ARCADIS Design & Consultancy for natural and built assets

Mr. William Bennett – Project Manager
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Subject:
Annual Site Restoration Monitoring Summary – 2018
Ramapo Paint Sludge Site – Operable Unit 2 (OU-2)
Ramapo, Rockland County, New York
Site No. 344065

ENVIRONMENT

Date:
April 3, 2019

Contact:
Jon Rocklin

Phone:
201.797.7400

Email:
Jon.rocklin@arcadis.com

Our ref:
NJ000602.0004

Dear Mr. Bennett:

Arcadis of New York Inc. (Arcadis), on behalf of Ford Motor Company (Ford), is submitting the 2018 Annual Restoration Monitoring Report for Operable Unit 2 (OU-2) of the Ramapo Paint Sludge Site located in the Town of Ramapo, Rockland County, New York.

The Torne Valley Road Area, designated as OU-2, was subject to a Remedial Action consisting of excavation, removal and off-site transportation and disposal of paint sludge and impacted soils in accordance with the New York State Department of Environmental Conservation (NYSDEC) approved Final RD dated July 2015. Following removal and off-site transportation of the paint sludge and impacted soils, the site was backfilled with clean imported fill material and restored in accordance with the NYSDEC approved Site Restoration Plan (SRP) dated February 2016.

The attached Annual Restoration Monitoring Reports have been prepared by Amy S. Green Environmental Consultants, Inc. (ASGCEI) to document to the NYSDEC the following:

- The woody and herbaceous plant species composition within the restoration area following the 2018 growing seasons; and,
- The routine maintenance and monitoring activities that were/will be conducted at OU-2 for the duration of the restoration monitoring program.

Should you have any additional questions or concerns related to the restoration monitoring program, please feel free to contact me at any time.

Sincerely,

ARCADIS U.S., Inc.

Jon Rocklin
Project Manager

Copies:
M. Zakkar (Ford)
C. Berardi Tuohy (Arcadis)
T. Dzurinko (TOR)

Enclosures:
ASGECI “Third Annual Restoration Monitoring Report (2018)”

2018 ANNUAL
RESTORATION MONITORING REPORT

For The

Ford Motor Company Site: Operable Unit 2 Remediation Project
Ramapo, Rockland County, New York, Site No. 3-44-065

December 2018

PREPARED FOR:

ARCADIS US Inc.
17-17 Route 208 North
Fair Lawn, NJ 07410

PREPARED BY:

AMY S. GREENE ENVIRONMENTAL
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ASGECI Project # 3437b

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1.0 INTRODUCTION

On behalf of Ford Motor Company (Ford) and ARCADIS U.S., Inc. (ARCADIS), Amy S. Greene Environmental Consultants, Inc. (ASGECI) has prepared this third Annual Restoration Monitoring Report (2018) for Torne Valley Road Area designated as Operable Unit 2 (OU-2) of the Ramapo Paint Sludge Site, located in the Town of Ramapo, Rockland County, New York (the Site).

Annual restoration monitoring is being implemented at OU-2 in accordance with the New York State Department of Environmental Conservation (NYSDEC) approved Site Restoration Plan (SRP) dated February 11, 2016 (Appendix A). A remedial action consisting of targeted removal and disposal of paint sludge with embankment excavation was performed at the Site during 2015 in accordance with the Record of Decision (ROD) issued by the New York State Department of Environmental Conservation (NYSDEC), dated March 2014. This Annual Restoration Monitoring Report is the third of five annual monitoring reports planned for the OU-2 Project. The purpose of this report is to:

- Quantify and document woody and herbaceous plant species composition within the restoration area; and,

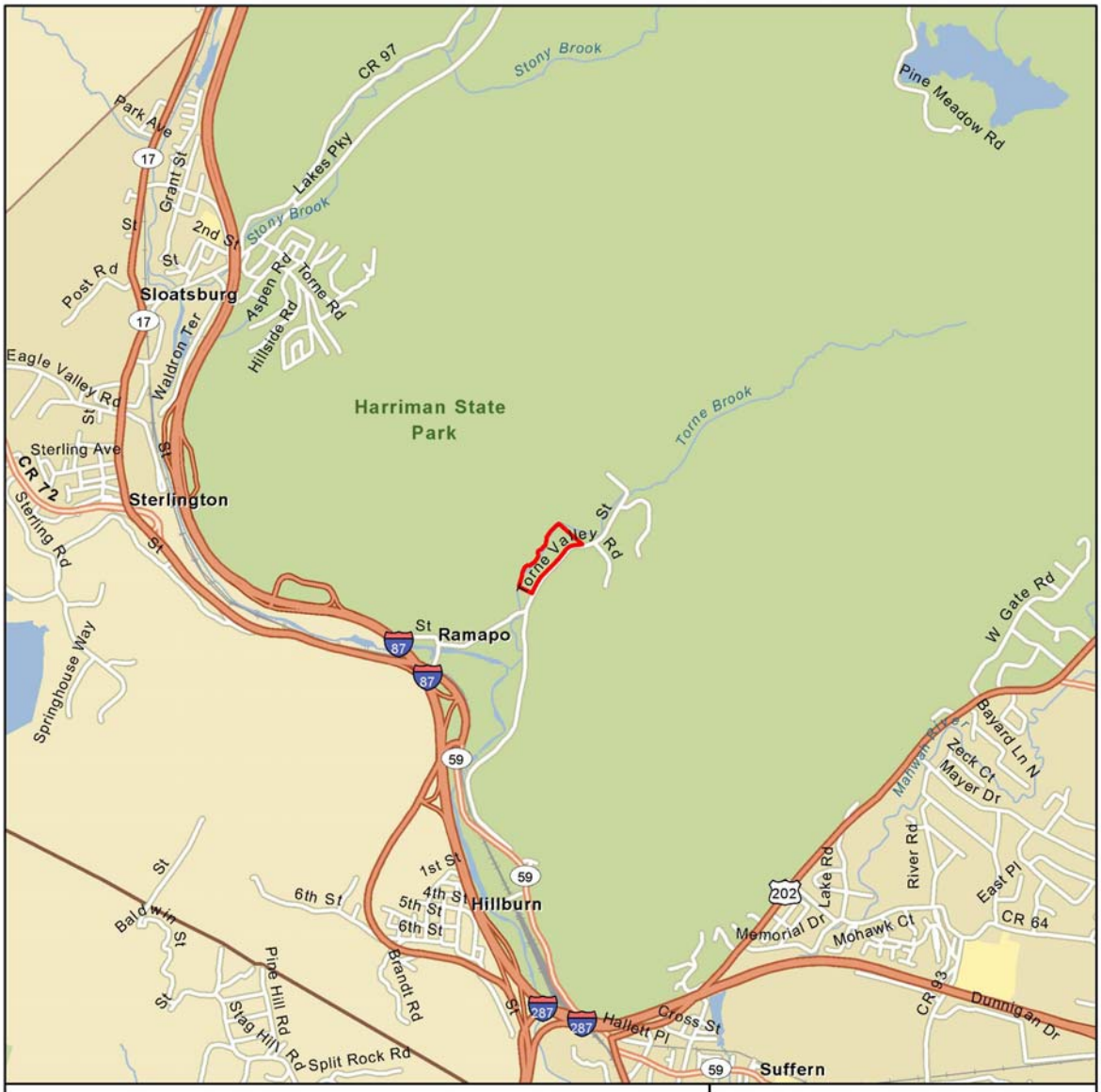
- Discuss routine maintenance & monitoring activities that have been conducted at the Site as of the date of this report.

1.1 Site Description and History

The Site includes valley side and river flat areas and extends along the bottom of Torne Valley in a north/south direction. OU-2 is generally bound to the west by the Ramapo River and Torne Brook; to the north by Harriman State Park and a Consolidated-Edison Substation; to the east by Harriman State Park and Torne Valley Road; and to the south by Sloatsburg Road/State Route 59.

The majority of OU-2 (approximately 15.4 acres) is located west of Torne Valley Road (OU-2 North) with an additional area (approximately 0.7 acres) located east of Torne Valley Road (OU-2 South), approximately 3,765 feet south of OU-2 North.

OU-2 is comprised of natural lands and includes upland forests, maintained accessways, and riparian corridors along Torne Brook. Torne Brook flows to the Ramapo River, which flows to the Pompton River, part of the Passaic River Drainage System. The project area is also adjacent to the nearby Harriman State Park, which is owned and operated by the NYSDEC.



