

**First Creek AML Project  
Stream Restoration Plan  
Addendum to NWP-27 application**

**Prepared For:  
Carbon Trading, Inc.  
P.O. Box 1373  
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**By**

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## **1.0 Introduction**

Carbon Trading, Inc. (Carbon Trading) respectfully submits this stream restoration plan to the U.S. Army Corps of Engineers (USACE), respectively, for stream impacts associated with the refuse removal project located in Perry County, Kentucky east of the community of Bonnyman, Kentucky.

## **2.0 Project Description**

This site is refuse from previous deep mining operations. The method of clean up proposed is removal of the coal refuse and reclamation of the disturbed area. The coal refuse produces high acidity and metal concentrations within the watershed. The location of the refuse within the headwaters of the watershed and adverse impacts on the stream are significant. Removal and simple restoration of this site would eliminate any negative impacts on this tributary.

## **2.1 Project History**

The refuse deposit is residual from mining by Harvey Coal Corporation and other mining companies, sometimes between 1925 and 1960's. The estimated acreage of the refuse impoundment is approximately 22 acres. Some previous stabilization of the refuse on the western edge of the impoundment had been attempted in 2011. This was done as an AML Enhancement Project titled "Harveyton Refuse Project". Work was also done sometime in the 1980's on the refuse area by the AML. This consisted of some grading of materials and planting of erosion control grasses.

## **2.2 Project Purpose and Need**

Removal of the refuse is necessary for the stoppage of downstream migration of the refuse and coal during heavy rain events. Removal of the refuse will also stop acid drainage and high metal concentrations within the watershed. Recoverable coal tonnage is estimated at 45%, which economically promotes the removal of the refuse. The refuse as stated is being washed into First Creek by stream undercutting of the refuse pile. This is evident by the physical movement of coal chunks for over 1 mile downstream. The refuse also poses a fire risk as historically reported; a fire occurred in a small area of the impoundment and had to be extinguished. With stream movement through the impoundment, acid drainage is also occurring and visually evident.

### ***Specific Objectives:***

The below listed specific objectives have not been weighted and are all equally important to meeting the overall objective.

1. To reduce metal concentrations to non-toxic levels within the stream
2. To increase the pH to natural conditions
3. Restore aquatic and terrestrial habitat
4. Restore riparian areas
5. Restore degraded stream banks

### ***Criteria for meeting the above objectives:***

1. Increase habitat areas through the creation of riparian areas and reclamation of refuse areas
2. Restore degraded riparian areas
3. Restore degraded stream bank areas

## **3.0 Project Alternatives**

Through the developmental process of formulating restoration opportunities to the above listed specific problems, two alternatives were considered. Going forward with the project as a plan of action and implementation of no action were considered.

### **3.1 No Action Alternative**

If the alternative of no action were elected, the present conditions would be maintained for the next hundred years with the potential for only limited, if any improvements over time. This decision would also differ from the recommended actions with respect to stream restoration, reclamation of the refuse area and increased aquatic habitat. Although the no action alternative is feasible, no improvements would be made within the watershed and neither the land nor the stream would be meeting their potential.

### **3.2 Proposed Alternative**

The proposed plan of action is removal of the refuse, stream channel reconstruction, and establishment of the riparian zones resulting in an improvement of the overall environmental condition of the entire tributary.

#### **4.0 Existing Conditions and Previous Impacts**

The refuse has eroded with physical movement up to one mile downstream, contributing to high acidity and high metal concentrations, subsequently impacting water quality in the entire tributary. Refuse piles also have a tendency to spontaneously catch fire because they generate a lot of internal heat, resulting in serious impacts to local air quality including smoke, haze, heat, or venting of hazardous gases within close distance to a populated area, posing a danger to both the public and wildlife.

#### **5.0 Proposed Project Impacts**

<b>Stream Impacts</b>				
<b>Reach#</b>	<b>Impact (linear ft.)</b>	<b>Stream Type</b>	<b>EII</b>	<b>EIU</b>
1	2371	Perennial	0.1	237.1
2	854	Intermittent	0.1	85.4
3	62	Ephemeral	0.1	6.2
4	138	Intermittent	0.1	13.8
<b>Wetland Impacts</b>				
<b>Feature</b>		<b>Type</b>	<b>Area Acres</b>	
Wetland#1		Abutting persistent emergent	0.28	

#### **5.1 Wetlands**

**Soils:** The NRCS (Natural Resources Conservation Service) maps the soil types as Shelocta-Cutshin and Shelocta-Gilpin. These soils are listed as non-hydric soils by the NRCS (Natural Resources Conservation Service). It appears that topsoil and/or fill have been placed during the capping of the old refuse area. Adjacent upland areas on the site were well-drained showing no indicators of wetland hydrology. The wetland soils do not appear to be native soil and the wetland is not natural. They were likely formed when the refuse fill was capped with soil/fill to provide a growth medium for vegetation to prevent erosion.

**Hydrology:** The main source of hydrology to this site appears to be the stream flow of the perennial stream (First Creek) by stream braiding and saturated hydraulic conductivity. Hydrology indicators observed on the site included surface water, water stained leaves, sediment deposits, watermarks on plants, and saturated soils.

**Vegetation:** Common species observed in the wetland areas include cattail (*Typha latifolia*), Black Willow (*Salix nigra*). These species are listed by NRCS as Obligate Wetland (OBL) and Facultative Wetland (FACW).

## **6.0 Reference Reach**

Due to existing disturbance in this area, stream alteration, and sedimentation due to previous disturbance, the stream restoration plan has been designed utilizing reference reach stream segments.

### **6.1 Methods**

A reference reach provides natural channel design criteria that are based on measured morphological relationships from stable channels. A search was carried out for suitable reference reaches for the design of the new channel using topographic maps followed by field investigations. Criteria used to identify a potential reference reach included: current land use, drainage area, stream order, absence of man-made alterations, stream classification, and stream condition. Visual inspections were conducted along the channel of each potential reference reach. Each reach was walked and notes were taken on the vegetative cover, bank stability, sinuosity, channel classification, and channel condition. The inspection was performed to ensure that the contributing watershed was not adversely affecting the condition of the reach.

### **6.2 Reference Reach Site**

Two streams were identified as reference reaches; Left Fork of Big Double Creek and an unnamed tributary to the Left Fork of Big Double Creek in Clay County, Kentucky. These reference reaches were both surveyed on March 2, 2013. All of the surveys were performed using techniques outlined in the *USDA Stream Channel Reference Sites: An Illustrated Guide to Field Technique* (Harrelson et al., 1994).

### **6.3 Design**

#### ***Reference Reach***

Due to existing disturbance in this area, stream alteration, and sedimentation due to previous disturbance, the stream restoration plan has been designed utilizing reference reach stream segments. Reference reach segments were selected from a reference reach stream to better represent pre-impact conditions. These segments were taken from The Left Fork of Big Double Creek and an unnamed tributary to The Left Fork of Big Double Creek at Peabody, Ky. Data from this reference reach is in the following sections.

#### ***Existing Species Composition***

Riparian Zone: Poplar, Oak, Maple, Hickory, and Beech trees were found dominant in the surrounding undisturbed streams with patches of various grasses and herbaceous species covering the side slopes of the channels. This is consistent with Braun's Mixed Mesophytic Forest Region description as including beech, yellow poplar, assorted oaks and hickories, walnut, hemlock, and pine. (Ref. Braun, L.E., 1974, *Deciduous Forests of Eastern North America*)

### ***Stream Substrate***

Substrate, bankfull depth, bankfull width, and geometry will be taken from reference reach segments.

### ***Sinuosity***

Due to stream alteration in the proposed project area, sinuosity is projected from the reference reach, which will increase the overall linear feet of stream.

### ***Riparian Corridor***

A riparian corridor will be established for a minimum of 25' or when plantings encounter the undisturbed forest canopy. Native vegetation plantings will begin at OHWM height with no trees within the flood prone width of the constructed channel. Listings of vegetation are included with this document.

### ***Stream Crossings***

Fill material will be removed from the stream corridor with small equipment in order to avoid unnecessary disturbances to the riparian corridors.

### ***Velocity Dissipating Structures***

Cross-vanes, J-hooks, W-hooks and native bank revetments will provide energy dissipation, create pools and riffles, and establish aquatic habitat. A design for each has been provided. Each vane or hook will be constructed of durable non-acidic and non-toxic rock materials and will be located based on the construction table at proposed riffle/pool locations. Illustrations are provided.

### ***Habitat Enhancement and In-Stream Improvements***

Habitat enhancement methods and in-stream improvements may be used include random boulder placement, boulder clusters, boulder wing deflectors, and root wads. Natural rock will also be used to create riffles and pool scenarios. Durable non-acidic and non-toxic rock will be utilized for these. Illustrations can be found in the following sections.

### ***Wetlands***

The wetlands located on the project area are not natural and were likely formed due to hydraulic conductivity, saturation and infiltration due to a poorly constructed channel when the topsoil/fill was placed to cap the refuse fill. The applicant proposes offset the loss of the wetlands through a combination of creating a riparian corridor, stream restoration, and upland buffer enhancement therefore providing an overall ecological lift to the site.

*Pre-project vs. Post-project conditions*

<b>Pre-Project</b>				
<b>Reach #</b>	<b>Stream Type</b>	<b>Length</b>	<b>EII</b>	<b>EIU</b>
1	Perennial	2371	0.1	237.1
2	Intermittent	854	0.1	85.4
3	Ephemeral	62	0.1	6.2
4	Intermittent	138	0.1	13.8
Total				342.5
<b>Feature</b>		<b>Type</b>		<b>Area Acres</b>
Wetland#1		Abutting persistent emergent		0.28
Total				0.28

<b>Post-Project</b>				
<b>Reach #</b>	<b>Stream Type</b>	<b>Length</b>	<b>EII</b>	<b>EIU</b>
1	Perennial	2440.07	0.13	317.2
2	Intermittent	905.32	0.13	117.7
3	Ephemeral	109.06	0.11	11.9
4	Intermittent	171.35	0.12	20.6
4	Ephemeral	148.87	0.1	14.9
Total				482.3

Ecological Lift= 482.3 (EIU value derived from restored stream channel)-342.5 (EIU value of existing stream)=139.8 EIU's

**7.0 Site Protection**

The stream restoration area would be physically protected, to the extent practical, from activity that could harm the success of this restoration project during the post-restoration period. This site is private property and further, this site, as waters of the United States, benefit from all of the statutory and regulatory protections of such waters. Future disturbances in the form of pollutant discharges, channel alterations, or filling would be limited in accordance with those laws.

**8.0 Contingency**

Success criteria for the site have one primary component: (1) the successful restoration of channels in the project area. Initiation of stream restoration would occur as soon as practically possible, in a phased approach once the GOB removal is complete. Should an unforeseen problem arise, pertinent agencies would be notified immediately. Appropriate

remedial actions would be taken immediately to rectify the problem (i.e. adjust the plan). It is anticipated that that restoration work in First Creek would be completed within one year of the completion of GOB removal. Because this area is bonded to ensure project activities are completed, and since part of the proposed plan would include restoration of these channels as a part of the project plan, bond is in place to act as both a contingency plan and financial assurance that the proposed restoration would be completed.

## **9.0 Financial Assurance**

A financial bond is required as part of the AML project permit. Stream channels, which would be temporarily impacted as a result of the operation of the permit, fall within the bonded area and would have a bond in place. Because this area is bonded to ensure the GOB removal and stream restoration activities are completed, and since part of the proposed AML project plan would include placement of restored channels as a part of the AML project plan, the bond itself serves as a financial assurance.

# Appendix A

# AML ENHANCEMENT RULE PROJECT PLAN

## First Creek Refuse Reclamation; Perry County, Kentucky

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### **Section I. PROJECT DESCRIPTION**

1. First Creek Coal and Refuse Removal Project.

Site located near Hazard, Kentucky east of the community of Bonnyman, Kentucky. The property is located in the HAZARD NORTH QUADRANGLE of Perry County Kentucky. Latitude and Longitude of the refuse centers approximately at:

Lat: 37 degrees, 18' 40.71" N Long: 83 degrees, 11' 47.93" W

First Creek is a continuous flowing stream which is currently flowing in a southerly and then westerly direction through the refuse impoundment area towards Harveyton.

2. The refuse deposit is residual from mining by Harvey Coal Corporation and other mining companies, sometimes between 1925 and 1960's.

The estimated acreage of the refuse impoundment is approximately 22 acres. The estimated tonnage of the site is approximately 300,000 to 400,000 tons. Removal of the refuse is necessary for the stoppage of downstream migration of the refuse and coal during heavy rain events and to stop acid drainage into First Creek. Recoverable coal tonnage is estimated at 45% which economically promotes the removal of the refuse.

3. Property of the planned removal project is owned by Kentucky River Properties and is accessed via Harveyton Road/ First Creek Road. Road is capable of sustaining truck and equipment movement.
4. The refuse as stated is being washed into First Creek by stream undercutting of the refuse pile. This is evident by the physical movement of coal chunks for over 1 mile downstream. This refuse also poses a fire risk as historically reported; a fire occurred in a small area of the impoundment and had to be extinguished. With stream movement through the impoundment, acid drainage is also occurring and visually evident.
5. Some previous stabilization of the refuse on the western edge of the impoundment had been attempted in 2011. This was done as an AML Enhancement Project titled "Harveyton Refuse Project". Work was also done sometime in the 1980's on the refuse area by the AML. This consisted of some grading of materials and planting of erosion control grasses.

# AML ENHANCEMENT RULE PROJECT PLAN

## First Creek Refuse Reclamation; Perry County, Kentucky

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6. Carbon Trading INC, a privately owned corporation, with a corporate office address of PO BOX 1373, St. Albans, West Virginia 25177 will be in charge of the refuse removal project. Ownership of Carbon Trading, INC consists of Mrs. Pam Brown and four children: Meghan E. Brown, Alex Brown, Mary Katherine Brown and Doug Brown.
7. Erline Resources is the company contracted by Carbon Trading, INC to perform the refuse removal. This is a privately owned company owned by Mr. Jess Bowling with an operating address at:  
PO BOX 231  
Big Creek, KY 40914

## **Section II**     **WORK PROPOSAL AND PLANS**

### **1. Property Access**

Access to the work area will begin on the Western edge of the property from Harveyton Road. Harveyton Road is a developed, pavement road ending and becoming gravel as you come onto what will be the permitted area. Plans are to cut an access road from the property edge off of Harveyton Road down slope and easterly to an elevation consistent to the lowest level of the refuse pile. This access road will accommodate digging and grading equipment and dump trucks which will remove the refuse. The point where the access road is developed will be the starting point for the removal of the refuse material and proceed eastward. This beginning point also is the point where First Creek exits the property and moves westward. Control for any sedimentation will be implemented at this point where the stream leaves the property. Any storm water associated with the haul road and equipment activity area will be controlled and kept on the property and will be routed through the sediment controls also at the point where First Creek exits the property.

### **2. Sediment Control**

Sediment control for the project will utilize the AML Erosion and Sediment Control Best Management Practices (BMP) Manual. Silt fences or straw bales will be installed to capture all disturbed areas to minimize effects of runoff from the project area.

# AML ENHANCEMENT RULE PROJECT PLAN

## First Creek Refuse Reclamation; Perry County, Kentucky

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### 3. Refuse Removal Operations Plan

The proposed removal operation will begin with the necessary removal of existing vegetation that currently covers the refuse material. Field reviews of the project area revealed that mature trees exist throughout the removal area. Due to Federal Fish and Wildlife comments made during NEPA consultations regarding the protection of possible Indiana Bat Habitats, mature trees will only be removed from the period beginning October 15 and ending March 31 unless a bat survey is performed by qualified personnel. The bat survey will determine if potential Indiana bat habitat exists within the project area. Once a bat survey has been performed and clearance given from DAML, or beginning on or after October 15 and ending on or before March 31, the mature trees will be removed from the project area and refuse removal operations will begin.

Initial recovery will begin at the lower elevations of the refuse pile. Initial drainage will be controlled by the construction of on-site sump areas. The operation will continue in 5 to 15 foot lifts with the work area consistently sloped to the back. A depression/sump area will be maintained at the back at all times in order to control runoff. If deemed necessary during removal operations, a series of sumps/sediment traps will be constructed on either side of the work area to control runoff. Other devices that may be used to control runoff may include silt fences, and hay/straw bales. Additionally, as the work area begins in different lifts, a berm (approximately five feet in height) will be maintained at the front of the work area. As the material is removed, the berm will be pulled back with an excavator and maintained for material removal on the following lift, as the process is repeated. This process will follow complete removal of the refuse pile with minimal disturbance of the refuse pile outslope at any given time. Basically, the refuse pile will be worked from within itself. As the refuse pile lowers in elevation, the front berm would be pulled inward and lowered simultaneously until the valley floor is reached.

