



**PROPOSED SAMPLE LOCATION PLAN  
FOR  
JANUARY 2009 LEACHATE RELEASE**

**LINCOLN COUNTY LANDFILL  
PERMIT NO. 55-03  
LINCOLNTON, NORTH CAROLINA  
S&ME Project No. 1356-09-006**

Prepared for:



**North Carolina Department of Environment and Natural Resources  
Division of Waste Management – Solid Waste Section  
1646 Mail Service Center  
Raleigh, North Carolina 27699-1646**

Prepared by:



**S&ME, Inc.  
9751 Southern Pine Blvd  
Charlotte, North Carolina 28273**

June 18, 2009





June 18, 2009

NC Department of Environment and Natural Resources  
Division of Waste Management – Solid Waste Section  
1646 Mail Service Center  
Raleigh, NC 27699-1646

Attention: Ms. Jaclynne Drummond  
Compliance Hydrogeologist

**Reference: Proposed Sample Location Plan  
for January 2009 Leachate Release**  
Lincoln County Landfill, Permit No. 55-03  
Lincolnton, North Carolina  
S&ME Project No. 1356-09-006

Dear Ms. Drummond:

The enclosed Proposed Sample Location Plan presents the results of our GPS delineation of the impacted area for the January 2009 leachate release at the Lincoln County Landfill and our proposed soil and surface water sample locations for further assessment. This Proposed Sample Location Plan is a part of S&ME's approved Assessment Plan dated February 26, 2009 for the January 2009 leachate release. Following approval of the sample locations, S&ME will commence with the sampling, analysis and reporting detailed in the Assessment Plan. If you should have any questions or need additional information please contact us at (704)-523-4726.

Respectfully submitted,

S&ME, Inc.

*Courtney R. Withers*  
Courtney R. Withers, P.G.  
Project Geologist

*Julie R. Petersen*  
Julie R. Petersen, P.G.  
Project Manager  
NC Registration No. 1995



Senior Reviewed by Jason S. Reeves, P.E., Senior Project Engineer

cc: Nancy Rickard, Lincoln County (1 copy)

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Drawing 1 of 1      Proposed Sample Locations

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Appendix I      Photographs from GPS Delineation

## **1. INTRODUCTION**

Lincoln County Landfill experienced a leachate release that occurred over the weekend leading up to Monday, January 19, 2009. In response to the leachate release, NCDENR issued a Facility Compliance Audit Report dated January 21, 2009 to Lincoln County. Action #3 of the audit report requested that an assessment plan be prepared to evaluate the extent of soil, surface water, and groundwater impact on-site from the January 2009 leachate release.

As per your request, S&ME prepared an Assessment Plan dated February 26, 2009. NCDENR approved the plan on March 6, 2009 via a letter titled "Leachate Release Assessment". As part of the approved Assessment Plan, S&ME performed a GPS delineation of the potentially impacted areas on-site and prepared a Proposed Sample Location Plan for NCDENR approval. The following plan details our on-site activities to date and proposed sample locations for soil and surface water.

## **2. INITIAL SOIL AND SURFACE WATER SAMPLES**

Surface water samples and soil samples were collected following the leachate release on January 19, 20, and 23, 2009. Sample locations were approximated in the field utilizing a handheld global positioning system (GPS) device, with approximate 1 meter reported accuracy, and are identified on the site aerial map included with this plan as *Drawing 1 of 1, Proposed Sample Locations*.

### **2.1 Soil Samples**

Seven (7) soil samples were collected in the areas considered to have come in contact with the leachate release. Soil samples were collected at the ground surface utilizing a field cleaned trowel.

Soil samples soil-1 and soil-2 were collected in the storm water conveyance leading from the secondary containment storm water discharge to sediment trap ST-2. Soil sample soil-3 was collected within sediment trap ST-2 and soil sample soil-4 was collected from the storm water conveyance area/path leading from sediment trap ST-2 to its discharge location on-site. Soil samples soil-5, soil-6, and soil-7 were collected at peripheral locations of the lowland area. The results of which were detailed in the approved Assessment Plan dated February 26, 2009.