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Project Area

N
W E
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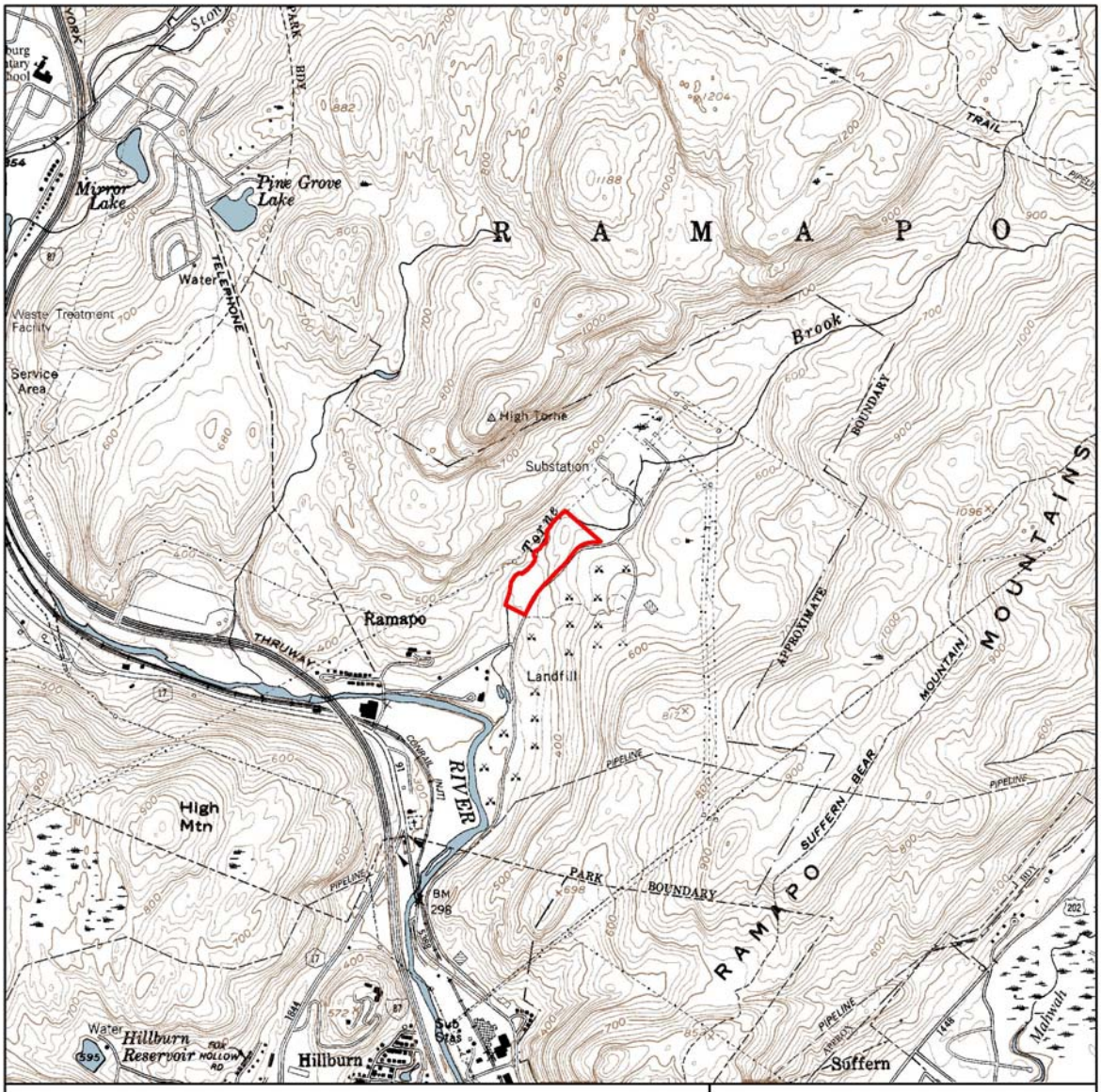
Figure 1
Site Location Map

Ford Motor Company Site
Operable Unit 2 Project
Town of Ramapo
Rockland County, New York

ASGECI Project # 3437 B

3,000 Feet

AMY S. GREENE ENVIRONMENTAL CONSULTANTS



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Project Area

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Figure 2
USGS Topographic Map

Ford Motor Company Site
Operable Unit 2 Project
Town of Ramapo
Rockland County, New York

ASGECI Project # 3437 B

2,000 Feet

AMY S. GREENE ENVIRONMENTAL CONSULTANTS

1.2 Project Description

The Remedial Action consisted of excavation, removal, transportation and disposal of paint sludge and impacted soil as outlined in the Final Remedial Design approved by the NYSDEC in July 2015. The total area disturbed during the execution of the Remedial Design is approximately 12.67 acres. Of this, only 0.31 acres is located within OU-2 South. All areas of disturbance can be viewed in the As-Built Monitoring Plan (Appendix B).

A total of 56,537 tons of impacted soil and paint sludge were excavated, removed, and disposed of at the approved off-site disposal facilities. A total of 19,990 tons of general clean fill was imported to backfill the excavation areas. The general backfill was sourced from the Braen Van Orden Pit located in Ringwood, New Jersey. The analytical and geotechnical parameters for the approved fill material are provided in Appendix C.

The Site topography was generally restored to pre-existing elevations and graded to drain towards Torne Brook. Site stabilization also occurred as particular areas were remediated, concurrent with final grading. A total of 32,200 cubic yards of topsoil was imported from RER Supply located in Wantage, New Jersey for use in restoring the Site to original grade. The analytical parameters for the approved topsoil are provided in Appendix C**.** Following placement of topsoil, the disturbed area was hydroseeded with annual rye grass and straw.

1.3 Site Restoration Summary

Remediation of the project area resulted in the temporary disturbance of 11.63 acres of upland forest, approximately 550 linear feet of streambank as well as 0.94 acres of upland meadow. The project area was planted to restore vegetative communities within six months after the disturbances occur. The area was restored with the following communities:

- 10.12 acres of upland forest
- 0.10 acres streambank areas
- 2.13 acres upland meadow
- 0.32 acres gravel access areas

The project area was planted entirely with native species, similar to those that will be removed as a result of the remediation process. Plants were installed in a random pattern, with groups of similar species clustered together. All of the selected species are native plants that will require no maintenance once established. The plant diversity should, as the Site matures, improve the value of the Site to a variety of wildlife.

The seeding of the disturbed project area with the herbaceous seed mix may be performed at any time after remediation. Planting, seeding, fertilizing, and stabilization will be performed according to the specifications prepared specifically for this project.

1.3.1 Upland Meadow

A total of 2.13 acres of upland meadows were restored in areas along Torne Valley Road. All upland meadow areas were permanently stabilized by seeding with a warm season grass mixture, including little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*), switchgrass (*Panicum virgatum*), oats (*Avena sativa*), Virginia wild rye (*Elymus virginicus*), annual ryegrass (*Lolium multiflorum*), smooth aster (*Aster laevis*), black-eyed Susan (*Rudbeckia hirta*), purple coneflower (*Echinacea purpurea*), wild bergamot (*Monarda fistulosa*), and lance-leaved coreopsis (*Coreopsis lanceolata*). All permanent seeding and stabilization was completed in accordance with the SRP dated March 2016.

1.3.2 Upland Forest Areas

10.12 acres of upland forest habitat was restored in accordance with the SRP. All disturbed upland forests were planted with a combination of containerized plant materials. Trees and shrubs were planted at approximately 20-foot on-center. Tree and shrub species including northern red oak (*Quercus rubra*), sugar maple (*Acer saccharum*), white ash (*Fraxinus americana*), sweet birch (*Betula lenta*), American sycamore (*Platanus occidentalus*), tulip poplar (*Liriodendron tulipifera),* black chokeberry (*Aronia melanocarpa*), eastern red cedar (*Juniperus virginica*), Virginia rose (*Rosa virginiana*), witch hazel (*Hamamelis virginiana*), and southern arrowwood (*Viburnum dentatum*) were installed within the upland areas. All upland areas were stabilized by seeding with a warm season grass mixture including little bluestem, big bluestem, Indian grass, switchgrass, oats, Virginia wild rye, annual ryegrass, smooth aster, black-eyed Susan, purple coneflower, wild bergamot, and lance-leaved coreopsis.

Within the upland forest restoration area, steep slopes were identified and received additional seeding and stabilization measures. All slopes 25-pecent (4:1 slope) or steeper were stabilized with the temporary stabilization seed mixture in addition to the upland forest seed mix. The steep slope areas were also stabilized with high performance biodegradable erosion control matting. All permanent seeding, stabilization, and plantings were completed in accordance with the SRP.