Any concrete debris or red dog found on the refuse removal area will be pulverized, buried and covered with graded refuse and cover material. Erline Resources will dispose of metal and debris and any trash encountered within the refuse area in an off-site approved landfill. I

As initially noted, the existing coal refuse area was created by underground workings within the No. 7 coal bed. According to the underground mine map downloaded from the Kentucky Mine Mapping Initiative Web site there are entrances on each side of the refuse pile at elevation of approximately 1200. The entries are now covered with spoil. The

# AML ENHANCEMENT RULE PROJECT PLAN

## First Creek Refuse Reclamation; Perry County, Kentucky

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operator conducting the removal operation will utilize caution when removing the refuse material located at the No. 7 seam elevation to ensure that no adits are encountered.

The equipment to be used for the work will include track hoes, bulldozers and tri-axel trucks.

During the removal process excessive dust protection will be controlled by the utilization of watering trucks. The dust control measure will be conducted within the removal site, access/haul roads, and any place deemed necessary by the Division of Abandoned Mine Lands.

Once all refuse has been removed from the project area, a diversion will be constructed that will follow the natural drainage pattern of the watershed and will place 'boulder clusters' where necessary, in order to decrease flow velocity prior to entering the stream channel.

All refuse removal will be conducted between the hours of 6:00 AM and 6:00 PM Monday through Saturday, unless an emergency warrants the changing of the scheduled work hours. If emergency refuse removal is warranted, the Division of Abandoned Mine Land personnel will be notified in advance of such removal. Refuse material will not occur until DAML, gives prior approval unless the emergency constitutes a direct and imminent threat to public health and safety.

Engine braking will be used sparingly, only as needed to allow drivers to safely negotiate roads associated with the project.

### **Dust Control**

Dust control will be accomplished by periodically watering unpaved roads, promptly removing all coal, rock, soil and other dust forming debris from roads and frequently scraping and compacting unpaved roads.

### **Reclamation**

As the refuse operation is completed in any given area not to be redisturbed, that area will be scarified, limed, topsoiled or alternant topsoiled, then seeded and mulched according to the revegetation plan. Necessary topsoil material will be obtained from the sides of the removal area at elevations below the existing refuse area and/or from the material available along the access road. If the original topsoil located at the original ground line proves to not have been contaminated by the refuse material, alternate topsoil will not be necessary. Upon completion of refuse recovery operations, all disturbed areas will be revegetated so as to prevent erosion and establish a suitable post reclamation land use. The areas to be revegetated may require lime application to neutralize any acidic or

## AML ENHANCEMENT RULE PROJECT PLAN

### First Creek Refuse Reclamation; Perry County, Kentucky

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barren spots or to promote vegetative growth. Location and rates of lime application will be determined by DAML.

The coal refuse removal area includes an area of First Creek that is approximately 1000 feet in length. No equipment will operate in the waters of First Creek without Division of Water and Corps of Engineers approval, and the First Creek stream channel will not be excavated without appropriate authorizations.

If Erline Resources should abandon this proposed coal refuse removal operation prior to all refuse being removed, then the disturbed area(s) will be revegetated in accordance with this plan prior to leaving the site. Additionally, proper drainage will be provided prior to leaving the site. If the refuse material located at the local stream bank cannot be removed, due to the material being inaccessible without disturbances to the local stream channel, then this refuse material will be armored with rock material in order to prevent erosion of the refuse material.

Should refuse removal cease for a period to exceed 60 days, the Contractor will either begin reclamation of the site or resume refuse removal. Only three cessation periods of 60 days each will be permitted. Should refuse removal cease for a third period, the Contractor agrees to immediately begin reclamation of the site without interruption until the site meets the reclamation requirements of this agreement and Work plan.

The Director of the Division of Abandoned Mine Lands may, at his/her sole discretion, grant additional shutdown periods. The Director may grant the additional time period after receiving a written request from the Contractor prior to the expiration of the third period. The request must provide sufficient information to support the need for the additional cessation period. The Director must grant the additional cessation period in writing. Amendments to this Work plan may be made in writing with the concurrence of DAML and the Contractor.

Tree planting will be done under a separate DAML contract after the refuse has been seeded according to this work plan. This effort will serve as DAML's contribution to the Enhancement Rule project as required by federal law.

**AML ENHANCEMENT RULE PROJECT PLAN**  
**First Creek Refuse Reclamation; Perry County, Kentucky**

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**REVEGETATION PLAN**

**FIRST CREEK REFUSE AML PROJECT**

Fertilizer 500# of 18-46-0 and 200# of 0-0-60 per acre

Ag-Lime 5 tons per acre

Seed Mixture	Seeding Rate
	(lb. /ac. PLS*)

**SPRING SEED MIX**

Application Period: February 15 to June 15

Creeping Red Fescue	20
Redtop	5
Orchard grass	20
Birds foot Trefoil	10
Korean Lespedeza (Hulled)	10
Medium Red Clover	10
Ladino Clover	5
	80 lbs

**SUMMER NO SEEDING**

Application Period: June 16 to August 14

# AML ENHANCEMENT RULE PROJECT PLAN

## First Creek Refuse Reclamation; Perry County, Kentucky

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### FALL SEED MIX

Application Period: August 15 to February 14

Creeping Red Fescue	20
Perennial Ryegrass	10
Orchard grass	15
Timothy	10
Birds foot Trefoil	10
Ladino Clover	5
Medium Red Clover	10
	80 LBS

Plus 1 bushel/acre Soft Red Winter Wheat as cover crop

\*PLS-Pure Live Seed is determined by multiplying the percent germination of the seed by the percent purity. Then, dividing this product into the specified rate yields the application.

### **Tree Planting**

Tree planting will be accomplished between February 1 and April 15. Trees shall consist of one or two year old seedlings of 1,500 Northern Red Oak and 1,000 Green Ash. Trees will be planted by DAML. This will be considered the AML Contribution to the site reclamation and will allow the project to qualify for the exemption to permitting requirements for government financed construction projects. Tree roots will be pruned to no less than six inches. Planting shall be accomplished by dibble bar or similar tool and heeling-in method. Trees shall be distributed evenly over the site.

### **Drawings**

Engineering drawings will be included as appendages.

Appendage 1. Site boundaries and estimated disturbance area boundary drawing.

AML ENHANCEMENT RULE PROJECT PLAN  
First Creek Refuse Reclamation; Perry County, Kentucky

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Appendage 2. Cross sectional estimated material removal drawing.

As "Project Manager" and employee of Carbon Trading Inc and authorized Agent for Erline Resources LLC, I affirm that I possess the authority and requisite property rights to request permits and oversee the above proposed reclamation activities.

Signed: \_\_\_\_\_

Date: \_\_\_\_\_

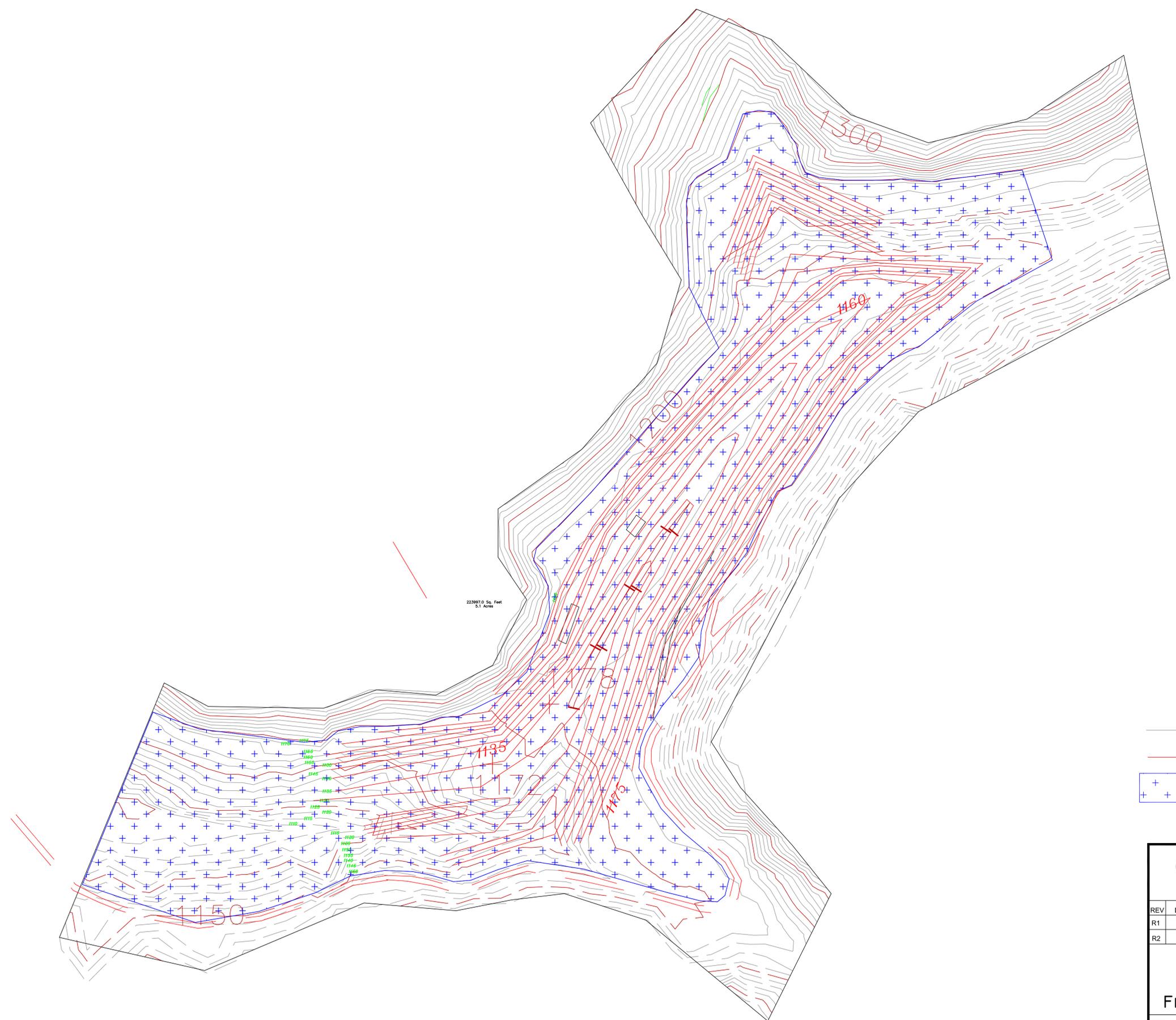
Larry C. Camp

3637 Boy Scout Road

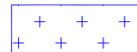
Ashland, Kentucky 41102

Project Manager

Carbon Trading Inc.



Legend

-  Original Contour
-  Regraded Contour
-  Refuse Recovery

 **CBC** ENGINEERS & ASSOCIATES, LTD  
 112 DENNIS DRIVE  
 LEXINGTON, KY 40503

REV	DATE	DESCRIPTION	REV	DATE	DESCRIPTION
R1			R3		
R2			R4		

**CARBON TRADING INC.**  
**TOPOGRAPHIC MAP**  
**FIRST CREEK REFUSE RECLAMATION**

DRAWN BY: ms	DATE: 11-30-12	SHEET NO.
CHECKED BY: ms	SCALE: 1"=100'	1
existing topo AML_Regrade	JOB NO: 14516L	

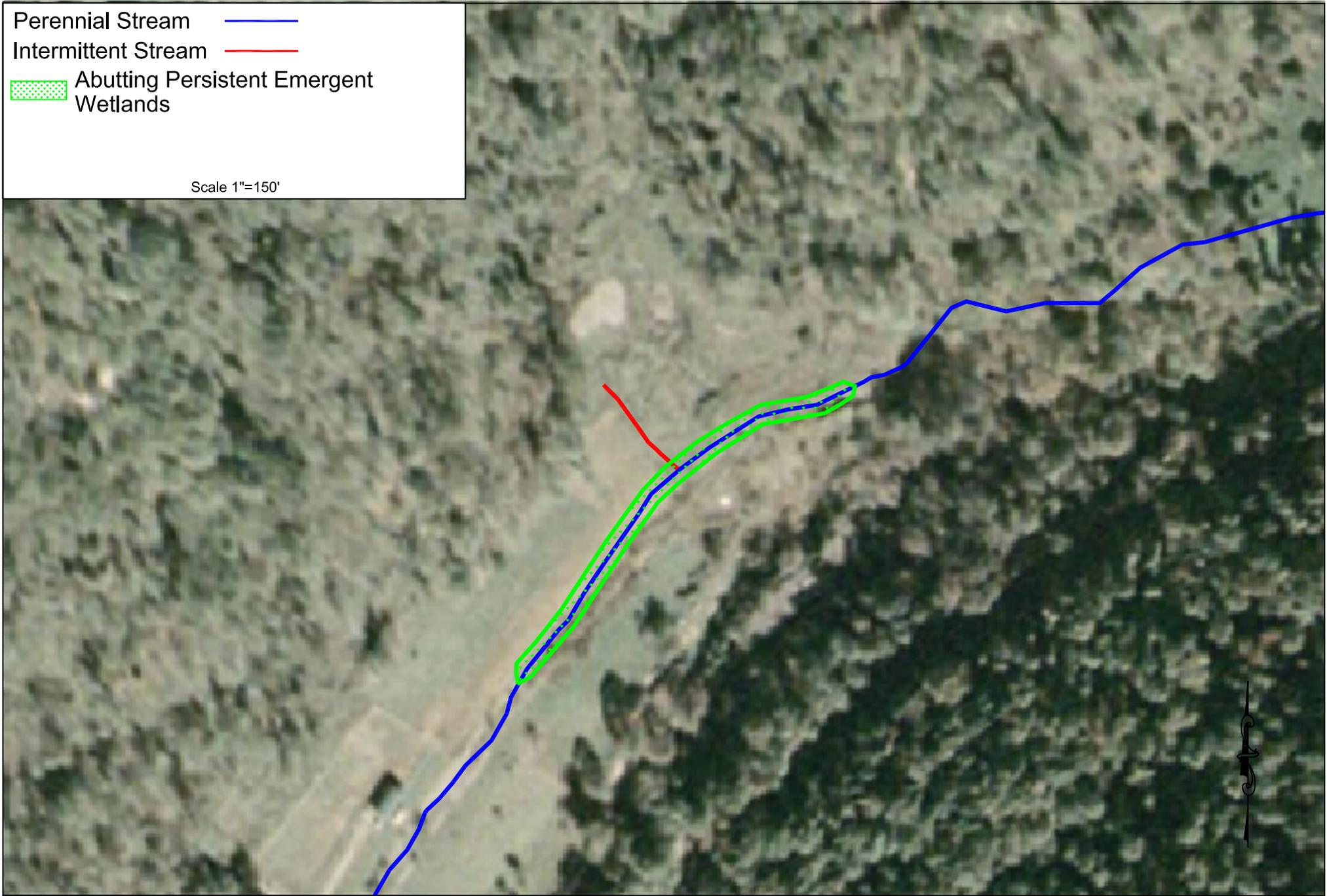
# Appendix B

Perennial Stream ———

Intermittent Stream ———

Abutting Persistent Emergent Wetlands

Scale 1"=150'



# Appendix C



A product of the National  
Cooperative Soil Survey,  
a joint effort of the United  
States Department of  
Agriculture and other  
Federal agencies, State  
agencies including the  
Agricultural Experiment  
Stations, and local  
participants

# Custom Soil Resource Report for Leslie and Perry Counties, Kentucky



# Preface

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Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://soils.usda.gov/sqi/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<http://offices.sc.egov.usda.gov/locator/app?agency=nrsc>) or your NRCS State Soil Scientist ([http://soils.usda.gov/contact/state\\_offices/](http://soils.usda.gov/contact/state_offices/)).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

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# **How Soil Surveys Are Made**

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Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

