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**United States Department of Energy**



**Savannah River Site**

**Explanation of Significant Differences (ESD) for the  
Revision 0 Interim Action Record of Decision Remedial  
Alternative Selection: PAR Pond Unit (U)**

**Lower Three Runs Integrator Operable Unit Tail Portion  
(Middle and Lower Subunits) (U)**

**CERCLIS Number: 35**

**SRNS-RP-2012-00121**

**Revision 1**

**June 2012**

**Prepared by:  
Savannah River Nuclear Solutions, LLC  
Savannah River Site  
Aiken, SC 29808**

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**Prepared for U.S. Department of Energy under Contract No. DE-AC09-08SR22470**

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**Prepared for  
U.S. Department of Energy  
and  
Savannah River Nuclear Solutions, LLC  
Aiken, South Carolina**

ESD for the Rev. 0 IAROD Remedial Alternative Selection  
PAR Pond Unit (U) LTR IOU Tail Portion (U)  
Savannah River Site  
June 2012

SRNS-RP-2012-00121  
Rev. 1

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## LIST OF ABBREVIATIONS AND ACRONYMS

|                 |                                                                       |
|-----------------|-----------------------------------------------------------------------|
| ARARs           | Applicable or Relevant and Appropriate requirements                   |
| CERCLA          | Comprehensive Environmental Response, Compensation, and Liability Act |
| Cs-137          | cesium-137                                                            |
| ESD             | Explanation of Significant Differences                                |
| FFA             | Federal Facility Agreement                                            |
| ft              | feet                                                                  |
| IROD            | Interim Action Record of Decision                                     |
| IOU             | Integrator Operable Unit                                              |
| LUCs            | land use controls                                                     |
| mi <sup>2</sup> | square miles                                                          |
| NCP             | National Oil and Hazardous Substances Pollution Contingency Plan      |
| RCRA            | Resource Conservation and Recovery Act                                |
| SCDHEC          | South Carolina Department of Health and Environmental Control         |
| SRNS            | Savannah River Nuclear Solutions, LLC                                 |
| SRS             | Savannah River Site                                                   |
| USDOE           | United States Department of Energy                                    |
| USEPA           | United States Environmental Protection Agency                         |
| WSRC            | Westinghouse Savannah River Company LLC                               |

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## I. INTRODUCTION

This Explanation of Significant Differences (ESD) is being issued by the United States Department of Energy (USDOE), the lead agency for the Savannah River Site (SRS) for remedial activities, with concurrence by the U.S. Environmental Protection Agency (USEPA) – Region 4 and the South Carolina Department of Health and Environmental Control (SCDHEC). The purpose of this ESD is to announce the incorporation of Land Use Controls (LUCs) in the form of signage and fencing following implementation of a Time Critical Removal Action for the lower and middle sections of the Lower Three Runs (LTR) Integrator Operable Unit (IOU) into the interim remedial action for PAR Pond (685-G). The *Interim Action Record of Decision Remedial Alternative Selection Par Pond Unit (U)* (WSRC 1995) was issued in January 1995.

Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 117(c), SRS is required to publish an ESD whenever there is a significant change to a component of a remedy specified in a (interim) Record of Decision (ROD). Sections 300.435(c)(2)(i) and 300.825(a)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) require the lead agency to provide an explanation of the differences and to make this information available to the public in the Administrative Record File and information repositories.

PAR Pond (685-G) is a 2,500 acre man-made reservoir that was used during reactor operations. From the PAR Pond Dam, LTR Creek flows

approximately 19 miles before it enters the Savannah River. PAR Pond received effluent discharges from stormwater drains, reactor cooling water, and process water from various reactor operations contaminated with low levels of radionuclides. PAR Pond sediments are contaminated with cesium-137 (Cs-137); therefore PAR Pond is listed in the SRS Federal Facility Agreement (FFA 1993) as a CERCLA waste unit at SRS and is one of the subunits within the larger LTR IOU (Figure 1). As described in the interim action ROD (IROD), the PAR Pond subunit consists of the PAR Pond Reservoir, the series of pre-cooler ponds and canals, and the LTR Creek. The lower and middle sections of the LTR Creek are the focus of this ESD.

In March of 1991 a depression was found on the downstream side of the PAR Pond Dam. From June to September of 1991 the water level in PAR Pond was reduced from 200 ft to 181 ft mean sea level to reduce the potential of a dam failure and possible flooding in downstream communities. The drawdown of the water level exposed large areas of sediments that were contaminated with Cs-137. The IROD for PAR Pond selected refilling PAR Pond and maintaining the water level at its original 200-ft level to cover and shield Cs-137 contaminated exposed sediments as the Interim Remedial Action (IRA). The IROD recognized that subsequent remedial actions would need to be performed for other PAR Pond subunits. This ESD does not alter the existing interim remedial decision for PAR Pond, but provides added protection to the public from exposure to contaminated sediments that migrated to the creek below the PAR Pond Dam.

The ESD is part of the Administrative Record File and is available for public review during normal business hours at the following repositories.

