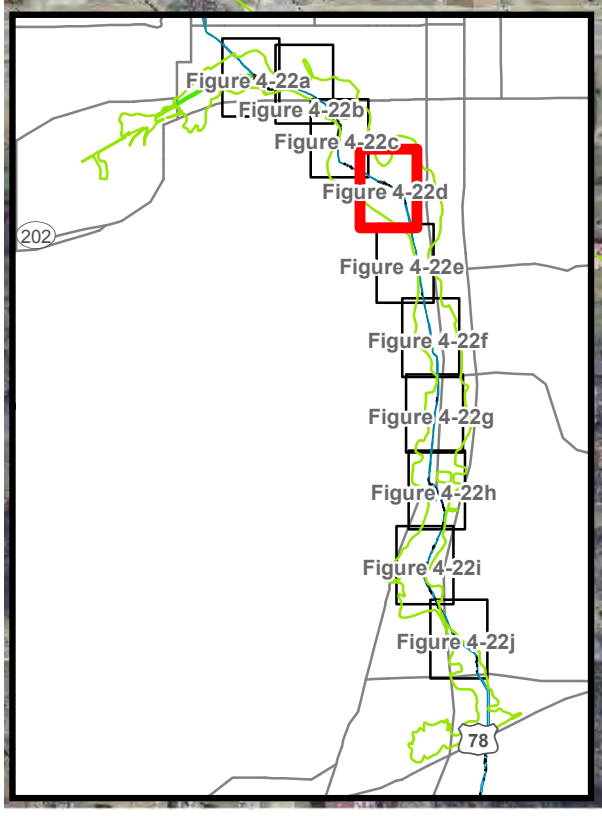
S-3-05		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10069	0-2	1.4
S10070	2-10.5	2.1

S-2-16		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10062	0-2	4.0
S10063	2-4	3.3

S-3-02		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10066	0-2	8.1
S10067	2-12	11
S10068	12-15.5	17

S-3-07		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10071	0-2	0.66
S10072	2-8	0.76

S-2-15
S-2-16
S-3-01
S-3-02
S-3-03
S-3-04
S-3-05
S-3-06
S-3-07



Legend

- Sediment Sample Location
- Snow Creek
- OU-1/OU-2 Downgradient Floodplain

Sediment Deposit
Average PCB Concentration (mg/kg)
- < 3
- ≥ 3 and < 10
- ≥ 10

Sediment Deposit
Estimated PCB Concentration (mg/kg) (see Note 4)
- < 3
- ≥ 3 and < 10

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Sediment sample locations are approximate.
3. Snow Creek deposits are based on field probing conducted in 1999.
4. Estimated PCB concentrations for sediment deposits with no sampling data were interpreted based on PCB data for nearby sediment samples.
5. in: inches
   mg/kg: milligram per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl
   PRG: preliminary remediation goal