## Custom Soil Resource Report

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

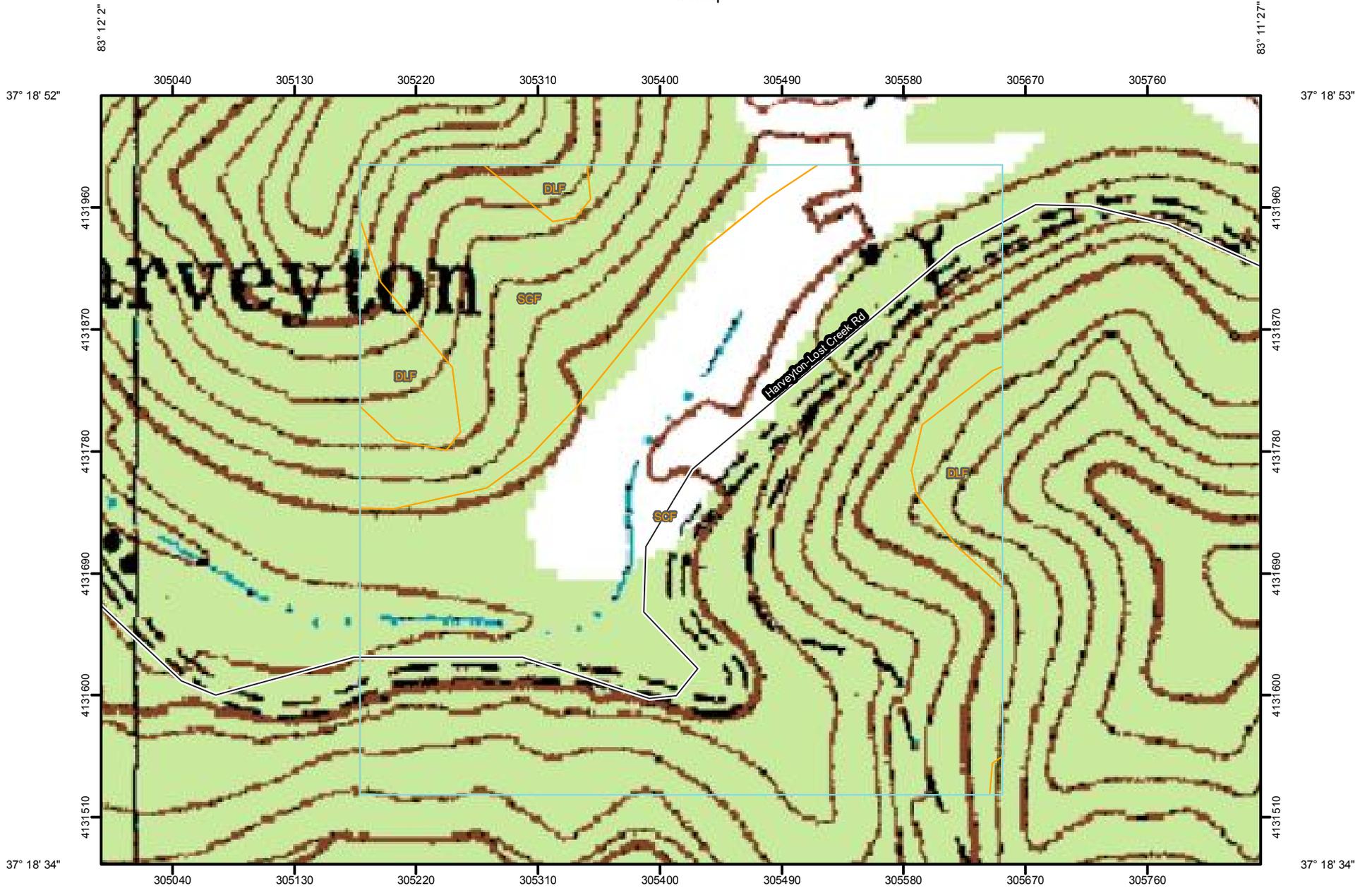
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

# Soil Map

---

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

# Custom Soil Resource Report Soil Map



83° 12' 1"



Map Scale: 1:4,060 if printed on A size (8.5" x 11") sheet.



83° 11' 27"

4131960

4131870

4131780

4131690

4131600

4131510

4131960

4131870

4131780

4131690

4131600

4131510

83° 12' 2"

37° 18' 52"

305040

305130

305220

305310

305400

305490

305580

305670

305760

83° 11' 27"

37° 18' 53"

37° 18' 34"

305040

305130

305220

305310

305400

305490

305580

305670

305760

83° 11' 27"

37° 18' 34"

# Custom Soil Resource Report

## MAP LEGEND

### Area of Interest (AOI)

 Area of Interest (AOI)

### Soils

 Soil Map Units

### Special Point Features

-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot
-  Spoil Area
-  Stony Spot

 Very Stony Spot

 Wet Spot

 Other

### Special Line Features

-  Gully
-  Short Steep Slope
-  Other

### Political Features

 Cities

### Water Features

 Streams and Canals

### Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

## MAP INFORMATION

Map Scale: 1:4,060 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service  
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>  
 Coordinate System: UTM Zone 17N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Leslie and Perry Counties, Kentucky  
 Survey Area Data: Version 9, Sep 16, 2012

## Map Unit Legend

Leslie and Perry Counties, Kentucky (KY633)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
DLF	Dekalb-Rock outcrop-Latham association, steep	3.9	7.2%
SCF	Shelocta-Cutshin association, steep	40.1	73.6%
SGF	Shelocta-Gilpin association, steep	10.5	19.2%
<b>Totals for Area of Interest</b>		<b>54.5</b>	<b>100.0%</b>

## Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If

## Custom Soil Resource Report

intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

## Leslie and Perry Counties, Kentucky

### DLF—Dekalb-Rock outcrop-Latham association, steep

#### Map Unit Setting

*Landscape:* Mountains

*Elevation:* 820 to 2,460 feet

*Mean annual precipitation:* 43 to 54 inches

*Mean annual air temperature:* 42 to 67 degrees F

*Frost-free period:* 156 to 196 days

#### Map Unit Composition

*Dekalb and similar soils:* 50 percent

*Rock outcrop:* 25 percent

*Latham and similar soils:* 15 percent

*Minor components:* 10 percent

#### Description of Dekalb

##### Setting

*Landform:* Ridges

*Landform position (two-dimensional):* Summit

*Landform position (three-dimensional):* Mountaintop

*Down-slope shape:* Convex

*Across-slope shape:* Linear

*Parent material:* Loamy skeletal residuum weathered from sandstone

##### Properties and qualities

*Slope:* 15 to 70 percent

*Depth to restrictive feature:* 20 to 40 inches to lithic bedrock

*Drainage class:* Well drained

*Capacity of the most limiting layer to transmit water (Ksat):* High to very high (6.00 to 20.00 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Available water capacity:* Low (about 3.1 inches)

##### Interpretive groups

*Farmland classification:* Not prime farmland

*Land capability (nonirrigated):* 7e

*Hydrologic Soil Group:* A

##### Typical profile

*0 to 2 inches:* Channery loam

*2 to 34 inches:* Very channery loam

*34 to 38 inches:* Unweathered bedrock

#### Description of Rock Outcrop

##### Setting

*Landform:* Ridges

*Landform position (two-dimensional):* Summit

*Landform position (three-dimensional):* Free face

*Down-slope shape:* Linear

*Across-slope shape:* Linear

## Custom Soil Resource Report

*Parent material:* Horizontally bedded sandstone and siltstone and/or shale

### **Interpretive groups**

*Farmland classification:* Not prime farmland

*Land capability (nonirrigated):* 8

### **Description of Latham**

#### **Setting**

*Landform:* Ridges

*Landform position (two-dimensional):* Summit

*Landform position (three-dimensional):* Mountaintop

*Down-slope shape:* Convex

*Across-slope shape:* Linear

*Parent material:* Clayey residuum weathered from shale

#### **Properties and qualities**

*Slope:* 15 to 70 percent

*Depth to restrictive feature:* 20 to 40 inches to paralithic bedrock

*Drainage class:* Moderately well drained

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)

*Depth to water table:* About 26 to 31 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Available water capacity:* Low (about 4.5 inches)

#### **Interpretive groups**

*Farmland classification:* Not prime farmland

*Land capability (nonirrigated):* 7e

*Hydrologic Soil Group:* D

#### **Typical profile**

*0 to 3 inches:* Silt loam

*3 to 33 inches:* Silty clay loam

*33 to 37 inches:* Weathered bedrock

### **Minor Components**

#### **Handshoe**

*Percent of map unit:* 3 percent

#### **Marrowbone**

*Percent of map unit:* 3 percent

#### **Ramsey**

*Percent of map unit:* 2 percent

#### **Rayne**

*Percent of map unit:* 2 percent

## SCF—Shelocta-Cutshin association, steep

### Map Unit Setting

*Landscape:* Mountains

*Elevation:* 820 to 2,460 feet

*Mean annual precipitation:* 43 to 54 inches

*Mean annual air temperature:* 42 to 67 degrees F

*Frost-free period:* 156 to 196 days

### Map Unit Composition

*Shelocta and similar soils:* 60 percent

*Cutshin and similar soils:* 25 percent

*Minor components:* 15 percent

### Description of Shelocta

#### Setting

*Landform:* Mountain slopes

*Landform position (two-dimensional):* Backslope

*Landform position (three-dimensional):* Mountainflank

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Parent material:* Fine-loamy colluvium derived from sandstone and shale

#### Properties and qualities

*Slope:* 15 to 60 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Well drained

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high  
(0.57 to 1.98 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Available water capacity:* High (about 9.2 inches)

#### Interpretive groups

*Farmland classification:* Not prime farmland

*Land capability (nonirrigated):* 7e

*Hydrologic Soil Group:* B

#### Typical profile

*0 to 5 inches:* Silt loam

*5 to 60 inches:* Channery silty clay loam

*60 to 72 inches:* Channery loam

## Description of Cutshin

### Setting

*Landform:* Mountain slopes  
*Landform position (two-dimensional):* Footslope  
*Landform position (three-dimensional):* Mountainflank  
*Down-slope shape:* Concave  
*Across-slope shape:* Linear  
*Parent material:* Fine-loamy colluvium derived from sandstone and shale

### Properties and qualities

*Slope:* 15 to 60 percent  
*Depth to restrictive feature:* 40 to 82 inches to paralithic bedrock  
*Drainage class:* Well drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high  
(0.57 to 1.98 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Available water capacity:* Low (about 6.0 inches)

### Interpretive groups

*Farmland classification:* Not prime farmland  
*Land capability (nonirrigated):* 7e  
*Hydrologic Soil Group:* B

### Typical profile

*0 to 19 inches:* Channery loam  
*19 to 50 inches:* Channery loam  
*50 to 60 inches:* Weathered bedrock

## Minor Components

### Latham

*Percent of map unit:* 6 percent

### Gilpin

*Percent of map unit:* 5 percent

### Rowdy

*Percent of map unit:* 2 percent

### Grigsby

*Percent of map unit:* 2 percent

## SGF—Shelocta-Gilpin association, steep

### Map Unit Setting

*Landscape:* Mountains  
*Elevation:* 820 to 2,460 feet  
*Mean annual precipitation:* 43 to 54 inches

## Custom Soil Resource Report

*Mean annual air temperature:* 42 to 67 degrees F  
*Frost-free period:* 156 to 196 days

### Map Unit Composition

*Shelocta and similar soils:* 60 percent  
*Gilpin and similar soils:* 20 percent  
*Minor components:* 20 percent

### Description of Shelocta

#### Setting

*Landform:* Mountain slopes  
*Landform position (two-dimensional):* Footslope  
*Landform position (three-dimensional):* Mountainflank  
*Down-slope shape:* Concave  
*Across-slope shape:* Linear  
*Parent material:* Fine-loamy colluvium derived from sandstone and shale

#### Properties and qualities

*Slope:* 15 to 60 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Well drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high  
(0.57 to 1.98 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Available water capacity:* High (about 9.2 inches)

#### Interpretive groups

*Farmland classification:* Not prime farmland  
*Land capability (nonirrigated):* 7e  
*Hydrologic Soil Group:* B

#### Typical profile

*0 to 5 inches:* Silt loam  
*5 to 60 inches:* Channery silty clay loam  
*60 to 72 inches:* Very channery loam

### Description of Gilpin

#### Setting

*Landform:* Mountain slopes  
*Landform position (two-dimensional):* Backslope  
*Landform position (three-dimensional):* Mountainflank  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Fine-loamy residuum weathered from sandstone and shale

#### Properties and qualities

*Slope:* 15 to 60 percent  
*Depth to restrictive feature:* 20 to 40 inches to paralithic bedrock  
*Drainage class:* Well drained  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high  
(0.57 to 1.98 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None

## Custom Soil Resource Report

*Frequency of ponding:* None  
*Available water capacity:* Low (about 5.1 inches)

### **Interpretive groups**

*Farmland classification:* Not prime farmland  
*Land capability (nonirrigated):* 7e  
*Hydrologic Soil Group:* C

### **Typical profile**

*0 to 4 inches:* Channery silt loam  
*4 to 36 inches:* Channery silt loam  
*36 to 44 inches:* Weathered bedrock

### **Minor Components**

#### **Dekalb**

*Percent of map unit:* 7 percent

#### **Latham**

*Percent of map unit:* 7 percent

#### **Cutshin**

*Percent of map unit:* 5 percent

#### **Rock outcrop**

*Percent of map unit:* 1 percent

# **Soil Information for All Uses**

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## **Suitabilities and Limitations for Use**

The Suitabilities and Limitations for Use section includes various soil interpretations displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each interpretation.

## **Land Classifications**

Land Classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

## **Hydric Rating by Map Unit**

This rating indicates the proportion of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is designated as "all hydric," "partially hydric," "not hydric," or "unknown hydric," depending on the rating of its respective components.

"All hydric" means that all components listed for a given map unit are rated as being hydric, while "not hydric" means that all components are rated as not hydric. "Partially hydric" means that at least one component of the map unit is rated as hydric, and at least one component is rated as not hydric. "Unknown hydric" indicates that at least one component is not rated so a definitive rating for the map unit cannot be made.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part

## Custom Soil Resource Report

(Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

### References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

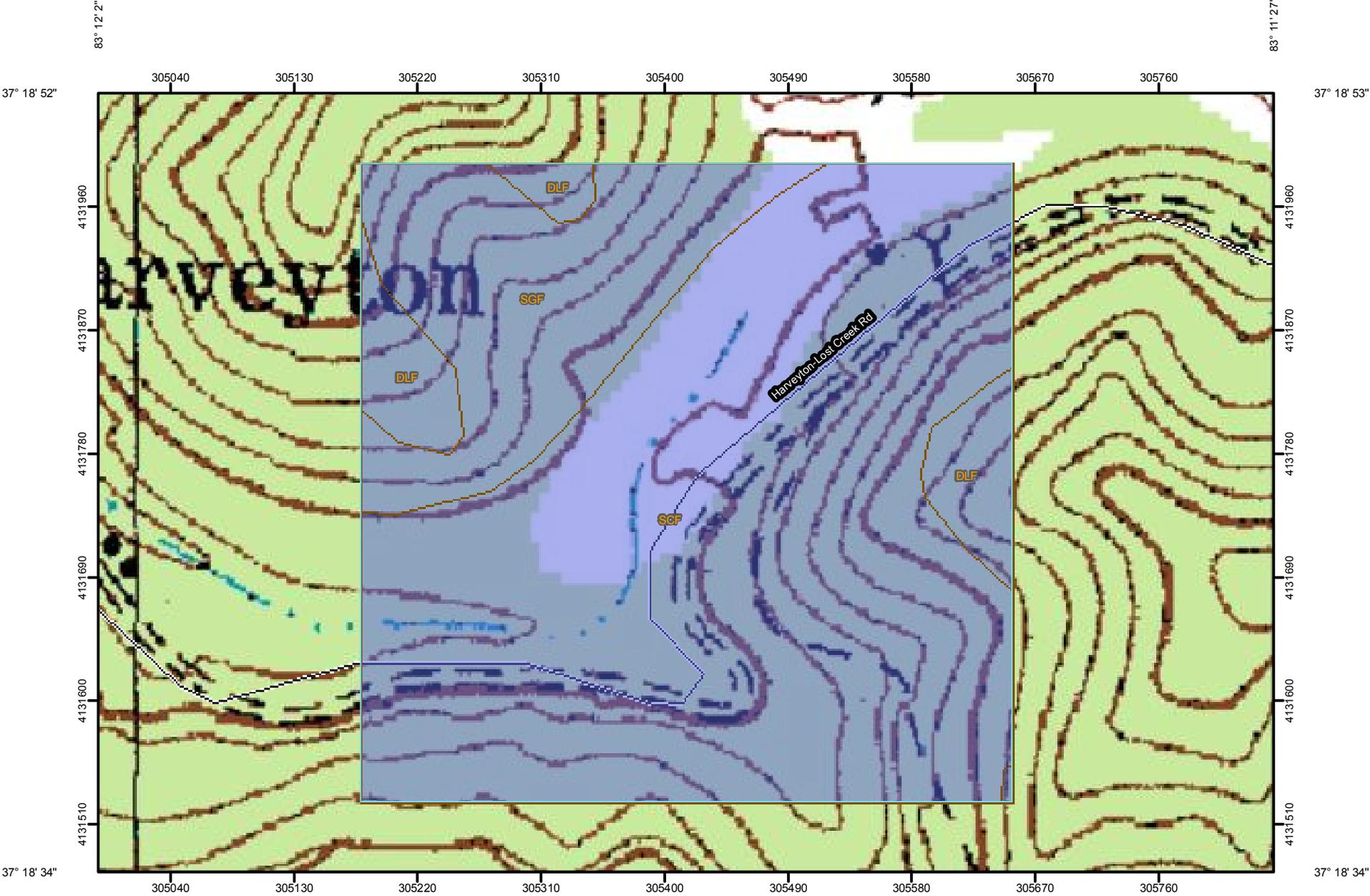
Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

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Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Custom Soil Resource Report  
Map—Hydric Rating by Map Unit



Map Scale: 1:4,060 if printed on A size (8.5" x 11") sheet.



