



January 6, 2016

053-3184D F/N 206

Mr. Hilary Thornton
United States Environmental Protection Agency
Region IV
Atlanta Federal Center
4WD-SRSEB, 11th Floor
61 Forsyth Street, SW
Atlanta, GA 30303-8960

Mr. Danny Smith
North Carolina Department of Environment and Natural Resources
Division of Water Quality
3800 Barrett Drive
Raleigh, NC 27609
Mailing Address: 1628 Mail Service Center
Raleigh, NC 27699-1628

**RE: REACHES 1 TO 3 2015 VISUAL AND VEGETATION MONITORING
WARD TRANSFORMER SUPERFUND SITE, RALEIGH, NORTH CAROLINA**

Dear Mr. Thornton and Mr. Smith:

On behalf of the Ward Transformer Site Trust (Trust), Golder Associates NC, Inc. (Golder) submits the results of the visual and vegetation monitoring of the riparian vegetation for Reaches 1 to 3 for the Phase 2 Removal Action (RA) at the Ward Transformer Superfund Site, Raleigh, North Carolina.

MONITORING PERFORMED DURING 2015 REPORTING PERIOD

Repairs of the reconstructed areas at Reaches 1 to 3 were conducted from December 2014 through April 2015, as shown on the as-built survey shown in Attachment 1. Golder conducted visual and vegetation monitoring of the reaches as follows:

Month	Description
May	Visual Site Monitoring and Vegetation Monitoring post-RA reconstruction repairs
July	Visual Site Monitoring
July	Repair Monitoring (repairs of minor erosion identified in May)
September	Visual Site Monitoring and Vegetation Monitoring
October	Maintenance Monitoring
December	Maintenance Monitoring

Additional monitoring events were performed for repair and maintenance activities in July, October, and December. The monitoring reports are provided in Attachments 2 to 7.

Visual Site Monitoring included walking the reaches to identify points of potential concern and to photo-document the conditions at the Site. During the May 2015 monitoring, Golder observed minor erosion areas along Reaches 1 to 3.

Vegetation Monitoring included counting surviving planted trees and estimating the areal coverage of herbaceous vegetation using four (4) fixed vegetation plots. After the reconstruction repairs were completed, Golder re-established the monitoring plots in May 2015 at the approximate locations set-up

Golder Associates NC, Inc.

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Greensboro, NC 27407

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Golder Associates: Operations in Africa, Asia, Australasia, Europe, North America and South America

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during the September 2014 baseline monitoring. Golder added a new plot (Plot No. 4) along Reach 1 in an area north of the Reach 1 channel. Locations of the monitoring plots are provided in Figure 1. Plot No. 1 in Reach 1 measured 40 feet by approximately 62 feet in order to accommodate the additional riprap apron on the south side of the culvert along the Reach 1 access road. Plot Nos. 2, 3, and 4 measured 50 feet by 50 feet.

For the May event, the number of surviving planted trees, the areal coverage of herbaceous ground cover estimated within the monitoring plots, and the calculated tree density per acre are summarized in the table below. In May, the average tree density was calculated to be approximately 903 trees per acre.

Plot No.	Herbaceous Ground Cover	Number of Surviving Planted Trees	Number of Volunteer Trees	Number of Trees	Calculated Tree Density per Acre
1	97%	37	0	37	650
2	95%	27	1	28	488
3	80%	36	1	37	645
4	85%	90	15	105	1830
Average	89%	48	4	52	903

For the September event, the number of surviving planted trees and the areal coverage of herbaceous ground cover estimated within the monitoring plots are summarized in the table below.

Plot No.	Herbaceous Ground Cover	Number of Surviving Planted Trees	Number of Volunteer Trees	Number of Trees	Calculated Tree Density per Acre
1	80%	4	8	12	211
2	80%	15	9	24	418
3	80%	11	24	35	610
4	95%	25	157	182	3171
Average	84%	14	50	63	1103

The average tree density calculated from the September event results is approximately 1,103 trees per acre. The species that had better survivability are tulip poplar, oaks, red maple, red bud, sweet gum, and loblolly pines.

Compared to the May monitoring event, the average herbaceous ground cover decreased slightly from 89% to 84%, while the tree density increased from 903 to 1,103 per acre due to increased volunteer trees.

ACTIONS PERFORMED

During July 2015, Seneca Landscapes conducted repairs of the minor erosion areas along Reaches 1 to 3 identified during the May 2015 visual and vegetation monitoring. The repair monitoring report is provided in Attachment 4.

In late September and early October 2015, Seneca Landscapes conducted maintenance of the Reaches 1 to 3 restored areas. Maintenance included mowing in Reach 1 and aerating, amending, and overseeding or hydroseeding various parts of Reaches 1 to 3. The monitoring report is provided in Attachment 6.

In December 2015, Seneca Landscapes planted additional trees as part of the maintenance targeting the selected Zone 2 and Zone 3/4 areas along Reaches 1 to 3. The monitoring report is provided in Attachment 7.

ANTICIPATED ACTIONS

Golder will continue visual and vegetation monitoring in 2016 as planned.

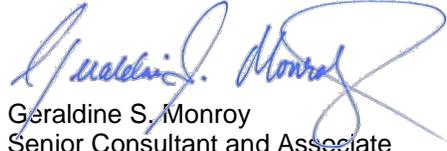
Should there be any questions regarding this Progress Report, please contact the undersigned or the Trust's Project Coordinator, Mr. Weir at 412-249-3118.

Sincerely,

GOLDER ASSOCIATES NC, INC.



Benjamin Draper, P.G.
Project Geologist



Geraldine S. Monroy
Senior Consultant and Associate

GM/BD/sdp

cc: Mr. William G. Weir, Civil & Environmental Consultants, Inc. (by email)
Mr. Daniel M. Darragh, Cohen & Grigsby, PC (by email)
Mr. Michael Brom, PCS Administration (USA), Inc. (by email)
Mr. Henry Lyon, Duke Energy Progress, Inc. (by email)
Mr. Jason D. Witt, Murray Energy Corporation (by email)
Mr. Nile Testerman, NCDENR (by email)

Attachments:

- Attachment 1: As-built Survey for Phase 2 Removal Action Repairs
- Attachment 2: May 2015 Visual and Vegetation Monitoring Report
- Attachment 3: July 2015 Visual Monitoring Report
- Attachment 4: July 2015 Repair Monitoring Report
- Attachment 5: September 2015 Visual and Vegetation Monitoring Report
- Attachment 6: October 2015 Maintenance Monitoring Report
- Attachment 7: December 2015 Maintenance Monitoring Report



LEGEND

 Monitoring Plots

NOTES

REFERENCE

Wake County GIS, 2010
 Fleming Engineering, Inc., 2006 - 2014
 Projection: North Carolina State Plane Datum: NAD 83



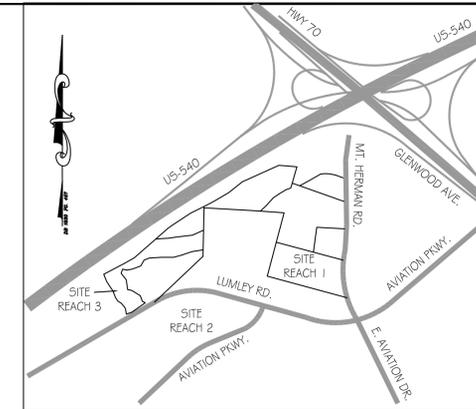
PROJECT	Ward Transformer Superfund Site Raleigh, North Carolina		
TITLE	Reaches 1 to 3 Plot Location Map		
	PROJECT No.	053-31848	SCALE AS SHOWN
	DESIGN	-	REV. 0
	GIS	SSH	OCT-2014
	CHECK	JAD	OCT-2014
	REVIEW	GM	OCT-2014
			FIGURE 1

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

C:\GIS\Ward_Transformer\GIS\PROJECTS\Reach_1_to_3_Monitoring\Figure 1 Plot and Photo Location Map for Reach 1 to 3_Monitoring.mxd 01 Oct 2015 16:59:58 PM

**ATTACHMENT 1
AS-BUILT SURVEY FOR
PHASE 2 REMOVAL ACTION REPAIRS**

WARD TRANSFORMER SUPERFUND SITE REPAIRS FOR PHASE 2 REMOVAL ACTION AS-BUILTS



VICINITY MAP
1" = 1000'

Fleming Engineering, Inc.
CONSULTING ENGINEERS & LAND SURVEYORS
8518 Triad Drive Colfax, NC 27235
Phone (336) 852-9797 License No. C-0950
www.FlemingEngineering.com

TOWNSHIP OF MORRISVILLE WAKE COUNTY STATE OF NORTH CAROLINA

SUPERFUND REMOVAL ACTION CONTACTS:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION IV
HILARY THORNTON
ATLANTA FEDERAL CENTER
4WD-SRSEB, 11TH FLOOR
61 FORSYTH STREET, SW
ATLANTA, GA 30303
(404) 452-8809

WARD TRANSFORMER SITE TRUST
C/O WILLIAM WEIR, PROJECT COORDINATOR
CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
333 BALDWIN ROAD
PITTSBURGH, PA 15205
(800) 365-2324

GOLDER ASSOCIATES INC.
GERALDINE MONROY, PE
3130 CHAMBLEE TUCKER ROAD
ATLANTA, GA 30341
(770) 496-1893

SURVEYING CONTACTS:

FLEMING ENGINEERING, INC.
CRAIG S. FLEMING, PE, PLS
c/o BRENT COCKRUM, PE
8518 TRIAD DRIVE
COLFAX, NC 27235
(336) 544-6423
bcockrum@flemingengineering.com

CONTRACTOR CONTACTS:

DENOVO CONSTRUCTORS, LLC
JENNIFER SEAMAN
100 S. WACKER DR, SUITE LL1-50
CHICAGO, IL 60606
312-733-9370
jseaman@denovogrp.com

NOTES:

THESE PLANS ARE A SUPPLEMENT TO THE WARD PHASE 2 REMOVAL ACTION AS-BUILTS DATED OCTOBER 1, 2014.

LOCATIONS BASED ON FIELD SURVEY BY FLEMING ENGINEERING, INC., PERFORMED DURING APRIL 2015.

PROPERTY LINES AND RIGHT-OF-WAY DATA FOR LUMLEY ROAD AND TRACTS 1-3 ARE PER FIELD LOCATIONS. ALL OTHER PROPERTY LINES ARE PER WAKE COUNTY GIS.

CONTOURS ARE PER WAKE COUNTY GIS.

THIS MAP DOES NOT MEET G.S. 47-30 AND IS NOT FOR THE RECORDATION OR CONVEYANCE OF PROPERTY.

NO GEOTECHNICAL ENGINEERING AND TESTING WAS PERFORMED BY FLEMING ENGINEERING, INC.

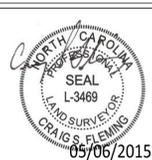
ZONE 1 INFORMATION FOR REACHES 2 AND 3 WERE DERIVED BY USING THE EDGE OF THE ZONE 2 AREAS AND THE ORIGINAL LIMITS OF THE ZONE 1 LOCATIONS USED IN THE 2014-10-01 AS-BUILTS.

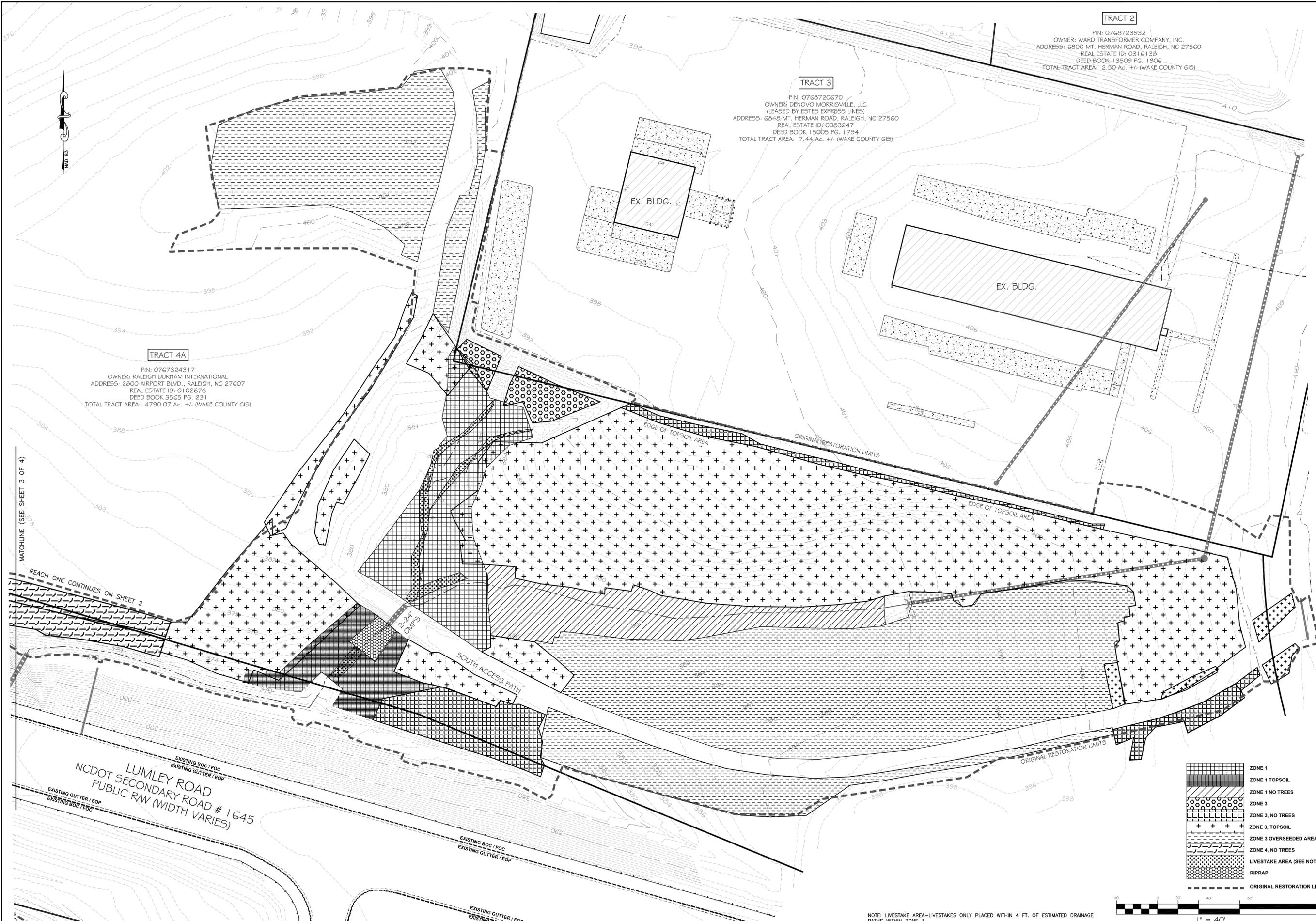
WARD TRANSFORMER SITE, PHASE 2
ASBUILT DRAWINGS - COVER SHEET

PROJECT LOCATION:
COUNTY: WAKE
TOWNSHIP: MORRISVILLE

NO.	DATE	REVISION NOTE
1	06/16/2014	PER GOLDER COMMENTS
2	08/29/2014	PER GOLDER COMMENTS
3	09/17/2014	PER GOLDER COMMENTS
4	10/01/2014	PER GOLDER COMMENTS
5	04/16/2015	PER DENOVO REQUEST
6	04/21/2015	PER DENOVO COMMENTS
7	05/06/2015	PER DENOVO COMMENTS
8	05/19/2015	PER DENOVO COMMENTS