0 150 300 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

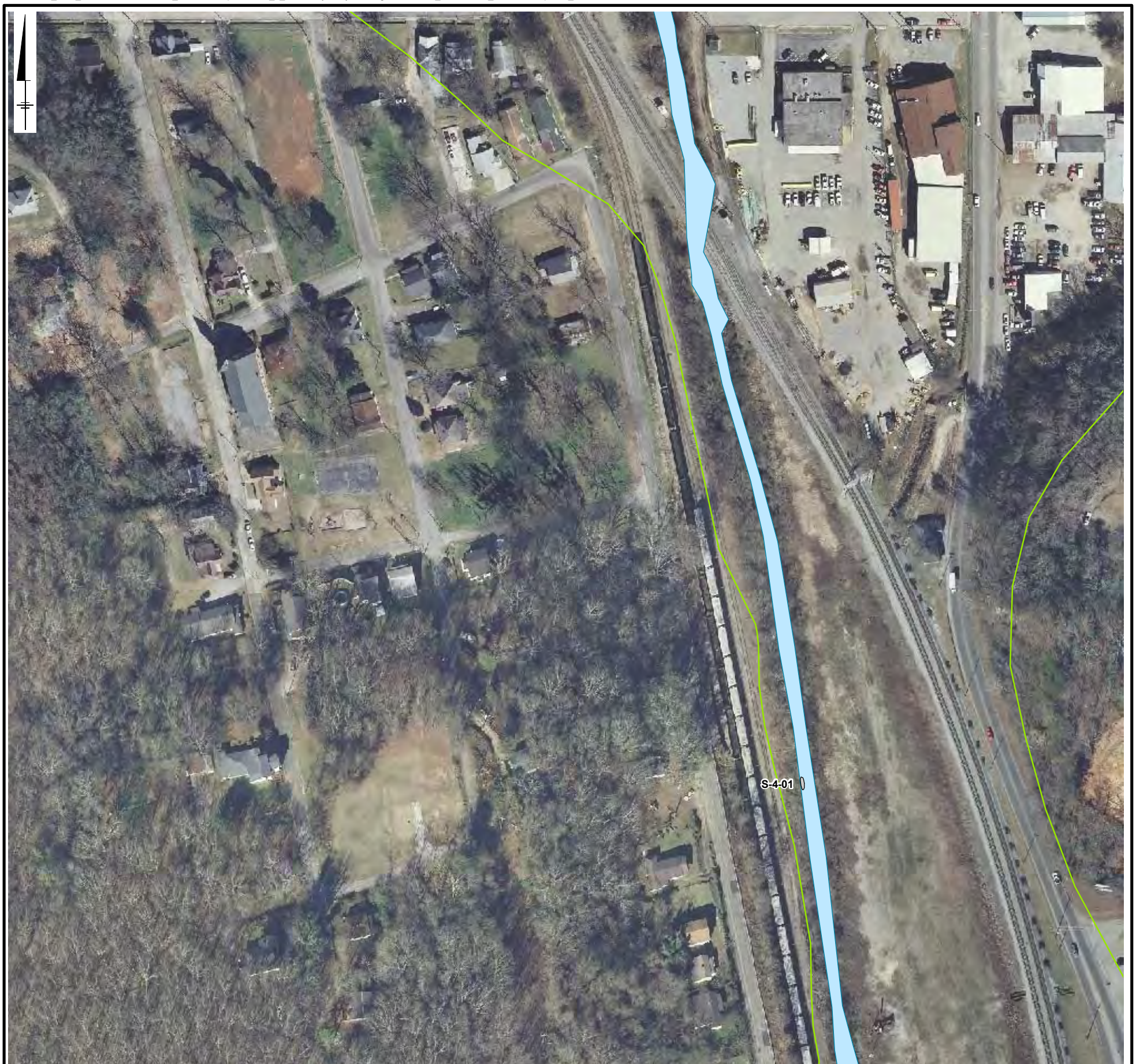
OU-1/OU-2 Feasibility Study Report

Candidate Remedial Areas for Sediment/ Creek Banks with a PCB PRG of 3 mg/kg

Solutia

Figure
4-22d

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: jbistrovich
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-22AtoJ_SnowCreek_SedimentDeposits_WithData1.mxd 3/28/2016 8:44:17 AM



S-4-02		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10073	0-2	1.1
S10074	2-4	0.58

Legend

- Sediment Sample Location
- Snow Creek
- OU-1/OU-2 Downgradient Floodplain
- Sediment Deposit Average PCB Concentration (mg/kg) < 3
- Sediment Deposit Estimated PCB Concentration (mg/kg) (see Note 4) < 3

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Sediment sample locations are approximate.
3. Snow Creek deposits are based on field probing conducted in 1999.
4. Estimated PCB concentrations for sediment deposits with no sampling data were interpreted based on PCB data for nearby sediment samples.
5. in: inches
   mg/kg: milligram per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl
   PRG: preliminary remediation goal

0 150 300 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Candidate Remedial Areas for Sediment/ Creek Banks with a PCB PRG of 3 mg/kg

Solutia

Figure
4-22e

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: jbistrovich
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-22AtoJ_SnowCreek_SedimentDeposits_WithData1.mxd 3/28/2016 8:44:17 AM



Legend

- Snow Creek
- OU-1/OU-2 Downgradient Floodplain

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. OU: operable unit
   PCB: polychlorinated biphenyl
   PRG: preliminary remediation goal
3. No remedial areas shown on this figure. Figure included to provide complete view of Snow Creek.

0 150 300 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Candidate Remedial Areas for Sediment/ Creek Banks with a PCB PRG of 3 mg/kg

Solutia

Figure
4-22f

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: jbistrovich
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-22AtoJ_SnowCreek_SedimentDeposits_WithData1.mxd 3/28/2016 8:44:17 AM

S-5-01		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10075	0-3.5	0.65
S10076 [duplicate]	0-3.5	0.76

S-5-01

Figure 4-22a
Figure 4-22b
Figure 4-22c
Figure 4-22d
Figure 4-22e
Figure 4-22f
Figure 4-22g
Figure 4-22h
Figure 4-22i
Figure 4-22j
202
78

Legend

- Sediment Sample Location
- Snow Creek
- OU-1/OU-2 Downgradient Floodplain
- Sediment Deposit
- Average PCB Concentration (mg/kg)
  - < 3

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Sediment sample locations are approximate.
3. Snow Creek deposits are based on field probing conducted in 1999.
4. in: inches
   mg/kg: milligram per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl
   PRG: preliminary remediation goal

0 150 300 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Candidate Remedial Areas for Sediment/ Creek Banks with a PCB PRG of 3 mg/kg