# Custom Soil Resource Report

## MAP LEGEND

### Area of Interest (AOI)

 Area of Interest (AOI)

### Soils

 Soil Map Units

### Soil Ratings

 All Hydric

 Partially Hydric

 Not Hydric

 Unknown Hydric

 Not rated or not available

### Political Features

 Cities

### Water Features

 Streams and Canals

### Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

## MAP INFORMATION

Map Scale: 1:4,060 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service  
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>  
Coordinate System: UTM Zone 17N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Leslie and Perry Counties, Kentucky  
Survey Area Data: Version 9, Sep 16, 2012

**Table—Hydric Rating by Map Unit**

Hydric Rating by Map Unit— Summary by Map Unit — Leslie and Perry Counties, Kentucky (KY633)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
DLF	Dekalb-Rock outcrop-Latham association, steep	Not Hydric	3.9	7.2%
SCF	Shelocta-Cutshin association, steep	Not Hydric	40.1	73.6%
SGF	Shelocta-Gilpin association, steep	Not Hydric	10.5	19.2%
<b>Totals for Area of Interest</b>			<b>54.5</b>	<b>100.0%</b>

**Rating Options—Hydric Rating by Map Unit**

*Aggregation Method:* Absence/Presence

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Absence/Presence" returns a value that indicates if, for all components of a map unit, a condition is always present, never present, partially present, or whether the condition's presence or absence is unknown. The exact phrases used for a particular attribute may vary from what is shown below.

"Always present" means that the corresponding condition is present in all of a map unit's components.

"Never present" means that the corresponding condition is not present in any of a map unit's components.

"Partially present" means that the corresponding condition is present in some but not all of a map unit's components, or that the presence or absence of the corresponding condition cannot be determined for one or more components of the map unit.

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"Unknown presence" means that for components where presence or absence can be determined, the corresponding condition is never present, but the presence or absence of the corresponding condition cannot be determined for one or more components.

The result returned by this aggregation method quantifies the degree to which the corresponding condition is present throughout the map unit.

*Tie-break Rule:* Lower

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

# References

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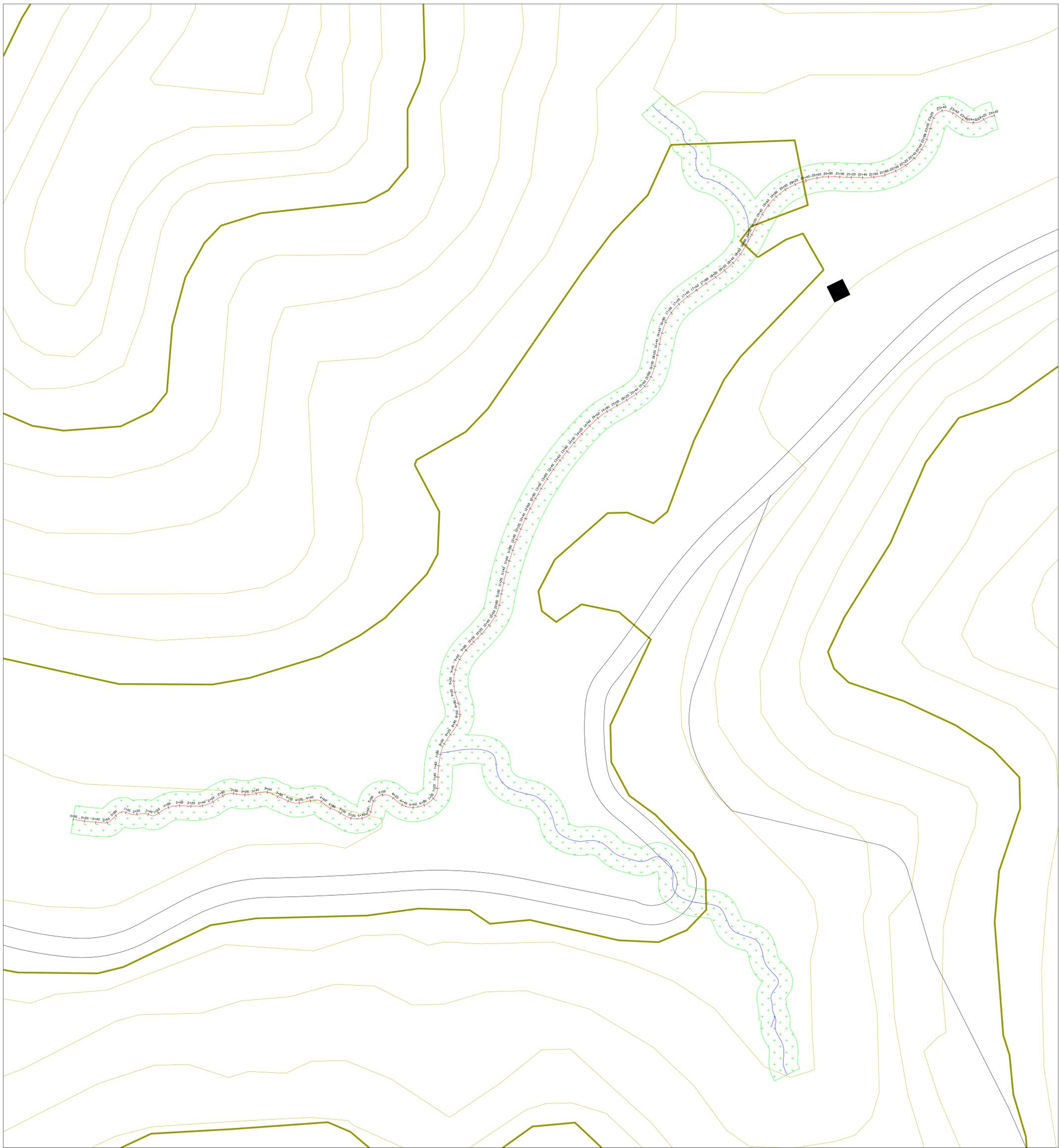
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## Appendix D



Notes:

- (1) Native vegetation begins at OHW height
- (2) Trees will be established in a random pattern for a minimum of 25' or until existing forest conditions are encountered

	Station #
	Reach #1
	Tree planting & revegetation zone

Reach #1  
 Anticipated Stream Reconstruction Design  
 Perennial  
 Plan View

Scale 1"=50'

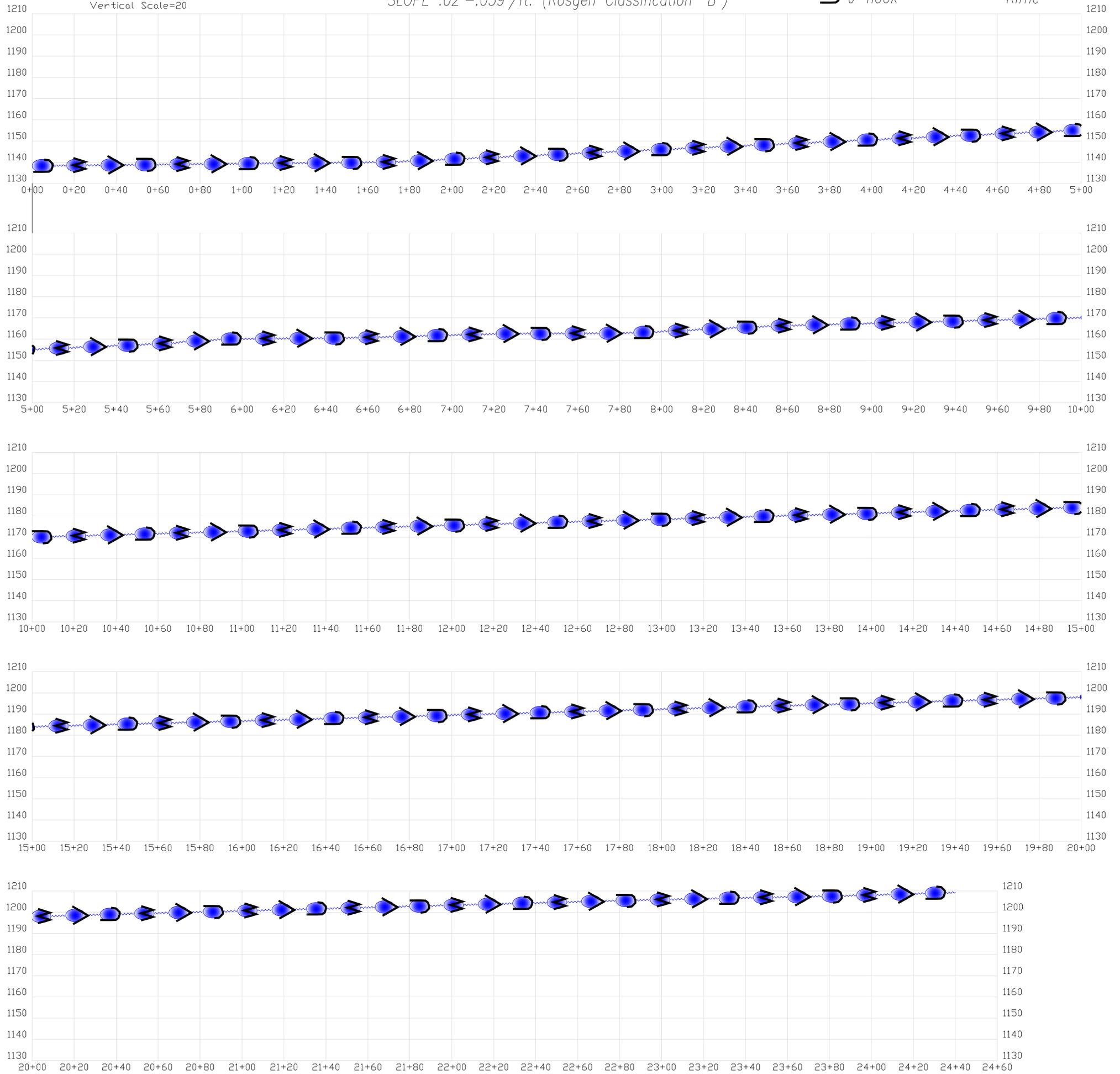
SINUOSITY MAY VARY BETWEEN 1-1.2

Reach #1  
Anticipated Stream Reconstruction Design  
Perennial  
Profile View

- Cross-vane
- W-vane
- J-hook
- J-hook
- Pool
- Riffle

SLOPE .02'-.039'/ft. (Rosgen Classification "B")

Horizontal Scale=20  
Vertical Scale=20



RECONSTRUCTED STREAM							
	RIFFLE	POOL					
%	43.3%	56.7%					
RATIO	1	1.31	D16	D35	D50	D84	D95
AVERAGE LENGTH	7.09	9.30	(mm)	(mm)	(mm)	(mm)	(mm)
AVERAGE WATER DEPTH	0.82	1.53	7.445	18.76	37.9	189	362
AVERAGE BANKFULL DEPTH	3.29	3.53					

### Reach #1 Reconstructed Stream Alignment

Station	Northing	Easting	Elevation
0+00.00	365989.26	2741794.34	1138.33
0+09.30	365987.80	2741803.52	1138.33
0+15.90	365986.77	2741810.04	1138.49
0+16.39	365986.71	2741810.53	1138.50
0+25.69	365985.63	2741819.77	1138.50
0+31.89	365984.90	2741825.93	1138.65
0+32.78	365984.84	2741826.81	1138.67
0+42.08	365984.12	2741836.08	1138.67
0+47.89	365983.68	2741841.88	1138.81
0+49.17	365983.63	2741843.16	1138.84
0+58.47	365983.23	2741852.45	1138.84
0+59.02	365983.21	2741853.00	1138.85
0+62.52	365984.32	2741856.32	1138.94
0+65.56	365985.98	2741858.86	1139.01
0+66.51	365986.50	2741859.66	1139.01
0+68.41	365987.83	2741861.01	1139.01
0+72.36	365990.67	2741863.76	1139.01
0+74.86	365992.46	2741865.50	1139.01
0+76.03	365993.31	2741866.31	1139.04
0+81.95	365997.26	2741870.72	1139.18
0+85.63	365999.72	2741873.45	1139.18
0+89.13	366001.57	2741876.43	1139.18
0+91.25	366002.19	2741878.45	1139.18
0+93.12	366002.74	2741880.24	1139.22
0+96.38	366002.91	2741883.50	1139.30
0+98.34	366002.10	2741885.28	1139.35
1+03.91	365999.79	2741890.35	1139.35
1+07.64	365999.01	2741894.00	1139.35
1+13.94	365997.69	2741900.15	1139.50
1+14.73	365997.79	2741900.94	1139.52
1+24.03	365999.00	2741910.16	1139.52
1+27.40	365999.43	2741913.50	1139.60
1+31.12	365999.38	2741917.22	1139.69
1+34.92	365999.33	2741921.02	1139.69
1+38.91	365998.59	2741924.95	1139.69
1+40.42	365998.13	2741926.39	1139.69
1+42.91	365997.38	2741928.76	1139.75
1+46.98	365995.70	2741932.47	1139.84
1+47.51	365995.70	2741933.00	1139.86
1+50.47	365995.70	2741935.95	1139.86
1+51.73	365996.06	2741937.17	1139.86
1+56.81	365998.65	2741941.53	1139.86
1+59.32	365999.94	2741943.69	1139.91
1+63.90	366002.60	2741947.41	1140.02
1+66.26	366003.98	2741949.33	1140.02
1+66.53	366004.14	2741949.55	1140.02
1+73.20	366007.52	2741955.30	1140.02

<b>Station</b>	<b>Northing</b>	<b>Easting</b>	<b>Elevation</b>
1+74.08	366007.97	2741956.06	1140.11
1+80.29	366010.39	2741961.77	1140.69
1+82.08	366011.08	2741963.42	1140.69
1+87.38	366012.57	2741968.51	1140.69
1+89.59	366012.83	2741970.70	1140.69
1+94.95	366013.46	2741976.03	1141.26
1+96.68	366013.49	2741977.76	1141.44
2+02.95	366013.59	2741984.03	1141.44
2+05.98	366013.38	2741987.05	1141.44
2+08.45	366013.20	2741989.51	1141.70
2+13.07	366012.98	2741994.13	1142.19
2+22.37	366012.53	2742003.42	1142.19
2+24.09	366012.45	2742005.14	1142.38
2+29.46	366012.73	2742010.50	1142.95
2+38.76	366013.21	2742019.78	1142.95
2+39.23	366013.24	2742020.26	1143.00
2+45.85	366014.68	2742026.71	1143.70
2+46.78	366014.89	2742027.62	1143.70
2+54.77	366017.81	2742035.06	1143.70
2+55.15	366017.99	2742035.39	1143.70
2+58.39	366019.51	2742038.25	1144.04
2+62.24	366021.75	2742041.38	1144.45
2+65.99	366023.94	2742044.43	1144.45
2+71.54	366026.82	2742049.17	1144.45
2+73.99	366028.10	2742051.26	1144.71
2+78.63	366030.21	2742055.40	1145.20
2+81.99	366031.73	2742058.39	1145.20
2+87.93	366034.05	2742063.86	1145.20
2+88.83	366034.40	2742064.69	1145.30
2+95.02	366035.25	2742070.82	1145.95
2+96.34	366035.44	2742072.13	1145.95
2+99.65	366035.33	2742075.44	1145.95
3+04.32	366034.36	2742080.00	1145.95
3+07.23	366033.76	2742082.85	1146.26
3+11.41	366033.28	2742087.00	1146.70
3+15.23	366032.84	2742090.80	1146.70
3+20.71	366032.75	2742096.28	1146.70
3+23.23	366032.70	2742098.79	1146.97
3+27.80	366033.06	2742103.35	1147.46
3+31.22	366033.33	2742106.76	1147.46
3+37.10	366034.34	2742112.55	1147.46
3+38.74	366034.62	2742114.17	1147.63
3+44.19	366036.14	2742119.41	1148.21
3+46.30	366036.72	2742121.43	1148.21
3+53.49	366037.73	2742128.55	1148.21
3+55.99	366038.08	2742131.03	1148.47
3+59.52	366037.77	2742134.54	1148.85
3+60.58	366037.55	2742135.58	1148.96
3+63.52	366036.93	2742138.45	1148.96
3+67.52	366035.58	2742142.21	1148.96