1.3.3 Streambank Stabilization Area

The streambank stabilization area can be described as all areas within 3 feet horizontally from the mean high water mark of Torne Brook. Therefore, the width of the streambank stabilization will vary depending on proposed disturbance and slopes. Streambank stabilization areas restored included 0.03 acres located along approximately 550 linear feet of the southern bank of Torne Brook. As needed, streambank areas were stabilized by adding natural stone at the toe-of-slope within Torne Brook. All areas above the toe-of-slope and normal water levels were restored utilizing only soil, vegetation, and other bioengineering devices. All disturbed riverbank areas were planted with a combination of live stakes and containerized plant materials. Live stakes were planted in a staggered fashion along the riverbank at approximately one-foot on-center to provide instant protection from scour and erosion. Containerized shrubs were planted at four-foot on-center in streambank areas that are more than two feet above bank full. Additionally, containerized trees were planted at ten-foot on-center. Tree and shrub species such as black willow (*Salix nigra*), silky dogwood (*Cornus amomum)*, elderberry (*Sambucus canadensis*), and witch hazel were installed within the streambank stabilization areas.

All stream bank stabilization areas were stabilized by seeding a native grass mixture including little bluestem, Indian grass, switchgrass, Virginia wild rye, annual ryegrass, fox sedge (*Carex vulpinoides*), soft rush (*Juncus effusus*), path rush (*Juncus tenuis*), swamp sunflower (*Helianthus angustifolius*), joe-pye-weed (*Eupatorium fistulosum),* boneset (*Eupatorium perfoliatum*), narrow-leaved goldenrod (*Euthamia graminifolia*), Canada goldenrod (*Solidago canadensis*), and wild bergamot. The streambank areas also received the temporary stabilization mixtures to insure stabilization. All permanent seeding, stabilization, and plantings were completed in accordance with the SRP.

2.0 MONITORING PROGRAM

In accordance with the NYSDEC approved Site Remediation Plan (SRP), the Site will be monitored for five growing seasons following the completion of the planting/seeding within the restored project area. Monitoring will be used to determine if the requirements of the approved SRP have been met and if additional maintenance and monitoring is necessary to meet the goals of the project. Monitoring commenced in the fall of 2016 and will continue until 2020.

During the monitoring period, planted species and any additional "volunteer" species are identified. The average percent coverage of vegetation is estimated and noted for the annual and final reports. Permanent sampling station locations and photograph locations were established onsite in order to illustrate the relative success of the project and annual changes in vegetative cover. The monitoring protocol utilized is adapted from Peet et al. (1998) and is briefly discussed under Section 3 below.

Invasive weed species are evaluated and monitored. The overall health and vigor of the plantings are evaluated. Herbivory is evaluated, to determine if it is resulting in plant mortality. In addition, any maintenance activities (such as hand weeding, application of a pesticide or other approved method for the removal of invasive/noxious species in the restoration Site) are identified.

This annual monitoring report has been prepared in accordance with the approved SRP. A comprehensive, final report that summarizes the results and success of the restoration project will be prepared after the final site visit in the fall of the fifth (5^{th}) year.

3.0 VEGETATION

Vegetation monitoring following the 2018 growing season was conducted on October 12, 2018. Vegetative success criteria was evaluated by systematic sampling within the riparian restoration area. Permanent vegetation plots were established within the restoration area in 2016 (quantity 6). Plot locations are indicated on the “Restoration Monitoring Plan” included in Appendix B.

Representative photographs of the plot locations are presented in Appendix D. Photographs are useful in documenting the change and establishment of a restoration project throughout the monitoring period.

The corners of the vegetation sampling plots were also staked in the field. The sampling methodology for inventory plots is discussed in detail by Peet et al. (1998). Generally, each plot consists of a 2 by 3 array of modules, each module being 10 meters long by 10 meters wide. A 2 x 5 module array is the recommended size for description of forest communities; however, smaller arrays may be used in areas with homogeneous overstory vegetation or dense understory. The smaller 2 by 3 module array is suitable for sampling this project area, due to its size and relatively homogenous cover. The standard observation unit used was a 20 by 30 meter plot. Within each array, woody stem presence, cover, diameter, and height was recorded. Depending on coverage of herbs and bryophytes (i.e., mosses), these strata were sampled using a subset of modules or nested quadrats within modules. Plot and site data was recorded for each array including soil morphology, aspect, slope, elevation, topographic position, and total estimated cover of the vegetative strata (trees, saplings, shrubs, herbs, vines, and bryophytes).

Estimates of woody stem density, woody stem height, and herbaceous cover were obtained for each planted and naturally regenerating species. In addition, a complete count of all planted trees was performed to determine tree planting success. Field data sheets can be viewed in Appendix E.

3.1 Results of Vegetation Monitoring

Average density of planted species is estimated to be 155 trees and shrubs per acre (see Table 1 below). Some naturally-regenerating species were identified within the sample plots, including sycamore (*Platanus occidentalis*), cottonwood (*Populus deltoides*), and invasive species such as multiflora rose.

Table 1: Average Density and Average Height for Planted and Naturally Regenerating Woody Plants Following the 2018 Growing Season

Common Name	Scientific Name	Average Density (stems/acre)	Average Height (feet)
Red Maple	*Acer rubrum*	5.9	9.1
River Birch	*Betula nigra*	8.2	8.6
Silver Maple	*Acer saccharinum*	1.2	6.5
American Sycamore	*Platanus occidentalis*	23.5	7.4
Eastern Cottonwood	*Populus deltoides*	16.5	8.5
Black Cherry	*Prunus serotina*	2.4	2.5
Black Chokeberry	*Aronia melanacarpa*	3.5	3.5
Eastern Red Cedar	*Juniperus virginiana*	7.1	3.8
Tulip Poplar	*Liriodendron tulipifera*	3.5	5.8
Red Oak	*Quercus rubra*	14.1	9.1
White Pine	*Pinus strobus*	8.2	8.5
Hackberry	*Celtis occidentalis*	2.4	8.5
Box Elder	*Acer negundo*	4.7	7.5
Multiflora Rose	*Rosa multiflora*	4.7	2.8
Black Willow	*Salix nigra*	16.5	3.3
Pussy Willow	*Salix discolor*	5.9	2.5
Silky Dogwood	*Cornus amomum*	15.3	2.9
Serviceberry	*Amelanchier canadensis*	4.7	7.0
Sugar Maple	*Acer saccharum*	1.2	8.5
Gray Birch	*Betula populifolia*	5.9	8.5
Wineberry	*Rubus phoenicolasius*	1.2	2.5
Witchhazel	*Hamemalis virginiana*	1.2	7.5
White Ash	*Fraxinus americana*	3.5	13.2
Summary		**Average Density (stems/acre)**	**Average Height (feet)**
Total All Species		161.2	6.4
Total Planted Species		155.3	6.8
Total Naturally Regenerating Species		5.9	2.6

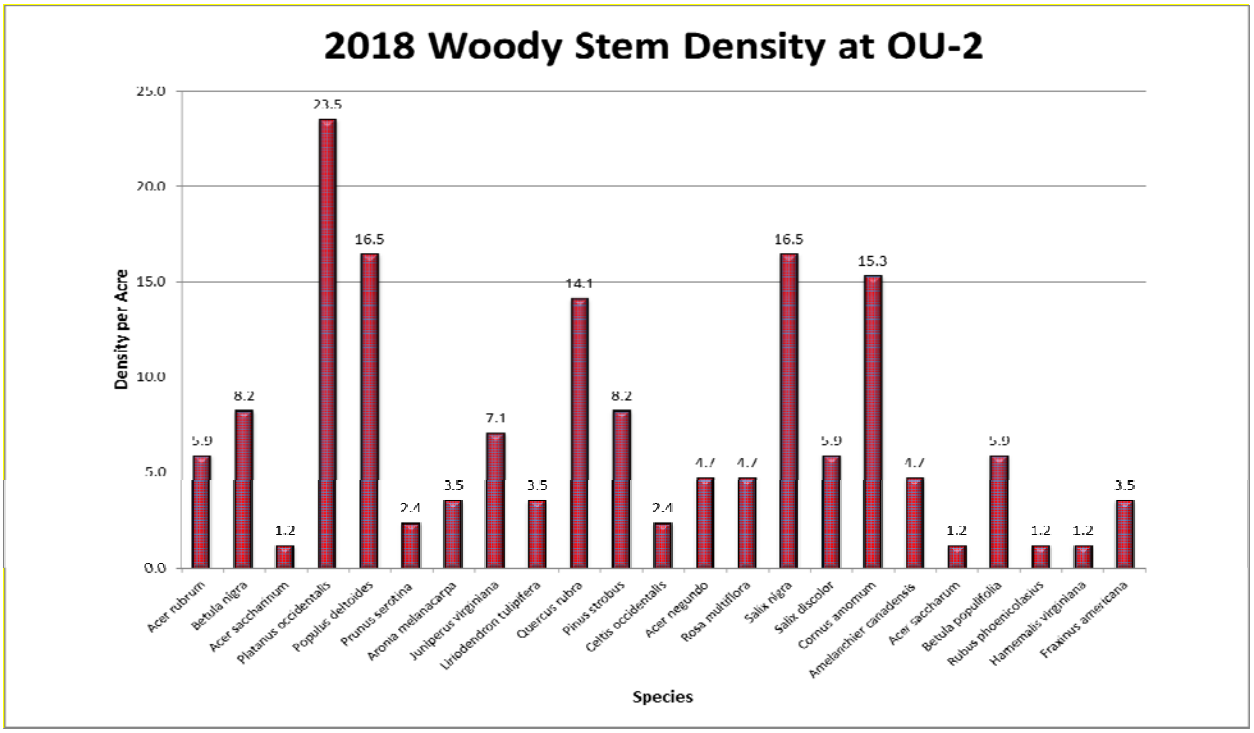

FIGURE 3: *Average woody stem density for all species recorded within monitoring plots at the OU-2 Restoration following the 2017 growing season.*