Solutia

Figure
4-22g

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: jbistrovich
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-22AtoJ_SnowCreek_SedimentDeposits_WithData1.mxd 3/28/2016 8:44:17 AM

S-5-02		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10077	0-3.5	4.5

S-5-03		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10078	0-2	5.8
S10079	2-4	1.6

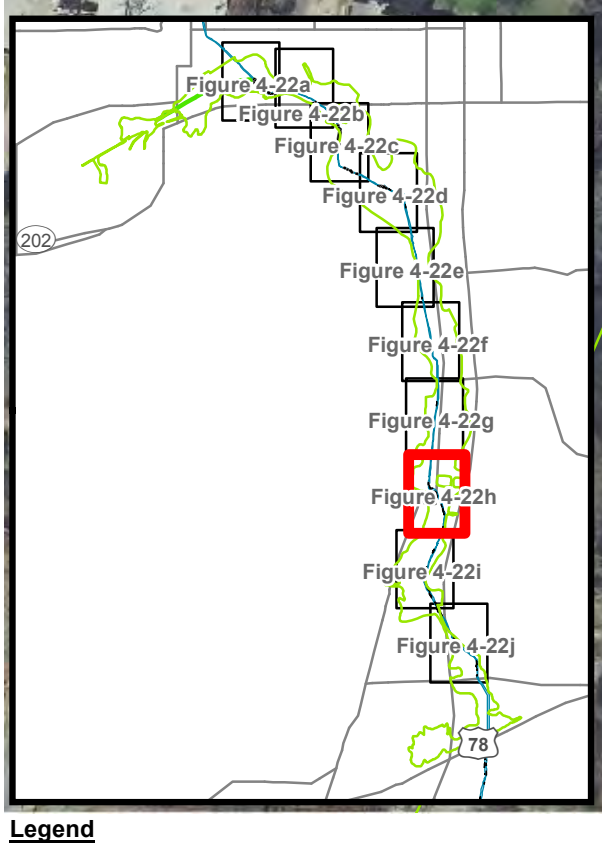
S-LOW-1		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10136	0-6	1.7

S-5-04		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10080	0-2	1.8
S10081	2-6	1.9

S-5-05		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10082	0-2	1.2
S10083	2-4	1.9

S-5-06		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10084	0-2	2.7
S10085	2-5	2.3

S-5-03
S-5-04
S-5-05
S-5-06
S-5-07
S-5-08A
S-5-08B



Legend

- Sediment Sample Location
- Snow Creek
- OU-1/OU-2 Downgradient Floodplain
- Deposit with Metals Exceedance and PCB < 3 mg/kg

Sediment Deposit
Average PCB Concentration (mg/kg)
- < 3
- ≥ 3 and < 10

Sediment Deposit
Estimated PCB Concentration (mg/kg) (see Note 4)
- < 3

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Sediment sample locations are approximate.
3. Snow Creek deposits are based on field probing conducted in 1999.
4. Estimated PCB concentrations for sediment deposits with no sampling data were interpreted based on PCB data for nearby sediment samples.
5. in: inches
   mg/kg: milligram per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl
   PRG: preliminary remediation goal

0 150 300 Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Candidate Remedial Areas for Sediment/ Creek Banks with a PCB PRG of 3 mg/kg

Solutia

Figure
4-22h

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: jbistrovich
ANNISTON
Q:\Anniston_PCB_site\AnnistonAL\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Figure4-22AtoJ_SnowCreek_SedimentDeposits_WithData1.mxd 3/28/2016 8:44:17 AM

S-5-08B
S-5-9
S-5-10
S-5-11A
S-5-11B
S-5-12A
S-5-12B
S-5-13
S-5-14
S-5-15
S-5-16

PECON-020		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
PECON-020	0-3	0.75

CA-25-9999-90		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
PCWASTE-004-A	0-3	11
S70746	6-12	0.76

FE2-001-C		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
FE2-001-C	0-3	2.5

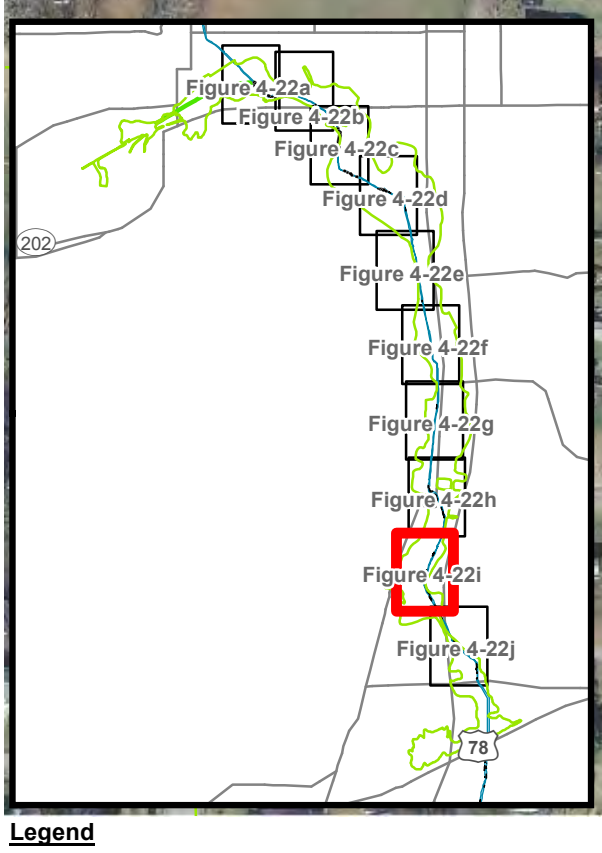
FE2-001-A		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
FE2-001-A	0-3	0.90