US Department of Energy  
Public Reading Room  
Gregg-Graniteville Library  
University of South Carolina – Aiken  
171 University Parkway  
Aiken, South Carolina 29801  
(803) 641-3465

Thomas Cooper Library  
Government Documents Department  
University of South Carolina  
Columbia, South Carolina 29208  
(803) 777-4866

## **II. SITE HISTORY AND SELECTED REMEDY**

Due to the complexity and size of multiple waste units located in different areas of the SRS, the site is divided into six watersheds for the purpose of managing a comprehensive cleanup strategy. In addition, the SRS also identifies six IOUs which are the surface water bodies and associated wetlands that correspond to the six respective watersheds. The LTR watershed and middle and lower sections of the corresponding LTR IOU are the focus of this ESD.

The LTR watershed is located in the southeastern portion of SRS. The watershed drains about 180 square miles (mi<sup>2</sup>) including two SRS facility areas: P-Area Operable Unit (PAOU) that contains P Reactor (105-P), and R-Area Operable Unit (RAOU) that contains R Reactor (105-R). R Reactor began operations in 1953 and P Reactor began operations in 1954. PAR Pond was constructed in 1958 to receive secondary cooling water from both P and R Reactors.

The LTR stream is a large blackwater stream that originates in the northeast portion of SRS and follows a southerly direction for approximately 24.5 miles (mi). From the PAR Pond Dam, LTR flows approximately 19 mi, braiding through bottomland/floodplain forests before it enters the Savannah River. The LTR has an annual average flow rate of 64 cubic feet per second (ft<sup>3</sup>/sec).

Soil types in and along the LTR corridor range from seasonally wet, hydric soils to well-drained soils. Sediment/soil media refers to floodplain sediment that may periodically be dry, but may also periodically be flooded and/or inundated.

Approximately 10% of the LTR IOU land use is industrial. The remainder of the watershed primarily consists of managed forests, wetlands, and surface water impoundments. The upper and middle portions of the LTR (including ponds and canals) are well within SRS property. Approximately, five miles downstream from the PAR Pond Dam, beginning at the Patterson Mill Road crossing, the SRS boundary narrows along the LTR and associated floodplain. This area is referred to as the LTR “tail portion” of the LTR IOU. The DOE-owned tail portion consists of an approximate 1/8 – 1/4 mile wide area on each side of the stream channel. The narrow tail portion is bounded on both sides by private property, some of which includes residential parcels. There are four public road crossings, two power line crossings, and a railroad crossing along the tail portion of LTR.

### *Summary of Contamination*

Before construction of PAR Pond in 1958, R Reactor discharged cooling water and liquid effluent directly into the LTR. Liquid releases contained process leaks, disassembly basin purges, and secondary cooling water (thermal discharges) which contained tritium, metallic contaminants, and other radiological contaminants. Many of the radiological contaminants present in the cooler ponds and PAR Pond were sorbed onto the sediments. Migration of sediments downstream of the pond systems did occur resulting in deposition of contaminated sediments and soil within the LTR IOU.

Data collected from past sampling events indicate that Cs-137 is the major contaminant in the LTR IOU for sediment and soil matrixes. In 2009 and 2010, an extensive characterization of the LTR IOU was undertaken as part of the American Recovery and Reinvestment Act. This investigation included sampling within the watershed systems (i.e., canals, pre-cooler ponds and stream channel/floodplain). Within each system, the sampling design involved an even spacing of transects to collect an unbiased population of data. Data consisted of in-situ field collected survey data along transects supplemented with the collection of sediment/soil and surface water samples for laboratory analysis.

For evaluation purposes in the LTR IOU Periodic Report (SGCP 2009), the adolescent trespasser was selected as the most likely human receptor for the LTR tail portion because of the natural attractiveness of the area for recreational activities (i.e., hunting, fishing, hiking etc.) and access from public property.

Exposure of the adolescent trespasser to Cs-137 contaminated soil/sediment at concentrations  $>23.7$  pCi/g have been calculated to result in an unacceptable cancer risk of  $1 \times 10^{-4}$  or greater. This means that the adolescent trespasser has a 1 in 10,000 chance of getting cancer from continued exposure to the contaminated soil/sediment based on the exposure assumptions.

The characterization sampling identified elevated Cs-137 levels along three sampling transects (transects 4, 13, and 23) in the middle and lower LTR tail portion (Figure 2). In the middle LTR tail portion (transect 4), there were 5 human health exceedances for Cs-137 out of 30 analyses (16.7%) when compared to the adolescent trespasser soil benchmark of 23.7 pCi/g. For the lower tail portion (transects 13 and 23), there were 2 human health exceedances out of 72 analyses (2.8%) for Cs-137 when compared to the adolescent trespasser soil benchmark of 23.7 pCi/g (Figure 2). Based on laboratory analyzed data, the maximum Cs-137 detection in the middle and lower LTR tail portion was 91.7 pCi/g, found at transect 4.

### *Selected Interim Remedial Action*

Because the Cs-137 contaminated sediment/soil will remain at levels that would continue to pose an unacceptable future risk to adolescent trespassers ( $>1 \times 10^{-4}$ ), a Time Critical Removal Action in the middle and lower LTR tail was necessary. On January 5, 2012, representatives of USEPA, SCDHEC, and USDOE, reached agreement that addition of LUCs following a Time Critical Removal Action for excavation of the contaminated sediment/soil media in the middle and lower sections

of the LTR IOU was appropriate to protect human health and the environment.