### **2.2 Surface Water Samples**

Five (5) surface water samples were collected from the lowland area that may have received water from the leachate release. One (1) surface water sample was collected up-gradient of the release, and one (1) sample was collected downstream of the landfill. Surface water samples were collected by directly dipping from the surface water body utilizing the laboratory provided containers.

Surface water sample SW-1 was collected up-gradient of the leachate release from an unnamed tributary to Indian Creek located northwest of the leachate tanks. Surface water

sample SW-2 was collected from a small unnamed tributary to Indian Creek, southwest of the leachate release. Surface water sample SW-3 was collected in Indian Creek downstream of the property at Shoal Road. Surface water samples SW-4 and SW-5, and the sample identified as "Leachate" were collected in the lowlands area where ponding of water was observed. The surface water sample identified as "Discharge" was collected in an unnamed tributary to Indian Creek south of the leachate release. The results of which were detailed in the approved Assessment Plan dated February 26, 2009.

### **3. GPS DELINEATION OF POTENTIALLY IMPACTED AREAS**

To aid in the delineation of potentially impacted areas on-site, S&ME visually observed the area southwest (down-gradient) of the leachate tanks and delineated the extent of ponding in the lowlands area on March 31, 2009. S&ME also identified the inflow and outflow features of the lowlands and its ultimate discharge point at Indian Creek. These areas are identified on *Drawing 1 of 1, Proposed Sample Locations*. Photographs of the on-site features taken during the GPS delineation are provided in *Appendix I* and also identified on *Drawing 1 of 1*.

To further aid in the delineation of potentially impacted areas on site, S&ME contracted Spatial Data Consultants to perform an aerial survey of the area providing 1-foot contour intervals and an updated aerial photograph. The aerial survey is provided on *Drawing 1 of 1, Proposed Sample Locations*.

### **4. ADDITIONAL SOIL AND SURFACE WATER SAMPLES**

Based on the GPS delineation and aerial survey, S&ME proposes to collect the following additional soil and surface water samples as part of the approved Assessment Plan.

#### **4.1 Additional Soil Samples**

To further evaluate potential on-site soil impact in the vicinity of the leachate release, S&ME proposes to collect four (4) additional surface soil samples down gradient of the spill. The samples are identified on *Drawing 1 of 1* as soil-10, soil-15, soil-16, and soil-17.

S&ME also proposes to collect six (6) surface background soil samples outside the vicinity of the release to characterize the baseline concentrations of the on-site soils. Four (4) of the six (6) samples will be collected as close as practical to the spill area in lithology similar to that of the soils which may have come in contact with leachate. These four (4) samples are identified as soil-11, soil-12, soil-13, soil, and soil-14 on *Drawing 1 of 1*.

One (1) of the six (6) background samples will be collected from the initial sample location for soil-7. Based on the GPS survey, soil-7 is located up-gradient of the spill area; however, its analytical results yielded trace amounts of acetone and methyl ethyl ketone (MEK). S&ME will resample from this area to confirm the sample analysis to help rule out possible field or laboratory contaminants.

One (1) of the six (6) background soil samples will be collected from sediment trap SB-1 outside of the release area to characterize background metals concentrations that may be typical of sediment from this area of the property. This soil sample is identified as soil-8 on *Drawing 1 of 1*.

Within sediment trap ST-2, S&ME will perform a 5-foot hand auger boring and collect soil samples at approximate 1-foot intervals to characterize the vertical extent of leachate migration in the soil. This soil sample is identified as soil-9 on *Drawing 1 of 1*.

As per the approved Assessment Plan, soil samples will be analyzed for Appendix I volatile organics and metals, as well as nitrate-nitrite (soluble), phosphorus, sulfate (soluble), percent solids, and pH.

#### **4.2 Surface Water Samples**

S&ME has selected nine (9) additional surface water samples in the ponded area of the lowlands. The samples will be collected in selected areas found during the GPS delineation that have not been previously sampled and from areas previously sampled to compare concentrations over time. Eight (8) of the nine (9) locations are new and are identified as SW-6 through SW-13 on *Drawing 1 of 1*. The previous surface water sample location identified as "Discharge" will also be re-sampled.