DRAWN BY: BC
CHECKED BY: CSF
DATE: 06/16/2014
PROJECT NO.: 0428.02
REF. NO.:
SCALE:





TRACT 2
 PIN: 0768723932
 OWNER: WARD TRANSFORMER COMPANY, INC.
 ADDRESS: 6800 MT. HERMAN ROAD, RALEIGH, NC 27560
 REAL ESTATE ID: 0316138
 DEED BOOK 13509 PG. 1806
 TOTAL TRACT AREA: 2.50 Ac. +/- (WAKE COUNTY GIS)

TRACT 3
 PIN: 0768720670
 OWNER: DENOVO MORRISVILLE, LLC
 (LEASED BY ESTES EXPRESS LINES)
 ADDRESS: 6848 MT. HERMAN ROAD, RALEIGH, NC 27560
 REAL ESTATE ID: 0083247
 DEED BOOK 15005 PG. 1794
 TOTAL TRACT AREA: 7.44 Ac. +/- (WAKE COUNTY GIS)

TRACT 4A
 PIN: 0767324317
 OWNER: RALEIGH DURHAM INTERNATIONAL
 ADDRESS: 2800 AIRPORT BLVD., RALEIGH, NC 27607
 REAL ESTATE ID: 0102676
 DEED BOOK 3565 PG. 231
 TOTAL TRACT AREA: 4790.07 Ac. +/- (WAKE COUNTY GIS)

- ZONE 1
- ZONE 1 TOPSOIL
- ZONE 1 NO TREES
- ZONE 3
- ZONE 3, NO TREES
- ZONE 3, TOPSOIL
- ZONE 3 OVERSEEDED AREA
- ZONE 4, NO TREES
- LIVESTAKE AREA (SEE NOTE)
- RIPRAP
- ORIGINAL RESTORATION LIMITS



NOTE: LIVESTAKE AREA—LIVESTAKES ONLY PLACED WITHIN 4 FT. OF ESTIMATED DRAINAGE PATHS WITHIN ZONE 1.

Fleming Engineering, Inc.
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 Phone (336) 852-9797 License No. C-0950
 www.FlemingEngineering.com

WARD TRANSFORMER SITE, PHASE 2
 REPAIRS FOR PHASE 2 REMOVAL ACTION (1 OF 3)

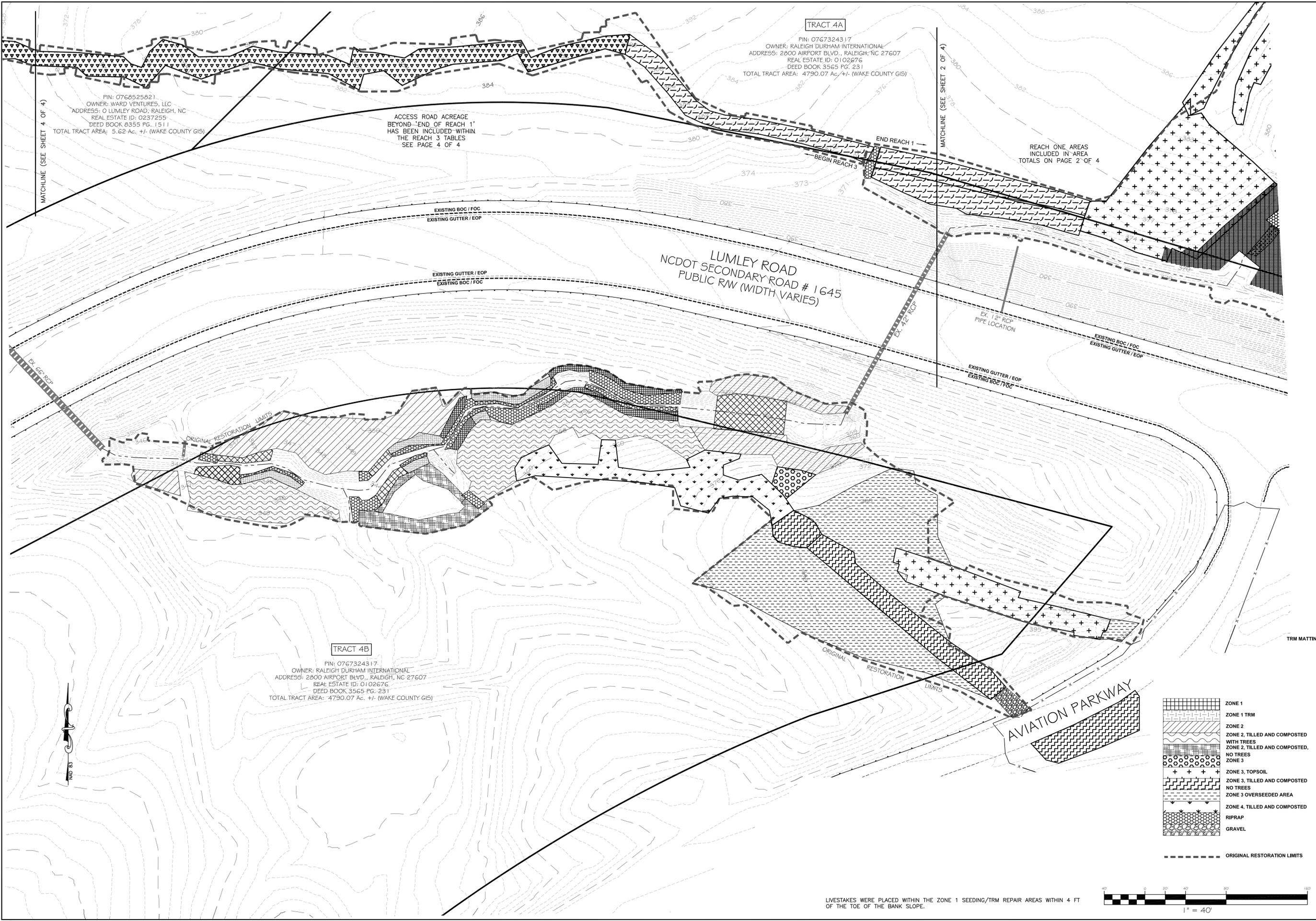
PROJECT LOCATION:
 COUNTY: WAKE
 TOWNSHIP: MORRISVILLE

NO.	DATE	REVISION NOTE
1	08/08/2014	PER GOLDBERG COMMENTS
2	08/29/2014	PER GOLDBERG COMMENTS
3	09/17/2014	PER GOLDBERG COMMENTS
4	10/01/2014	PER DENOVO REQUEST
5	04/29/2015	PER DENOVO COMMENTS
6	05/20/2015	PER DENOVO COMMENTS

DRAWN BY: BC
 CHECKED BY: CSF
 DATE: 06/16/2014
 PROJECT NO.: 0428.02
 REF. NO.:

SCALE: 1" = 40'





PIN: 0768525821
 OWNER: WARD VENTURES, LLC
 ADDRESS: 0 LUMLEY ROAD, RALEIGH, NC
 REAL ESTATE ID: 0237255
 DEED BOOK 0355 PG. 151 I
 TOTAL TRACT AREA: 5.62 Ac. +/- (WAKE COUNTY GIS)

ACCESS ROAD ACREAGE
 BEYOND END OF REACH 1
 HAS BEEN INCLUDED WITHIN
 THE REACH 3 TABLES
 SEE PAGE 4 OF 4

TRACT 4A
 PIN: 0767324317
 OWNER: RALEIGH DURHAM INTERNATIONAL
 ADDRESS: 2800 AIRPORT BLVD., RALEIGH, NC 27607
 REAL ESTATE ID: 0102676
 DEED BOOK 3565 PG. 231
 TOTAL TRACT AREA: 4790.07 Ac. +/- (WAKE COUNTY GIS)

TRACT 4B
 PIN: 0767324317
 OWNER: RALEIGH DURHAM INTERNATIONAL
 ADDRESS: 2800 AIRPORT BLVD., RALEIGH, NC 27607
 REAL ESTATE ID: 0102676
 DEED BOOK 3565 PG. 231
 TOTAL TRACT AREA: 4790.07 Ac. +/- (WAKE COUNTY GIS)

LUMLEY ROAD
 NCDOT SECONDARY ROAD # 1645
 PUBLIC RW (WIDTH VARIES)

REACH ONE AREAS
 INCLUDED IN AREA
 TOTALS ON PAGE 2 OF 4

EX. 12" RCP
 PIPE LOCATION

EXISTING GUTTER / EOP
 EXISTING BOC / FOC

ORIGINAL RESTORATION LIMITS

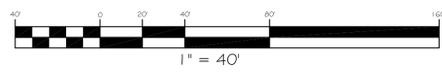
ORIGINAL RESTORATION LIMITS

AVIATION PARKWAY

- ZONE 1
- ZONE 1 TRM
- ZONE 2
- ZONE 2, TILLED AND COMPOSTED WITH TREES
- ZONE 2, TILLED AND COMPOSTED, NO TREES
- ZONE 3
- ZONE 3, TOPSOIL
- ZONE 3, TILLED AND COMPOSTED NO TREES
- ZONE 3 OVERSEED AREA
- ZONE 4, TILLED AND COMPOSTED RIPRAP
- ZONE 4, TILLED AND COMPOSTED GRAVEL

----- ORIGINAL RESTORATION LIMITS

LIVESTAKES WERE PLACED WITHIN THE ZONE 1 SEEDING/TRM REPAIR AREAS WITHIN 4 FT OF THE TOE OF THE BANK SLOPE.



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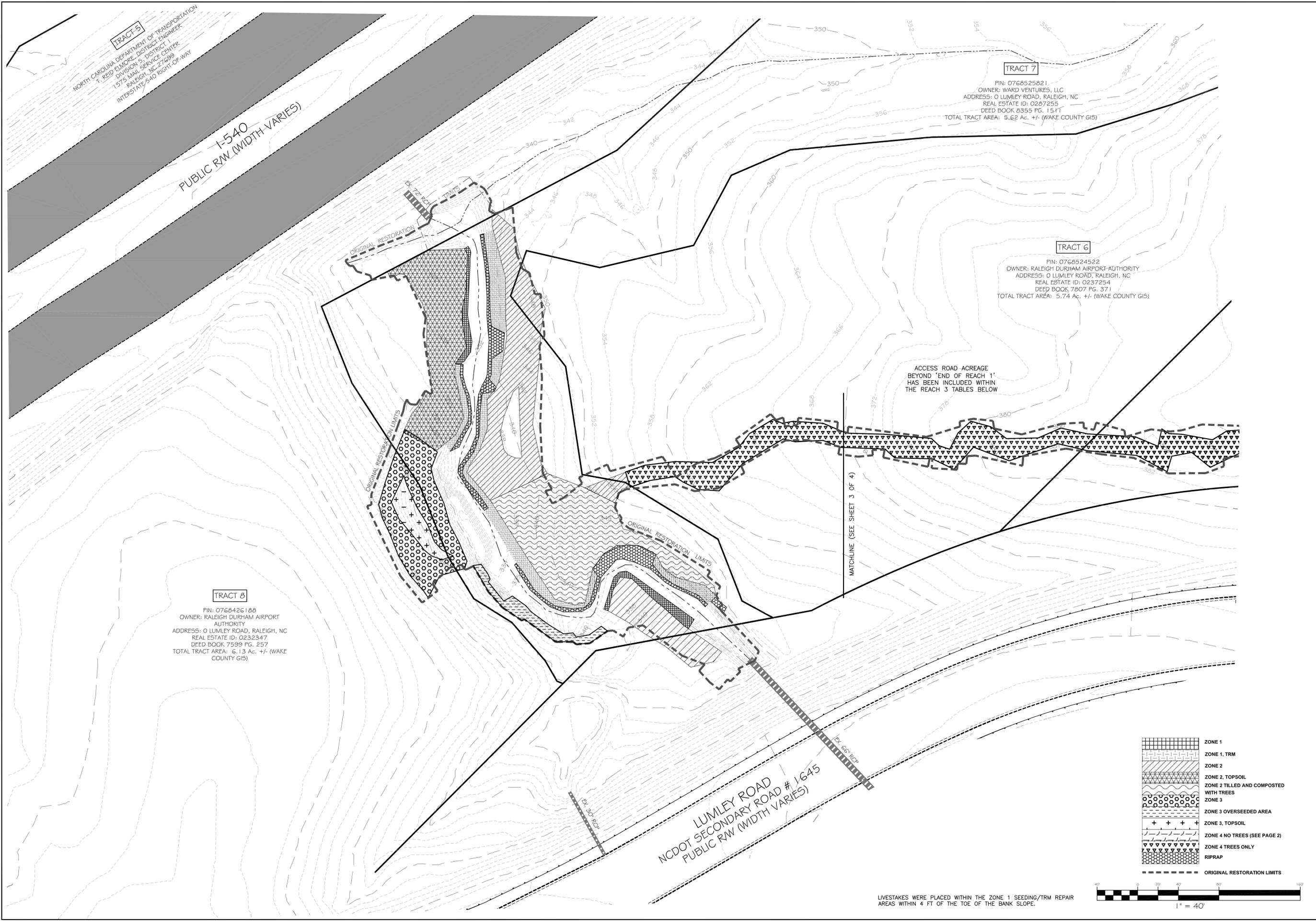
WARD TRANSFORMER SITE, PHASE 2
 REPAIRS FOR PHASE 2 REMOVAL ACTION (2 OF 3)