The Time Critical Removal Action in the LTR IOU tail portion will be conducted for the identified soil/sediment locations in the three hot spot areas (transects 4, 13, and 23) that exceed the  $1 \times 10^{-4}$  risk (23.7 pCi/g) for the adolescent trespasser receptor. The USDOE, USEPA, and SCDHEC agreed that the excavation areas will be limited to one acre for each transect (a total of three acres), initiated at the identified hot spots (i.e., sampling points with Cs-137 activities  $>23.7$  pCi/g). Final agreement was reached that the 12 pCi/g ( $5 \times 10^{-5}$  risk) for an adolescent trespasser would be used as the cleanup goal for excavation. Sediment/soil within the defined one acre removal areas would be excavated to the depth necessary to achieve the 12 pCi/g cleanup goal and disposed of in a CERCLA Off-Site Rule approved disposal facility. The removal action will excavate contaminated sediment/soil on both sides of the stream, but not within the stream bed. Approximately 4,800 ft<sup>3</sup> of Cs-137 contaminated sediment/soil media will be excavated and removed. This action will reduce the volume of available Cs-137 in the LTR IOU tail portion. Residual activities of Cs-137 in the tail portion will decay and the amount of Cs-137 available to migrate further in the tail portion will diminish with time. The Time Critical Removal Action (removal of sediment/soil) will be documented by a Removal Site Evaluation Report (SRNS 2012) followed by an Action Memorandum which both require public notice.

Figures 2, 3, 4, and 5 depict the location of each transect and the one acre polygons where the sediment/soil removal actions will be performed.

This ESD documents the LUCs that will be implemented following the Time Critical Removal Action. Portions of LTR have signs and fencing placed previously, and this ESD will consist of installation of additional fencing and signs (near the major road crossings and utility easements) along the middle and lower sections of the LTR tail. It was also agreed to add additional fencing (three strand barbed wire) near transect 13. Figure 6 illustrates the locations of the existing fencing and proposed fencing extensions used to restrict access to the contaminated media located in the LTR IOU tail portion. There are approximately 7 miles of new fencing included in the LUCs for LTR IOU including proposed fencing at the SRS boundary near the soil removal areas at Transect 13 and Transect 23.

Signs will be placed along the entire perimeter of the tail portion of the LTR IOU along the SRS boundary approximately every 200 ft (estimated to be 1006 locations). Signs will include both Warning signs and No Trespassing signs. Approximately 1,006 Warning and No Trespassing signs will be posted on the perimeter of the LTR IOU tail portion. The signs are spaced approximately 200 ft apart. The warning sign states the following:

**CAUTION**  
UNAUTHORIZED ENTRY PROHIBITED  
CHEMICAL OR RADIOACTIVE  
CONTAMINANTS MAY BE PRESENT  
CONTACT SAVANNAH RIVER SITE  
PUBLIC INVOLVEMENT AT  
1-800-881-7292

The No Trespassing signs states the following and are enforceable by law:

**No Trespassing**  
 By Order of the  
 United States Department of Energy

The unauthorized entry upon any facility, installation, or real property subject to the jurisdiction, administration, or in the custody of the Department of Energy, which has been designated as subject to the provisions contained in Title 10, Code of Federal Regulations, Part 860, is prohibited. The unauthorized carrying, transporting, or otherwise introducing or causing to be introduced, any dangerous weapon, explosive, or other dangerous instrument or material likely to produce substantial injury or damage to persons or property, into or upon such facility, installation, or real property is likely prohibited.

Whoever willfully violates these regulations, shall, upon conviction, be punishable by a fine of not more than \$5,000. Whoever willfully violates these regulations with respect to any facility, installation, or real property enclosed by a fence, wall, floor, roof, or other structural barrier, shall be guilty of a misdemeanor and, upon conviction, shall be punished by a fine not to exceed \$100,000 or imprisonment for not more than 1 year, or both (Title 42 United States Code, 2278(a); Title 18, United States Code 3571)

By authority of Section 229 of the Atomic Energy Act of 1954, as amended (Title 42, United States Code, 2278(a) and Title 10, Code of Federal Regulations, Part 860 of the rules and regulations of the Department of Energy) this facility, installation, or real property has been designated as subject to these regulations by the United States

installation of warning signs and limited fencing that would be installed to protect SRS workers and unintentional trespassers from exposure to contaminated floodplain sediment and soils using warning signs and fences. The Fact Sheet was made available for public review and comment and the removal action began in December 2004.

On February 6, 2007 the SCDHEC issued a Government Performance and Results Act Human Exposure Environmental Indicator letter indicating that prevention of human exposure was not adequately controlled unless additional actions were taken along the LTR tail portion. In response, USDOE conducted an early action plan that included posting additional signs and documenting inspections along the tail portion. Additionally, the USDOE sent a letter to landowners with property adjacent to LTR IOU advising them of the No Trespassing restrictions on USDOE property. The correspondence to the property owners reiterated that Cs-137 contamination is present in LTR Creek and floodplain sediments and informed property owners of increased SRS law enforcement patrols to prevent trespassing and access to the LTR tail. Indication of trespassing activities continues to be observed in the lower portions of the LTR IOU.