S&ME will also collect five (5) surface water samples from Indian Creek and its tributaries. Three (3) samples will be collected along Indian Creek from up gradient and down gradient locations. These sample locations are identified as SW-15, SW-17, and existing location SW-3 on *Drawing 1 of 1*. Two (2) samples will be collected from tributaries to and from the lowland area identified as SW-14 and SW-16 on *Drawing 1 of 1*.

As per the approved Assessment Plan, surface water samples will be analyzed for Appendix I volatile organics and metals, as well as biological oxygen demand (BOD), chemical oxygen demand (COD), nitrate-nitrite, phosphorus, sulfate, and total suspended solids (TSS). Field parameters of pH, specific conductivity, and dissolved oxygen will be recorded at the time of surface water sample collection.

#### **4.3 QA/QC**

S&ME proposes a comprehensive QA/QC program, which will include duplicate samples, trip blanks, field blanks, and equipment blanks. The QA/QC program will aid in identifying any possible field or laboratory contaminants during this Assessment. S&ME will submit samples to a North Carolina Certified laboratory for analysis.

## **5. GROUNDWATER MONITORING WELL INSTALLATION**

### **5.1 Proposed Monitoring Well Locations**

As per the approved Assessment Plan, S&ME proposes installing three (3) groundwater monitoring wells between sediment trap ST-2 and Indian Creek and its tributaries: one (1) well within the release area and two (2) wells down gradient of the release area. Locations will be further evaluated after analysis of the soil and surface water samples and will be submitted for approval by the Division prior to installation.

**LINCOLN COUNTY LANDFILL**  
**LEACHATE ASSESSMENT ACTIVITIES**  
**PHOTOGRAPHS FROM GPS DELINEATION**  
**S&ME PROJECT NO. 1356-09-006**



<b>Photo 1</b>		
<p>Leachate Holding Tanks</p> <p>Outfall</p>		<p>Date: 3/31/2009</p> <p>Photographer: J. Petersen</p>
<b>Location / Orientation</b>	Looking North	
<b>Remarks</b>	Sediment Trap ST-2	

<b>Photo 2</b>		
<p>Leachate Holding Tanks</p> <p>ST-2 Outfall</p>		<p>Date: 3/31/2009</p> <p>Photographer: J. Petersen</p>
<b>Location / Orientation</b>	Looking North	
<b>Remarks</b>	Sediment Trap ST-2 Outfall	

**LINCOLN COUNTY LANDFILL**  
**LEACHATE ASSESSMENT ACTIVITIES**  
**PHOTOGRAPHS FROM GPS DELINEATION**  
**S&ME PROJECT NO. 1356-09-006**



<b>Photo 3</b>	
	
<b>Date:</b> 3/31/2009	
<b>Photographer:</b> J. Petersen	
<b>Location / Orientation</b>	Looking West
<b>Remarks</b>	Lowlands area where ST-2 discharges.

<b>Photo 4</b>	
	
<b>Date:</b> 3/31/2009	
<b>Photographer:</b> J. Petersen	
<b>Location / Orientation</b>	Looking South
<b>Remarks</b>	Northern edge of lowlands area along fence line.

<b>Photo 5</b>	
	
<b>Date:</b> 09	

**LINCOLN COUNTY LANDFILL**  
**LEACHATE ASSESSMENT ACTIVITIES**  
**PHOTOGRAPHS FROM GPS DELINEATION**  
**S&ME PROJECT NO. 1356-09-006**



		Date: 3/31/201
		Photographer: J. Petersen
Location / Orientation	Looking West	
Remarks	View from sediment basin SB-1 plunge pool toward lowlands area.	

<b>Photo 6</b>		
		Date: 3/31/2009
		Photographer: J. Petersen
Location / Orientation	Looking Northeast	
Remarks	Drainage channel through lowlands which leads to discharge point for lowlands area.	