PROJECT LOCATION:
 COUNTY: NORTH CAROLINA
 TOWNSHIP: MORRISVILLE

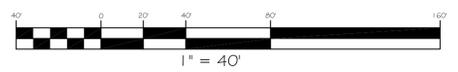
NO.	DATE	REVISION NOTE
1	08/07/2014	PER GOLDERS COMMENTS
2	08/29/2014	PER GOLDERS COMMENTS
3	09/17/2014	PER GOLDERS COMMENTS
4	10/01/2014	PER GOLDERS COMMENTS
5	04/16/2015	PER DENWID COMMENTS
6	05/21/2015	PER DENWID COMMENTS
7	05/21/2015	PER DENWID COMMENTS

DRAWN BY: BC
 CHECKED BY: CSF
 DATE: 06/16/2014
 PROJECT NO.: 0428.02
 REF. NO.:
 SCALE: 1" = 40'





- ZONE 1
- ZONE 1, TRM
- ZONE 2
- ZONE 2, TOPSOIL
- ZONE 2 TILLED AND COMPOSTED WITH TREES
- ZONE 3
- ZONE 3 OVERSEEDED AREA
- ZONE 3, TOPSOIL
- ZONE 4 NO TREES (SEE PAGE 2)
- ZONE 4 TREES ONLY
- RIPRAP
- ORIGINAL RESTORATION LIMITS



LIVESTAKES WERE PLACED WITHIN THE ZONE 1 SEEDING/TRM REPAIR AREAS WITHIN 4 FT OF THE TOE OF THE BANK SLOPE.

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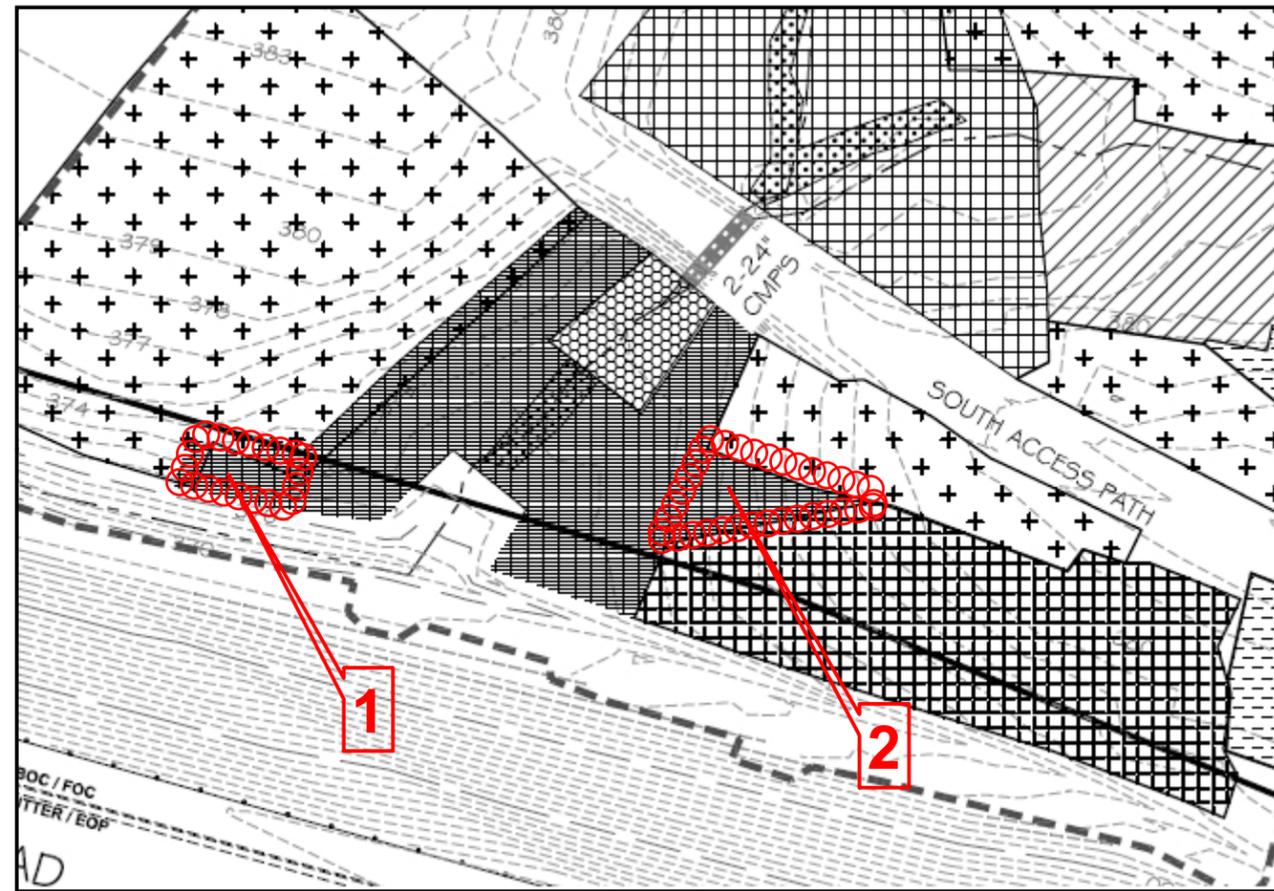
WARD TRANSFORMER SITE, PHASE 2
REPAIRS FOR PHASE 2 REMOVAL ACTION (3 OF 3)

PROJECT LOCATION:
COUNTY: WAKE
TOWNSHIP: MORRISVILLE

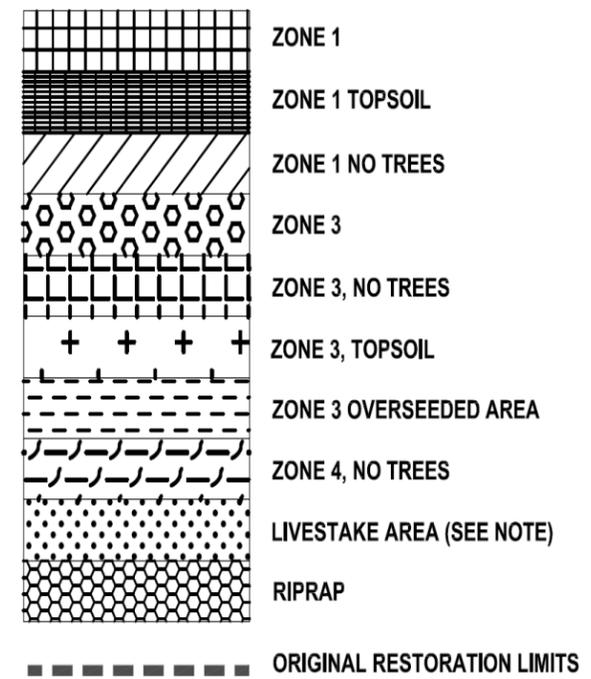
NO.	DATE	REVISION NOTE
1	08/07/2014	PER GOLDBERG COMMENTS
2	08/29/2014	PER GOLDBERG COMMENTS
3	09/17/2014	PER GOLDBERG COMMENTS
4	10/07/2014	PER GOLDBERG COMMENTS
5	04/16/2015	PER DENNINO REQUEST
6	04/21/2015	PER DENNINO COMMENTS
7	05/06/2015	PER DENNINO COMMENTS
8	05/19/2015	PER DENNINO COMMENTS

DRAWN BY: BC
CHECKED BY: CSF
DATE: 06/16/2014
PROJECT NO.: 0428.02
REF. NO.:
SCALE: 1" = 40'





SHEET 2 LEGEND



SHEET 2 CORRECTIONS

CORRECTION 1: ZONE 3, NO TREES
(with a small amount of topsoil)

CORRECTION 2: ZONE 3, TOPSOIL

CORRECTION 3: ZONE 3, TOPSOIL

REFERENCE

Fleming Engineering, Inc., Ward Transformer Superfund Site Repairs for Phase 2 Removal Action As-Built 2015

NOT TO SCALE

PROJECT	Ward Transformer Superfund Site Raleigh, North Carolina		
TITLE	Sheet 2 Corrections Repairs for Phase 2 Removal Action		
	PROJECT No. 053-31848	SCALE AS SHOWN	REV. 0
	DESIGN -		
	GIS SSH	JULY-2015	APPENDIX: R
	CHECK JAD	JULY-2015	
	REVIEW GM	JULY-2015	



ATTACHMENT 2
MAY 2015 VISUAL AND VEGETATION MONITORING REPORT

REACHES 1 TO 3 VISUAL AND VEGETATION MONITORING REPORT

PROJECT NAME: WARD TRANSFORMER SUPERFUND SITE, RALEIGH, NC.

PROJECT NUMBER: 053-3184D

DATE: 5/5/2015

WEATHER: Partly Cloudy, 72-82°F, Wind SW-SSW mph, 3-11 mph, max 19 mph

GOLDER PERSONNEL: Kevin Seaford, Jeremy DeVore

OTHER PERSONNEL: Mark Breyman (DeNovo)

OVERSIGHT: None

HEALTH AND SAFETY ISSUES: None

NOTES: Kevin Seaford and Jeremy DeVore conducted the monitoring of the re-vegetation and surface water and erosion control features of Reaches 1, 2, and 3 at the Ward Transformer Superfund Site Phase 2 Removal Action on Tuesday, May 5, 2015. Visual monitoring included a walk-through assessment of the Reaches to document current conditions, as shown on Photographs 1 through 13, and to identify points of potential concern, as shown on Photographs 14 through 18.

Golder personnel re-established three (3) vegetation plots along Reaches 1, 2, and 3 and added an additional plot in Reach 1 (Plot 4). Plots 2, 3, and 4 measured 50 feet by 50 feet. Plot 1 in Reach 1 measured 40 feet x by approximately 62 feet in order to accommodate the additional riprap apron on the south side of the culvert along the Reach 1 access road. Photographs were taken at each plot, as shown on Photographs 9 through 12. Vegetation monitoring plot locations are provided in Attachment A. The monitoring plot sketches and details are provided in Attachment B.

The planted and volunteer trees were identified and counted in each plot. The areal coverage of herbaceous ground cover was estimated within each monitoring plot in four (4) individual sampling frames, each 10 square feet in area. The table below provides a description of the location of the photos taken from the plots, the number of surviving planted and volunteer trees found in the plots, and an estimate of the area of herbaceous ground cover in each plot.

Plot No.	Photo Location	Herbaceous Cover Estimate of Area	Surviving Trees in Plot	Volunteer Trees in Plot
Plot 1	Photograph 9 Reach 1 - from NE corner, facing SW	97	37	0
Plot 2	Photograph 10 Reach 2 - from NE corner, facing SW	95	27	1
Plot 3	Photograph 11 Reach 3 - from NE corner, facing SW	80	36	1
Plot 4	Photograph 12 Reach 1 – from SW corner, facing NE	85	90	15

Reach 1

In the Reach 1 area, erosion was observed south and downstream of the riprap stormwater channels near the edge of the 'wet area.' The erosion channel was approximately 20 feet long by 2-5 feet wide, and an average depth of 6-12" during the monitoring. This area is shown in Photo 14.

Other minor areas of erosion were observed in the Reach 1 channel and surrounding.



Reach 2

In Reach 2, two (2) erosion areas along the turf-reinforcement matting (TRM) were observed along the Reach 2 channel. The first area, shown in Photo 15, was approximately 10 feet long located along the south bank toe of Reach 2 at the end of the first riprap toe section. The TRM was loose and folded and the wooden stakes dislodged or loose.

The second area, shown in Photo 16, was located approximately midway along the Reach 2 channel on the north bank slope. Soil beneath the TRM sloughed from the side of the bank. The soil sloughed toward the bottom of the slope resulting in stretching of the TRM or a 'trampolining/tenting' effect in an area approximately 10 feet long and 3-4 feet wide with approximately 1 feet of space between the TRM and the soil surface. There is little vegetation in this area.

Reach 3

In Reach 3, two erosion areas were observed. The first area, shown in Photo 17, is located immediately above the upstream DOT riprap apron on the west side of the Reach 3 channel. A series of several small erosion channels are forming in an area approximately 10 feet long, 2-3 feet wide and 1-2 feet deep were observed above riprap.

The second area shown in Photo 18, is located along the west side of the Reach 3 channel along the top of the stream bank cut. The soil is sloughing at the top of the stream bank cut above partially weathered rock and depositing sediment at the riprap toe and the straw matting is being pulled and torn as a result. The affected area measures approximately 25 feet long and 12 feet tall.