<b>Station</b>	<b>Northing</b>	<b>Easting</b>	<b>Elevation</b>
3+69.88	366034.44	2742144.28	1148.96
3+73.19	366032.84	2742147.18	1149.31
3+76.97	366030.98	2742150.47	1149.71
3+80.71	366029.15	2742153.73	1149.71
3+86.27	366027.56	2742159.06	1149.71
3+88.34	366026.96	2742161.05	1149.93
3+93.35	366024.57	2742165.44	1150.46
3+93.36	366024.56	2742165.45	1150.46
3+98.30	366022.34	2742169.86	1150.46
4+02.66	366020.62	2742173.87	1150.46
4+03.13	366020.44	2742174.30	1150.51
4+09.75	366018.74	2742180.70	1151.21
4+10.65	366018.51	2742181.57	1151.21
4+14.64	366018.16	2742185.55	1151.21
4+19.05	366018.34	2742189.95	1151.21
4+19.41	366018.36	2742190.31	1151.25
4+24.18	366018.97	2742195.04	1151.76
4+26.14	366019.35	2742196.97	1151.96
4+31.57	366020.41	2742202.29	1151.96
4+35.44	366021.23	2742206.07	1151.96
4+41.75	366022.58	2742212.24	1152.63
4+42.53	366022.70	2742213.01	1152.72
4+46.89	366023.40	2742217.31	1152.72
4+49.39	366023.60	2742219.80	1152.72
4+51.83	366023.51	2742222.24	1152.72
4+52.99	366023.46	2742223.40	1152.84
4+57.57	366022.16	2742227.79	1153.32
4+58.92	366021.42	2742228.92	1153.47
4+61.06	366020.26	2742230.72	1153.47
4+65.94	366017.01	2742234.37	1153.47
4+68.22	366015.47	2742236.04	1153.47
4+70.94	366013.62	2742238.03	1153.76
4+73.40	366012.09	2742239.96	1154.02
4+75.31	366011.19	2742241.64	1154.22
4+80.66	366008.66	2742246.36	1154.22
4+84.61	366007.24	2742250.04	1154.22
4+85.52	366006.91	2742250.89	1154.31
4+90.36	366005.16	2742255.40	1154.83
4+90.48	366005.10	2742255.51	1154.84
4+91.70	366004.53	2742256.59	1154.97
4+97.54	366001.79	2742261.75	1154.97
5+01.00	365999.86	2742264.62	1154.97
5+04.80	365997.74	2742267.78	1155.35
5+08.09	365996.06	2742270.60	1155.69
5+09.72	365995.22	2742272.00	1155.69
5+17.26	365992.15	2742278.88	1155.69
5+17.39	365992.11	2742279.01	1155.69
5+22.05	365990.80	2742283.48	1156.16
5+24.48	365990.50	2742285.89	1156.41
5+29.57	365989.88	2742290.94	1156.41

<b>Station</b>	<b>Northing</b>	<b>Easting</b>	<b>Elevation</b>
5+33.78	365990.28	2742295.13	1156.41
5+36.50	365990.53	2742297.84	1156.68
5+40.87	365991.50	2742302.10	1157.12
5+43.80	365992.15	2742304.96	1157.12
5+47.64	365993.42	2742308.58	1157.12
5+50.17	365994.70	2742310.77	1157.12
5+51.14	365995.20	2742311.61	1157.22
5+55.13	365998.08	2742314.36	1157.63
5+57.04	365999.76	2742315.26	1157.83
5+57.26	365999.96	2742315.36	1157.85
5+58.57	366001.11	2742315.97	1157.85
5+66.56	366008.91	2742317.72	1157.85
5+73.65	366015.83	2742319.28	1159.08
5+76.26	366018.37	2742319.85	1159.08
5+79.77	366021.68	2742321.03	1159.08
5+82.95	366024.38	2742322.71	1159.08
5+83.76	366025.07	2742323.13	1159.19
5+85.96	366026.63	2742324.69	1159.49
5+87.75	366027.90	2742325.95	1159.73
5+90.04	366029.12	2742327.89	1160.04
5+91.74	366030.02	2742329.33	1160.04
5+93.82	366030.81	2742331.25	1160.04
5+97.34	366031.98	2742334.57	1160.04
5+99.34	366032.33	2742336.54	1160.04
6+01.33	366032.68	2742338.50	1160.08
6+05.33	366032.69	2742342.50	1160.17
6+06.43	366032.51	2742343.58	1160.19
6+09.32	366032.03	2742346.44	1160.19
6+13.32	366030.71	2742350.21	1160.19
6+15.73	366029.51	2742352.30	1160.19
6+17.71	366028.53	2742354.02	1160.24
6+22.82	366025.22	2742357.92	1160.35
6+32.12	366019.20	2742365.00	1160.35
6+35.05	366017.30	2742367.23	1160.41
6+39.21	366015.30	2742370.88	1160.50
6+42.58	366013.69	2742373.84	1160.50
6+48.13	366011.95	2742379.11	1160.50
6+48.51	366011.83	2742379.47	1160.50
6+50.57	366011.18	2742381.43	1160.58
6+55.60	366010.52	2742386.41	1160.79
6+58.56	366010.14	2742389.35	1160.79
6+64.90	366010.49	2742395.68	1160.79
6+66.55	366010.59	2742397.32	1160.89
6+71.99	366012.02	2742402.57	1161.23
6+76.45	366013.19	2742406.88	1161.23
6+81.29	366015.07	2742411.34	1161.23
6+83.99	366016.12	2742413.82	1161.39
6+88.38	366018.53	2742417.49	1161.67
6+91.97	366020.51	2742420.50	1161.67
6+97.68	366024.48	2742424.60	1161.67

<b>Station</b>	<b>Northing</b>	<b>Easting</b>	<b>Elevation</b>
6+99.96	366026.06	2742426.24	1161.81
7+04.77	366029.93	2742429.09	1162.11
7+06.15	366031.05	2742429.91	1162.11
7+09.68	366034.25	2742431.39	1162.11
7+13.68	366038.06	2742432.59	1162.11
7+14.07	366038.45	2742432.66	1162.11
7+17.40	366041.73	2742433.23	1162.32
7+21.16	366045.48	2742433.49	1162.55
7+23.85	366048.16	2742433.68	1162.55
7+30.46	366054.76	2742434.14	1162.55
7+33.20	366057.49	2742434.33	1162.59
7+37.55	366061.84	2742434.43	1162.65
7+46.16	366070.45	2742434.63	1162.65
7+46.85	366071.13	2742434.67	1162.65
7+53.94	366078.21	2742435.16	1162.68
7+61.84	366086.09	2742435.71	1162.68
7+63.24	366087.47	2742435.93	1162.68
7+70.33	366094.47	2742437.06	1162.71
7+79.27	366103.29	2742438.50	1162.71
7+79.63	366103.65	2742438.55	1162.71
7+80.45	366104.46	2742438.68	1162.76
7+86.72	366110.51	2742440.33	1163.10
7+88.02	366111.76	2742440.68	1163.10
7+96.02	366119.22	2742443.55	1163.10
7+96.02	366119.23	2742443.55	1163.10
8+03.11	366125.54	2742446.78	1163.93
8+04.01	366126.34	2742447.19	1163.93
8+12.41	366133.28	2742451.92	1163.93
8+15.18	366135.57	2742453.47	1164.25
8+19.50	366139.07	2742456.02	1164.76
8+28.80	366146.59	2742461.49	1164.76
8+30.89	366148.27	2742462.72	1165.00
8+35.89	366152.47	2742465.44	1165.59
8+38.44	366154.61	2742466.83	1165.59
8+44.70	366160.22	2742469.61	1165.59
8+45.19	366160.66	2742469.82	1165.59
8+45.97	366161.36	2742470.17	1165.66
8+52.28	366167.45	2742471.83	1166.25
8+53.96	366169.06	2742472.28	1166.25
8+57.28	366172.38	2742472.56	1166.25
8+60.59	366175.67	2742472.84	1166.25
8+61.58	366176.66	2742472.77	1166.25
8+68.17	366183.23	2742472.32	1166.66
8+68.67	366183.73	2742472.23	1166.69
8+76.16	366191.12	2742471.03	1166.69
8+77.97	366192.87	2742470.57	1166.69
8+83.92	366198.62	2742469.06	1167.06
8+85.06	366199.70	2742468.68	1167.13
8+91.52	366205.79	2742466.52	1167.13
8+94.36	366208.53	2742465.78	1167.13

<b>Station</b>	<b>Northing</b>	<b>Easting</b>	<b>Elevation</b>
8+99.51	366213.50	2742464.43	1167.44
9+01.45	366215.41	2742464.07	1167.56
9+07.51	366221.36	2742462.95	1167.56
9+10.75	366224.59	2742462.65	1167.56
9+17.84	366231.65	2742461.98	1168.00
9+18.13	366231.93	2742461.95	1168.00
9+25.71	366239.51	2742462.33	1168.00
9+27.14	366240.92	2742462.53	1168.00
9+33.71	366247.42	2742463.45	1168.40
9+34.23	366247.93	2742463.57	1168.43
9+41.70	366255.21	2742465.29	1168.43
9+43.53	366256.94	2742465.87	1168.43
9+49.70	366262.79	2742467.84	1168.81
9+50.62	366263.63	2742468.21	1168.86
9+57.70	366270.10	2742471.07	1168.86
9+59.92	366272.04	2742472.15	1168.86
9+65.70	366277.09	2742474.97	1169.22
9+67.01	366278.16	2742475.72	1169.30
9+76.16	366285.64	2742481.00	1169.30
9+76.31	366285.75	2742481.10	1169.30
9+83.40	366291.11	2742485.74	1169.73
9+91.85	366297.49	2742491.27	1169.73
9+92.70	366298.10	2742491.87	1169.73
9+98.89	366302.53	2742496.20	1170.11
9+99.79	366303.16	2742496.84	1170.17
10+09.09	366309.68	2742503.47	1170.17
10+14.66	366313.59	2742507.44	1170.51
10+16.18	366314.72	2742508.46	1170.60
10+25.48	366321.62	2742514.69	1170.60
10+30.66	366325.46	2742518.17	1170.92
10+32.57	366326.94	2742519.37	1171.04
10+41.87	366334.18	2742525.21	1171.04
10+44.75	366336.42	2742527.01	1171.22
10+45.44	366336.96	2742527.45	1171.26
10+48.96	366339.89	2742529.41	1171.48
10+53.03	366343.27	2742531.67	1171.48
10+58.26	366347.84	2742534.21	1171.48
10+61.03	366350.26	2742535.56	1171.66
10+65.35	366354.19	2742537.36	1171.95
10+68.16	366356.74	2742538.52	1171.95
10+74.65	366362.90	2742540.58	1171.95
10+75.74	366363.93	2742540.93	1172.02
10+79.45	366367.54	2742541.77	1172.26
10+81.74	366369.77	2742542.29	1172.41
10+83.73	366371.72	2742542.74	1172.41
10+90.37	366378.29	2742543.67	1172.41
10+91.04	366378.95	2742543.79	1172.41
10+98.13	366385.92	2742545.09	1172.88
11+07.43	366395.06	2742546.80	1172.88
11+08.80	366396.41	2742547.05	1172.97

<b>Station</b>	<b>Northing</b>	<b>Easting</b>	<b>Elevation</b>
11+14.52	366401.99	2742548.28	1173.34
11+23.82	366411.07	2742550.29	1173.34
11+27.24	366414.41	2742551.02	1173.56
11+30.91	366417.97	2742551.93	1173.80
11+40.21	366426.98	2742554.22	1173.80
11+45.68	366432.28	2742555.56	1174.16
11+47.30	366433.84	2742556.01	1174.27
11+56.60	366442.78	2742558.59	1174.27
11+63.69	366449.59	2742560.56	1174.73
11+64.11	366449.99	2742560.68	1174.73
11+72.99	366458.44	2742563.41	1174.73
11+80.08	366465.19	2742565.59	1175.19
11+82.55	366467.54	2742566.35	1175.19
11+89.38	366473.96	2742568.66	1175.19
11+96.47	366480.64	2742571.06	1175.65
12+00.99	366484.89	2742572.58	1175.65
12+05.77	366489.33	2742574.35	1175.65
12+12.86	366495.93	2742576.95	1176.12
12+19.42	366502.03	2742579.37	1176.12
12+22.16	366504.54	2742580.46	1176.12
12+29.25	366511.05	2742583.28	1176.58
12+37.86	366518.94	2742586.70	1176.58
12+38.55	366519.57	2742587.00	1176.58
12+45.64	366525.98	2742590.02	1177.04
12+54.94	366534.39	2742593.99	1177.04
12+56.29	366535.62	2742594.57	1177.13
12+62.03	366540.72	2742597.18	1177.51
12+71.33	366549.00	2742601.42	1177.51
12+74.73	366552.03	2742602.97	1177.73
12+78.42	366555.26	2742604.75	1177.97
12+87.72	366563.40	2742609.25	1177.97
12+93.17	366568.16	2742611.88	1178.32
12+94.81	366569.58	2742612.72	1178.43
13+04.11	366577.57	2742617.48	1178.43
13+11.20	366583.66	2742621.11	1178.90
13+11.60	366584.01	2742621.31	1178.90
13+20.50	366591.50	2742626.11	1178.90
13+27.59	366597.48	2742629.93	1179.36
13+30.04	366599.54	2742631.25	1179.36
13+36.89	366605.19	2742635.12	1179.36
13+43.98	366611.04	2742639.13	1179.82
13+48.47	366614.74	2742641.67	1179.82
13+53.28	366618.62	2742644.51	1179.82
13+60.37	366624.34	2742648.71	1180.28
13+66.91	366629.61	2742652.57	1180.28
13+69.67	366631.78	2742654.28	1180.28
13+76.76	366637.36	2742658.65	1180.75
13+85.35	366644.12	2742663.95	1180.75
13+86.06	366644.67	2742664.41	1180.75
13+93.15	366650.10	2742668.96	1181.21

<b>Station</b>	<b>Northing</b>	<b>Easting</b>	<b>Elevation</b>
14+02.45	366657.23	2742674.93	1181.21
14+03.78	366658.26	2742675.78	1181.30
14+09.54	366662.55	2742679.62	1181.67
14+18.84	366669.49	2742685.81	1181.67
14+22.22	366672.01	2742688.06	1181.89
14+25.93	366674.70	2742690.62	1182.14
14+35.23	366681.43	2742697.03	1182.14
14+40.65	366685.36	2742700.77	1182.49
14+42.32	366686.53	2742701.96	1182.60
14+47.80	366690.38	2742705.86	1182.60
14+51.62	366693.07	2742708.57	1182.60
14+57.16	366696.96	2742712.51	1182.95
14+58.71	366697.90	2742713.75	1183.05
14+68.01	366703.56	2742721.13	1183.05
14+72.82	366706.48	2742724.95	1183.35
14+75.10	366707.67	2742726.89	1183.49
14+84.40	366712.54	2742734.82	1183.49
14+91.49	366716.25	2742740.86	1183.93
14+92.14	366716.59	2742741.41	1183.93
15+00.79	366720.85	2742748.94	1183.93
15+07.88	366724.34	2742755.11	1184.38
15+12.56	366726.65	2742759.19	1184.38
15+17.18	366729.03	2742763.14	1184.38
15+24.27	366732.70	2742769.21	1184.82
15+27.89	366734.56	2742772.31	1184.82
15+33.57	366737.69	2742777.05	1184.82
15+35.50	366738.76	2742778.67	1184.94
15+40.66	366741.87	2742782.78	1185.26
15+43.50	366743.59	2742785.04	1185.26
15+49.96	366747.83	2742789.91	1185.26
15+51.50	366748.84	2742791.07	1185.36
15+57.05	366752.79	2742794.97	1185.71
15+61.55	366755.99	2742798.13	1185.71
15+66.35	366759.84	2742801.01	1185.71
15+69.12	366762.06	2742802.67	1185.88
15+73.44	366765.77	2742804.87	1186.15
15+77.12	366768.93	2742806.75	1186.15
15+82.74	366774.03	2742809.13	1186.15
15+83.28	366774.51	2742809.36	1186.18
15+89.83	366780.63	2742811.71	1186.59
15+90.91	366781.64	2742812.10	1186.59
15+99.13	366789.53	2742814.40	1186.59
16+05.95	366796.08	2742816.31	1187.02
16+06.22	366796.34	2742816.37	1187.04
16+15.52	366805.45	2742818.21	1187.04
16+22.61	366812.40	2742819.61	1187.48
16+31.91	366821.52	2742821.45	1187.48
16+39.00	366828.47	2742822.86	1187.92
16+48.30	366837.59	2742824.70	1187.92
16+53.36	366842.55	2742825.70	1188.24