### *Previous Actions in LTR IOU*

In September 2004, the USDOE, with agreement from the USEPA and SCDHEC, prepared an Early Action Fact Sheet to document a non-time critical removal action along the tail section of LTR IOU. The Early Action Fact Sheet described the

### **III. BASIS FOR THE EXPLANATION OF SIGNIFICANT DIFFERENCE**

The IROD for the PAR Pond Unit (WSRC 1995) only addressed the action selected for the exposed contaminated sediment at the PAR Pond reservoir. The purpose of this ESD is to document additional interim remedial actions for the Cs-137 contaminated

sediment/soil in the middle and lower tail portions of the LTR IOU.

#### IV. DESCRIPTION OF SIGNIFICANT DIFFERENCES

The *Interim Action Record of Decision Remedial Alternative Selection Par Pond Unit (U)* (WSRC 1995) was issued in January 1995. As previously explained, the IROD only addressed the interim remedial action to refill and maintain the PAR Pond reservoir at its original water elevation for shielding of contaminated sediments and will not change with this ESD. The significant differences described in this ESD are to incorporate additional interim remedial actions for the lower and middle tail portions of the LTR IOU contaminated by discharges of water and sediment from effluents in PAR Pond.

Human health exposures to Cs-137 in soil and sediment media in the LTR IOU middle and lower tail portions have been found at levels that would pose an unacceptable risk ( $>1 \times 10^{-4}$ ) to adolescent trespassers. A Time Critical Removal Action will be implemented to excavate contaminated sediment/soil to reduce human health risk. In addition, signs and fencing will be installed to prevent inadvertent and unauthorized access to contaminated areas located on USDOE property.

The USDOE, SCDHEC and USEPA reached agreement on January 5, 2012, for the scope of proposed interim remedial action to be implemented for the LTR IOU (ERD 2001). As previously described, these actions include the implementation of LUCs in the form of additional fencing and warning signs following the Time Critical Removal

Action of approximately three acres of contaminated soil/sediment from the middle and lower tail sections of the LTR IOU. Approximately 7 miles of additional fencing will be constructed. Signs will be placed along the entire perimeter of the tail portion of the LTR IOU at the SRS boundary approximately every 200 ft (estimated to be 1,006 locations). Signs would include both Warning signs and No Trespassing signs.

The proposed LUCs, removal action, and off-site disposal of contaminated sediment/soils are estimated to cost approximately \$12,800,000.

#### V. STATUTORY DETERMINATIONS

The nine criteria used to compare alternatives were derived from the statutory requirements of CERCLA Section 121. The National Contingency Plan [40 CFR § 300.430 (e) (9)] sets forth nine evaluation criteria that provide the basis for evaluating alternatives and selecting a remedy. Because a Time Critical Removal Action followed by LUCs was selected for the interim remedy for the LTR IOU tail portion, a comparison of remedial alternatives was not required.

An ESD generally does not reopen consideration of Applicable and or Relevant and Appropriate Requirements (ARARs). In addition, the only new components added to the IROD are LUCS which do not necessitate an additional ARAR evaluation.

The selected interim remedial action for the LTR IOU middle and lower tail portions leaves hazardous substances in place that pose a potential future risk

and will require land use restrictions. LUCs, implemented as part of the interim remedial action, will be maintained until the concentration of hazardous substances in the soil and sediments are at such levels to allow for unrestricted use and exposure. A Land Use Control Implementation Plan (LUCIP) will be prepared by the USDOE that describes the implementation and maintenance actions for the interim remedial action, including periodic inspections. The USDOE is responsible for implementing, maintaining, monitoring, reporting upon, and enforcing the LUCs selected under this ESD. The LUCIP will remain in effect unless and until modifications are approved by the USEPA and SCDHEC as needed to be protective of human health and the environment. LUCIP modification will only occur through another CERCLA document.

Although the interim remedial action for the middle and lower tail portions of the LTR IOU will enhance current protective measures, Cs-137 will remain at levels that do not allow unlimited use and unrestricted exposure. In accordance with Section 121(c) of CERCLA and NCP §300.430(f)(5)(iii)(c), a statutory review will be conducted within five years after initiation of the interim remedial action to ensure that the remedy is and will continue to be protective of human health and the environment.

## VI. PUBLIC PARTICIPATION

The public will be informed of the changes to the selected interim remedy as specified in this ESD through the *SRS Environmental Bulletin*, a newsletter sent to approximately 3,500 citizens in South Carolina and Georgia, and through the *Aiken Standard*, the *Allendale Citizen Leader*, the *Barnwell*

*People Sentinel*, *The State*, and the *Augusta Chronicle* newspapers.