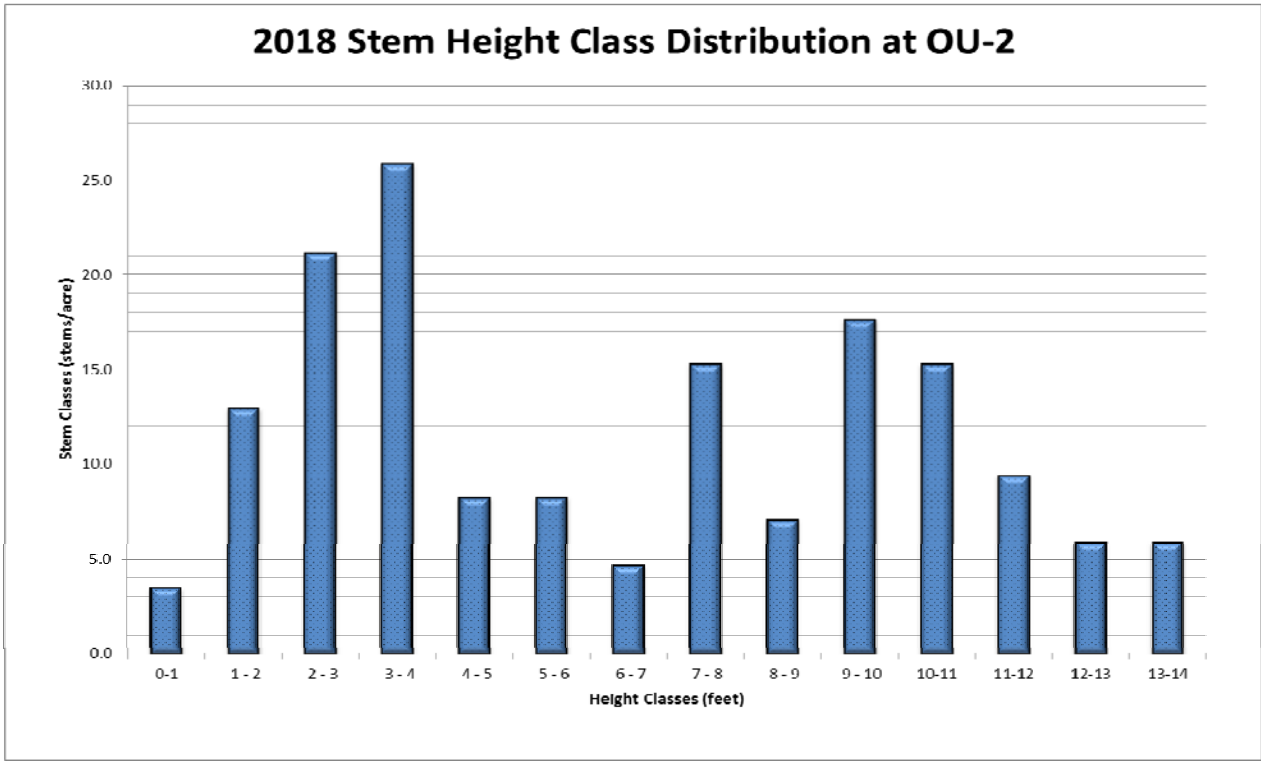

FIGURE 4: *Woody stem height class distribution for planted species within the OU-2 restoration area following the 2017 growing season.*

Overall woody species diversity is excellent. Over 20 species of desirable species are present within the Site. Distribution of these species is fairly equal, with only a few species extending more than 10 stems per acre. Sycamore has established as the most prevalent tree species, while cottonwood and red oak (*Quercus rubrum*) also are readily found.

Planted tree and shrub density for individual species ranged from approximately 1 to 24 stems per acre (see Table 1 and Figure 3 above). Shrub establishment and growth is minimal, except for the stream embankment area where black willow (*Salix nigra*), pussy willow (*Salix discolor*) and silky dogwood (*Cornus amomum*) are present from the establishment of live stakes. Shrub establishment has been undoubtedly hindered by the presence of deers.

Average height class of planted species sampled within the monitoring plots during 2018 was estimated at 6.8 feet, increasing slightly from the previous monitoring event. Individual species ranged from 2 foot saplings to trees over 14 feet tall. The most abundant stem class was in the 3-4 foot range due to the presence of live stakes. Putting those live stakes aside, the highest number of trees and shrubs fell within the 9 to 10 feet average height classes. A majority of the planted species have average heights greater than 6 feet. Comparing the collected data from previous years, it is evident that the trees throughout the Site are thriving and growing.

Table 2: 2018 Estimated Herbaceous Cover

Common Name	Scientific Name	Average Cover (%)
Switchgrass	*Panicum virgatum*	27.50
Indiangrass	*Sorghastrum nutans*	14.83
Wild Bergamot	*Monarda fistulosa*	11.33
Black-Eyed Susan	*Rudbeckia hirta*	10.83
Virginia Wild Rye	*Elymus virginicus*	4.50
Mugwort	*Artemesia vulgaris*	4.33
Barnyard Grass	*Echinochloa crus-galli*	4.17
Japanese Hops	*Humulus japonicus*	4.17
Fall Panicum	*Panicum dichotomiflorum*	3.17
Lance-Leaved Coreopsis	*Coreopsis lanceolata*	3.00
Calico Aster	*Symphyotrichum lateriflorum*	2.67
Fireweed	*Erechtites hieraciifolius*	2.00
Tickseed Sunflower	*Bidens sp.*	1.67
Little Bluestem	*Schizachryium scoparium*	0.83
New England Aster	*Symphyotrichum novae-angliae*	0.83
Evening Primrose	*Oenthothera biennis*	0.67
Pennsylvania Smartweed	*Polygonum pennsylvanica*	0.33
Yellow Foxtail	*Setaria pumila*	0.33
Common Cockleburr	*Xanthium stumarium*	0.33
Swamp Sunflower	*Helianthus angustifolius*	0.33
Narrow-Leaved Goldenrod	*Euthamia graminifolia*	0.33
Common Mullein	*Verbascum thapsus*	0.33
Giant Dandelion	*Tragopogon dubius*	0.00
2018 Totals		**98.50**

Herbaceous coverage within the 2018 growing season continued to excel as the designed seed mix continues to establish and thicken. Since native grass mixtures often take 2-3 years to establish, the full establishment of the design mixture has likely matured. The original designed native herbaceous seed mixture was applied to the Site in 2016 as specified on the Restoration Notes and Detailed Plan (Appendix B). Overall coverage, including native plantings and volunteer species, was again estimated at 98-percent (see Table 2 above). Switchgrass (*Panicum virgatum*), and indiangrass (*Sorghastrum nutans*) are the dominant species, as can be determined by qualitative and visual assessments of the Site. Wildflowers such as black-eyed Susan (*Rudbeckia hirta*), and wild bergamot (*Monarda fistulosa*) are also prevalent throughout the herbaceous layer. Several other volunteer species were identified within the sample plots. Volunteer species including fireweed (*Erechtites hieraciifolius*), barnyard grass (*Echinochloa crus-galli)*, fall panicum (*Panicum dichotomiflorum)*, and calico aster *(Symphyotrichum lateriflorum*) all were identified within a majority of the sampling plots. Invasive species including Japanese hops (*Humulus japonicus*), and mugwort (*Artemisia vulgaris*) were identified within the Site, mainly along areas sloping toward the stream. These species were targeted during the Fall 2018 herbicide treatment. Further information regarding invasive species control can be viewed in Section 5 of this report.

3.2 Conclusions of Vegetation Monitoring

The 2018 monitoring effort documented the successful establishment of the OU-2 restoration area. Woody stem density was over 150 stems per acre, which equates to a survival rate of approximately 65%. Tree survival can be estimated as nearly 90% after a robust successful replant in 2017. Shrubs have not survived well for a variety of reasons including the presence of deers and the subsequent herbivory that takes place to all smaller plants. Trees have fared better against the deer damage, although many trees were noted to be browsed or rubbed despite the presence of tree guards. Often, tree guards are displaced from the tree trunks by deers during the rubbing of the trunks. Despite difficult conditions, trees continue to establish and grow. Many tree species have an average height of 6 feet or greater. Overall average woody stem height is 6.4 feet. Sycamore and cottonwood are the most prevalent tree species and are also among the tallest in average height.