<b>Photo 7</b>		
	31/2009	

**LINCOLN COUNTY LANDFILL**  
**LEACHATE ASSESSMENT ACTIVITIES**  
**PHOTOGRAPHS FROM GPS DELINEATION**  
**S&ME PROJECT NO. 1356-09-006**



		Date: 3/31/2009 Photographer: J. Petersen			
	<table border="1" style="width: 100%;"> <tr> <td style="width: 30%;"><b>Location / Orientation</b></td> <td>Looking North</td> </tr> <tr> <td><b>Remarks</b></td> <td>Southern edge of lowlands area at discharge. Discharge is to the left of the photo on other side of the fence line.</td> </tr> </table>	<b>Location / Orientation</b>	Looking North	<b>Remarks</b>	Southern edge of lowlands area at discharge. Discharge is to the left of the photo on other side of the fence line.
<b>Location / Orientation</b>	Looking North				
<b>Remarks</b>	Southern edge of lowlands area at discharge. Discharge is to the left of the photo on other side of the fence line.				

<b>Photo 8</b>					
		Date: 3/31/2009 Photographer: J. Petersen			
	<table border="1" style="width: 100%;"> <tr> <td style="width: 30%;"><b>Location / Orientation</b></td> <td>Looking West</td> </tr> <tr> <td><b>Remarks</b></td> <td>Discharge from lowlands area.</td> </tr> </table>	<b>Location / Orientation</b>	Looking West	<b>Remarks</b>	Discharge from lowlands area.
<b>Location / Orientation</b>	Looking West				
<b>Remarks</b>	Discharge from lowlands area.				

<b>Photo 9</b>					
		Date: 3/31/2009 Photographer: J. Petersen			
	<table border="1" style="width: 100%;"> <tr> <td style="width: 30%;"><b>Location / Orientation</b></td> <td>Looking West</td> </tr> <tr> <td><b>Remarks</b></td> <td>Backwater area.</td> </tr> </table>	<b>Location / Orientation</b>	Looking West	<b>Remarks</b>	Backwater area.
<b>Location / Orientation</b>	Looking West				
<b>Remarks</b>	Backwater area.				

**LINCOLN COUNTY LANDFILL**  
**LEACHATE ASSESSMENT ACTIVITIES**  
**PHOTOGRAPHS FROM GPS DELINEATION**  
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	Date
	Photographer: J. Petersen
<b>Location / Orientation</b>	Looking East
<b>Remarks</b>	Backwater area of lowlands discharge channel near Indian Creek.

<b>Photo 10</b>	
	Date: 3/31/2009
	Photographer: J. Petersen
<b>Location / Orientation</b>	Looking South
<b>Remarks</b>	Where lowlands discharge channel intersects with Indian Creek.

<b>Photo 11</b>	
	Date: 3/31/2009
	Photographer: J. Petersen

**LINCOLN COUNTY LANDFILL**  
**LEACHATE ASSESSMENT ACTIVITIES**  
**PHOTOGRAPHS FROM GPS DELINEATION**  
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		<b>Photographer:</b> J. Petersen
<b>Remarks</b> Small tributary from north side of lowlands area which discharges to Indian Creek. Up gradient of release.		

<b>Photo 12</b>			
			<b>Date:</b> 3/31/2009
			<b>Photographer:</b> J. Petersen
<b>Location / Orientation</b> Looking North			
<b>Remarks</b> Inflow to lowlands area from the north. Up gradient of release.			