To obtain more information concerning this ESD, contact:

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## VII. REFERENCES

FFA 1993. *Federal Facility Agreement for the Savannah River Site*, Administrative Docket No. 89-05-FF (Effective Date: August 16, 1993)

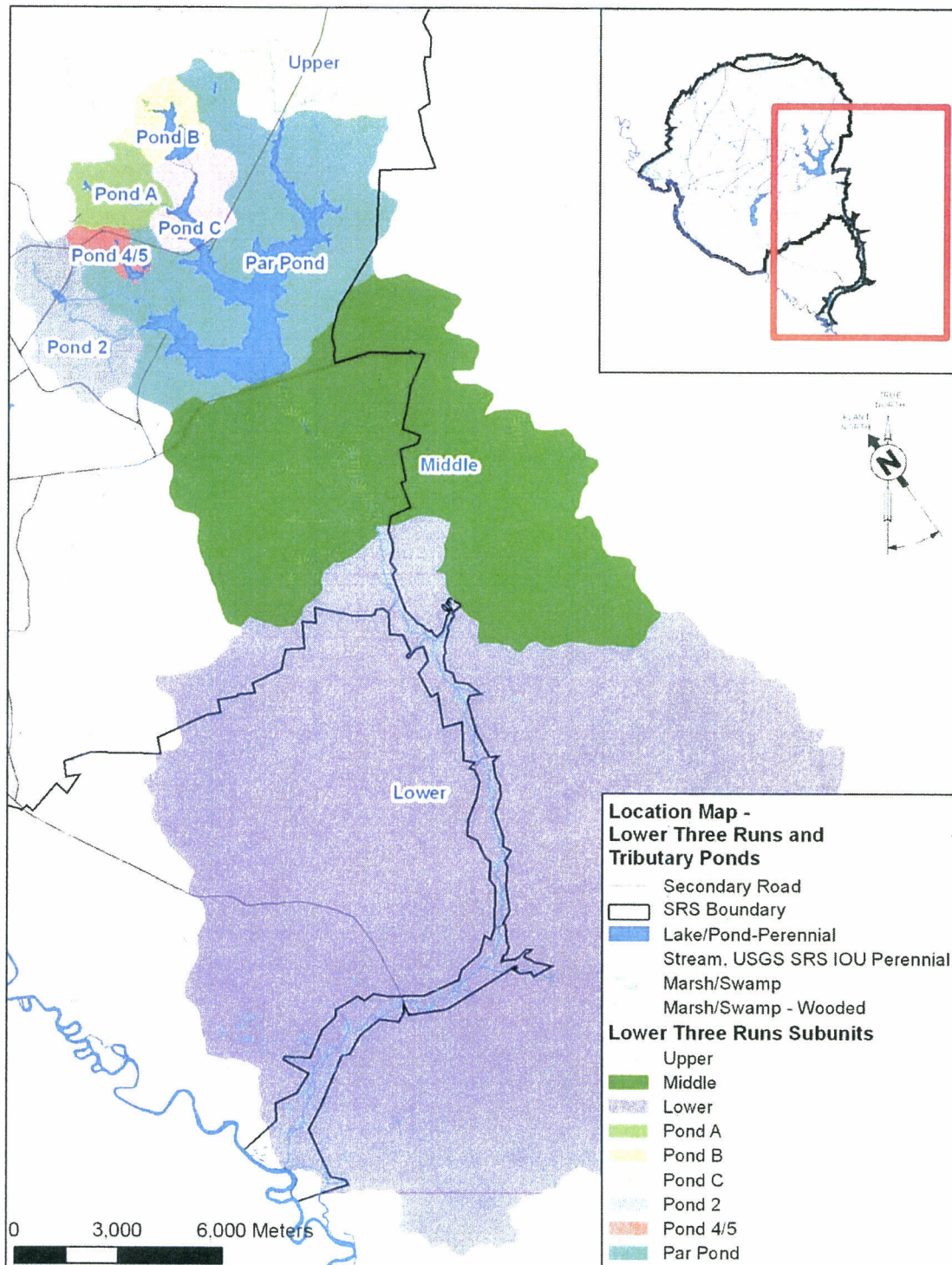
SGCP 2009. *Sampling and Analysis Plan for the Lower Three Runs Stream, Floodplain, and Headwaters*, SGCP-SAP-00003, Rev. 1, Savannah River Site, Aiken, SC (October 2009)

SRNS 2012. *Removal Site Evaluation Report (RSER) for the Lower Three Runs (LTR) Integrator Operable Unit (IOU) Tail Portion (Middle and Lower Subunits) (U)*, SRNS-RP-2012-00118, Rev. 0, March 2012, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