Plots and photograph locations are shown on the site map in Attachment A.



Photograph No. 1
Reach 1 RDU Slope and Channel
Facing Northeast



Photograph No. 2
Reach 1 Channel South of Access Path
Facing Southeast



Photograph No. 3
Reach 1 Estes Southwest Corner and RDU Slope
Facing North



Photograph No. 4
Reach 2 Channel at Former NCDOT Sedimentation Pond
Facing East



Photograph No. 5
Reach 2 Channel Upstream of First RDU Confluence
Facing West



Photograph No. 6
End of Reach 2 Channel
Facing East



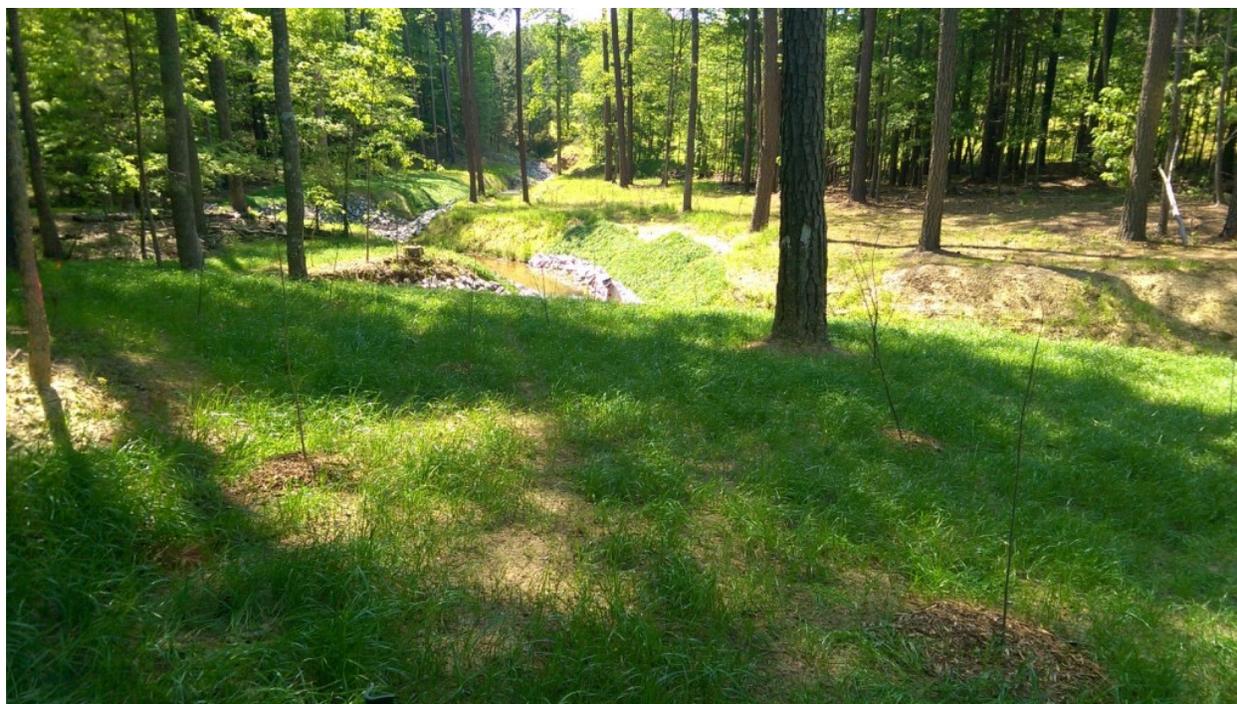
Photograph No. 7
Beginning of Reach 3 Channel
Facing Southeast



Photograph No. 8
End of Reach 3 Channel
Facing West



Photograph No. 9
View of Vegetation Plot 1
Facing Southwest from Northeast Corner



Photograph No. 10
View of Vegetation Plot 2
facing Southwest from Northeast Corner



Photograph No. 11
View of Vegetation Plot 3
Facing Southwest from Northeast Corner



Photograph No. 12
View of Vegetation Plot 4
Facing Southwest from Northeast Corner



Photograph No. 13
Reach 3 Slide Repair Area
Facing West



Photograph No. 14
Erosion Channel Upstream of Reach 1 'wet area'
Facing South



Photograph No. 15
Loose/Displaced TRM at End of First Riprap Toe Protection Along South Side of Reach 2
Facing West



Photograph No. 16
Sloughed Soil and TRM Displacement Along North Bank in Reach 2 Channel
Facing Northeast



Photograph No. 17
Erosion Channels Along Top of West Side of Upstream DOT NCDOT Riprap Apron at Reach 3
Facing North



Photograph No. 18
Erosion Along Top of Stream Bank Cut on West Side of Reach 3 Channel
Facing Southwest

ATTACHMENT A SITE MAP



ATTACHMENT B VEGETATION MONITORING PLOTS

Vegetation and Visual Monitoring Report
Ward Transformer Superfund Site

- B-1 -

5/5/2015
053-3184D

ATTACHMENT B - VEGETATION MONITORING PLOTS

Table 1: Vegetation Monitoring at the Ward Transformer Site

Plot ID: Plot 1 Reach 1

Date: 5/5/2015

Investigators: Kevin Seaford
Jeremy DeVore

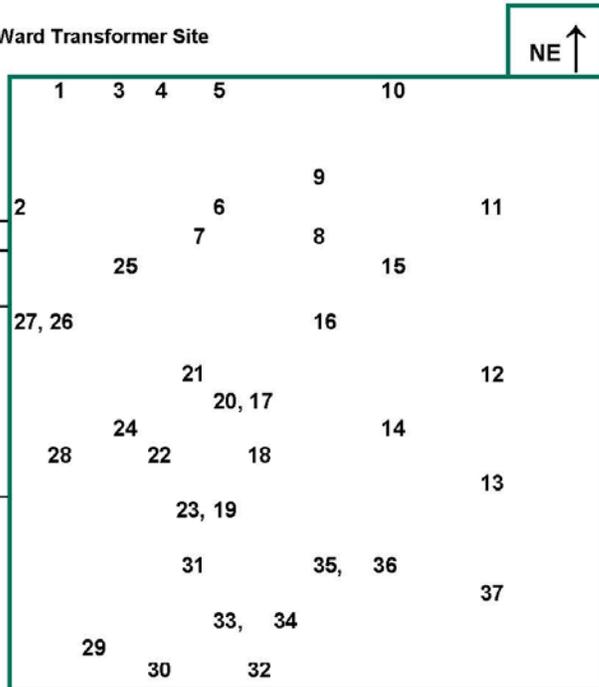
Weather: sunny 73° F

Start: 11:40 AM

Finish: 12:15 PM

Herbaceous Percent Cover: 97

Photo taken from the southwest corner facing northeast.



Planted Trees/Shrubs (Live Stems) P

Plot Sketch
(not to scale)

ID	Species	Common Name	% Cover
1	<i>Liquidambar styraciflua</i>	sweet gum	1
2	<i>Acer saccharum</i>	sugar maple	1
3	<i>Liquidambar styraciflua</i>	sweet gum	1
4	<i>Acer rubrum</i>	red maple	1
5	<i>Sambucus canadensis</i>	American black elderberry	1
6	<i>Alnus serrulata</i>	hazel alder	1
7	<i>Salix nigra</i>	black willow	1
8	<i>Alnus serrulata</i>	hazel alder	1
9	<i>Cornus amomum</i>	silky dogwood	1
10	<i>Sambucus canadensis</i>	American black elderberry	1
11	<i>Betula nigra</i>	river birch	1
12	<i>Acer rubrum</i>	red maple	1
13	<i>Acer rubrum</i>	red maple	1
14	<i>Betula nigra</i>	river birch	1
15	<i>Acer rubrum</i>	red maple	1
16	<i>Cornus amomum</i>	silky dogwood	1
17	<i>Cornus amomum</i>	silky dogwood	1
18	<i>Alnus serrulata</i>	hazel alder	1
19	<i>Cornus amomum</i>	silky dogwood	1
20	<i>Alnus serrulata</i>	hazel alder	1
21	<i>Sambucus canadensis</i>	American black elderberry	1
22	<i>Sambucus canadensis</i>	American black elderberry	1
23	<i>Alnus serrulata</i>	hazel alder	1

Veg-Ward-20140505-Reach-1-3.xlsx



**ATTACHMENT B
VEGETATION MONITORING PLOTS**

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24	<i>Liquidambar styraciflua</i>	sweet gum	1
25	<i>Carpinus caroliniana</i>	American hornbeam	1
26	<i>Carpinus caroliniana</i>	American hornbeam	1
27	<i>Carpinus caroliniana</i>	American hornbeam	1
28	<i>Acer rubrum</i>	red maple	1
29	<i>Liquidambar styraciflua</i>	sweet gum	1
30	<i>Liquidambar styraciflua</i>	sweet gum	1
31	<i>Betula nigra</i>	river birch	1
32	<i>Alnus serrulata</i>	hazel alder	1
33	<i>Cornus amomum</i>	silky dogwood	1
34	<i>Alnus serrulata</i>	hazel alder	1
35	<i>Cornus amomum</i>	silky dogwood	1
36	<i>Liquidambar styraciflua</i>	sweet gum	1
37	<i>Betula nigra</i>	river birch	1

Notes: Several recently planted trees were observed, but were dead.

ATTACHMENT B VEGETATION MONITORING PLOTS

Vegetation and Visual Monitoring Report
Ward Transformer Superfund Site

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ATTACHMENT B - VEGETATION MONITORING PLOTS

Table 1: Vegetation Monitoring at the Ward Transformer Site

Plot ID: Plot 2 Reach 2

Date: 5/5/2015

Investigators: Kevin Seaford
Jeremy DeVore

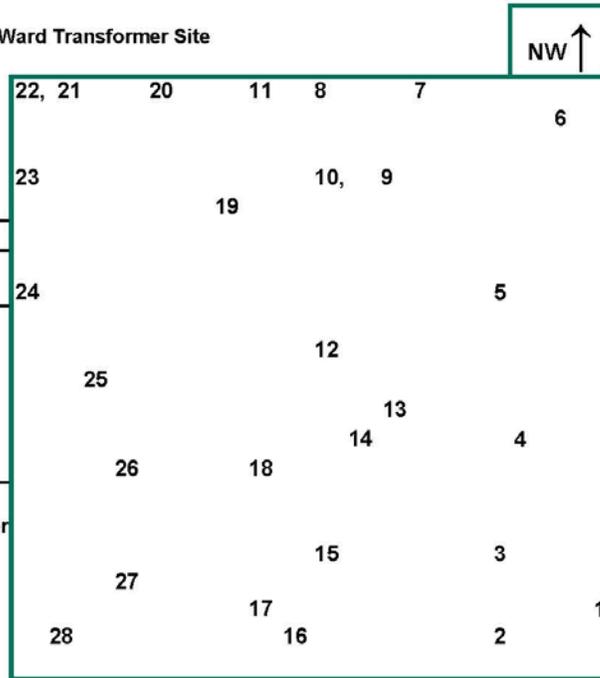
Weather: sunny 76° F

Start: 2:00 PM

Finish: 2:45 PM

Herbaceous Percent Cover: 95

Photo taken from the southeast corner facing northwest.



Plot Sketch (not to scale)

Planted Trees/Shrubs (Live Stems)

ID	Species	Common Name	% Cover
1	<i>Acer rubrum</i>	red maple	1
2	<i>Fraxinus pennsylvanica</i>	green ash	1
3	<i>Liquidambar styraciflua</i>	sweet gum	1
4	<i>Acer rubrum</i>	red maple	1
5	<i>Liquidambar styraciflua</i>	sweet gum	1
6	<i>Acer rubrum</i>	red maple	1
7	<i>Fraxinus pennsylvanica</i>	green ash	1
8	<i>Carpinus caroliniana</i>	American hornbeam	1
9	<i>Liriodendron tulipifera</i>	tulip poplar	1
10	<i>Fraxinus pennsylvanica</i>	green ash	1
11	<i>Fraxinus pennsylvanica</i>	green ash	1
12	<i>Quercus rubra</i>	northern red oak	1
13	<i>Carpinus caroliniana</i>	American hornbeam	1
14	<i>Nyssa sylvatica</i>	black gum	1
15	<i>Fraxinus pennsylvanica</i>	green ash	1
16	<i>Pinus taeda</i>	loblolly pine	1
17	<i>Liriodendron tulipifera</i>	tulip poplar	1
18	<i>Quercus rubra</i>	northern red oak	1
19	<i>Liquidambar styraciflua</i>	sweet gum	1
20	<i>Carpinus caroliniana</i>	American hornbeam	1
21	<i>Cornus amomum</i>	silky dogwood	1
22	<i>Cornus amomum</i>	silky dogwood	1
23	<i>Acer rubrum</i>	red maple	1

volunteer



**ATTACHMENT B
VEGETATION MONITORING PLOTS**

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24	<i>Acer rubrum</i>	red maple	1
25	<i>Quercus rubra</i>	northern red oak	1
26	<i>Quercus rubra</i>	northern red oak	1
27	<i>Liriodendron tulipifera</i>	tulip poplar	1
28	<i>Carpinus caroliniana</i>	American hornbeam	1

Notes:

**ATTACHMENT B
VEGETATION MONITORING PLOTS**

Vegetation and Visual Monitoring Report
Ward Transformer Superfund Site

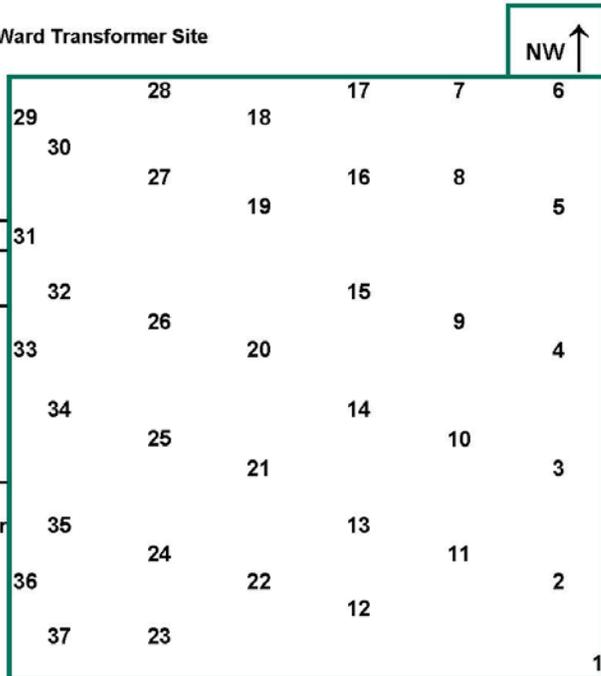
- B-3 -

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053-3184D

ATTACHMENT B - VEGETATION MONITORING PLOTS

Table 1: Vegetation Monitoring at the Ward Transformer Site

Plot ID: Plot 3 Reach 3
Date: 5/5/2015
Investigators: Kevin Seaford
Jeremy DeVore
Weather: sunny 70° F
Start: 12:45 PM
Finish: 1:15 PM
Herbaceous Percent Cover: 80
Photo taken from the southeast corner facing northwest.