S-5-13		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10086	0-3.5	1.3

S-5-14A		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10087	0-2	1.5
S10088	2-5	0.92

S-5-14B		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10089	0-2	1.6
S10090	2-5.5	1.6

PCWaste-004-B		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
PCWaste-004-B	0-3	1.2



Legend

- Sediment Sample Location
- Snow Creek
- OU-1/OU-2 Downgradient Floodplain
- Deposit with Metals Exceedance and PCB < 3 mg/kg

Sediment Deposit
Average PCB Concentration (mg/kg)
- < 3

Sediment Deposit
Estimated PCB Concentration (mg/kg) (see Note 4)
- < 3
- ≥ 3 and < 10

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Sediment sample locations are approximate.
3. Snow Creek deposits are based on field probing conducted in 1999.
4. Estimated PCB concentrations for sediment deposits with no sampling data were interpreted based on PCB data for nearby sediment samples.
5. in: inches
   mg/kg: milligram per kilogram
   OU: operable unit
   PCB: polychlorinated biphenyl
   PRG: preliminary remediation goal

0 150 300
Feet
Graphic Scale

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Candidate Remedial Areas for Sediment/ Creek Banks with a PCB PRG of 3 mg/kg

Solutia

Figure
4-22i

City: SYR Div/Group: SWG Created By: KIVES Last Saved By: jbistrovich
ANNISTON
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S-5-16
S-5-17
S-5-18
S-5-19
S-5-21
S-5-22
S-5-23
S-5-24
S-5-25

S-5-24		
Sample Name	Depth Interval (in)	Total PCB (mg/kg)
S10091	0-2	1.2
S10092	2-12	1.2

Figure 4-22a
Figure 4-22b
Figure 4-22c
Figure 4-22d
Figure 4-22e
Figure 4-22f
Figure 4-22g
Figure 4-22h
Figure 4-22i
Figure 4-22j
202
78

Legend

- Sediment Sample Location
- Snow Creek
- OU-1/OU-2 Downgradient Floodplain

Sediment Deposit
Average PCB Concentration (mg/kg)
< 3
Sediment Deposit
Estimated PCB Concentration (mg/kg) (see Note 4)
< 3

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Sediment sample locations are approximate.
3. Snow Creek deposits are based on field probing conducted in 1999.
4. Estimated PCB concentrations for sediment deposits with no sampling data were interpreted based on PCB data for nearby sediment samples.
5. in: inches
mg/kg: milligram per kilogram
OU: operable unit
PCB: polychlorinated biphenyl
PRG: preliminary remediation goal

0 150 300 Feet
Graphic Scale

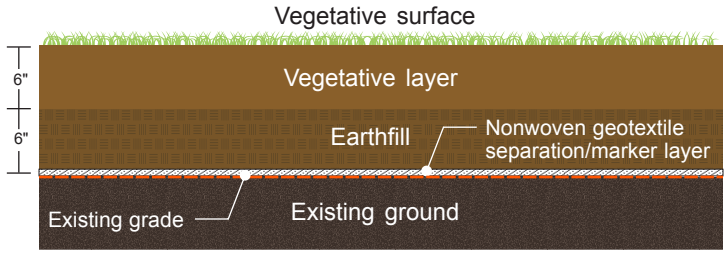
Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

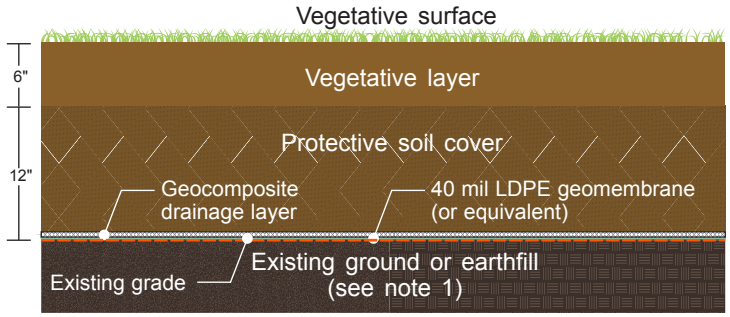
Candidate Remedial Areas for Sediment/ Creek Banks with a PCB PRG of 3 mg/kg