STORMWATER DISCHARGE FROM  
SECONDARY CONTAINMENT

STORMWATER CONVEYANCE  
TO ST-2

SOIL-1

SOIL-2

SEDIMENT TRAP  
ST-2

SOIL-9

SOIL-3

ST-2 OUTFALL

SOIL-10

PHOTO 1

PHOTO 2

LOWLAND AREA  
INFLOW

SOIL-7

PHOTO 3

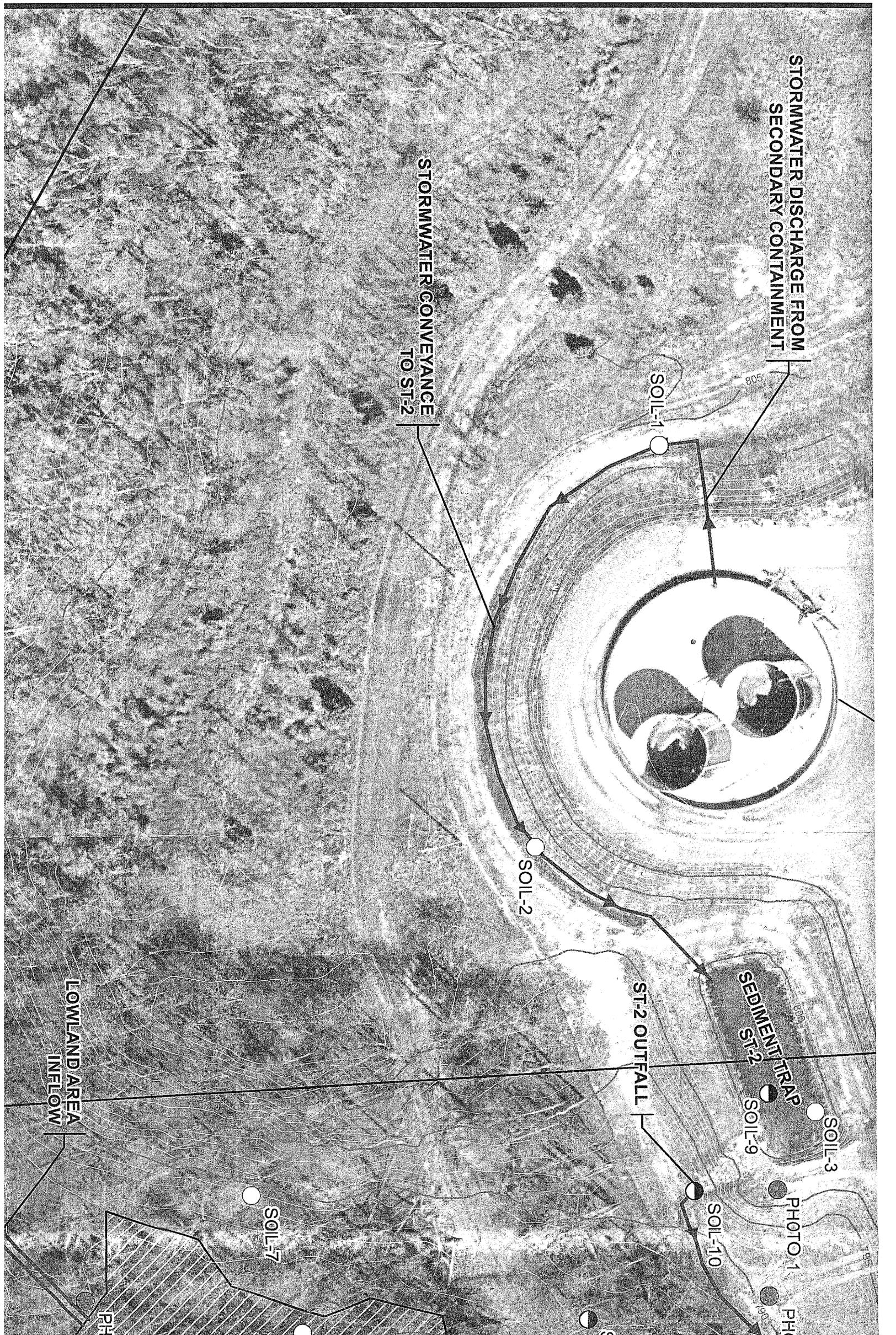




PHOTO 3

SOIL-10

DISCHARGE

PHOTO 1

PHOTO 2