Planted Trees/Shrubs (Live Stems)



Plot Sketch
(not to scale)

ID	Species	Common Name	% Cover
1	<i>Quercus falcata</i>	southern red oak	1
2	<i>Quercus rubra</i>	northern red oak	1
3	<i>Cercis canadensis</i>	eastern redbud	1
4	<i>Quercus velutina</i>	black oak	1
5	<i>Liriodendron tulipifera</i>	tulip poplar	1
6	<i>Quercus alba</i>	white oak	1
7	<i>Liriodendron tulipifera</i>	tulip poplar	1
8	<i>Liriodendron tulipifera</i>	tulip poplar	1
9	<i>Cercis canadensis</i>	eastern redbud	1
10	<i>Acer rubrum</i>	red maple	1
11	<i>Cercis canadensis</i>	eastern redbud	1
12	<i>Cercis canadensis</i>	eastern redbud	1
13	<i>Quercus rubra</i>	northern red oak	1
14	<i>Quercus rubra</i>	northern red oak	1
15	<i>Quercus rubra</i>	northern red oak	1
16	<i>Liquidambar styraciflua</i>	sweet gum	1
17	<i>Quercus rubra</i>	northern red oak	1
18	<i>Quercus rubra</i>	northern red oak	1
19	<i>Liquidambar styraciflua</i>	sweet gum	1
20	<i>Quercus rubra</i>	northern red oak	1
21	<i>Cercis canadensis</i>	eastern redbud	1
22	<i>Quercus rubra</i>	northern red oak	1
23	<i>Liquidambar styraciflua</i>	sweet gum	1

volunteer



**ATTACHMENT B
VEGETATION MONITORING PLOTS**

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24	<i>Acer rubrum</i>	red maple	1
25	<i>Liquidambar styraciflua</i>	sweet gum	1
26	<i>Acer rubrum</i>	red maple	1
27	<i>Liquidambar styraciflua</i>	sweet gum	1
28	<i>Acer rubrum</i>	red maple	1
29	<i>Cornus amomum</i>	silky dogwood	1
30	<i>Liriodendron tulipifera</i>	tulip poplar	1
31	<i>Salix nigra</i>	black willow	1
32	<i>Fraxinus pennsylvanica</i>	green ash	1
33	<i>Alnus serrulata</i>	hazel alder	1
34	<i>Liriodendron tulipifera</i>	tulip poplar	1
35	<i>Acer rubrum</i>	red maple	1
36	<i>Alnus serrulata</i>	hazel alder	1
37	<i>Acer rubrum</i>	red maple	1

Notes:

ATTACHMENT B VEGETATION MONITORING PLOTS

Vegetation and Visual Monitoring Report
Ward Transformer Superfund Site

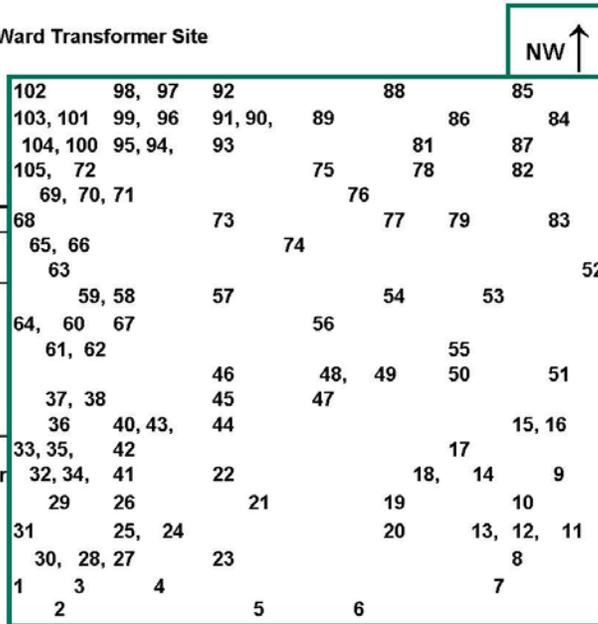
- B-4 -

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053-3184D

ATTACHMENT B - VEGETATION MONITORING PLOTS

Table 1: Vegetation Monitoring at the Ward Transformer Site

Plot ID: Plot 4 Reach 1
Date: 5/5/2015
Investigators: Kevin Seaford
Jeremy DeVore
Weather: sunny 70° F
Start: 11:00 am
Finish: 11:30 am
Herbaceous Percent Cover: 85
Photo taken from the southeast corner facing northwest.



Planted Trees/Shrubs (Live Stems) (P)

Plot Sketch
(not to scale)

ID	Species	Common Name	% Cover
1	<i>Ulmus americana</i>	American elm	1
2	<i>Salix nigra</i>	black willow	1
3	<i>Acer rubrum</i>	red maple	1
4	<i>Sambucus canadensis</i>	American black elderberry	1
5	<i>Acer rubrum</i>	red maple	1
6	<i>Quercus alba</i>	white oak	1
7	<i>Pinus taeda</i>	loblolly pine	1
8	<i>Acer rubrum</i>	red maple	1
9	<i>Liquidambar styraciflua</i>	sweet gum	1
10 - 17	<i>Pinus taeda</i>	loblolly pine	1
18	<i>Acer rubrum</i>	red maple	1
19	<i>Quercus velutina</i>	black oak	1
20 - 21	<i>Ulmus americana</i>	American elm	1
22 - 23	<i>Cornus amomum</i>	silky dogwood	1
24	<i>Nyssa sylvatica</i>	black gum	1
25	<i>Liquidambar styraciflua</i>	sweet gum	1
26	<i>Salix nigra</i>	black willow	1
27	<i>Carya glabra</i>	pignut hickory	1
28	<i>Sambucus canadensis</i>	American black elderberry	1
29	<i>Salix nigra</i>	black willow	1
30	<i>Liquidambar styraciflua</i>	sweet gum	1
31 - 40	<i>Salix nigra</i>	black willow	1
41	<i>Fraxinus pennsylvanica</i>	green ash	1
42 - 43	<i>Sambucus canadensis</i>	American black elderberry	1
44	<i>Acer rubrum</i>	red maple	1

volunteer
volunteer
volunteer
volunteer
volunteer



**ATTACHMENT B
VEGETATION MONITORING PLOTS**

Vegetation and Visual Monitoring Report
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45	<i>Cornus amomum</i>	silky dogwood	1
46	<i>Acer rubrum</i>	red maple	1
47	<i>Cornus amomum</i>	silky dogwood	1
48	<i>Sambucus canadensis</i>	American black elderberry	1
49	<i>Acer rubrum</i>	red maple	1
50	<i>Ulmus americana</i>	American elm	1
51	<i>Liquidambar styraciflua</i>	sweet gum	1
52	<i>Carpinus caroliniana</i>	American hornbeam	1
53 - 54	<i>Acer rubrum</i>	red maple	1
55	<i>Quercus rubra</i>	northern red oak	1
56	<i>Salix nigra</i>	black willow	1
57	<i>Liquidambar styraciflua</i>	sweet gum	1
58	<i>Sambucus canadensis</i>	American black elderberry	1
59	<i>Fraxinus pennsylvanica</i>	green ash	1
60 - 66	<i>Salix nigra</i>	black willow	1
67	<i>Carya glabra</i>	pignut hickory	1
68	<i>Acer rubrum</i>	red maple	1
69	<i>Cornus amomum</i>	silky dogwood	1
70	<i>Salix nigra</i>	black willow	1
71	<i>Carpinus caroliniana</i>	American hornbeam	1
72	<i>Salix nigra</i>	black willow	1
73	<i>Acer rubrum</i>	red maple	1
74	<i>Salix nigra</i>	black willow	1
75	<i>Alnus serrulata</i>	hazel alder	1
76 - 77	<i>Salix nigra</i>	black willow	1
78	<i>Liquidambar styraciflua</i>	sweet gum	1
79	<i>Carya glabra</i>	pignut hickory	1
80	<i>Salix nigra</i>	black willow	1
81	<i>Alnus serrulata</i>	hazel alder	1
82	<i>Ulmus americana</i>	American elm	1
83 - 86	<i>Acer rubrum</i>	red maple	1
87	<i>Quercus alba</i>	white oak	1
88	<i>Sambucus canadensis</i>	American black elderberry	1
89	<i>Cornus amomum</i>	silky dogwood	1
90	<i>Liquidambar styraciflua</i>	sweet gum	1
91 - 92	<i>Diospyros virginiana</i>	persimmon	1
93 - 95	<i>Liquidambar styraciflua</i>	sweet gum	1
96 - 99	<i>Morella cerifera</i>	wax myrtle	1
100	<i>Salix nigra</i>	black willow	1
100 - 102	<i>Cornus amomum</i>	silky dogwood	1
103 - 105	<i>Ulmus americana</i>	American elm	1

volunteer

Notes:

ATTACHMENT 3
JULY 2015 VISUAL MONITORING REPORT

REACHES 1 TO 3 VISUAL MONITORING REPORT

PROJECT NAME: WARD TRANSFORMER SUPERFUND SITE, RALEIGH, NC.

PROJECT NUMBER: 053-3184D

DATE: 7/1/2015

WEATHER: Mostly Cloudy, 84-87°F, Wind WSW mph, 6-8 mph

GOLDER PERSONNEL: Jeremy DeVore

OTHER PERSONNEL: Andrew Van Vlack (Seneca Landscapes)

OVERSIGHT: None

HEALTH AND SAFETY ISSUES: None

NOTES: Jeremy DeVore conducted visual monitoring of the re-vegetation and surface water and erosion control features of Reaches 1, 2, and 3 at the Ward Transformer Superfund Site Phase 2 Removal Action on Wednesday July 1, 2015. Visual monitoring included a walk-through assessment of the Reaches to document current conditions as shown on Photographs 1 through 13. Photographs of potential points of concern are shown in Photographs 14 through 19.

Photograph locations along with the vegetation monitoring plot locations are shown on a site map provided in Attachment A.

Reach 1

In the Reach 1 area, erosion was observed south and downstream of the riprap stormwater channels near the edge of the 'wet area.' The erosion channel was approximately 15 feet long by 2-3 feet wide, and an average depth of 6-8" during the monitoring. This area has partially filled in with sediment and has somewhat improved since the May 2015 monitoring. This area is shown in Photo 14.

Other minor areas of erosion were observed in the Reach 1 channel and surrounding area that have remained generally in the same condition or slightly improved by filling in of channels and increased vegetation.

Reach 2

In Reach 2, the two (2) erosion areas along the turf-reinforcement matting (TRM) previously identified in May 2015 were observed along the Reach 2 channel. The first area, shown in Photo 15, was approximately 10 feet long located along the south bank toe of Reach 2 at the end of the first riprap toe section. The density of vegetation in this area has increased and sediment load has filled in some of the TRM. The TRM remains folded and loose in spots and the wooden stakes dislodged or loose.

The second area, shown in Photos 16 and 17, was located approximately midway along the Reach 2 channel on the north bank slope. Soil beneath the TRM continues to slough from the side of the bank to the toe. The soil has sloughed toward the bottom of the slope resulting in stretching of the TRM or a 'trampolining/tenting' effect in an area that has increased in length to approximately 20 feet long and 3-4 feet wide with approximately 1 foot of space between the TRM and the soil surface. The TRM is tearing as the soil sloughs. A secondary slough approximately 5 feet long has formed above the original slough area. The temporary grass has died off in this area and there is very little to no permanent vegetation.

Minor displacement of riprap was observed on the installed riprap channel at the first downstream tributary to Reach 2.

Reach 3

In Reach 3, two erosion areas were observed. The first area, shown in Photo 18, is located immediately above the upstream DOT riprap apron on the west side of the Reach 3 channel. A series of several small erosion channels are forming in an area approximately 10 feet long, 2-3 feet wide and 1-2 feet deep were observed above riprap. These erosion features did not show any significant change from May 2015.

The second area shown in Photo 19, is located along the west side of the Reach 3 channel along the top of the stream bank cut. The soil is sloughing at the top of the stream bank cut above partially weathered rock and depositing sediment at the riprap toe and the straw matting is being pulled and torn as a result. The affected area measures approximately 25 feet long and 12 feet tall. This erosion feature did not show any significant change from May 2015. Plots and photograph locations are shown on the site map in Attachment A.