Solutia

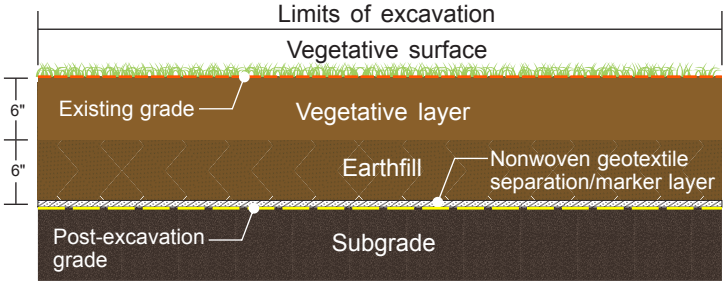
Figure
4-22j



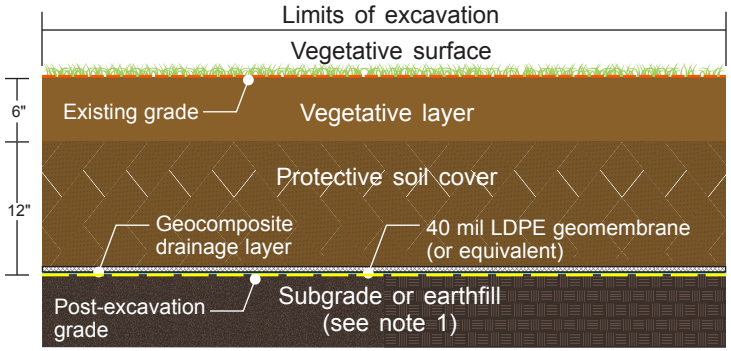
Typical Soil Cover Cross Section - No Soil Excavation



Typical Low-Permeability Cap Cross Section - No Soil Excavation



Typical Soil Cover Cross Section - Soil Excavation (Where Cover Placement Cannot Be Implemented Due to the Potential for Local Flooding)



Typical Low-Permeability Cap Cross Section - Soil Excavation (where Cover Placement Cannot Be Implemented Due to the Potential for Local Flooding)

Not to scale

Note:
1. Earthfill material to be provided as necessary to provide the proper drainage for the cap system.

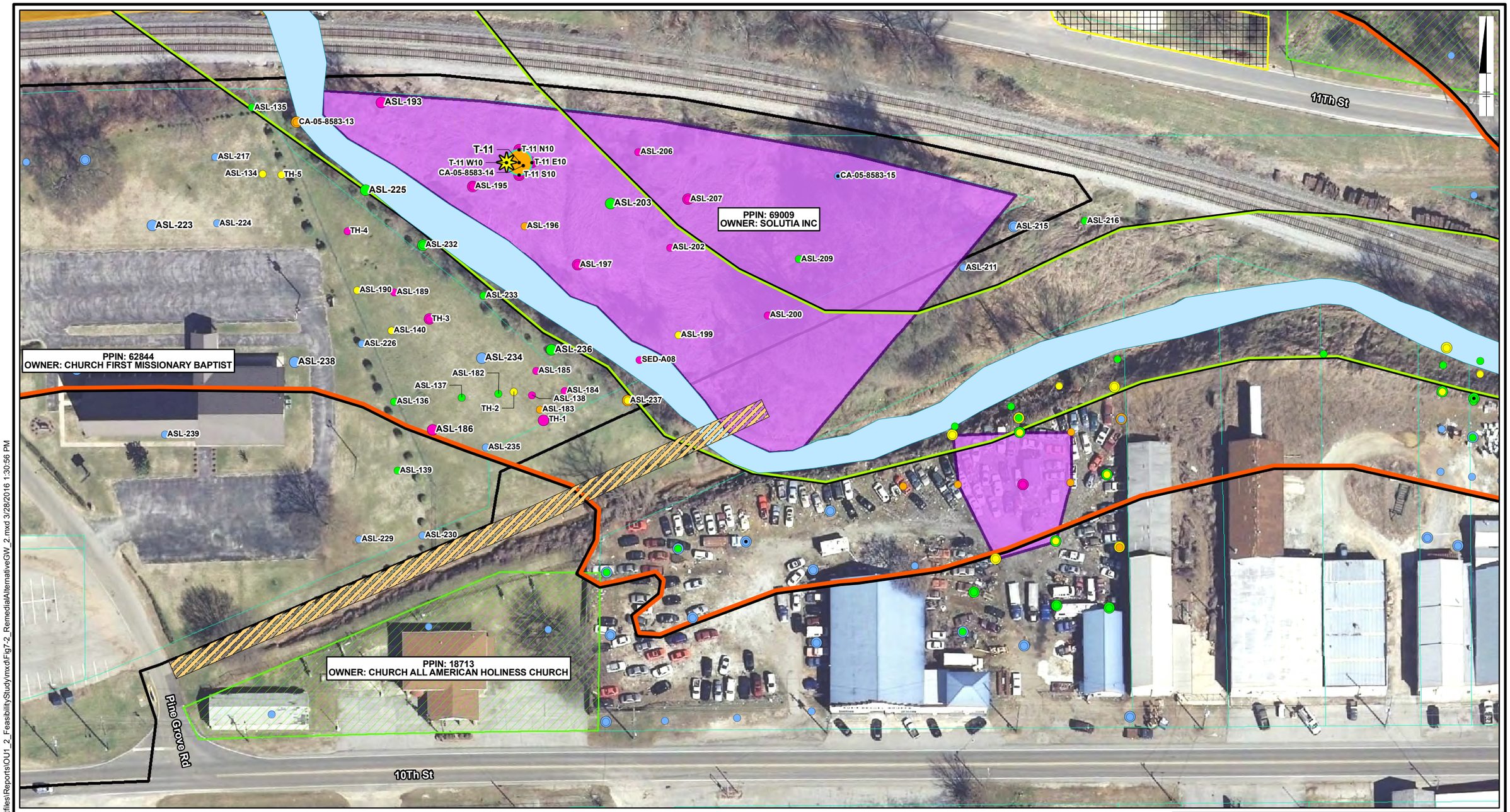
LDPE: low density polyethylene
OU: operable unit
PCB: polychlorinated biphenyl