Herbaceous coverage continues to exceed expectations, covering over 98% of the Site. Dominant species are warm season grasses including switchgrass and indiangrass. Forbs such as black-eyed susan and wild bergamot are readily identified, especially during the summer months when in bloom. Invasive species including mugwort and Japanese hops were documented within the restoration area. These species have been treated with herbicide since the monitoring effort and will continue to be monitored during future years.

The project is on a positive trajectory to meeting all goals and requirements set forth in the SRP dated March 2016.

4.0 WILDLIFE UTILIZATION

Wildlife utilization remains an important factor of the OU-2 Site restoration. The OU-2 restoration project provides a diverse habitat for a wide variety of wildlife species. Trees remain protected using tree guards due to the large population of white-tailed deers that are known to utilize the project area. Tree guards have been noted to be displaced by deer rubbing resulting in tree damage. Other herbivory or wildlife damage has not been noted.

Species of concern such as Indiana bat (*Myotis sodalis*) little brown bat (*Myotis lucifugus*), timber rattlesnake (*Crotalus horridus*) and northern copperhead (*Agkistrodon contortrix contortrix*) were all identified to utilize the Site prior to construction. Surveys for these were conducted prior to construction; however, none of these species have been documented onsite to date. Similar species identified include garter snake (*Thamnophis sirtalis)*, black rat snake (*Pantherophis obsoletus*), and box turtle (*Terrapene*

carolina carolina). Numerous avian species including neotropicals, passerines and raptors readily utilize the restoration area.

4.1 Wildlife Habitat Enhancement Features

Wildlife habitat enhancement features such as boulder piles, brushpiles, and coarse woody debris were incorporated into the Site Restoration Plan. Wildlife habitat enhancement features are intended to add suitable habitat features for a wide variety of species expected to utilize the site.

Bird boxes and bat boxes will be added throughout the restoration area in order to provide nesting and roosting habitat. Bird boxes will be placed in suitable locations either on existing trees or posts approximately 5- foot off the ground, as determined by the Restoration Specialist. Bat boxes are scheduled to be mounted on the south side of suitable existing trees at a minimum of 10 feet off the ground, as determined by the Restoration Specialist and Bat biologist. These habitat structures have not been installed to date but are planned to be installed Spring 2019. After installation, all wildlife habitat enhancement structures will be inspected annually to ensure that the structures are intact and functional. Records of activity within the wildlife habitat enhancement structures will be documented and presented in annual reports.

Wildlife documented onsite include groundhog (*Marmota monax*), gray squirrel (*Sciurus carolinensis*), and eastern cottontail (*Sylvilagus floridanus*). Neotropical birds and other passerines frequent all areas of the site. Avian species including wild turkey, (*Meleagris gallopavo*) red-tailed hawk (*Buteo jamaicensis*), Cooper's hawk (*Accipiter cooperii*), eastern bluebird (*Sialia sialis*), killdeer (*Charadrius ociferous*) (*Ardea herodias*), song sparrow (*Melospiza melodia*), American kestrel (*Falco sparverius*), American crow (*Corvus brachyrhynchos*), black vulture (*Coragyps atratus*), turkey vulture (*Cathartes aura*), blue jay (*Cyanocitta cristata*), red-tailed hawk (*Buteo jamaicensis*), killdeer (*Charadrius vociferous*), common grackle (*Quiscalus quiscula*), sharp shinned hawk (*Accipiter striatus*), American goldfinch (*Spinus tristis*) and American robin (*Turdus migratorius*) have been documented utilizing the project area during the monitoring period. Reptile species documented onsite include garter snake *(Thamnophis sirtalis*) and black rat snake (*Pantherophis obsoletus*).

Additionally, dragonflies and damselflies (*Odanates*) were documented onsite, likely breeding and reproducing within the open water areas nearby. The Site has a plethora of wildflowers during the summer months which provide excellent pollinator habitat. Monarch butterflies were noted onsite during monitoring visits, and have been documented to be utilizing milkweed (*Asclepias sp*.) as a host plant for breeding and reproduction

5.0 MAINTENANCE AND MONITORING SUMMARY

The presence of invasive species and use of the Site by wildlife was noted during preparation of the NYSDEC approved SRP; therefore, the establishment and extent of invasive species and wildlife impacts on planted species will be monitored for the duration of the monitoring period (5-years).

As a preventative maintenance tool, most trees and shrubs, depending on height and stature, were protected from deer browse and rubbing by the installation of tree guards. In addition, many trees were staked and guyed to keep upright until fully established. ASGECI has conducted routine monitoring and maintenance to these deer guards, stakes, and guying during this monitoring period. Maintenance included the reinstallation of stakes and guards, pruning of trees to better fit guards, removal of guards from dead trees, and the replacement of dysfunctional material.

Furthermore, ASGECI has implemented an herbicide treatment program to control the establishment of unwanted and invasive species. ASGECI has contracted with Weeds, Inc., a NYSDEC Licensed Pesticide Applicator to treat invasive species including common reed (*Phragmites australis*), mugwort (*Artemesia vulgaris*), multiflora rose (*Rosa multiflora*), autumn olive (*Eleagnus angustifolia*) and others. Weeds Inc. conducted a site wide spot treatment of all invasive species in October 2018, mainly targeting mugwort and Japanese hops. The herbicide treatment was deemed successful, but true results will be seen during qualitative site assessments in Summer 2019. Herbicide applications will likely be a part of future maintenance efforts.

As part of annual monitoring activities, ASGECI will continue to monitor the restoration Site and will identify problems, concerns, or hazards observed, such as erosion issues, plant die-off, establishment of invasive species, etc. ASGECI will provide recommendations to control or mitigate issues that have been identified.

6.0 OVERALL CONCLUSIONS & RECOMMENDATIONS

In general, woody and herbaceous plant species diversity is high. Tree species are established and are growing at a steady rate. The average stem height is 6.4 feet. The woody stem density is 154 stems per acre. Herbaceous coverage is dominated by warm season grasses and other species consistent with the design seed mixture. The Site provides high quality wildlife habitat, primarily for bird species that prefer early successional vegetation

Based on field observations, the restoration area continues to provide beneficial wildlife habitat values and has met the initial goals of the restoration plan. Recommendations for 2019 include, but are not limited to, the following:

- Monitor and maintain Tree Guards installed around each planted tree.
- Inspect and maintain all trees and shrubs to ensure that all plants are adequately installed in the ground, are stabilized from wind and water flow, and remain in a healthy state.
- Monitor the Site for the presence and establishment of invasive species. Conduct invasive species control in Spring and Fall 2019.
- Install wildlife habitat structures including bat boxes and bird boxes.
- Monitor the impact of deer browse and damage to planted vegetation.
- Conduct quarterly routine site inspections.
- Conduct informal wildlife surveys to assess amphibian, reptile, bird and invertebrate use.

7.0 LITERATURE CITED

Peet, R. K., T. R. Wentworth, and P. S. White. 1998. A Flexible Multipurpose Method for Recording Vegetation Composition and Structure. Castanea 63(3):262-274.

APPENDIX A

Coordination and Correspondence

- NYSDEC Site Restoration Plan Approval

Craig Metzgar

From: Bennett, William B (DEC) <william.bennett@dec.ny.gov>
Sent: Wednesday, February 03, 2016 12:26 PM
To: Rocklin, Jon; Crosby, David (DEC)
Cc: Mastrocola, Krista; Bracken, Paul; dzurinkot@ramapo-ny.gov; mzakkar@ford.com; Chuck Stead; Bennett, William B (DEC); Dawson, Jennifer R (DEC); Stercho, Jonathan J (DEC); Masi, Lisa M (DEC)
Subject: Re: Ford Ramapo OU-2: Area G Restoration.
Attachments: Ramapo_RestorationPlan_Rev.pdf

Jon,

Per your request, the Department has completed a conceptual review of proposed changes to the restoration plan as part of the ongoing remedial action for Ramapo Paint Sludge site OU-2 (Site No. 3-44-064). The Department has the following comments:

- A meadow may be established in a portion of Area A as part of the restoration plan for the current remedial action. A revised drawing showing the proposed footprint of the meadow and a corresponding planting list and planting plan for the meadow must be submitted to the Department for review.