Photographs



Photograph No. 1
Reach 1 RDU Slope and Channel
Facing Northeast



Photograph No. 2
Reach 1 Channel South of Access Path
Facing Southeast



Photograph No. 3
Reach 1 Estes Southwest Corner and RDU Slope
Facing North



Photograph No. 4
Reach 2 Channel at Former NCDOT Sedimentation Pond
Facing East



Photograph No. 5
Reach 2 Channel Upstream of First RDU Confluence
Facing West



Photograph No. 6
End of Reach 2 Channel
Facing East



Photograph No. 7
Beginning of Reach 3 Channel
Facing Southeast



Photograph No. 8
End of Reach 3 Channel
Facing West



Photograph No. 9
View of Vegetation Plot 1
Facing Southwest from Northeast Corner



Photograph No. 10
View of Vegetation Plot 2
Facing Southwest from Northeast Corner



Photograph No. 11
View of Vegetation Plot 3
Facing Southwest from Northeast Corner



Photograph No. 12
View of Vegetation Plot 4
Facing Southwest from Northeast Corner



Photograph No. 13
Reach 3 Slide Repair Area
Facing West



Photograph No. 14
Erosion Channel Upstream of Reach 1 'wet area'
Facing South



Photograph No. 15
Loose/Displaced TRM at End of First Riprap Toe Protection along South Side of Reach 2
Facing West



Photograph No. 16
Sloughed Soil and TRM Displacement at North Bank in Reach 2 Channel
Facing Northeast



Photograph No. 17
Closeup of Sloughed Soil and TRM Displacement at North Bank in Reach 2 Channel
Facing Northeast



Photograph No. 18
Erosion Rills above NCDOT Riprap Apron on West Side of Reach 3 Channel
Facing North (photo from May 2015, no change in conditions)



Photograph No. 19
Erosion at Top of Bank on West Side of Reach 3 Channel
Facing Southwest

**ATTACHMENT A
 SITE MAP**



**ATTACHMENT 4
JULY 2015 REPAIR MONITORING REPORT**

REACHES 1 TO 3 REPAIR MONITORING REPORT

PROJECT NAME: WARD TRANSFORMER SUPERFUND SITE, RALEIGH, NC.

PROJECT NUMBER: 053-3184D

DATE: 7/20 and 22/2015

WEATHER: Mostly Cloudy, 84-87°F, Wind WSW mph, 6-8 mph

GOLDER PERSONNEL: Jeremy DeVore, Ben Draper and Gina Monroy

OTHER PERSONNEL: Andrew Van Vlack (Seneca Landscapes)

OVERSIGHT: None

HEALTH AND SAFETY ISSUES: None

NOTES: Golder personnel monitored the Reaches 1 – 3 reconstruction repairs conducted by Seneca Landscapes on July 20 and 21, 2015 on erosions identified during the visual and vegetation monitoring in May 2015.

Reach 1

Seneca repaired the eroded channel on Reach 1 upstream of the 'wet area'.



Photograph No. 1
Repair of Erosion Channel Upstream of Reach 1 'wet area'
Facing South

Seneca also repaired minor erosions on the Reach 1 channel.



Photograph No. 2
Repair of Reach 1 Channel (taken 7/28/2015)
Facing Southeast

In addition, Seneca cleaned the accumulated sediment on rip rap apron at the east channel at Estes southwest corner east channel.



Photograph No. 3
Repair of Reach 1 Channel
Facing Northwest

Reach 2

In Reach 2, Seneca repaired the two erosion areas along the turf-reinforcement matting (TRM).



Photograph No. 4 (taken 7/28/2015)

Repaired Loose/Displaced TRM at End of First Riprap Toe Protection along South Side of Reach 2 Facing West



Photograph No. 5

Repaired Sloughed Soil and TRM Displacement at North Bank in Reach 2 Channel Facing Northeast

Reach 3

In Reach 3, Seneca repaired two erosion areas.



Photograph No. 6

Repaired Erosion Rills above NCDOT Riprap Apron on West Side of Reach 3 Channel Facing West



Photograph No. 7

Repaired Erosion at Top of Bank on West Side of Reach 3 Channel Facing Southwest

ATTACHMENT A
 SITE MAP



ATTACHMENT 5
SEPTEMBER 2015 VISUAL AND VEGETATION MONITORING REPORT

REACHES 1 TO 3 VISUAL AND VEGETATION MONITORING REPORT

PROJECT NAME: WARD TRANSFORMER SUPERFUND SITE, RALEIGH, NC.

PROJECT NUMBER: 053-3184D

DATE: 9/2/2015

WEATHER: Partly Cloudy, 75-93.6°F, Wind NW-WNW mph, 0-6 mph, max 6 mph

GOLDER PERSONNEL: Kevin Seaford, Benjamin Draper

OTHER PERSONNEL: Gina Monroy

OVERSIGHT: None

HEALTH AND SAFETY ISSUES: None

NOTES: Kevin Seaford and Benjamin Draper conducted the monitoring of the re-vegetation, surface water, and erosion control features of Reaches 1, 2, and 3 at the Ward Transformer Superfund Site Phase 2 Removal Action on Wednesday, September 2, 2015. Visual monitoring included a walk-through assessment of the Reaches to document current conditions, as shown on Photographs 1 through 13.

Golder personnel monitored four vegetation plots: Plot Nos. 1 and 4 along Reach 1, Plot No. 2 along Reach 2, and Plot No. 3 along Reach 3. Plot 1 in Reach 1 measures 40 feet by approximately 62 feet to accommodate the riprap apron on the south side of the culvert along the Reach 1 access road. Plot Nos. 2, 3, and 4 measures 50 feet by 50 feet. Photographs were taken at each plot, as shown on Photographs 9 through 12. Vegetation monitoring plot locations are provided in Attachment A. The monitoring plot sketches and details are provided in Attachment B.

The planted and volunteer trees were identified and counted in each plot. The areal coverage of herbaceous ground cover was estimated within each monitoring plot in four individual sampling frames, each 10 square feet in area. The table below provides a description of each photograph location, the number of surviving planted and volunteer trees found in each plot, and an estimate of the area of herbaceous ground cover in each plot.

Plot No.	Photo Location	Herbaceous Cover Estimate of Area	Surviving Trees in Plot	Volunteer Trees in Plot
Plot 1	Photograph 9 Reach 1 - from NE corner, facing SW	80	4	8
Plot 2	Photograph 10 Reach 2 - from NE corner, facing SW	80	15	9
Plot 3	Photograph 11 Reach 3 - from NW corner, facing SE	80	11	24
Plot 4	Photograph 12 Reach 1 – from SW corner, facing NE	95	25	157



Photograph No. 1
Reach 1 RDU Slope and Channel
Facing Northeast



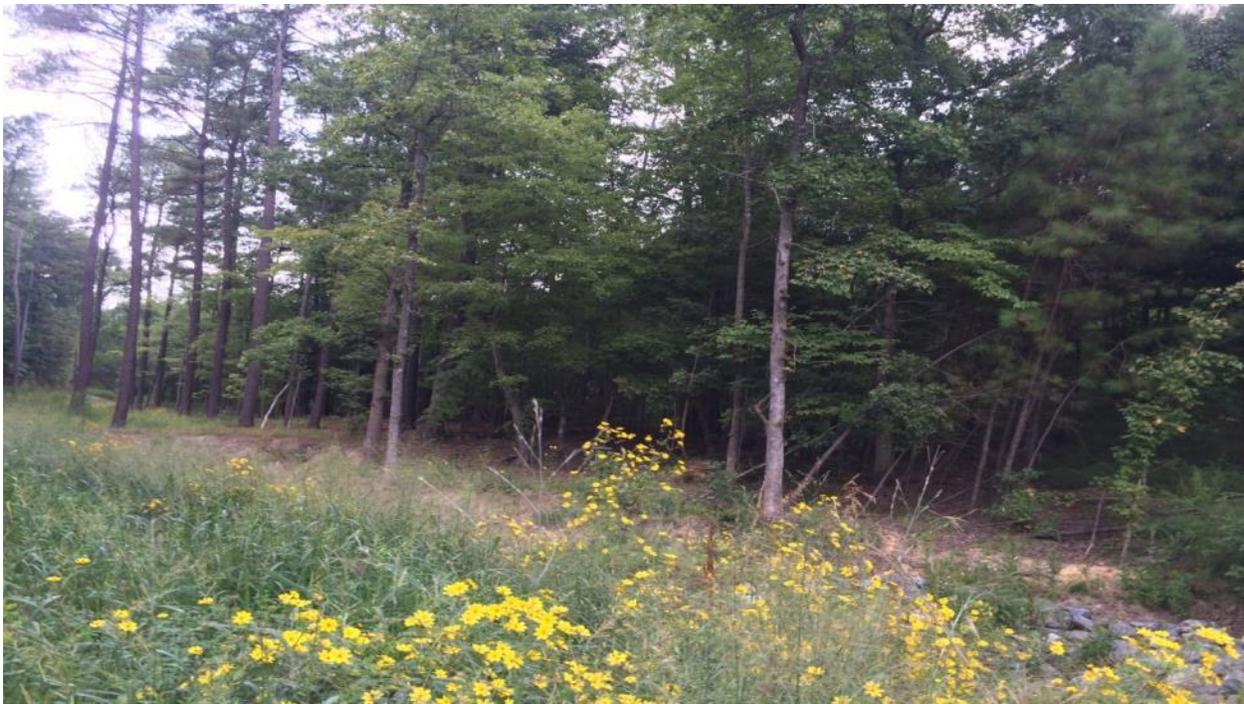
Photograph No. 2
Reach 1 Channel South of Access Path
Facing Southeast



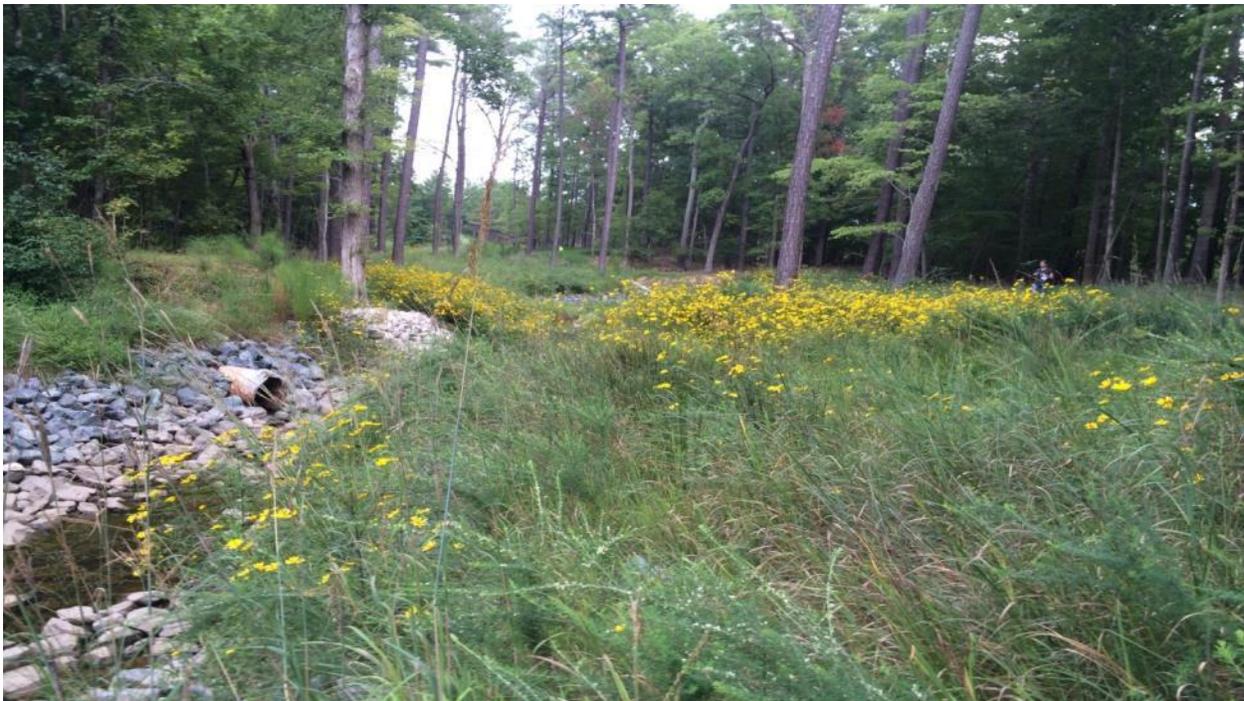
Photograph No. 3
Reach 1 Estes Southwest Corner and RDU Slope
Facing North



Photograph No. 4
Reach 2 Channel at Former NCDOT Sedimentation Pond
Facing East



Photograph No. 5
Reach 2 Channel Upstream of First RDU Confluence
Facing West



Photograph No. 6
End of Reach 2 Channel
Facing East



Photograph No. 7
Beginning of Reach 3 Channel
Facing Southeast



Photograph No. 8
End of Reach 3 Channel
Facing West



Photograph No. 9
View of Vegetation Plot 1
Facing Southwest from Northeast Corner



Photograph No. 10
View of Vegetation Plot 2
Facing Southwest from Northeast Corner



Photograph No. 11
View of Vegetation Plot 3
Facing Southeast from Northwest Corner



Photograph No. 12
View of Vegetation Plot 4
Facing Northeast from Southwest Corner



Photograph No. 13
Reach 3 Slide Repair Area
Facing West

**ATTACHMENT A
 SITE MAP**



**ATTACHMENT B
 VEGETATION MONITORING PLOTS**

Visual Monitoring Report
 Ward Transformer Superfund Site

- B-1 -

9/2/2015
 053-3184D

ATTACHMENT B - VEGETATION MONITORING PLOTS

Table 1: Vegetation Monitoring at the Ward Transformer Site

Plot ID: Plot 1 Reach 1

Date: 9/2/2015

Investigators: Kevin Seaford

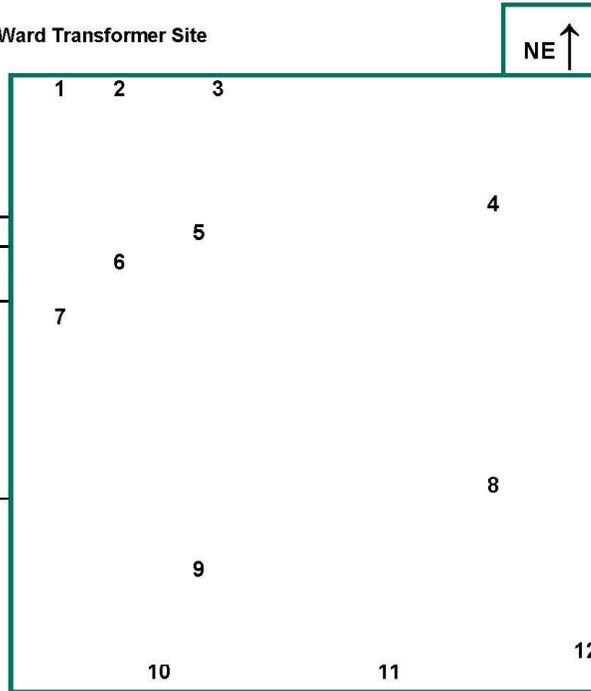
Weather: sunny 91° F

Start: 11:15 AM

Finish: 11:35 PM

Herbaceous Percent Cover: 80

Photo taken from the southwest corner facing northeast.