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama
OU-1/OU-2 Feasibility Study Report

Typical Soil Cover and Low-Permeability Cap Cross Sections

Solutia

Figure 7-1



City: SYR Div/Group: SWG Created By: K.IVES Last Saved By: kives
Anniston
Q:\Anniston_PCB_site\Anniston\ALM\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Fig7-2_RemedialAlternativeGW_2.mxd 3/28/2016 1:30:56 PM

Legend

Soil Sample Location
Surface PCB (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500

- Analytes other than PCB and Lead Analyzed
- Locations with Maximum PCB Results ≥ 500 mg/kg
- Completed Removal Area
- Residential < 1 (mg/kg)
- FEMA Floodway
- OU-1/OU-2 Downgradient Floodplain
- Exposure Unit
- Snow Creek
- Parcel Boundaries
- Interim Measure and Other Early Actions
- Potential Access Road
- Target Remedial Area - 1-Foot Soil Excavation
- Principle Threat Waste Area

0 75 150 Feet
Graphic Scale

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. Locations of the access road and bridge across Snow Creek would be determined during the design phase.
5. FEMA: Federal Emergency Management Agency
mg/kg: milligrams per kilogram
ND: nondetect
OU: operable unit
PCB: polychlorinated biphenyl
PPIN: property parcel identification number