SOIL-4

SW-8

SOIL-17

SOIL-10

LEACHATE

SW-9

SOIL-11

PHOTO 4

SW-11

SW-12

SOIL-6

SW-4

SOIL-7

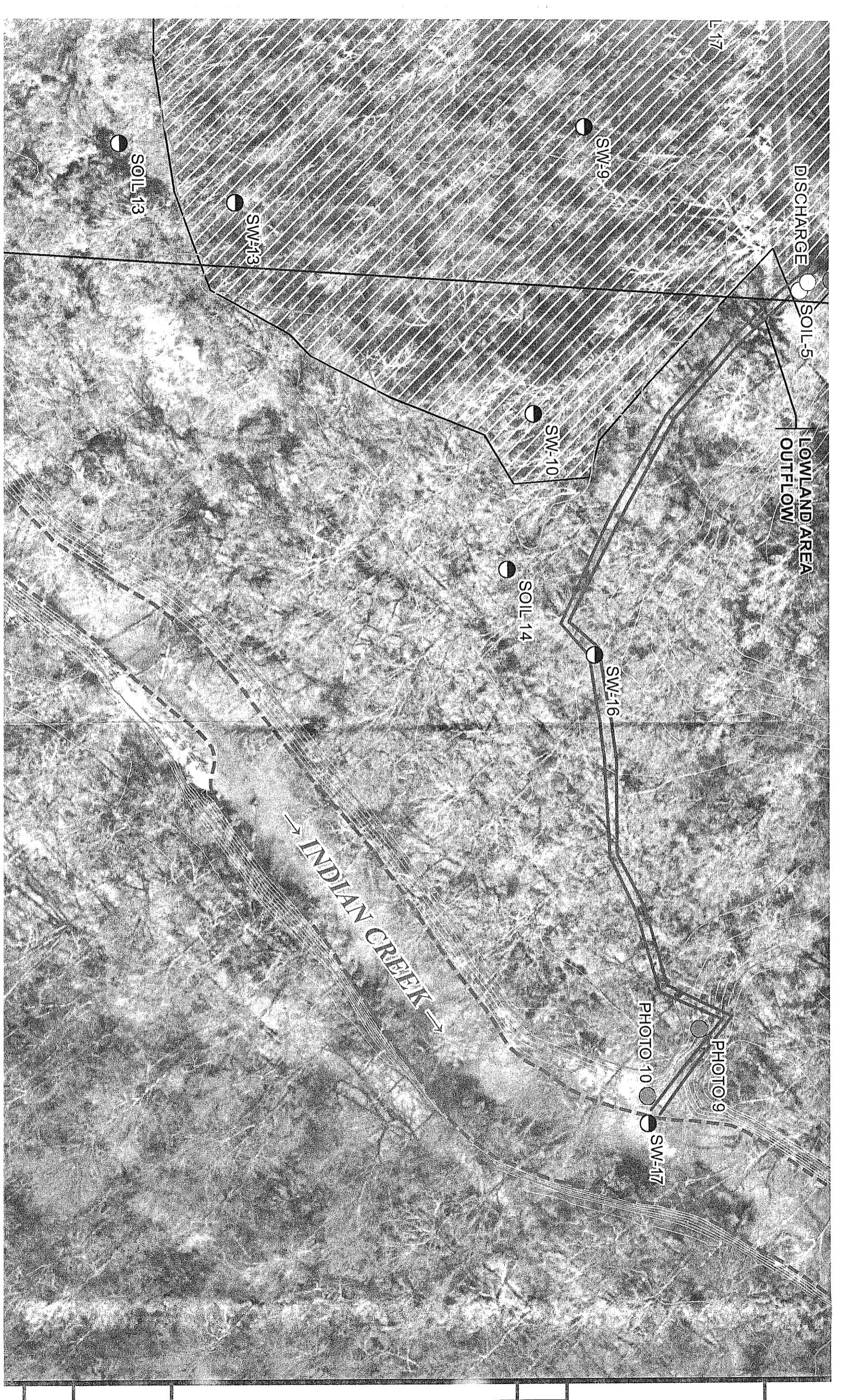
PHOTO 12

SW-5

SOIL-13

SW-13

SOIL-12



DISCHARGE

LOWLAND AREA  
OUTFLOW

E-17

SOIL 13

SW-13

SW-9

SOIL 5

SW-10

SOIL 14

SW-16

INDIAN CREEK

PHOTO 10

PHOTO 9

SW-17