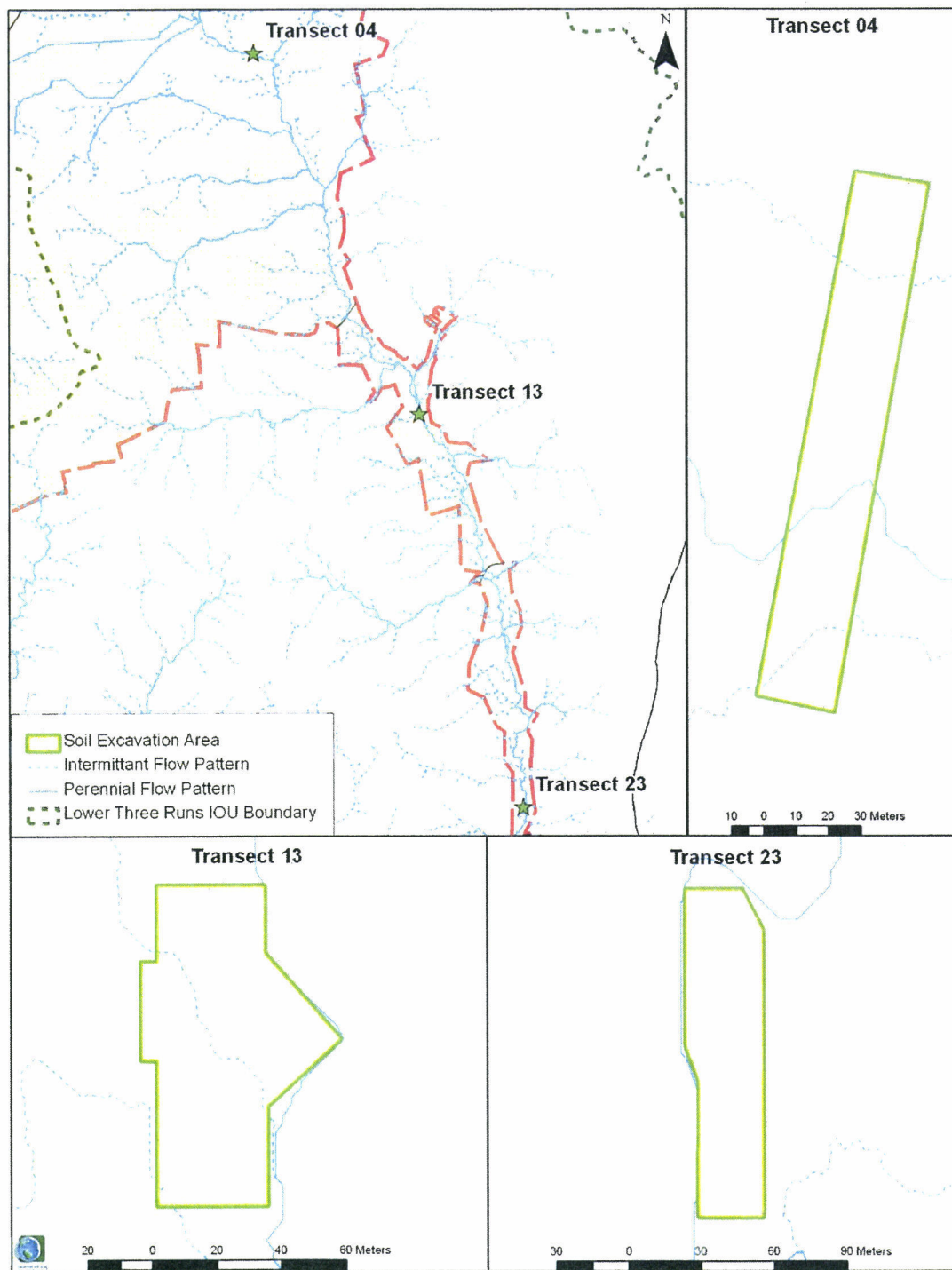
WSRC 1991. *PAR Pond Dam (U)*, ESH-ERG-91-0599, Letter from D.E. Gordon (Manager, Environmental Restoration and Groundwater Section, Environmental Protection Department, Westinghouse Savannah River Company, Aiken, SC) to James H. Scarbrough (Chief, RCRA and Federal Facilities Branch, US Environmental Protection Agency, Region IV, Atlanta, GA, July 17, 1991

WSRC 1995. *Interim Action Record of Decision Remedial Alternative Selection Par Pond Unit (U)*, WSRC-RP-93-1549, Rev. 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC (January 1995)