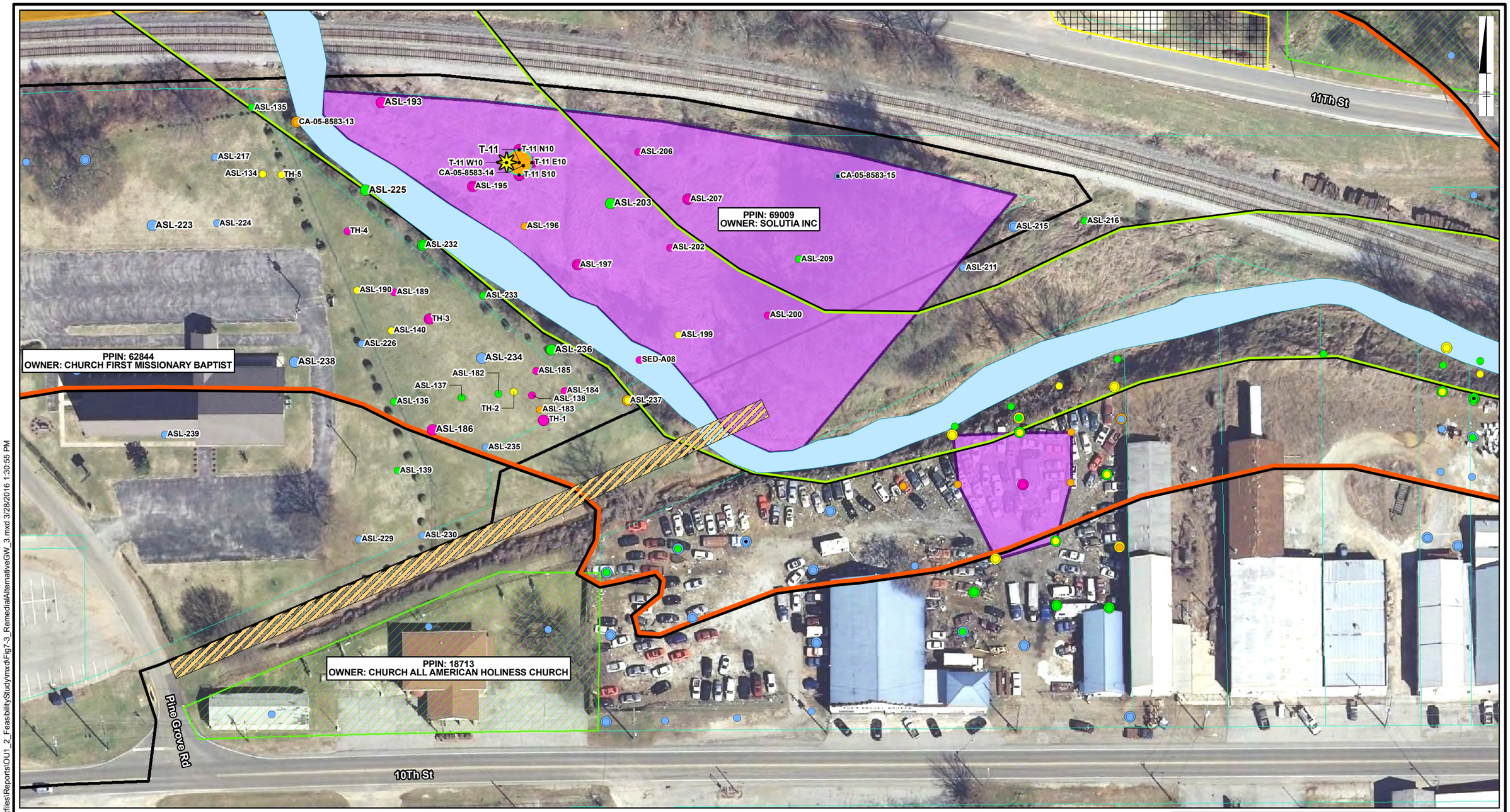
Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Remedial Alternative GW-2

Solutia

Figure
7-2



Legend

Soil Sample Location
Surface PCB (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500

- Analytes other than PCB and Lead Analyzed
- Locations with Maximum PCB Results ≥ 500 mg/kg
- Completed Removal Area
- Residential < 1 (mg/kg)
- FEMA Floodway
- OU-1/OU-2 Downgradient Floodplain
- Exposure Unit
- Snow Creek
- Parcel Boundaries
- Interim Measure and Other Early Actions
- Potential Access Road
- Target Remedial Area - 1.5-Foot Soil Excavation and Low-Permeability Cap
- Principle Threat Waste Area

0 75 150 Feet
Graphic Scale

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

Notes:
1. 2013 Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. Locations of the access road and bridge across Snow Creek would be determined during the design phase.
5. FEMA: Federal Emergency Management Agency
mg/kg: milligrams per kilogram
ND: nondetect
OU: operable unit
PCB: polychlorinated biphenyl
PPIN: property parcel identification number