<b>Station</b>	<b>Northing</b>	<b>Easting</b>	<b>Elevation</b>
16+55.39	366844.50	2742826.24	1188.36
16+59.24	366848.22	2742827.26	1188.36
16+64.69	366853.47	2742828.70	1188.36
16+69.01	366857.64	2742829.84	1188.64
16+71.78	366860.25	2742830.77	1188.82
16+76.35	366864.55	2742832.30	1188.82
16+81.08	366868.86	2742834.25	1188.82
16+83.94	366871.47	2742835.44	1189.00
16+88.17	366875.17	2742837.47	1189.28
16+91.94	366878.48	2742839.29	1189.28
16+97.47	366883.10	2742842.33	1189.28
16+99.94	366885.16	2742843.69	1189.44
17+04.56	366888.80	2742846.53	1189.74
17+07.94	366891.47	2742848.60	1189.74
17+13.86	366895.74	2742852.70	1189.74
17+20.48	366900.52	2742857.28	1190.16
17+20.95	366900.83	2742857.64	1190.19
17+30.25	366906.97	2742864.62	1190.19
17+36.17	366910.88	2742869.07	1190.58
17+37.34	366911.60	2742869.99	1190.65
17+43.25	366915.23	2742874.65	1190.65
17+46.64	366917.19	2742877.42	1190.65
17+53.73	366921.28	2742883.21	1191.11
17+54.39	366921.66	2742883.75	1191.11
17+63.03	366926.65	2742890.80	1191.11
17+70.12	366930.74	2742896.59	1191.57
17+74.12	366933.05	2742899.86	1191.57
17+79.42	366936.00	2742904.26	1191.57
17+86.51	366939.95	2742910.15	1192.03
17+90.51	366942.18	2742913.48	1192.03
17+95.81	366945.21	2742917.82	1192.03
18+02.90	366949.28	2742923.63	1192.49
18+06.27	366951.21	2742926.39	1192.49
18+12.20	366954.90	2742931.03	1192.49
18+19.29	366959.31	2742936.58	1192.95
18+22.27	366961.16	2742938.92	1192.95
18+28.59	366965.38	2742943.63	1192.95
18+35.68	366970.11	2742948.91	1193.41
18+37.39	366971.25	2742950.18	1193.41
18+44.98	366976.73	2742955.43	1193.41
18+45.03	366976.77	2742955.46	1193.42
18+52.07	366982.13	2742960.02	1193.88
18+53.02	366982.86	2742960.64	1193.88
18+61.02	366989.25	2742965.46	1193.88
18+61.37	366989.54	2742965.65	1193.88
18+68.46	366995.48	2742969.51	1194.34
18+71.58	366998.10	2742971.21	1194.34
18+77.76	367003.46	2742974.28	1194.34
18+84.85	367009.62	2742977.79	1194.80
18+87.43	367011.86	2742979.07	1194.80

<b>Station</b>	<b>Northing</b>	<b>Easting</b>	<b>Elevation</b>
18+94.15	367017.86	2742982.10	1194.80
19+01.24	367024.18	2742985.31	1195.26
19+06.08	367028.50	2742987.50	1195.26
19+10.54	367032.50	2742989.47	1195.26
19+17.63	367038.86	2742992.60	1195.72
19+20.11	367041.08	2742993.70	1195.72
19+21.93	367042.71	2742994.50	1195.72
19+26.93	367047.09	2742996.92	1195.72
19+34.02	367053.30	2743000.35	1196.18
19+37.93	367056.72	2743002.23	1196.18
19+43.32	367061.32	2743005.04	1196.18
19+50.41	367067.38	2743008.74	1196.64
19+51.82	367068.58	2743009.47	1196.64
19+59.44	367074.80	2743013.87	1196.64
19+59.71	367075.01	2743014.04	1196.64
19+66.80	367080.51	2743018.52	1197.10
19+67.44	367081.00	2743018.92	1197.10
19+75.44	367086.85	2743024.38	1197.10
19+76.10	367087.30	2743024.87	1197.10
19+83.19	367092.13	2743030.05	1197.56
19+83.44	367092.30	2743030.23	1197.56
19+91.43	367097.34	2743036.44	1197.56
19+92.49	367097.95	2743037.31	1197.56
19+99.43	367101.95	2743042.98	1198.01
19+99.58	367102.02	2743043.11	1198.02
20+07.43	367106.09	2743049.82	1198.02
20+08.88	367106.73	2743051.13	1198.02
20+15.97	367109.84	2743057.50	1198.48
20+19.60	367111.42	2743060.76	1198.48
20+20.73	367111.92	2743061.77	1198.48
20+25.27	367113.55	2743066.01	1198.48
20+32.36	367116.10	2743072.63	1198.92
20+36.38	367117.54	2743076.38	1198.92
20+41.66	367118.95	2743081.47	1198.92
20+48.75	367120.83	2743088.31	1199.36
20+52.37	367121.79	2743091.80	1199.36
20+58.05	367122.75	2743097.40	1199.36
20+65.14	367123.94	2743104.38	1199.80
20+68.37	367124.49	2743107.57	1199.80
20+74.44	367124.91	2743113.62	1199.80
20+81.53	367125.40	2743120.70	1200.24
20+84.36	367125.60	2743123.52	1200.24
20+90.19	367125.61	2743129.35	1200.24
20+90.83	367125.57	2743129.99	1200.24
20+97.92	367125.11	2743137.06	1200.67
21+07.22	367124.52	2743146.34	1200.67
21+10.70	367124.29	2743149.82	1200.89
21+14.31	367124.21	2743153.43	1201.11
21+23.61	367124.01	2743162.72	1201.11
21+30.70	367123.86	2743169.81	1201.55

<b>Station</b>	<b>Northing</b>	<b>Easting</b>	<b>Elevation</b>
21+40.00	367123.65	2743179.11	1201.55
21+44.73	367123.55	2743183.84	1201.84
21+47.09	367123.62	2743186.20	1201.99
21+52.36	367123.78	2743191.47	1201.99
21+56.39	367124.15	2743195.48	1201.99
21+60.36	367124.51	2743199.43	1202.23
21+63.48	367124.99	2743202.51	1202.43
21+68.36	367125.75	2743207.33	1202.43
21+72.78	367126.71	2743211.65	1202.43
21+76.35	367127.49	2743215.14	1202.65
21+79.87	367128.47	2743218.51	1202.87
21+84.35	367129.72	2743222.82	1202.87
21+89.17	367131.36	2743227.35	1202.87
21+92.35	367132.44	2743230.34	1203.06
21+96.26	367134.00	2743233.93	1203.30
22+00.35	367135.63	2743237.68	1203.30
22+05.56	367138.01	2743242.31	1203.30
22+08.35	367139.29	2743244.79	1203.48
22+12.65	367141.49	2743248.48	1203.74
22+16.35	367143.38	2743251.66	1203.74
22+21.95	367146.56	2743256.28	1203.74
22+24.35	367147.91	2743258.25	1203.89
22+29.04	367150.81	2743261.95	1204.18
22+32.35	367152.85	2743264.55	1204.18
22+38.34	367156.89	2743268.98	1204.18
22+42.75	367159.86	2743272.24	1204.45
22+45.43	367161.88	2743274.00	1204.62
22+50.34	367165.57	2743277.24	1204.62
22+54.73	367169.11	2743279.84	1204.62
22+58.34	367172.01	2743281.97	1204.84
22+61.82	367174.99	2743283.78	1205.06
22+66.33	367178.85	2743286.12	1205.06
22+71.12	367183.14	2743288.24	1205.06
22+74.33	367186.02	2743289.65	1205.26
22+78.21	367189.64	2743291.05	1205.50
22+82.75	367193.89	2743292.68	1205.50
22+87.51	367198.43	2743294.06	1205.50
22+89.85	367200.68	2743294.75	1205.63
22+94.60	367205.22	2743296.14	1205.91
23+03.90	367214.11	2743298.85	1205.91
23+10.99	367220.89	2743300.92	1206.24
23+14.01	367223.78	2743301.81	1206.24
23+18.05	367227.60	2743303.11	1206.24
23+20.29	367229.64	2743304.05	1206.24
23+21.97	367231.17	2743304.74	1206.32
23+25.48	367234.02	2743306.79	1206.49
23+27.38	367235.32	2743308.17	1206.58
23+27.74	367235.57	2743308.43	1206.58
23+29.71	367236.78	2743309.98	1206.58
23+33.72	367239.01	2743313.32	1206.58

<b>Station</b>	<b>Northing</b>	<b>Easting</b>	<b>Elevation</b>
23+36.68	367240.54	2743315.85	1206.58
23+36.74	367240.57	2743315.90	1206.58
23+39.66	367241.78	2743318.56	1206.72
23+42.53	367242.32	2743321.38	1206.85
23+43.77	367242.28	2743322.62	1206.91
23+45.47	367242.22	2743324.32	1206.91
23+47.49	367241.90	2743326.31	1206.91
23+53.07	367240.25	2743331.64	1206.91
23+57.49	367238.94	2743335.87	1207.12
23+60.16	367237.62	2743338.18	1207.25
23+67.17	367234.14	2743344.28	1207.25
23+69.46	367232.72	2743346.07	1207.25
23+76.55	367228.31	2743351.62	1207.58
23+77.09	367227.98	2743352.04	1207.58
23+81.11	367225.57	2743355.26	1207.58
23+85.83	367223.21	2743359.35	1207.58
23+85.85	367223.20	2743359.37	1207.58
23+87.02	367222.62	2743360.38	1207.65
23+92.79	367221.06	2743365.94	1207.98
23+92.94	367221.05	2743366.09	1207.98
23+96.74	367220.71	2743369.87	1207.98
24+02.24	367220.45	2743375.37	1207.98
24+02.74	367220.43	2743375.87	1208.02
24+05.68	367220.55	2743378.80	1208.22
24+09.33	367221.45	2743382.34	1208.47
24+10.46	367221.72	2743383.43	1208.47
24+12.40	367222.54	2743385.20	1208.47
24+16.36	367224.49	2743388.65	1208.47
24+18.63	367225.64	2743390.60	1208.47
24+22.37	367227.54	2743393.82	1208.73
24+25.72	367228.90	2743396.89	1208.97
24+28.28	367229.94	2743399.23	1208.97
24+34.17	367231.79	2743404.82	1208.97
24+35.02	367232.02	2743405.64	1208.97
24+40.07	367233.37	2743410.50	1209.39

### Reach #1 Reconstructed Stream Longitudinal Profile

Station	Elevation	Distance	Description
0+00.00	1138.33		Begin Pool
0+09.30	1138.33	9.3	Begin Riffle
0+16.39	1138.5	7.09	Begin Pool
0+25.69	1138.5	9.3	Begin Riffle
0+32.78	1138.67	7.09	Begin Pool
0+42.08	1138.67	9.3	Begin Riffle
0+49.17	1138.84	7.09	Begin Pool
0+58.47	1138.84	9.3	Begin Riffle
0+65.56	1139.01	7.09	Begin Pool
0+74.86	1139.01	9.3	Begin Riffle
0+81.95	1139.18	7.09	Begin Pool
0+91.25	1139.18	9.3	Begin Riffle
0+98.34	1139.35	7.09	Begin Pool
1+07.64	1139.35	9.3	Begin Riffle
1+14.73	1139.52	7.09	Begin Pool
1+24.03	1139.52	9.3	Begin Riffle
1+31.12	1139.69	7.09	Begin Pool
1+40.42	1139.69	9.3	Begin Riffle
1+47.51	1139.86	7.09	Begin Pool
1+56.81	1139.86	9.3	Begin Riffle
1+63.90	1140.02	7.09	Begin Pool
1+73.20	1140.02	9.3	Begin Riffle
1+80.29	1140.69	7.09	Begin Pool
1+89.59	1140.69	9.3	Begin Riffle
1+96.68	1141.44	7.09	Begin Pool
2+05.98	1141.44	9.3	Begin Riffle
2+13.07	1142.19	7.09	Begin Pool
2+22.37	1142.19	9.3	Begin Riffle
2+29.46	1142.95	7.09	Begin Pool
2+38.76	1142.95	9.3	Begin Riffle
2+45.85	1143.7	7.09	Begin Pool
2+55.15	1143.7	9.3	Begin Riffle
2+62.24	1144.45	7.09	Begin Pool
2+71.54	1144.45	9.3	Begin Riffle
2+78.63	1145.2	7.09	Begin Pool
2+87.93	1145.2	9.3	Begin Riffle
2+95.02	1145.95	7.09	Begin Pool
3+04.32	1145.95	9.3	Begin Riffle
3+11.41	1146.7	7.09	Begin Pool
3+20.71	1146.7	9.3	Begin Riffle
3+27.80	1147.46	7.09	Begin Pool
3+37.10	1147.46	9.3	Begin Riffle
3+44.19	1148.21	7.09	Begin Pool
3+53.49	1148.21	9.3	Begin Riffle
3+60.58	1148.96	7.09	Begin Pool
3+69.88	1148.96	9.3	Begin Riffle
3+76.97	1149.71	7.09	Begin Pool

<b>Station</b>	<b>Elevation</b>	<b>Distance</b>	<b>Description</b>
3+86.27	1149.71	9.3	Begin Riffle
3+93.36	1150.46	7.09	Begin Pool
4+02.66	1150.46	9.3	Begin Riffle
4+09.75	1151.21	7.09	Begin Pool
4+19.05	1151.21	9.3	Begin Riffle
4+26.14	1151.96	7.09	Begin Pool
4+35.44	1151.96	9.3	Begin Riffle
4+42.53	1152.72	7.09	Begin Pool
4+51.83	1152.72	9.3	Begin Riffle
4+58.92	1153.47	7.09	Begin Pool
4+68.22	1153.47	9.3	Begin Riffle
4+75.31	1154.22	7.09	Begin Pool
4+84.61	1154.22	9.3	Begin Riffle
4+91.70	1154.97	7.09	Begin Pool
5+01.00	1154.97	9.3	Begin Riffle
5+08.09	1155.69	7.09	Begin Pool
5+17.39	1155.69	9.3	Begin Riffle
5+24.48	1156.41	7.09	Begin Pool
5+33.78	1156.41	9.3	Begin Riffle
5+40.87	1157.12	7.09	Begin Pool
5+50.17	1157.12	9.3	Begin Riffle
5+57.26	1157.85	7.09	Begin Pool
5+66.56	1157.85	9.3	Begin Riffle
5+73.65	1159.08	7.09	Begin Pool
5+82.95	1159.08	9.3	Begin Riffle
5+90.04	1160.04	7.09	Begin Pool
5+99.34	1160.04	9.3	Begin Riffle
6+06.43	1160.19	7.09	Begin Pool
6+15.73	1160.19	9.3	Begin Riffle
6+22.82	1160.35	7.09	Begin Pool
6+32.12	1160.35	9.3	Begin Riffle
6+39.21	1160.5	7.09	Begin Pool
6+48.51	1160.5	9.3	Begin Riffle
6+55.60	1160.79	7.09	Begin Pool
6+64.90	1160.79	9.3	Begin Riffle
6+71.99	1161.23	7.09	Begin Pool
6+81.29	1161.23	9.3	Begin Riffle
6+88.38	1161.67	7.09	Begin Pool
6+97.68	1161.67	9.3	Begin Riffle
7+04.77	1162.11	7.09	Begin Pool
7+14.07	1162.11	9.3	Begin Riffle
7+21.16	1162.55	7.09	Begin Pool
7+30.46	1162.55	9.3	Begin Riffle
7+37.55	1162.65	7.09	Begin Pool
7+46.85	1162.65	9.3	Begin Riffle
7+53.94	1162.68	7.09	Begin Pool
7+63.24	1162.68	9.3	Begin Riffle
7+70.33	1162.71	7.09	Begin Pool
7+79.63	1162.71	9.3	Begin Riffle
7+86.72	1163.1	7.09	Begin Pool