- The proposals to construct a barn in Area A and a parking area in Area G are considered development proposals that cannot be amended to the restoration plan for this remedial action. This development must be reviewed as a Permit Jurisdiction Determination - specifically Article 11. The applicant/project sponsor should submit a request for this determination (letter form) to Region 3 Permits that includes a project narrative, site plans (may be a sketch plan but must show all disturbances and proposed work in detail), and a project location map (which also shows exactly where on the site the proposed work is located). Also, any rattlesnake avoidance or mitigation measures proposed should be included in the narrative and/or on the plans for review. Additional information about avoiding impact to rattlesnakes can also be provided to the applicant during the permit determination process.

- The proposed snake basking structures may be removed from the restoration plan.

Please provide the supplemental information requested above regarding the meadow in Area A. For more information regarding the permitting process for development projects at the site, please contact Jonathan Stercho in the Department's Region 3 office.

William B. Bennett III, P.E.
Environmental Engineer 2
Remedial Bureau C
Division of Environmental Remediation
New York State Department of Environmental Conservation
625 Broadway
Albany, NY 12233-7014
Phone: (518) 402-9662
William.Bennett@dec.ny.gov

From: Rocklin, Jon <Jon.Rocklin@arcadis.com>
Sent: Wednesday, January 13, 2016 2:45 PM
To: Bennett, William B (DEC); Crosby, David (DEC)
Cc: Mastrocola, Krista; Bracken, Paul; dzurinkot@ramapo-ny.gov; mzakkar@ford.com
Subject: RE: Ford Ramapo OU-2: Area G Restoration.

Bill – Attached is a figure that presents the planned restoration changes associated with the below email.

Thank you,
Jon

From: Rocklin, Jon
Sent: Monday, January 11, 2016 3:22 PM
To: 'william.bennett@dec.ny.gov' <william.bennett@dec.ny.gov>; 'david.crosby@dec.ny.gov' <david.crosby@dec.ny.gov>
Cc: Mastrocola, Krista <Krista.Mastrocola@arcadis.com>; Bracken, Paul <Paul.Bracken@arcadis.com>
Subject: Ford Ramapo OU-2: Area G Restoration.

Bill,

Arcadis, on behalf of Ford, is proposing an alternative restoration plan for Area G associated with the Ramapo Paint Sludge Site, Operable Unit 2 located in Ramapo, New York.

ARCADIS would like to restore Area G with screenings to a depth of 2 feet below grade followed by placement of 2 feet of DGA in lieu of the topsoil and upland meadow vegetation.

The reason for this alteration is associated with the Town of Ramapo's (property owner's) request to leave the current support zone (trailer and personnel parking) in place, following completion of the remediation. This area would become overflow parking for the existing site structure (Salt Box). Furthermore, the proposed plan to backfill Area G would be similar to backfill in Area A that already established the primary parking lot for the Salt Box.

Based on the NYSDEC response on the above approach, Viasant will need to plan the remainder of the remediation accordingly.

Thank you,
Jon

Jon Rocklin| Certified Project Manager | jon.rocklin@arcadis.com
Arcadis | Arcadis U.S., Inc.
17-17 Route 208 North 2nd Floor Fair Lawn NJ | 07410 | USA
T. 201-398-4364 | M. 914-260-7373

Connect with us! www.arcadis.com | LinkedIn | Twitter | Facebook

ARCADIS Design & Consultancy for natural and built assets

From: Ted Dzurinko [mailto:DzurinkoT@ramapo-ny.gov]
Sent: Monday, January 11, 2016 1:30 PM
To: Rocklin, Jon <Jon.Rocklin@arcadis.com>
Cc: Thomas F. Sullivan <sullivant@ramapo-ny.gov>; Mastrocola, Krista <Krista.Mastrocola@arcadis.com>; Bracken, Paul <Paul.Bracken@arcadis.com>
Subject: RE: Ford Ramapo OU-2 (Area G)

Hi Jon,

We thought we had previously spoken about leaving Area G for overflow parking.
That works for us.

Also, w.r.t. to working contiguous to area E in the turnaround area across from the scale house:
I spoke with Dennis O'Donnell last week.
RCSWMA may bbe willing to accommodate.
During the brief 2 week ± period that you need to work in the turnaround area RCSWMA may be able to make adjustments the way vehicles enter the scales & avoid the need to turn around.
You should reach out to Dennis :845-753-2200 (office) .

Ted

From: Rocklin, Jon [mailto:Jon.Rocklin@arcadis.com]
Sent: Monday, January 11, 2016 12:28 PM
To: Ted Dzurinko <DzurinkoT@ramapo-ny.gohv>; Thomas F. Sullivan <sullivant@ramapo-ny.gov>
Cc: Mastrocola, Krista <Krista.Mastrocola@arcadis.com>; Bracken, Paul <Paul.Bracken@arcadis.com>
Subject: [POSSIBLE SPAM] RE: Ford Ramapo OU-2 (Area G)
Importance: Low

Ted and Tom – Any feedback/thoughts on this?

Thank you,
Jon

From: Rocklin, Jon
Sent: Thursday, January 7, 2016 2:20 PM
To: 'dzurinkot@ramapo-ny.gov' <dzurinkot@ramapo-ny.gov>; 'SullivanT@ramapo.org' <SullivanT@ramapo.org>
Cc: Mastrocola, Krista <Krista.Mastrocola@arcadis.com>; Bracken, Paul <Paul.Bracken@arcadis.com>
Subject: Ford Ramapo OU-2 (Area G)

Ted and Tom – Something else I want to bring up to start the discussions was the restoration of Area G, which is where our Site trailers/parking are located.

There was mention the Town might want to use this area as overflow parking.

Viasant plans to commence excavation of this area in the near future. For planning purposes, it would be helpful to know what the Town is thinking restoration wise.

1. We backfill with clean fill and top soil.
2. We backfill with clean fill with the top 2 feet being DGA. We would essentially leave the trailer/parking area as it is for future parking use.

Thank you,
Jon

Jon Rocklin| Certified Project Manager | jon.rocklin@arcadis.com
Arcadis | Arcadis U.S., Inc.
17-17 Route 208 North 2nd Floor Fair Lawn NJ | 07410 | USA
T. 201-398-4364 | M. 914-260-7373

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ARCADIS Design & Consultancy for natural and built assets

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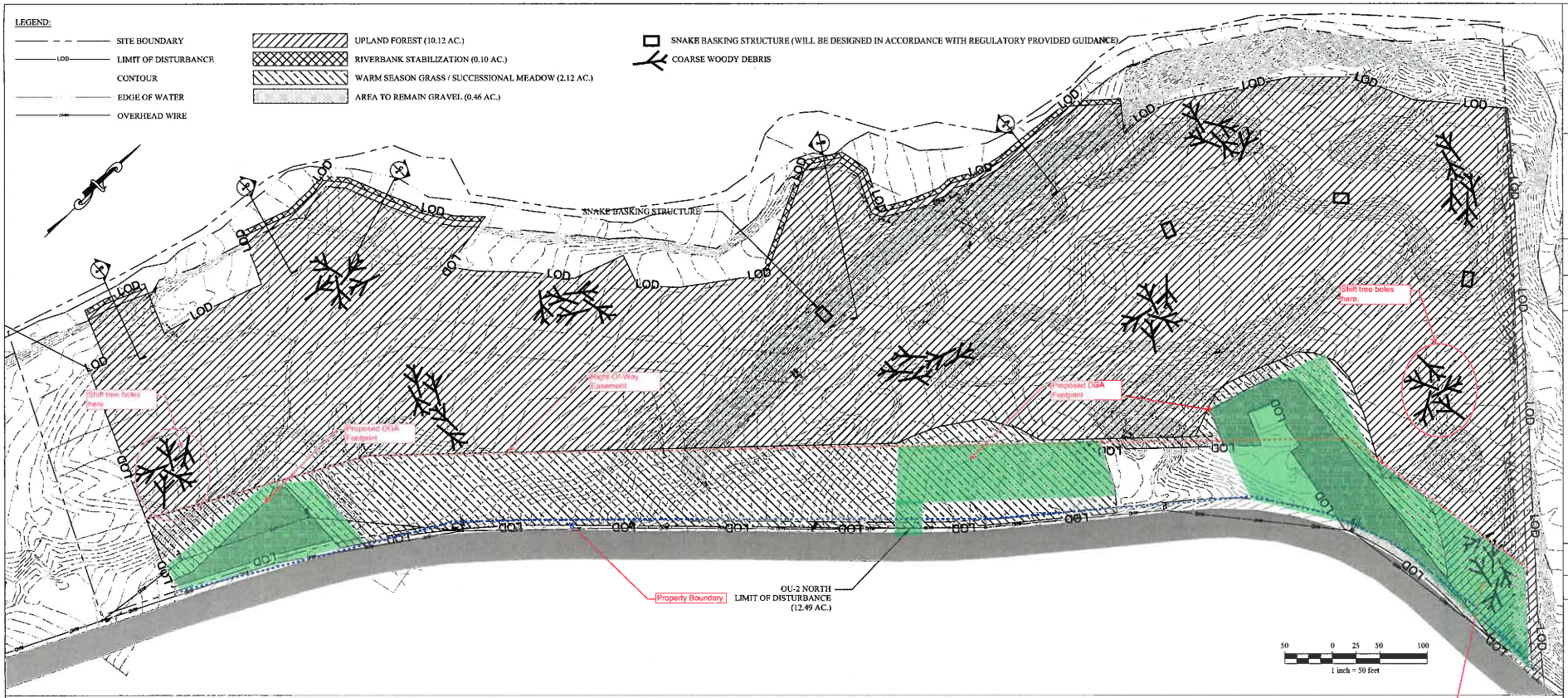