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

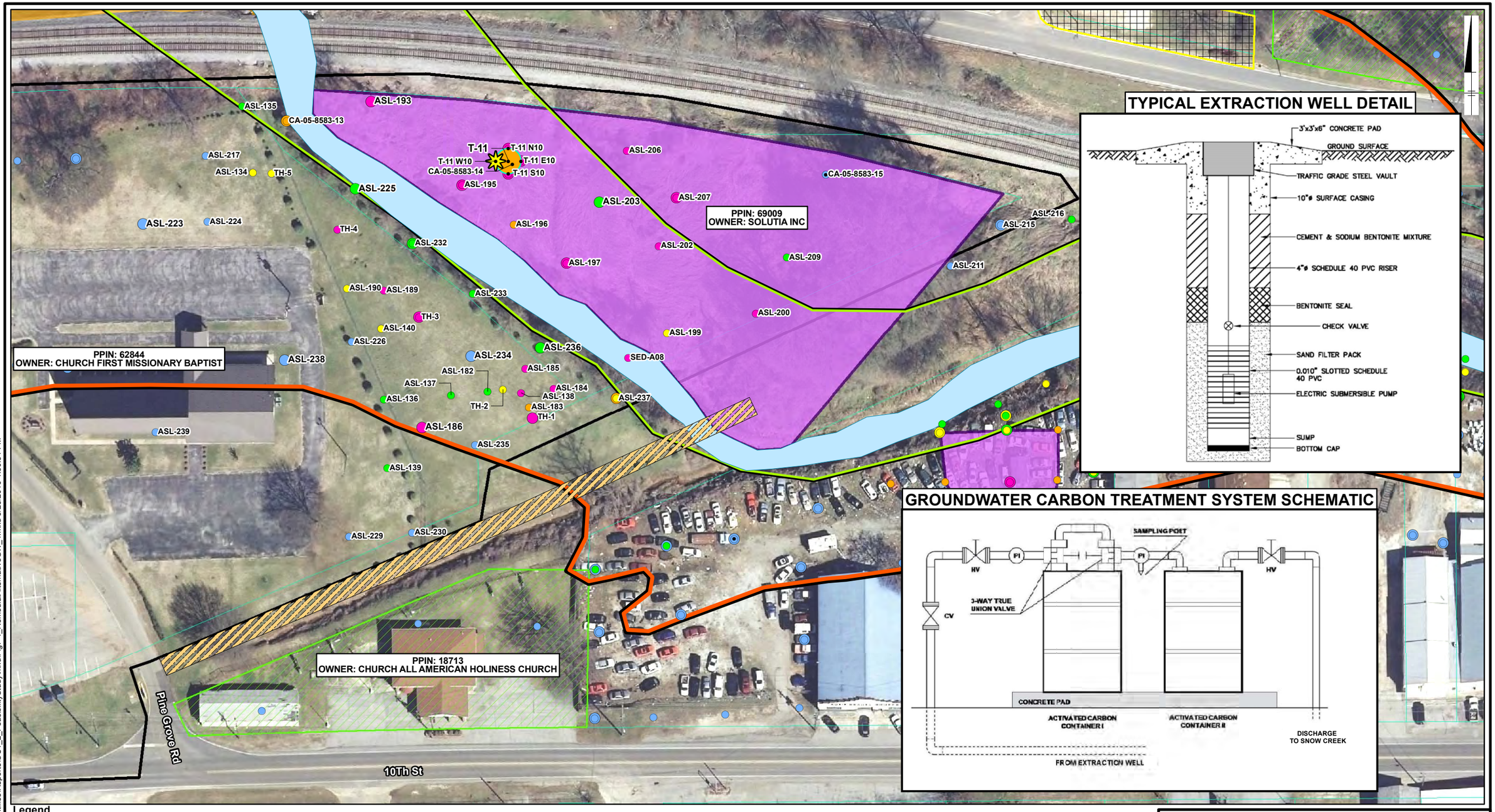
OU-1/OU-2 Feasibility Study Report

Remedial Alternative GW-3

Solutia

Figure
7-3

City: SYR Div/Group: SWG Created By: K.IVES Last Saved By: kives
Anniston
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TYPICAL EXTRACTION WELL DETAIL

GROUNDWATER CARBON TREATMENT SYSTEM SCHEMATIC

Legend

Soil Sample Location

Surface PCB (mg/kg)
- ND to < 1
- ≥ 1 to <10
- ≥ 10 to < 25
- ≥ 25 to < 50
- ≥ 50 to < 500

- Analytes other than PCB and Lead Analyzed
- Locations with Maximum PCB Results ≥ 500 mg/kg
- Completed Removal Area
- Residential < 1 (mg/kg)
- FEMA Floodway
- OU-1/OU-2 Downgradient Floodplain
- Exposure Unit
- Snow Creek
- Parcel Boundaries
- Interim Measure and Other Early Actions
- Potential Access Road
- Target Remedial Area - 1.5-Foot Soil Excavation and Low-Permeability Cap
- Principle Threat Waste Area
- (PI) Pressure Gauge

0 75 150 Feet

Graphic Scale

Inner and outer circles reflect surface and subsurface PCB concentrations, respectively.

Notes:
1. Aerial imagery provided by Calhoun County.
2. Surface concentrations depicted represent the average of data from the 0- to 1-foot interval.
3. Subsurface concentrations depicted represent the average of data from the 0- to 4-foot interval.
4. Locations of the access road and bridge across Snow Creek would be determined during the design phase.
5. Groundwater extraction well location would be determined during the design phase
6. CV: check valve
   FEMA: Federal Emergency Management Agency
   HV: hand-operated gauge
   mg/kg: milligrams per kilogram
   ND: nondetect
   OU: operable unit
   PCB: polychlorinated biphenyl
   PVC: polyvinyl chloride
   PPIN: property parcel identification number

Anniston PCB Site: OU-1/OU-2
Anniston, Alabama

OU-1/OU-2 Feasibility Study Report

Remedial Alternative GW-4

Solutia

Figure **7-4**

City: SYR Div/Group: SWG Created By: K.IVES Last Saved By: kives
Anniston
Q:\Anniston_PCB_site\AnnistonALM\MXDs_Printfiles\Reports\OU1_2_FeasibilityStudy\mxd\Fig7-4_RemedialAlternativeGW_4.mxd 3/28/2016 1:30:54 PM