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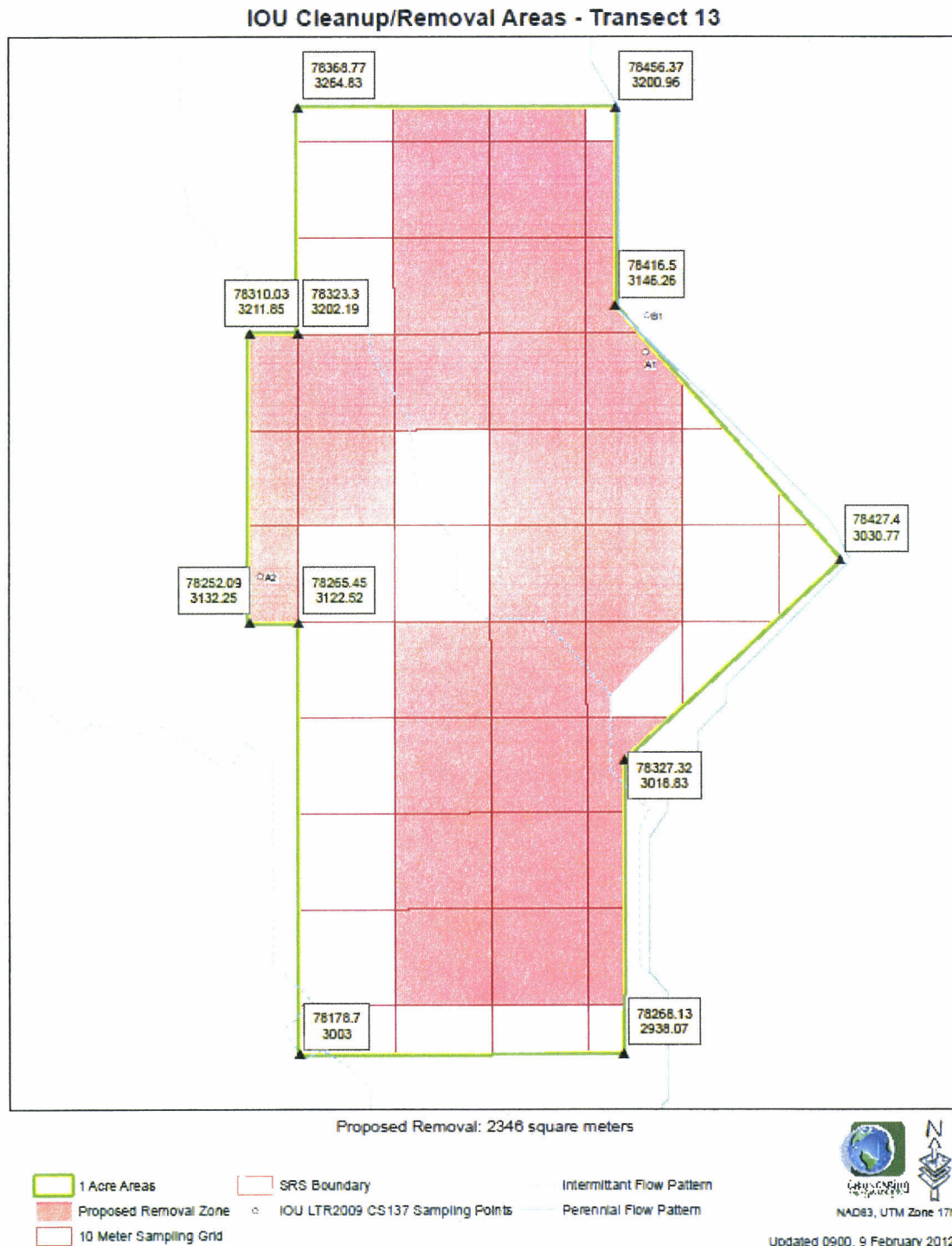
**Figure 1. Location of the Lower Three Runs IOU at the Savannah River Site**



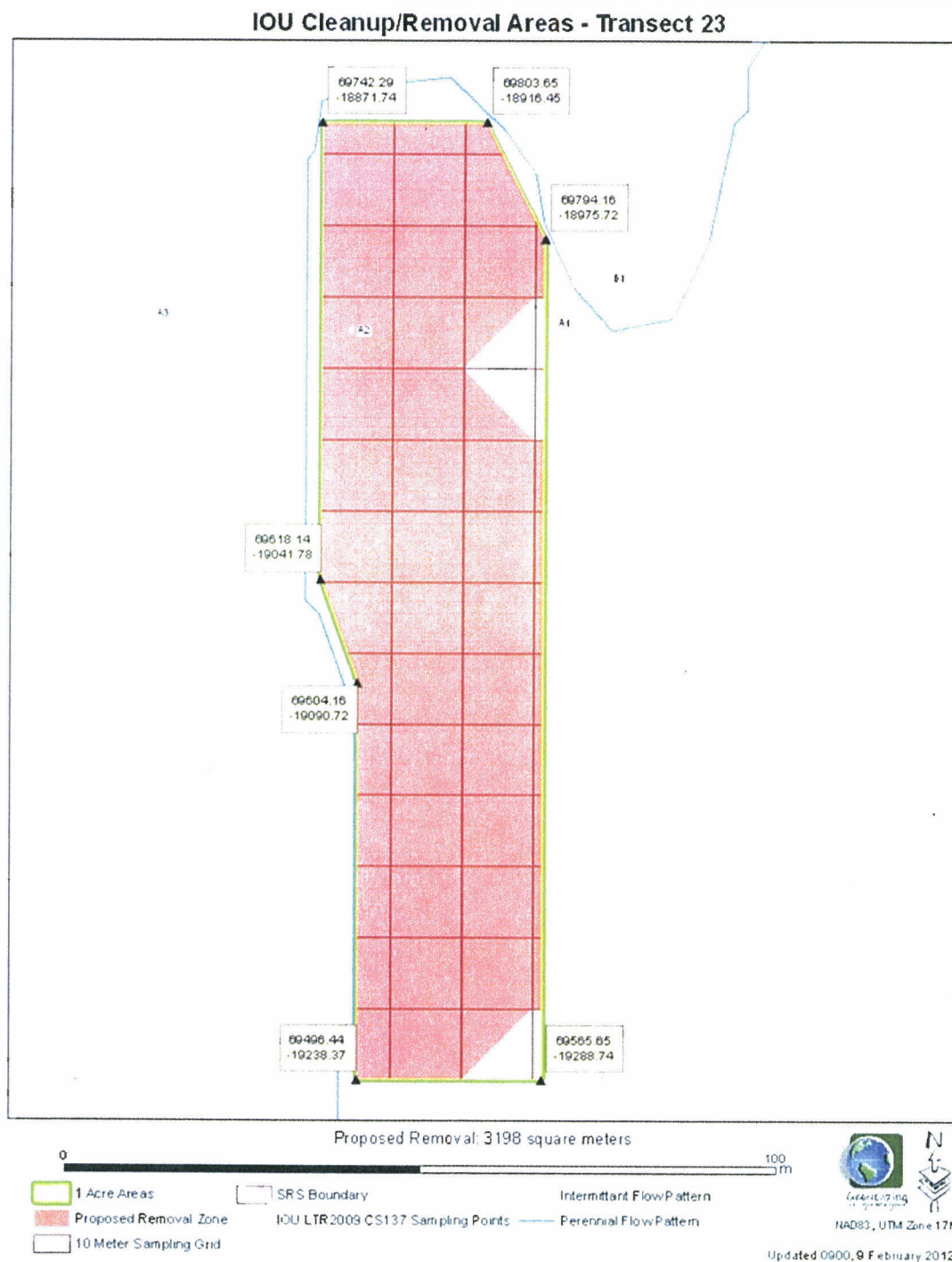
**Figure 2. Location of Contaminated Sampling Transects on LTR**