Planted Trees/Shrubs (Live Stems)



Plot Sketch
 (not to scale)

ID	Species	Common Name	% Cover	
1	<i>Liquidambar styraciflua</i>	sweet gum	1	planted
2	<i>Liquidambar styraciflua</i>	sweet gum	1	planted
3	<i>Sambucus canadensis</i>	American black elderberry	1	planted
4	<i>Betula nigra</i>	river birch	1	planted
5	<i>Salix nigra</i>	black willow	1	volunteer
6	<i>Ulmus Americana</i>	American elm	1	volunteer
7	<i>Betula nigra</i>	river birch	1	volunteer
8	<i>Acer rubrum</i>	red maple	1	volunteer
9	<i>Betula nigra</i>	river birch	1	volunteer
10	<i>Liquidambar styraciflua</i>	sweet gum	1	volunteer
11	<i>Betula nigra</i>	river birch	1	volunteer
12	<i>Liquidambar styraciflua</i>	sweet gum	1	volunteer

Notes: Several recently planted trees were observed, but were dead.



ATTACHMENT B VEGETATION MONITORING PLOTS

Visual Monitoring Report
Ward Transformer Superfund Site

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9/2/2015
053-3184D

ATTACHMENT B - VEGETATION MONITORING PLOTS

Table 1: Vegetation Monitoring at the Ward Transformer Site

Plot ID: Plot 2 Reach 2

Date: 9/2/2015

Investigators: Kevin Seaford

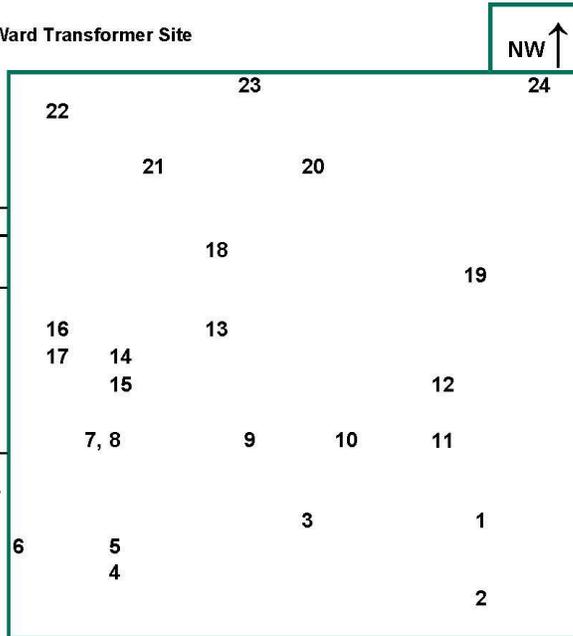
Weather: sunny 94° F

Start: 2:05 PM

Finish: 2:36 PM

Herbaceous Percent Cover: 80

Photo taken from the southeast corner facing northwest.



Planted Trees/Shrubs (Live Stems)

Plot Sketch (not to scale)



ID	Species	Common Name	% Cover	
1	<i>Acer rubrum</i>	red maple	1	planted
2	<i>Fraxinus pennsylvanica</i>	green ash	1	planted
3	<i>Fraxinus pennsylvanica</i>	green ash	1	planted
4	<i>Liquidambar styraciflua</i>	sweet gum	1	volunteer
5	<i>Liquidambar styraciflua</i>	sweet gum	1	volunteer
6	<i>Celtis occidentalis</i>	common hackberry	1	planted
7	<i>Quercus rubra</i>	northern red oak	1	planted
8	<i>Liquidambar styraciflua</i>	sweet gum	1	volunteer
9	<i>Quercus falcata</i>	southern red oak	1	volunteer
10	<i>Fraxinus pennsylvanica</i>	green ash	1	planted
11	<i>Liquidambar styraciflua</i>	sweet gum	1	planted
12	<i>Cercis canadensis</i>	eastern redbud	1	volunteer
13	<i>Pinus taeda</i>	loblolly pine	1	existing
14	<i>Quercus falcata</i>	southern red oak	1	planted
15	<i>Quercus falcata</i>	southern red oak	1	planted
16	<i>Acer rubrum</i>	red maple	1	existing
17	<i>Pinus taeda</i>	loblolly pine	1	volunteer
18	<i>Pinus taeda</i>	loblolly pine	1	volunteer
19	<i>Quercus falcata</i>	southern red oak	1	planted
20	<i>Fraxinus pennsylvanica</i>	green ash	1	planted
21	<i>Liquidambar styraciflua</i>	sweet gum	1	planted
22	<i>Acer rubrum</i>	red maple	1	planted
23	<i>Celtis occidentalis</i>	common hackberry	1	planted
24	<i>Acer rubrum</i>	red maple	1	planted

Notes:



**ATTACHMENT B
 VEGETATION MONITORING PLOTS**

Visual Monitoring Report
 Ward Transformer Superfund Site

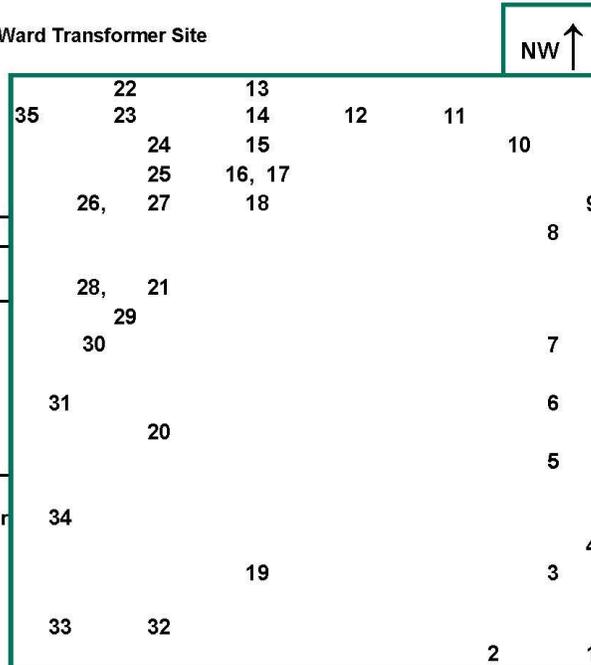
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9/2/2015
 053-3184D

ATTACHMENT B - VEGETATION MONITORING PLOTS

Table 1: Vegetation Monitoring at the Ward Transformer Site

Plot ID: Plot 3 Reach 3
Date: 9/2/2015
Investigators: Kevin Seaford
Weather: sunny 94° F
Start: 1:05 PM
Finish: 1:32 PM
Herbaceous Percent Cover: 80
Photo taken from the southeast corner facing northwest.



Planted Trees/Shrubs (Live Stems)



Plot Sketch
 (not to scale)

ID	Species	Common Name	% Cover	
1	<i>Quercus falcata</i>	southern red oak	1	volunteer
2	<i>Liquidambar styraciflua</i>	sweet gum	1	volunteer
3	<i>Quercus rubra</i>	northern red oak	1	planted
4	<i>Baccharis halimifolia</i>	eastern baccharis	1	volunteer
5	<i>Liquidambar styraciflua</i>	sweet gum	1	volunteer
6	<i>Liriodendron tulipifera</i>	tulip poplar	1	volunteer
7	<i>Quercus rubra</i>	northern red oak	1	planted
8	<i>Liquidambar styraciflua</i>	sweet gum	1	volunteer
9	<i>Pinus taeda</i>	loblolly pine	1	volunteer
10	<i>Baccharis halimifolia</i>	eastern baccharis	1	volunteer
11	<i>Quercus rubra</i>	northern red oak	1	volunteer
12	<i>Liquidambar styraciflua</i>	sweet gum	1	volunteer
13	<i>Quercus rubra</i>	northern red oak	1	volunteer
14	<i>Liriodendron tulipifera</i>	tulip poplar	1	volunteer
15	<i>Liriodendron tulipifera</i>	tulip poplar	1	volunteer
16	<i>Liquidambar styraciflua</i>	sweet gum	1	planted
17	<i>Liquidambar styraciflua</i>	sweet gum	1	volunteer
18	<i>Liriodendron tulipifera</i>	tulip poplar	1	volunteer
19	<i>Quercus rubra</i>	northern red oak	1	volunteer
20	<i>Quercus rubra</i>	northern red oak	1	planted
21	<i>Liriodendron tulipifera</i>	tulip poplar	1	volunteer
22	<i>Quercus rubra</i>	northern red oak	1	planted
23	<i>Acer rubrum</i>	red maple	1	planted

\\ATL1-S-FS1-VM\Golder\Atlanta\Clients\Ward Transformer\WARD 053-3184D Reach A Monitoring\300 Field Information\318 Sept 2015 Monitoring\Veg-Ward-2015-09-02



**ATTACHMENT B
 VEGETATION MONITORING PLOTS**

Visual Monitoring Report
 Ward Transformer Superfund Site

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9/2/2015
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24	<i>Platanus occidentalis</i>	American sycamore	1	volunteer
25	<i>Liriodendron tulipifera</i>	tulip poplar	1	volunteer
26	<i>Liquidambar styraciflua</i>	sweet gum	1	planted
27	<i>Liriodendron tulipifera</i>	tulip poplar	1	volunteer
28	<i>Ulmus rubra</i>	slippery elm	1	volunteer
29	<i>Baccharis halimifolia</i>	eastern baccharis	1	volunteer
30	<i>Liquidambar styraciflua</i>	sweet gum	1	volunteer
31	<i>Liquidambar styraciflua</i>	sweet gum	1	volunteer
32	<i>Liquidambar styraciflua</i>	sweet gum	1	planted
33	<i>Acer rubrum</i>	red maple	1	planted
34	<i>Acer rubrum</i>	red maple	1	planted
35	<i>Cornus amomum</i>	silky dogwood	1	planted

Notes:

**ATTACHMENT B
 VEGETATION MONITORING PLOTS**

Visual Monitoring Report
 Ward Transformer Superfund Site

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9/2/2015
 053-3184D

ATTACHMENT B - VEGETATION MONITORING PLOTS

Table 1: Vegetation Monitoring at the Ward Transformer Site

Plot ID: Plot 4 Reach 1	182	175	172
Date: 9/2/2015	180-181, 176	174	173
Investigators: Kevin Seaford	156 157	158 159	161-162 163-164 166-168 169-171
Weather: sunny 90° F	152	150	125-134
Start: 10:15 am	153	149	124
Finish: 10:54 am	151	135-148	
Herbaceous Percent Cover: 95	88 89	91, 93	105-123
Photo taken from the southeast corner facing northwest.	87 86	92	104
	81, 82, 56		
	83, 54, 55, 81, 78-80, 77	76	65
	43-53	69-75	68
	40, 41, 42	57	61, 60
	6-19 20-39		59
	2	62-64	58
	1, 3-5		



Planted Trees/Shrubs (Live Stems)



Plot Sketch
 (not to scale)

ID	Species	Common Name	% Cover	
1	<i>Ulmus americana</i>	American elm	1	planted
2	<i>Baccharis halimifolia</i>	eastern baccharis	1	volunteer
3-5	<i>Salix nigra</i>	black willow	1	volunteer
6-19	<i>Liquidambar styraciflua</i>	sweet gum	1	volunteer
20-40	<i>Pinus taeda</i>	loblolly pine	1	volunteer
41	<i>Morella cerifera</i>	wax myrtle	1	volunteer
42-43	<i>Pinus taeda</i>	loblolly pine	1	volunteer
44-53	<i>Pinus taeda</i>	loblolly pine	1	volunteer
54	<i>Sambucus canadensis</i>	American black elderberry	1	volunteer
55	<i>Salix nigra</i>	black willow	1	volunteer
56	<i>Sambucus canadensis</i>	American black elderberry	1	volunteer
57	<i>Ulmus americana</i>	American elm	1	planted
58-60	<i>Pinus taeda</i>	loblolly pine	1	volunteer
61	<i>Acer rubrum</i>	red maple	1	planted
62-64	<i>Pinus taeda</i>	loblolly pine	1	volunteer
65	<i>Liquidambar styraciflua</i>	sweet gum	1	planted
66-75	<i>Pinus taeda</i>	loblolly pine	1	volunteer
76	<i>Acer rubrum</i>	red maple	1	planted
77	<i>Ulmus americana</i>	American elm	1	planted
78-80	<i>Pinus taeda</i>	loblolly pine	1	volunteer
81	<i>Cornus amomum</i>	silky dogwood	1	planted
82	<i>Liquidambar styraciflua</i>	sweet gum	1	planted
83	<i>Salix nigra</i>	black willow	1	planted
84	<i>Sambucus canadensis</i>	American black elderberry	1	planted
85	<i>Liquidambar styraciflua</i>	sweet gum	1	planted