Upland Forest Planting Zone- OU-2 : 10.12 acres					
Plant Type	Common Name	Scientific Name	Size	Quantity	Spacing
Tree	sycamore	*Platanus occidentalis*	5'-6' Ht.	100	20 ft. O.C.
	white pine	*Pinus strobus*	5'-6' Ht.	100	20 ft. O.C.
	sugar maple	*Acer saccharum*	5'-6' Ht.	100	20 ft. O.C.
	sweet birch	*Betula lenta*	5'-6' Ht.	100	20 ft. O.C.
	red oak	*Quercus rubra*	5'-6' Ht.	100	20 ft. O.C.
	black oak	*Quercus velutina*	5'-6' Ht.	100	20 ft. O.C.
	tulip poplar	*Liriodendron tulipifera*	5'-6' Ht.	100	20 ft. O.C.
	sycamore	*Platanus occidentalis*	8'-10' Ht.	100	20 ft. O.C.
	white pine	*Pinus strobus*	8'-10' Ht.	100	20 ft. O.C.
	sugar maple	*Acer saccharum*	8'-10' Ht.	100	20 ft. O.C.
	sweet birch	*Betula lenta*	8'-10' Ht.	100	20 ft. O.C.
	red oak	*Quercus rubra*	8'-10' Ht.	100	20 ft. O.C.
	tulip poplar	*Liriodendron tulipifera*	8'-10' Ht.	100	20 ft. O.C.
Shrub	black chokeberry	*Aronia melanocarpa*	3'-4' Ht.	160	15 ft. O.C.
	virginia rose	*Rosa virginiana*	3'-4' Ht.	240	15 ft. O.C.
	southern arrowwood	*Viburnum dentatum*	3'-4' Ht.	160	15 ft. O.C.
	staghorn sumac	*Rhus typhina*	3'-4' Ht.	240	15 ft. O.C.
	witch hazel	*Hamamelis virginiana*	3'-4' Ht.	240	15 ft. O.C.

Streambank Stabilization: 0.10 acres					
Plant Type	Common Name	Scientific Name	Size	Quantity	Spacing
Shrub	witchhazel	*Hamamelis virginiana*	5'-6' Ht.	100	10 ft. O.C.
	pussy willow	*Salix bicolor*	live stakes	1000	1 ft. O.C.
	black willow	*Salix nigra*	live stakes	1000	1 ft. O.C.
	elderberry	*Sambucus canadensis*	3'-4' Ht.	200	4 ft. O.C.
	silky dogwood	*Cornus amomum*	3'-4' Ht.	200	4 ft. O.C.

** Depending on the planting season, live stake material may be substituted with rooted cuttings or plugs.

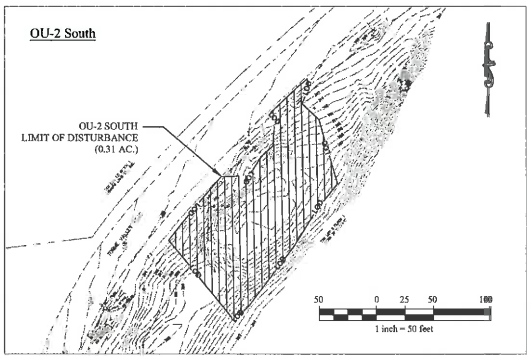
Upland Meadow and Upland Forest Seed Mix - 25 lbs per acre		
Scientific Name	Common Name	Percent
Panicum virgatum	switchgrass	20.0
Elymus virginicus	Virginia wild rye	15.0
Avena sativa	oats	15.0
Andropogon virginicus	little bluestem	10.0
Andropogon gerardii	big bluestem	10.0
Sorghastrum nutans	indian grass	10.0
Aster laevis	smooth aster	5.0
Rudbeckia hirta	black-eyed susan	5.0
Monarda fistulosa	wild bergamot	5.0
Echinacea purpurea	purple coneflower	2.5
Coreopsis lanceolata	lance-leaved coreopsis	2.5

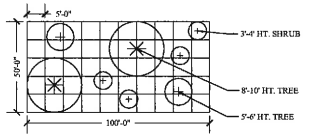
*Add 20 lbs. per acre Annual Rye Grass (*Lolium multiflorum*)

Bank Stabilization Area Seed Mix - 25 lbs per acre		
Scientific Name	Common Name	Percent
Panicum virgatum	switchgrass	20.0
Carex vulpinoidea	fox sedge	20.0
Andropogon scoparius	little bluestem	10.0
Elymus virginicus	Virginia wild rye	10.0
Juncus effusus	soft rush	5.0
Juncus tenuis	path rush	5.0
Helianthus angustifolius	swamp sunflower	5.0
Eupatorium fistulosum	Joe Pye Weed	5.0
Eupatorium perfoliatum	Boneset	5.0
Euthamia graminifolia	grass-leaved goldenrod	5.0
Solidago canadensis	canada goldenrod	5.0
Monarda fistulosa	wild bergamot	5.0

*Add Temporary Stabilization Seed Mix as specified

Temporary Stabilization Seed Mix - 50 lbs per acre		
Scientific Name	Common Name	Percent
Secale cereale	winter rye	40.0
Avena sativa	oats	40.0
Lolium multiflorum	annual ryegrass	20.0





1. Detail is representative only. Purpose is to show design intent. Prior to plant installation plant layout shall be staked out by contractor and approved by engineer.
2. Refer to plans (Sheet 1) for locations of planting areas and planting summary (Sheet 1 & 2) for plant species, quantities, spacing and other requirements.
3. Restoration specialist will layout species in a naturalistic fashion.
4. Photos will be collected to identify the current location of species and these species will be placed in similar locations upon site restoration to the extent feasible.
5. Restoration specialist will layout the trees and shrubs prior to planting. NYSDEC will be informed of the timing of this layout to provide oversight for approval of the restoration specialist layout.

1/A WOODY PLANTING LAYOUT, TYP.
SCALE: NONE

AMY S. GREENE ENVIRONMENTAL CONSULTANTS, INC.