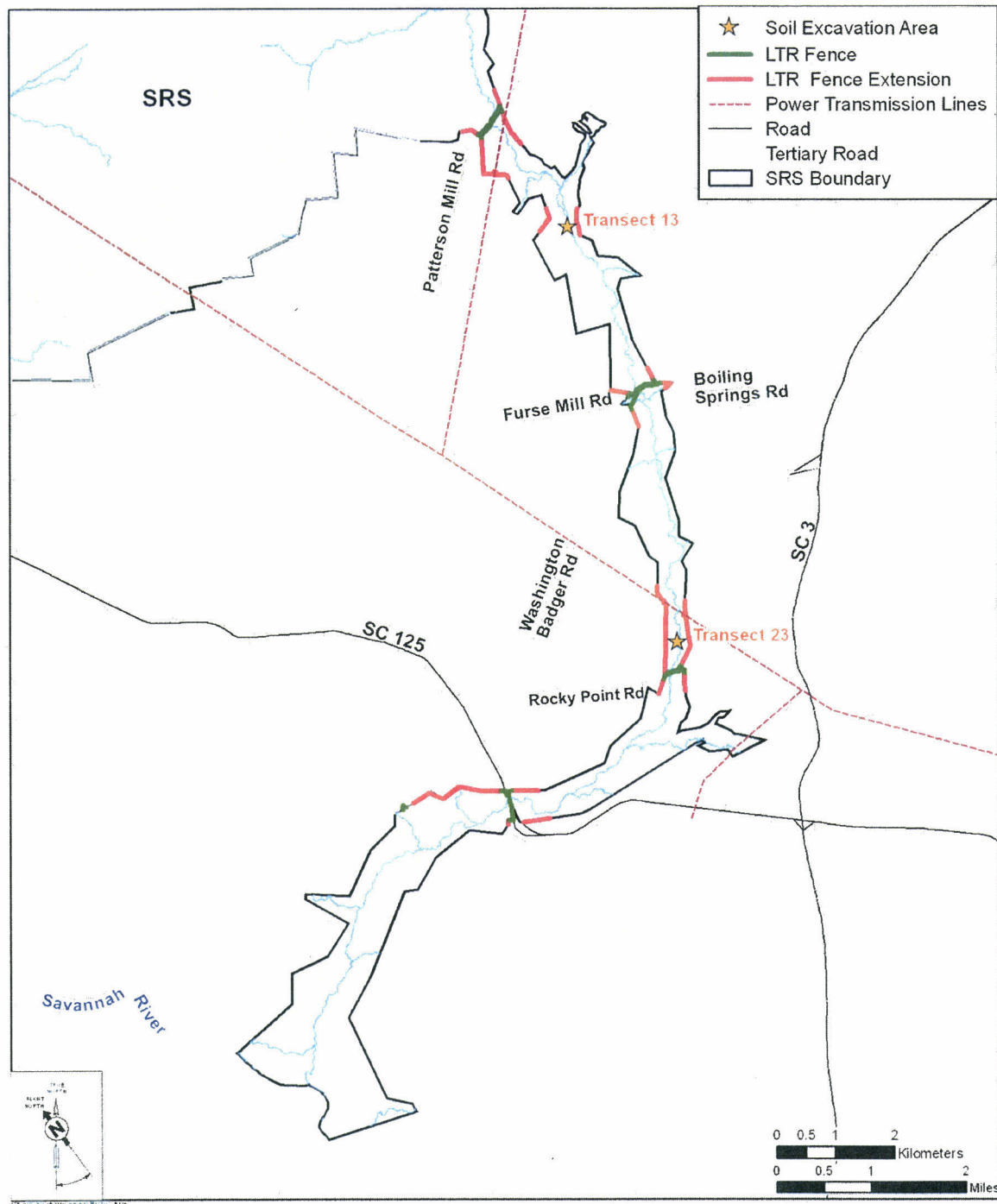
**Figure 3. Soil Removal Area Transect 4 in 1 Acre Polygon in LTR IOU Tail Portion**



**Figure 4. Soil Removal Area in Transect 13 in 1 Acre Polygon LTR IOU Tail Portion**



**Figure 5. Soil Removal Area in Transect 23 in 1 Acre Polygon LTR IOU Tail Portion**



**Figure 6. Location of Existing and Proposed Fencing Extensions on LTR IOU Tail**