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**ATTACHMENT B
 VEGETATION MONITORING PLOTS**

Visual Monitoring Report
 Ward Transformer Superfund Site

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9/2/2015
 053-3184D

86-87	<i>Salix nigra</i>	black willow	1	volunteer
88	<i>Fraxinus pennsylvanica</i>	green ash	1	planted
89-90	<i>Acer rubrum</i>	red maple	1	planted
91	<i>Sambucus canadensis</i>	American black elderberry	1	planted
92	<i>Cornus amomum</i>	silky dogwood	1	planted
93	<i>Acer rubrum</i>	red maple	1	planted
94	<i>Ulmus americana</i>	American elm	1	volunteer
95-103	<i>Pinus taeda</i>	loblolly pine	1	volunteer
104	<i>Acer rubrum</i>	red maple	1	volunteer
105-123	<i>Pinus taeda</i>	loblolly pine	1	volunteer
124	<i>Betula nigra</i>	river birch	1	volunteer
125-148	<i>Pinus taeda</i>	loblolly pine	1	volunteer
149	<i>Acer rubrum</i>	red maple	1	volunteer
150	<i>Salix nigra</i>	black willow	1	volunteer
151	<i>Liquidambar styraciflua</i>	sweet gum	1	volunteer
152	<i>Fraxinus pennsylvanica</i>	green ash	1	planted
153-155	<i>Salix nigra</i>	black willow	1	volunteer
156	<i>Salix nigra</i>	black willow	1	planted
157	<i>Betula nigra</i>	river birch	1	planted
158	<i>Salix nigra</i>	black willow	1	volunteer
159	<i>Acer rubrum</i>	red maple	1	planted
160	<i>Liquidambar styraciflua</i>	sweet gum	1	volunteer
161-162	<i>Salix nigra</i>	black willow	1	volunteer
163-164	<i>Liquidambar styraciflua</i>	sweet gum	1	volunteer
165	<i>Ulmus americana</i>	American elm	1	planted
166-168	<i>Pinus taeda</i>	loblolly pine	1	volunteer
169-171	<i>Liquidambar styraciflua</i>	sweet gum	1	volunteer
172	<i>Acer rubrum</i>	red maple	1	planted
173	<i>Paulownia tomentosa</i>	princesstree	1	volunteer
174-175	<i>Diospyros virginiana</i>	persimmon	1	planted
176	<i>Salix nigra</i>	black willow	1	volunteer
177-179	<i>Morella cerifera</i>	wax myrtle	1	volunteer
180-181	<i>Liquidambar styraciflua</i>	sweet gum	1	volunteer
182	<i>Ulmus americana</i>	American elm	1	volunteer

Notes:

**ATTACHMENT 6
OCTOBER 2015 MAINTENANCE MONITORING REPORT**

Figure 2: Reach 2 Maintenance

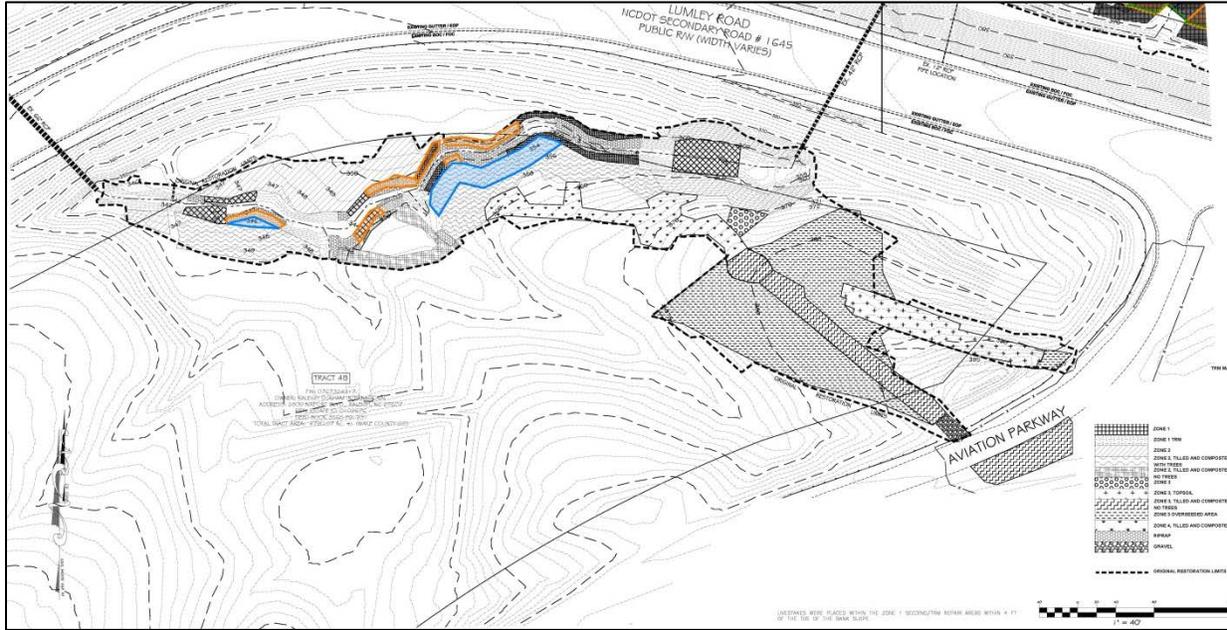


Figure 3: Reach 3 Maintenance



Photographs were taken at each reach, as shown on Photographs Nos. 1 to 3. Photograph locations are shown in Figure 4.



Photograph No. 1
Mowing and Overseeding at Reach 1 Slope
Facing Northeast



Photograph No. 2
Reach 2 Hydroseeding
Facing West



Photograph No. 3
Reach 3 Hydroseeding
Facing South

**ATTACHMENT 7
DECEMBER 2015 MAINTENANCE MONITORING REPORT**

REACHES 1 TO 3 MAINTENANCE MONITORING REPORT

PROJECT NAME: WARD TRANSFORMER SUPERFUND SITE, RALEIGH, NC.

PROJECT NUMBER: 053-3184D

DATE: 12/14/2015

WEATHER: Cloudy, 65°F, Calm

GOLDER PERSONNEL: Ben Draper

OTHER PERSONNEL: Seneca Landscapes

OVERSIGHT: None

HEALTH AND SAFETY ISSUES: None

NOTES: Golder personnel documented the Reaches 1 to 3 reconstruction maintenance conducted by Seneca Landscapes on December 14, 2015. The December maintenance activities included the planting of trees in various parts of Reaches 1 to 3, as shown in Figures Nos. 1 to 3, with the following colors signifying the type of tree species:

- Blue: Zone 2
- Green: Zone 3-4

Figure 1: Reach 1

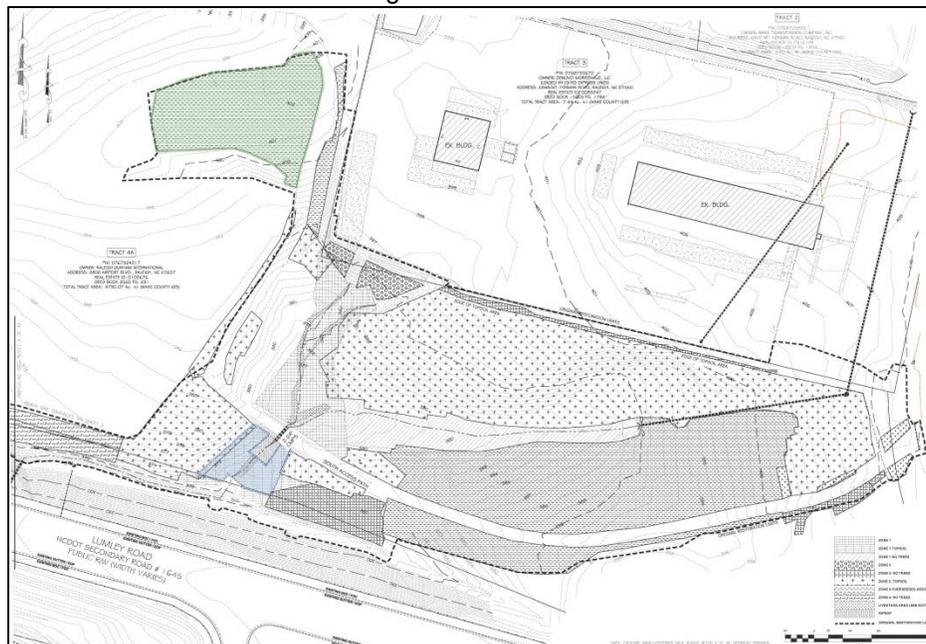


Figure 2: Reach 2

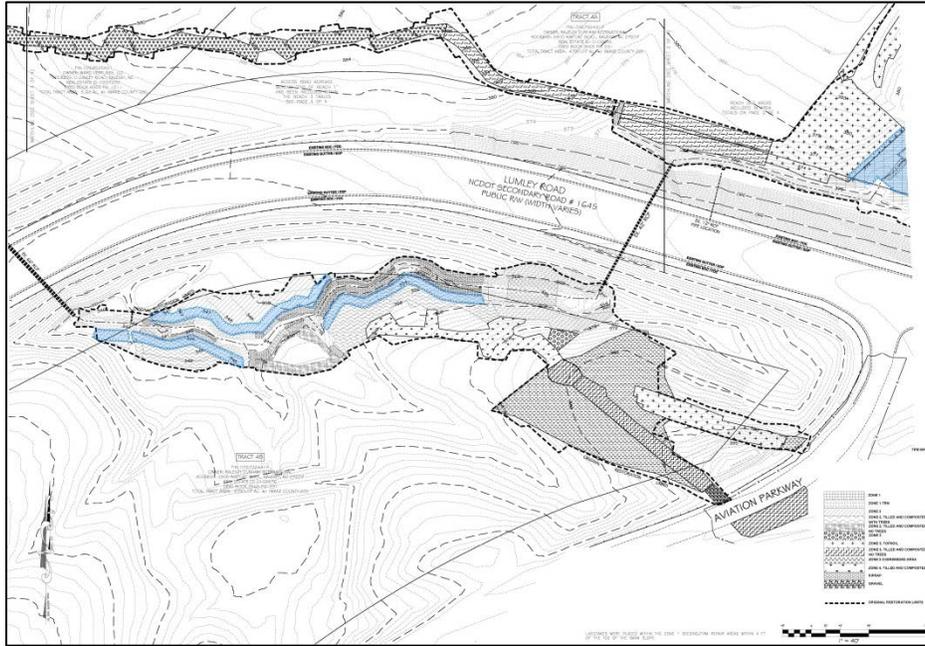


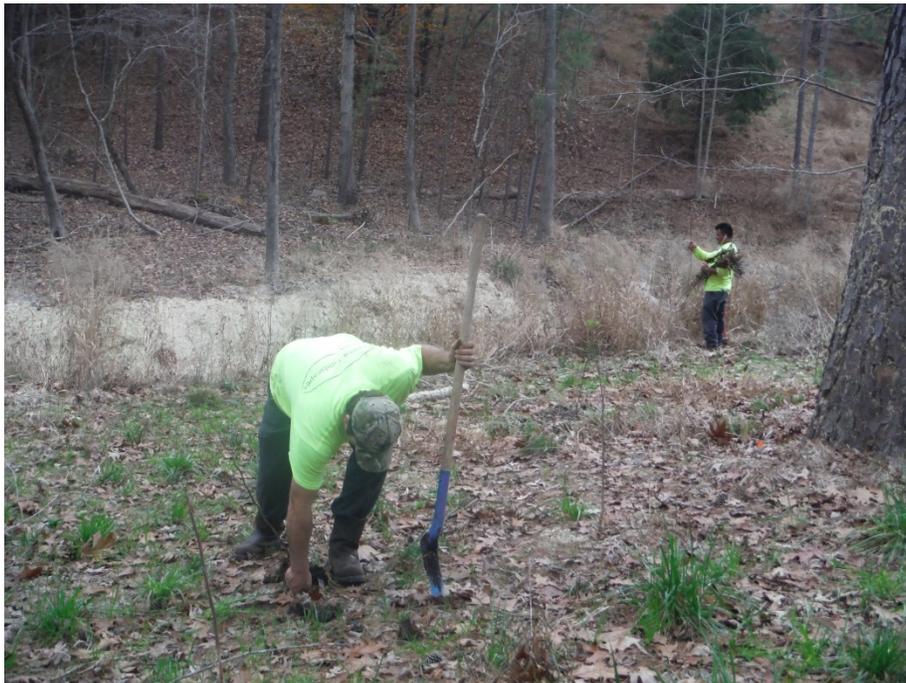
Figure 3: Reach 3 Maintenance



Photographs Nos. 1 to 3 show tree-planting activities at each reach.



Photograph No. 1
Trees Planted in Former Laydown Area West of Estes Trucking Facility.



Photograph No. 2
Tree Planting Activities in Reach 2



Photograph No. 3
Trees Planted in Reach 3

As a follow-up, additional photographs were taken of various areas that were over-seeded in October 2015, as shown on Photograph Nos. 4 to 6.



Photograph No. 4
Follow-up on Mowing and Overseeding at Reach 1
Facing Northeast



Photograph No. 5
Follow-up Reach 2 Hydroseeding
Facing West



Photograph No. 6
Follow-up Reach 3 Hydroseeding
Facing South