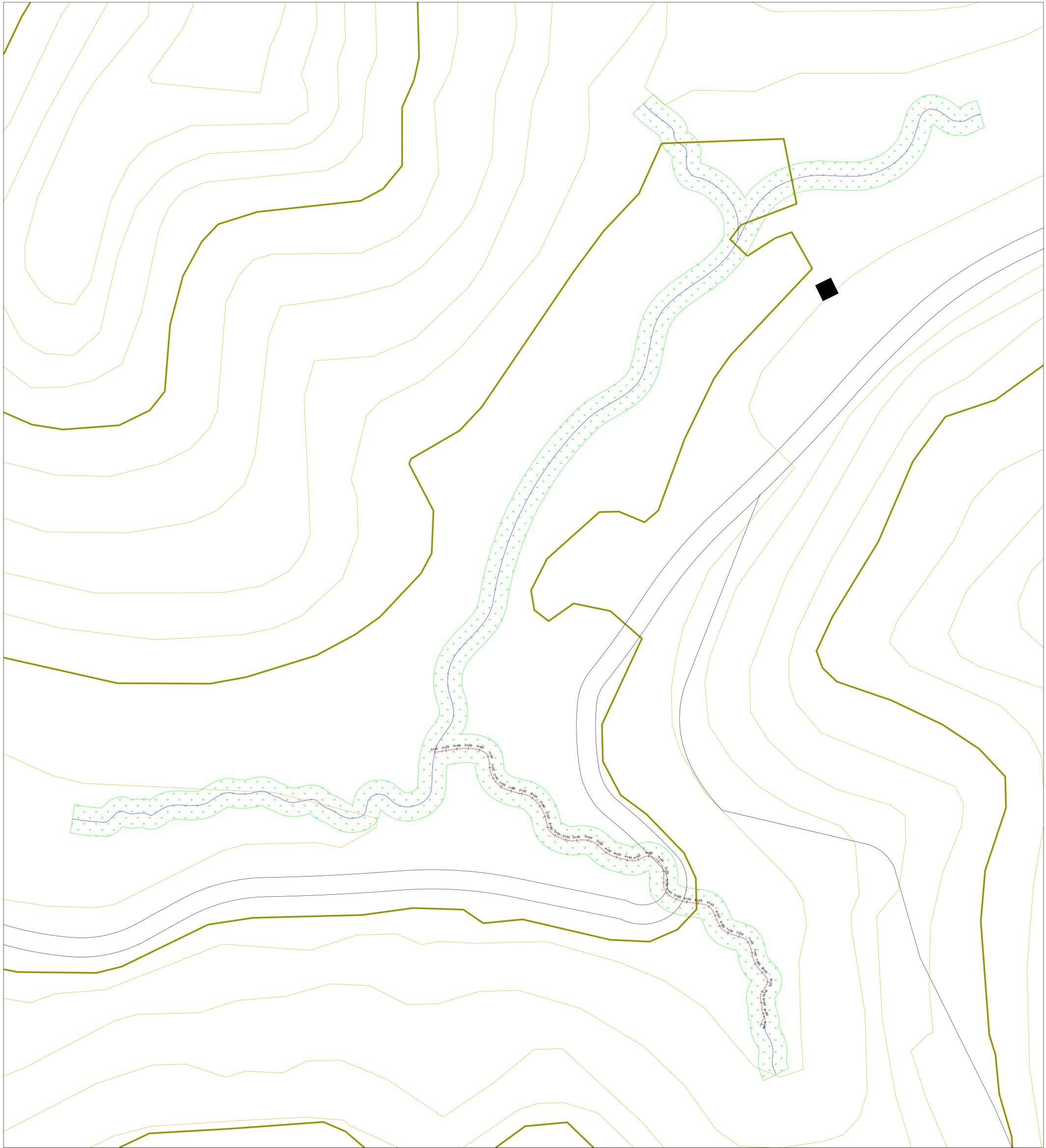
<b>Station</b>	<b>Elevation</b>	<b>Distance</b>	<b>Description</b>
7+96.02	1163.1	9.3	Begin Riffle
8+03.11	1163.93	7.09	Begin Pool
8+12.41	1163.93	9.3	Begin Riffle
8+19.50	1164.76	7.09	Begin Pool
8+28.80	1164.76	9.3	Begin Riffle
8+35.89	1165.59	7.09	Begin Pool
8+45.19	1165.59	9.3	Begin Riffle
8+52.28	1166.25	7.09	Begin Pool
8+61.58	1166.25	9.3	Begin Riffle
8+68.67	1166.69	7.09	Begin Pool
8+77.97	1166.69	9.3	Begin Riffle
8+85.06	1167.13	7.09	Begin Pool
8+94.36	1167.13	9.3	Begin Riffle
9+01.45	1167.56	7.09	Begin Pool
9+10.75	1167.56	9.3	Begin Riffle
9+17.84	1168	7.09	Begin Pool
9+27.14	1168	9.3	Begin Riffle
9+34.23	1168.43	7.09	Begin Pool
9+43.53	1168.43	9.3	Begin Riffle
9+50.62	1168.86	7.09	Begin Pool
9+59.92	1168.86	9.3	Begin Riffle
9+67.01	1169.3	7.09	Begin Pool
9+76.31	1169.3	9.3	Begin Riffle
9+83.40	1169.73	7.09	Begin Pool
9+92.70	1169.73	9.3	Begin Riffle
9+99.79	1170.17	7.09	Begin Pool
10+09.09	1170.17	9.3	Begin Riffle
10+16.18	1170.6	7.09	Begin Pool
10+25.48	1170.6	9.3	Begin Riffle
10+32.57	1171.04	7.09	Begin Pool
10+41.87	1171.04	9.3	Begin Riffle
10+48.96	1171.48	7.09	Begin Pool
10+58.26	1171.48	9.3	Begin Riffle
10+65.35	1171.95	7.09	Begin Pool
10+74.65	1171.95	9.3	Begin Riffle
10+81.74	1172.41	7.09	Begin Pool
10+91.04	1172.41	9.3	Begin Riffle
10+98.13	1172.88	7.09	Begin Pool
11+07.43	1172.88	9.3	Begin Riffle
11+14.52	1173.34	7.09	Begin Pool
11+23.82	1173.34	9.3	Begin Riffle
11+30.91	1173.8	7.09	Begin Pool
11+40.21	1173.8	9.3	Begin Riffle
11+47.30	1174.27	7.09	Begin Pool
11+56.60	1174.27	9.3	Begin Riffle
11+63.69	1174.73	7.09	Begin Pool
11+72.99	1174.73	9.3	Begin Riffle
11+80.08	1175.19	7.09	Begin Pool
11+89.38	1175.19	9.3	Begin Riffle
11+96.47	1175.65	7.09	Begin Pool

<b>Station</b>	<b>Elevation</b>	<b>Distance</b>	<b>Description</b>
12+05.77	1175.65	9.3	Begin Riffle
12+12.86	1176.12	7.09	Begin Pool
12+22.16	1176.12	9.3	Begin Riffle
12+29.25	1176.58	7.09	Begin Pool
12+38.55	1176.58	9.3	Begin Riffle
12+45.64	1177.04	7.09	Begin Pool
12+54.94	1177.04	9.3	Begin Riffle
12+62.03	1177.51	7.09	Begin Pool
12+71.33	1177.51	9.3	Begin Riffle
12+78.42	1177.97	7.09	Begin Pool
12+87.72	1177.97	9.3	Begin Riffle
12+94.81	1178.43	7.09	Begin Pool
13+04.11	1178.43	9.3	Begin Riffle
13+11.20	1178.9	7.09	Begin Pool
13+20.50	1178.9	9.3	Begin Riffle
13+27.59	1179.36	7.09	Begin Pool
13+36.89	1179.36	9.3	Begin Riffle
13+43.98	1179.82	7.09	Begin Pool
13+53.28	1179.82	9.3	Begin Riffle
13+60.37	1180.28	7.09	Begin Pool
13+69.67	1180.28	9.3	Begin Riffle
13+76.76	1180.75	7.09	Begin Pool
13+86.06	1180.75	9.3	Begin Riffle
13+93.15	1181.21	7.09	Begin Pool
14+02.45	1181.21	9.3	Begin Riffle
14+09.54	1181.67	7.09	Begin Pool
14+18.84	1181.67	9.3	Begin Riffle
14+25.93	1182.14	7.09	Begin Pool
14+35.23	1182.14	9.3	Begin Riffle
14+42.32	1182.6	7.09	Begin Pool
14+51.62	1182.6	9.3	Begin Riffle
14+58.71	1183.05	7.09	Begin Pool
14+68.01	1183.05	9.3	Begin Riffle
14+75.10	1183.49	7.09	Begin Pool
14+84.40	1183.49	9.3	Begin Riffle
14+91.49	1183.93	7.09	Begin Pool
15+00.79	1183.93	9.3	Begin Riffle
15+07.88	1184.38	7.09	Begin Pool
15+17.18	1184.38	9.3	Begin Riffle
15+24.27	1184.82	7.09	Begin Pool
15+33.57	1184.82	9.3	Begin Riffle
15+40.66	1185.26	7.09	Begin Pool
15+49.96	1185.26	9.3	Begin Riffle
15+57.05	1185.71	7.09	Begin Pool
15+66.35	1185.71	9.3	Begin Riffle
15+73.44	1186.15	7.09	Begin Pool
15+82.74	1186.15	9.3	Begin Riffle
15+89.83	1186.59	7.09	Begin Pool
15+99.13	1186.59	9.3	Begin Riffle
16+06.22	1187.04	7.09	Begin Pool

<b>Station</b>	<b>Elevation</b>	<b>Distance</b>	<b>Description</b>
16+15.52	1187.04	9.3	Begin Riffle
16+22.61	1187.48	7.09	Begin Pool
16+31.91	1187.48	9.3	Begin Riffle
16+39.00	1187.92	7.09	Begin Pool
16+48.30	1187.92	9.3	Begin Riffle
16+55.39	1188.36	7.09	Begin Pool
16+64.69	1188.36	9.3	Begin Riffle
16+71.78	1188.82	7.09	Begin Pool
16+81.08	1188.82	9.3	Begin Riffle
16+88.17	1189.28	7.09	Begin Pool
16+97.47	1189.28	9.3	Begin Riffle
17+04.56	1189.74	7.09	Begin Pool
17+13.86	1189.74	9.3	Begin Riffle
17+20.95	1190.19	7.09	Begin Pool
17+30.25	1190.19	9.3	Begin Riffle
17+37.34	1190.65	7.09	Begin Pool
17+46.64	1190.65	9.3	Begin Riffle
17+53.73	1191.11	7.09	Begin Pool
17+63.03	1191.11	9.3	Begin Riffle
17+70.12	1191.57	7.09	Begin Pool
17+79.42	1191.57	9.3	Begin Riffle
17+86.51	1192.03	7.09	Begin Pool
17+95.81	1192.03	9.3	Begin Riffle
18+02.90	1192.49	7.09	Begin Pool
18+12.20	1192.49	9.3	Begin Riffle
18+19.29	1192.95	7.09	Begin Pool
18+28.59	1192.95	9.3	Begin Riffle
18+35.68	1193.41	7.09	Begin Pool
18+44.98	1193.41	9.3	Begin Riffle
18+52.07	1193.88	7.09	Begin Pool
18+61.37	1193.88	9.3	Begin Riffle
18+68.46	1194.34	7.09	Begin Pool
18+77.76	1194.34	9.3	Begin Riffle
18+84.85	1194.8	7.09	Begin Pool
18+94.15	1194.8	9.3	Begin Riffle
19+01.24	1195.26	7.09	Begin Pool
19+10.54	1195.26	9.3	Begin Riffle
19+17.63	1195.72	7.09	Begin Pool
19+26.93	1195.72	9.3	Begin Riffle
19+34.02	1196.18	7.09	Begin Pool
19+43.32	1196.18	9.3	Begin Riffle
19+50.41	1196.64	7.09	Begin Pool
19+59.71	1196.64	9.3	Begin Riffle
19+66.80	1197.1	7.09	Begin Pool
19+76.10	1197.1	9.3	Begin Riffle
19+83.19	1197.56	7.09	Begin Pool
19+92.49	1197.56	9.3	Begin Riffle
19+99.58	1198.02	7.09	Begin Pool
20+08.88	1198.02	9.3	Begin Riffle
20+15.97	1198.48	7.09	Begin Pool

<b>Station</b>	<b>Elevation</b>	<b>Distance</b>	<b>Description</b>
20+25.27	1198.48	9.3	Begin Riffle
20+32.36	1198.92	7.09	Begin Pool
20+41.66	1198.92	9.3	Begin Riffle
20+48.75	1199.36	7.09	Begin Pool
20+58.05	1199.36	9.3	Begin Riffle
20+65.14	1199.8	7.09	Begin Pool
20+74.44	1199.8	9.3	Begin Riffle
20+81.53	1200.24	7.09	Begin Pool
20+90.83	1200.24	9.3	Begin Riffle
20+97.92	1200.67	7.09	Begin Pool
21+07.22	1200.67	9.3	Begin Riffle
21+14.31	1201.11	7.09	Begin Pool
21+23.61	1201.11	9.3	Begin Riffle
21+30.70	1201.55	7.09	Begin Pool
21+40.00	1201.55	9.3	Begin Riffle
21+47.09	1201.99	7.09	Begin Pool
21+56.39	1201.99	9.3	Begin Riffle
21+63.48	1202.43	7.09	Begin Pool
21+72.78	1202.43	9.3	Begin Riffle
21+79.87	1202.87	7.09	Begin Pool
21+89.17	1202.87	9.3	Begin Riffle
21+96.26	1203.3	7.09	Begin Pool
22+05.56	1203.3	9.3	Begin Riffle
22+12.65	1203.74	7.09	Begin Pool
22+21.95	1203.74	9.3	Begin Riffle
22+29.04	1204.18	7.09	Begin Pool
22+38.34	1204.18	9.3	Begin Riffle
22+45.43	1204.62	7.09	Begin Pool
22+54.73	1204.62	9.3	Begin Riffle
22+61.82	1205.06	7.09	Begin Pool
22+71.12	1205.06	9.3	Begin Riffle
22+78.21	1205.5	7.09	Begin Pool
22+87.51	1205.5	9.3	Begin Riffle
22+94.60	1205.91	7.09	Begin Pool
23+03.90	1205.91	9.3	Begin Riffle
23+10.99	1206.24	7.09	Begin Pool
23+20.29	1206.24	9.3	Begin Riffle
23+27.38	1206.58	7.09	Begin Pool
23+36.68	1206.58	9.3	Begin Riffle
23+43.77	1206.91	7.09	Begin Pool
23+53.07	1206.91	9.3	Begin Riffle
23+60.16	1207.25	7.09	Begin Pool
23+69.46	1207.25	9.3	Begin Riffle
23+76.55	1207.58	7.09	Begin Pool
23+85.85	1207.58	9.3	Begin Riffle
23+92.94	1207.98	7.09	Begin Pool
24+02.24	1207.98	9.3	Begin Riffle
24+09.33	1208.47	7.09	Begin Pool
24+18.63	1208.47	9.3	Begin Riffle
24+25.72	1208.97	7.09	Begin Pool

<b>Station</b>	<b>Elevation</b>	<b>Distance</b>	<b>Description</b>
24+35.02	1208.97	9.3	Begin Riffle
24+40.07	1209.39	5.05	End of Reach



Notes:  
 (1) Native vegetation begins at OHWM height  
 (2) Trees will be established in a random pattern for a minimum of 25' or until existing forest conditions are encountered

-  Station #
-  Reach #2
-  Tree planting & revegetation zone

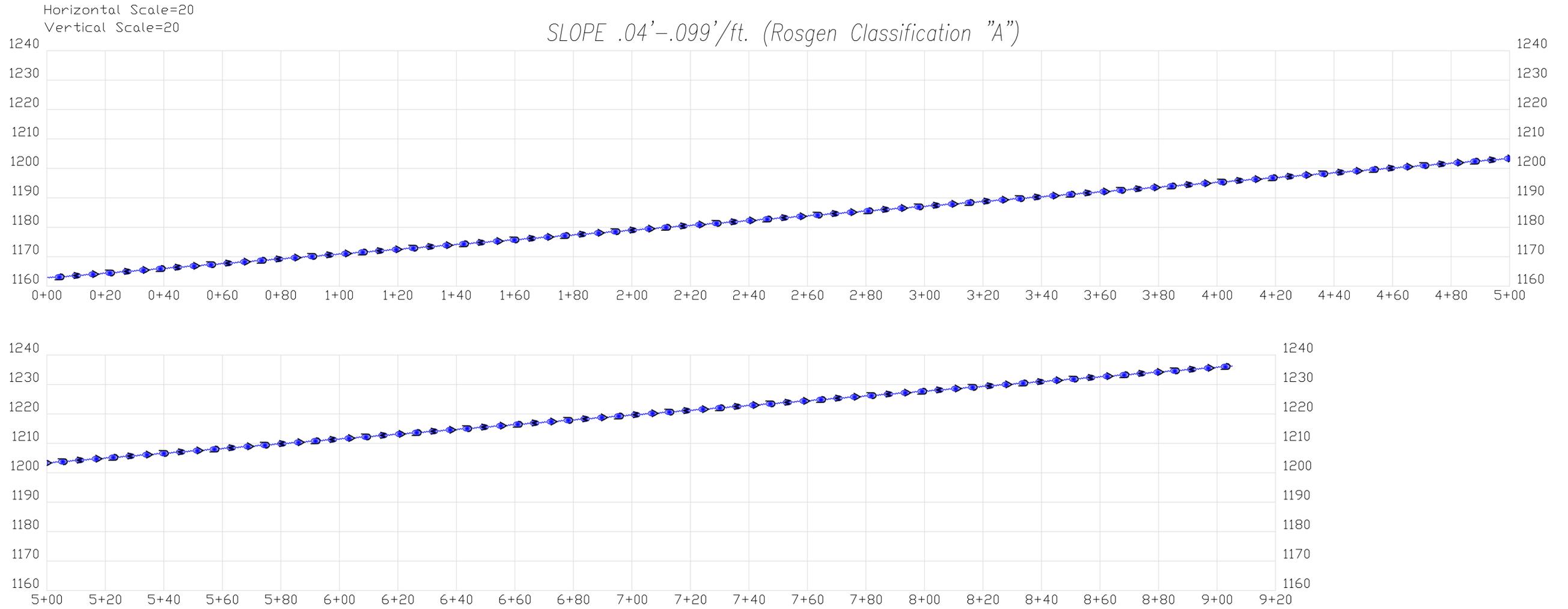
Reach #2  
 Anticipated Stream Reconstruction Design  
 Intermittent  
 Plan View

Scale 1"=50'

SINUOSITY MAY VARY BETWEEN 1-1.2

Reach #2  
Anticipated Stream Reconstruction Design  
Intermittent  
Profile View

- V Cross-vane  
W W-vane  
J J-hook
- J J-hook  
● Pool  
~ Riffle



RECONSTRUCTED STREAM					
	RIFFLE	POOL			
%	49.3%	50.7%			
RATIO	1	1.03	<i>D16</i>	<i>D35</i>	<i>D50</i>
AVERAGE LENGTH	2.84	2.92	<small>(MM)</small>	<small>(MM)</small>	<small>(MM)</small>
AVERAGE WATER DEPTH	0.43	0.62	<i>D84</i>	<i>D95</i>	
AVERAGE BANKFULL DEPTH	1.28	1.31	6.447	10.43	18.3
			107	215	

### Reach #2 Reconstructed Stream Alignment

Station	Northing	Easting	Elevation
0+00.00	366106.56	2742439.26	1162.88
0+02.84	366107.00	2742442.06	1163.11
0+05.76	366107.45	2742444.95	1163.11
0+08.60	366107.89	2742447.75	1163.58
0+11.52	366108.34	2742450.64	1163.58
0+14.36	366108.77	2742453.45	1164.05
0+17.28	366109.22	2742456.33	1164.05
0+20.12	366109.66	2742459.14	1164.52
0+23.04	366110.11	2742462.02	1164.52
0+25.88	366110.55	2742464.83	1164.99
0+28.80	366111.00	2742467.71	1164.99
0+31.64	366111.44	2742470.52	1165.46
0+34.56	366111.89	2742473.40	1165.46
0+37.40	366112.33	2742476.21	1165.93
0+39.52	366112.65	2742478.30	1165.93
0+40.32	366112.70	2742479.10	1165.93
0+43.16	366112.87	2742481.94	1166.40
0+46.08	366113.05	2742484.85	1166.40
0+48.92	366113.22	2742487.69	1166.87
0+51.84	366113.40	2742490.60	1166.87
0+54.68	366113.57	2742493.44	1167.34
0+55.15	366113.60	2742493.91	1167.34
0+57.60	366113.52	2742496.35	1167.34
0+60.44	366113.43	2742499.19	1167.80
0+63.36	366113.34	2742502.11	1167.80
0+65.55	366113.27	2742504.30	1168.16
0+66.20	366113.19	2742504.95	1168.27
0+69.12	366112.84	2742507.85	1168.27
0+71.96	366112.50	2742510.66	1168.74
0+73.11	366112.36	2742511.81	1168.74
0+74.88	366111.94	2742513.52	1168.74
0+77.72	366111.25	2742516.28	1169.21
0+80.64	366110.55	2742519.11	1169.21
0+82.49	366110.10	2742520.91	1169.51
0+83.48	366109.72	2742521.83	1169.68
0+86.02	366108.76	2742524.18	1169.68
0+86.40	366108.57	2742524.50	1169.68
0+89.24	366107.11	2742526.94	1170.14
0+91.29	366106.06	2742528.70	1170.14
0+92.16	366105.47	2742529.34	1170.14
0+94.80	366103.67	2742531.27	1170.58
0+95.00	366103.50	2742531.38	1170.61
0+97.92	366101.09	2742533.02	1170.61
0+98.79	366100.36	2742533.51	1170.75
1+00.76	366098.54	2742534.25	1171.08
1+01.78	366097.59	2742534.64	1171.08
1+03.68	366095.75	2742535.07	1171.08

<b>Station</b>	<b>Northing</b>	<b>Easting</b>	<b>Elevation</b>
1+06.52	366092.98	2742535.72	1171.55
1+07.09	366092.43	2742535.85	1171.55
1+09.44	366090.09	2742536.06	1171.55
1+12.28	366087.26	2742536.32	1172.01
1+15.20	366084.35	2742536.58	1172.01
1+18.04	366081.52	2742536.83	1172.48
1+20.96	366078.61	2742537.09	1172.48
1+21.50	366078.07	2742537.14	1172.57
1+23.80	366075.81	2742537.56	1172.95
1+26.72	366072.94	2742538.10	1172.95
1+28.20	366071.49	2742538.37	1173.19
1+29.56	366070.21	2742538.84	1173.42
1+32.48	366067.48	2742539.87	1173.42
1+35.32	366064.82	2742540.86	1173.88
1+35.73	366064.43	2742541.01	1173.88
1+38.24	366062.27	2742542.28	1173.88
1+41.08	366059.82	2742543.71	1174.35
1+43.72	366057.54	2742545.05	1174.35
1+44.00	366057.33	2742545.23	1174.35
1+46.84	366055.17	2742547.08	1174.82
1+49.76	366052.95	2742548.97	1174.82
1+51.71	366051.47	2742550.24	1175.14
1+52.60	366050.91	2742550.93	1175.29
1+55.52	366049.06	2742553.19	1175.29
1+58.36	366047.26	2742555.39	1175.75
1+59.70	366046.41	2742556.43	1175.75
1+61.28	366045.62	2742557.79	1175.75
1+64.12	366044.20	2742560.25	1176.22
1+66.24	366043.13	2742562.09	1176.22
1+67.04	366042.83	2742562.82	1176.22
1+69.88	366041.75	2742565.45	1176.69
1+72.80	366040.63	2742568.15	1176.69
1+75.64	366039.55	2742570.77	1177.16
1+77.59	366038.80	2742572.58	1177.16
1+78.56	366038.55	2742573.51	1177.16
1+81.40	366037.82	2742576.26	1177.63
1+84.32	366037.06	2742579.08	1177.63
1+87.16	366036.33	2742581.82	1178.09
1+90.08	366035.57	2742584.64	1178.09
1+92.92	366034.84	2742587.38	1178.56
1+93.27	366034.75	2742587.73	1178.56
1+95.84	366034.23	2742590.24	1178.56
1+98.68	366033.66	2742593.02	1179.03
1+99.06	366033.58	2742593.39	1179.03
2+01.60	366032.98	2742595.86	1179.03
2+04.44	366032.30	2742598.62	1179.50
2+06.64	366031.78	2742600.76	1179.50
2+07.36	366031.55	2742601.44	1179.50
2+10.20	366030.65	2742604.13	1179.96
2+12.57	366029.90	2742606.38	1179.96

<b>Station</b>	<b>Northing</b>	<b>Easting</b>	<b>Elevation</b>
2+13.12	366029.61	2742606.85	1179.96
2+15.96	366028.11	2742609.26	1180.43
2+18.88	366026.57	2742611.74	1180.43
2+20.12	366025.91	2742612.79	1180.64
2+21.72	366024.88	2742614.01	1180.90
2+24.64	366023.00	2742616.25	1180.90
2+27.48	366021.17	2742618.42	1181.37
2+28.11	366020.76	2742618.90	1181.37
2+30.40	366019.03	2742620.40	1181.37
2+33.24	366016.88	2742622.25	1181.83
2+36.16	366014.67	2742624.17	1181.83
2+37.08	366013.98	2742624.77	1181.99
2+39.00	366012.38	2742625.83	1182.30
2+41.92	366009.94	2742627.44	1182.30
2+44.65	366007.66	2742628.95	1182.75
2+44.76	366007.57	2742629.00	1182.77
2+47.68	366004.97	2742630.33	1182.77
2+50.52	366002.45	2742631.63	1183.24
2+52.65	366000.56	2742632.61	1183.24
2+53.44	365999.81	2742632.89	1183.24
2+56.28	365997.16	2742633.90	1183.70
2+59.20	365994.43	2742634.94	1183.70
2+60.64	365993.08	2742635.45	1183.94
2+62.04	365991.73	2742635.79	1184.17
2+64.96	365988.89	2742636.50	1184.17
2+67.80	365986.14	2742637.19	1184.64
2+69.34	365984.64	2742637.57	1184.64
2+70.72	365983.31	2742637.93	1184.64
2+73.56	365980.57	2742638.66	1185.11
2+76.48	365977.75	2742639.42	1185.11
2+79.32	365975.01	2742640.15	1185.58
2+80.34	365974.02	2742640.42	1185.58
2+82.24	365972.31	2742641.24	1185.58
2+83.86	365970.84	2742641.94	1185.84
2+85.08	365969.83	2742642.62	1186.04
2+87.86	365967.52	2742644.17	1186.04
2+88.00	365967.42	2742644.26	1186.04
2+90.84	365965.41	2742646.27	1186.51
2+93.76	365963.34	2742648.32	1186.51
2+93.95	365963.20	2742648.46	1186.54
2+96.60	365961.71	2742650.65	1186.98
2+99.52	365960.07	2742653.06	1186.98
3+02.36	365958.47	2742655.41	1187.45
3+02.42	365958.43	2742655.46	1187.45
3+05.28	365957.23	2742658.05	1187.45
3+08.12	365956.03	2742660.62	1187.91
3+09.99	365955.24	2742662.32	1187.91
3+11.04	365954.91	2742663.32	1187.91
3+13.88	365954.01	2742666.01	1188.38
3+16.80	365953.08	2742668.78	1188.38

<b>Station</b>	<b>Northing</b>	<b>Easting</b>	<b>Elevation</b>
3+17.98	365952.70	2742669.90	1188.58
3+19.64	365952.33	2742671.51	1188.85
3+22.56	365951.67	2742674.36	1188.85
3+23.24	365951.51	2742675.02	1188.96
3+25.40	365951.19	2742677.16	1189.32
3+28.32	365950.76	2742680.04	1189.32
3+30.78	365950.39	2742682.47	1189.72
3+31.16	365950.38	2742682.86	1189.78
3+34.08	365950.28	2742685.77	1189.78
3+34.17	365950.28	2742685.86	1189.80
3+36.92	365950.71	2742688.58	1190.25
3+39.83	365951.18	2742691.46	1190.25
3+39.84	365951.18	2742691.46	1190.25
3+42.68	365951.48	2742694.29	1190.72
3+45.60	365951.79	2742697.19	1190.72
3+47.40	365951.99	2742698.98	1191.02
3+48.44	365952.01	2742700.02	1191.19
3+51.36	365952.08	2742702.94	1191.19
3+52.09	365952.10	2742703.66	1191.31
3+54.20	365951.91	2742705.77	1191.66
3+57.12	365951.65	2742708.68	1191.66
3+59.62	365951.43	2742711.17	1192.07
3+59.96	365951.34	2742711.50	1192.12
3+62.88	365950.64	2742714.33	1192.12
3+65.72	365949.96	2742717.09	1192.59
3+65.86	365949.92	2742717.22	1192.59
3+68.64	365948.74	2742719.74	1192.59
3+71.48	365947.53	2742722.31	1193.06
3+73.38	365946.73	2742724.03	1193.06
3+74.40	365946.11	2742724.84	1193.06
3+77.24	365944.40	2742727.11	1193.53
3+80.16	365942.64	2742729.44	1193.53
3+81.05	365942.10	2742730.14	1193.67
3+83.00	365940.77	2742731.57	1193.99
3+85.92	365938.77	2742733.71	1193.99
3+88.76	365936.84	2742735.78	1194.46
3+91.68	365934.84	2742737.92	1194.46
3+94.52	365932.91	2742739.99	1194.93
3+97.28	365931.02	2742742.01	1194.93
3+97.44	365930.94	2742742.14	1194.93
4+00.28	365929.40	2742744.53	1195.40
4+03.20	365927.81	2742746.98	1195.40
4+04.81	365926.94	2742748.34	1195.66
4+06.04	365926.41	2742749.45	1195.86
4+07.90	365925.61	2742751.12	1195.86
4+08.96	365925.23	2742752.11	1195.86
4+11.80	365924.21	2742754.77	1196.33
4+14.72	365923.16	2742757.49	1196.33
4+15.50	365922.88	2742758.22	1196.46
4+17.56	365922.30	2742760.20	1196.80

<b>Station</b>	<b>Northing</b>	<b>Easting</b>	<b>Elevation</b>
4+20.48	365921.48	2742763.00	1196.80
4+23.32	365920.68	2742765.72	1197.27
4+24.52	365920.34	2742766.88	1197.27
4+26.24	365919.89	2742768.53	1197.27
4+29.08	365919.13	2742771.27	1197.73
4+32.00	365918.36	2742774.09	1197.73
4+34.84	365917.61	2742776.83	1198.20
4+37.76	365916.83	2742779.64	1198.20
4+40.60	365916.08	2742782.38	1198.67
4+41.71	365915.79	2742783.45	1198.67
4+43.52	365915.55	2742785.24	1198.67
4+46.36	365915.19	2742788.06	1199.14
4+49.23	365914.82	2742790.91	1199.14
4+49.28	365914.82	2742790.96	1199.14
4+52.12	365914.92	2742793.80	1199.61
4+52.57	365914.93	2742794.24	1199.61
4+55.04	365915.51	2742796.65	1199.61
4+57.88	365916.17	2742799.41	1200.07
4+57.91	365916.17	2742799.44	1200.07
4+60.80	365917.41	2742802.05	1200.07
4+63.64	365918.62	2742804.62	1200.54
4+66.56	365919.87	2742807.26	1200.54
4+69.10	365920.96	2742809.55	1200.96
4+69.40	365921.07	2742809.83	1201.01
4+72.32	365922.11	2742812.56	1201.01
4+74.55	365922.90	2742814.65	1201.38
4+75.16	365923.00	2742815.25	1201.48
4+78.06	365923.46	2742818.11	1201.48
4+78.08	365923.46	2742818.13	1201.48
4+80.92	365923.31	2742820.97	1201.94
4+82.05	365923.24	2742822.10	1201.94
4+83.84	365922.79	2742823.83	1201.94
4+85.26	365922.42	2742825.20	1202.18
4+86.68	365921.76	2742826.45	1202.41
4+89.60	365920.39	2742829.03	1202.41
4+92.44	365919.06	2742831.54	1202.88
4+92.78	365918.90	2742831.85	1202.88
4+95.36	365917.33	2742833.89	1202.88
4+96.78	365916.46	2742835.01	1203.11
4+98.20	365915.47	2742836.03	1203.35
5+00.78	365913.67	2742837.87	1203.35
5+01.12	365913.40	2742838.09	1203.35
5+03.96	365911.19	2742839.87	1203.81
5+04.77	365910.56	2742840.38	1203.81
5+06.88	365908.78	2742841.50	1203.81
5+08.77	365907.18	2742842.51	1204.13
5+09.72	365906.32	2742842.92	1204.28
5+12.64	365903.68	2742844.17	1204.28
5+12.77	365903.57	2742844.23	1204.30
5+15.48	365901.00	2742845.10	1204.75

<b>Station</b>	<b>Northing</b>	<b>Easting</b>	<b>Elevation</b>
5+16.77	365899.78	2742845.51	1204.75
5+18.40	365898.18	2742845.85	1204.75
5+20.76	365895.87	2742846.34	1205.14
5+21.24	365895.39	2742846.37	1205.22
5+24.16	365892.48	2742846.55	1205.22
5+26.88	365889.77	2742846.71	1205.66
5+27.00	365889.64	2742846.71	1205.68
5+29.92	365886.73	2742846.62	1205.68
5+32.76	365883.89	2742846.54	1206.15
5+35.68	365880.97	2742846.45	1206.15
5+38.52	365878.13	2742846.36	1206.62
5+41.44	365875.21	2742846.28	1206.62
5+43.51	365873.15	2742846.22	1206.96
5+44.28	365872.37	2742846.28	1207.09
5+47.03	365869.64	2742846.50	1207.09
5+47.20	365869.47	2742846.54	1207.09
5+50.04	365866.71	2742847.23	1207.56
5+51.02	365865.76	2742847.47	1207.56
5+52.96	365864.00	2742848.27	1207.56
5+55.01	365862.12	2742849.11	1207.89
5+55.80	365861.47	2742849.56	1208.02
5+58.72	365859.06	2742851.21	1208.02
5+59.01	365858.82	2742851.37	1208.07
5+61.56	365857.03	2742853.18	1208.49
5+63.61	365855.58	2742854.64	1208.49
5+64.48	365855.08	2742855.34	1208.49
5+67.32	365853.42	2742857.65	1208.96
5+70.24	365851.72	2742860.02	1208.96
5+71.15	365851.19	2742860.76	1209.11
5+73.08	365850.27	2742862.46	1209.43
5+74.89	365849.41	2742864.05	1209.43
5+76.00	365848.97	2742865.07	1209.43
5+78.84	365847.85	2742867.68	1209.89
5+81.76	365846.70	2742870.36	1209.89
5+82.46	365846.42	2742871.01	1210.01
5+84.60	365845.83	2742873.06	1210.36
5+87.52	365845.02	2742875.87	1210.36
5+90.36	365844.23	2742878.60	1210.83
5+93.28	365843.42	2742881.40	1210.83
5+93.61	365843.33	2742881.72	1210.88
5+96.12	365842.93	2742884.20	1211.30
5+99.04	365842.46	2742887.08	1211.30
6+01.88	365842.01	2742889.88	1211.76
6+04.80	365841.55	2742892.77	1211.76
6+06.34	365841.30	2742894.28	1212.02
6+07.64	365841.16	2742895.58	1212.23
6+10.56	365840.84	2742898.48	1212.23
6+13.40	365840.53	2742901.30	1212.70
6+16.32	365840.21	2742904.21	1212.70
6+19.16	365839.89	2742907.03	1213.17