No.	Date	Revision	By	Apvd
DSGN	CPM	DR SIR CHK XXX APVD XXX		

DATE

APPROVED

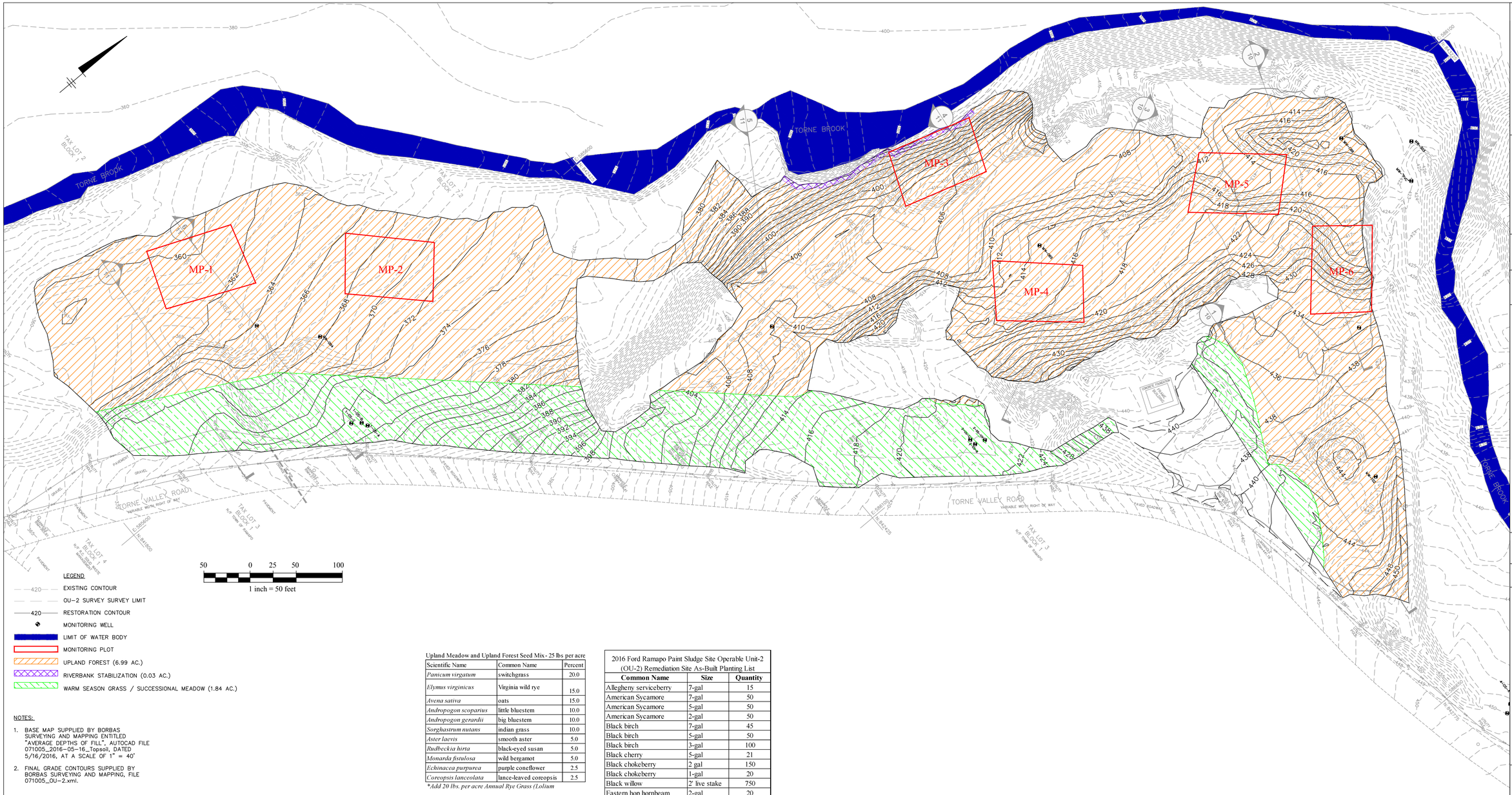
Ford Ramapo Sludge Site
Operable Unit 2 (OU-2)
Remediation Project
Town of Ramapo, Rockland County
New York

RESTORATION PLAN

Date	7/29/2015
ASGECI Project	#3437b
Sheet	1 OF 4

APPENDIX B

Restoration Monitoring Plan



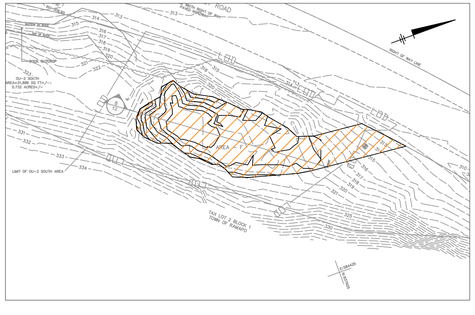
LEGEND

- EXISTING CONTOUR
- OU-2 SURVEY SURVEY LIMIT
- RESTORATION CONTOUR
- MONITORING WELL
- LIMIT OF WATER BODY
- MONITORING PLOT
- UPLAND FOREST (6.99 AC.)
- RIVERBANK STABILIZATION (0.03 AC.)
- WARM SEASON GRASS / SUCCESSIONAL MEADOW (1.84 AC.)

NOTES:

1. BASE MAP SUPPLIED BY BORBAS SURVEYING AND MAPPING ENTITLED "AVERAGE DEPTHS OF FILL", AUTOCAD FILE 071005_2016-05-16_Topsoil, DATED 5/16/2016, AT A SCALE OF 1" = 40'
2. FINAL GRADE CONTOURS SUPPLIED BY BORBAS SURVEYING AND MAPPING, FILE 071005_OU-2.xml.

Inset: OU-2 South



Upland Meadow and Upland Forest Seed Mix - 25 lbs per acre

Scientific Name	Common Name	Percent
Panicum virgatum	switchgrass	20.0
Elymus virginicus	Virginia wild rye	15.0
Avena sativa	oats	15.0
Andropogon scoparius	little bluestem	10.0
Andropogon gerardii	big bluestem	10.0
Sorghastrum nutans	indian grass	10.0
Aster laevis	smooth aster	5.0
Rudbeckia hirta	black-eyed susan	5.0
Monarda fistulosa	wild bergamot	5.0
Echinacea purpurea	purple coneflower	2.5
Coreopsis lanceolata	lance-leaved coreopsis	2.5

*Add 20 lbs. per acre Annual Rye Grass (Lolium

Bank Stabilization Area Seed Mix - 25 lbs per acre

Scientific Name	Common Name	Percent
Panicum virgatum	switchgrass	20.0
Carex vulpinoides	fox sedge	20.0
Andropogon scoparius	little bluestem	10.0
Elymus virginicus	Virginia wild rye	10.0
Juncus effuses	soft rush	5.0
Juncus tenuis	path rush	5.0
Helianthus angustifolius	swamp sunflower	5.0
Eupatorium fistulosum	Joe Pye Weed	5.0
Eupatorium perfoliatum	Boneset	5.0
Euthamia graminifolia	grass-leaved goldenrod	5.0
Solidago canadensis	canada goldenrod	5.0
Monarda fistulosa	wild bergamot	5.0

Temporary Stabilization Seed Mix - 50 lbs per acre

Scientific Name	Common Name	Percent
Secale cereale	winter rye	40.0
Avena sativa	oats	40.0
Lolium multiflorum	annual ryegrass	20.0

2016 Ford Ramapo Paint Sludge Site Operable Unit-2 (OU-2) Remediation Site As-Built Planting List

Common Name	Size	Quantity
Allegheny serviceberry	7-gal	15
American Sycamore	7-gal	50
American Sycamore	5-gal	50
American Sycamore	2-gal	50
Black birch	7-gal	45
Black birch	5-gal	50
Black birch	3-gal	100
Black cherry	5-gal	21
Black chokeberry	2 gal	150
Black chokeberry	1-gal	20
Black willow	2' live stake	750
Eastern hop hornbeam	2-gal	20
Eastern White Pine	5-6',B&B	30
Hackberry	7-gal	15
Northern red oak	2-gal	30
Pussy willow	2' live stake	750
Red maple	7-gal	50
River birch	7-gal	50
Serviceberry	7-gal	65
Silky dogwood	1-gal	40
Silver maple	5-gal	8
Silver maple	3-gal	70
Southern arrowwood	1-gal	90
Staghorn sumac	2-gal	74
Sugar maple	5-gal	84
Tulip poplar	3-gal	200
Virginia rose	2-gal	220
Witch hazel	2-gal	150
TOTAL		**3247**

AMY S. GREENE ENVIRONMENTAL CONSULTANTS INC.
4 WALTER E. FORAN BLVD. SUITE 209 FLEMINGTON, NJ 08822 (908) 788-9676

No.	Date	Revision	By	Apvd
DSGN	CPM	DR SR CHK XXX	APVD XXX	

APPROVED DATE

Ramapo Paint Sludge Site
Operable Unit 2
Site Restoration
Rockland County
New York

MONITORING PLAN OU-2 NORTH & OU-2 SOUTH

Date	5/3/2017
ASGECI Project	#3437b
Sheet	1 OF 1

APPENDIX C

Soil Information

- Topsoil Approval

VIASANT, LLC.
606 East Baltimore Pike, Fl3
Media, PA 19063
(484) 443-4250

Top Soil Materials
Ramapo Paint Sludge Site
Operable Unit 2 (OU-2)
Ramapo, NY

VIASANT Submittal(s) Number:	**S-037**
VIASANT Project Number:	**VPR-15112**
Submittal Title :	VIASANT – Top Soil Materials
Submittal Date:	8/20/15
Date(s) of Previous Submissions/Cross-Reference:	
To: **Cc:**	Jon Rocklin, ARCADIS Paul Bracken, ARCADIS Krista Mastrocola, ARCADIS Mike Furlong, VIASANT
From:	John Geary
Reference Specification Section and/or Drawing:	31-23-23 1.5

Contractor's Submittal Section:

We are sending:

☐ Shop Drawing X Product Data ☐ Sample Schedule X Record ☐ Plan

X Certificate **X** Report Permit ☐ Other:

# of Copies	As Requested	For Review	For Approval	For Your File	Deviations from Specification
Electronic	X	X	X	X	N/A

COMMENTS:

Please find the attached information for the proposed Top Soil Materials for the Ramapo OU-2 site.

This submittal has been reviewed and approved for submission by:

VIASANT, LLC.
606 East Baltimore Pike, Fl3
Media, PA 19063
(484) 443-4250

John Geary August 20, 2015
Contractor's Signature and Date

VIASANT

Engineer's Review & Comments Section:

This Submittal has been:

☐ Approved ☐ Approved as Noted ☐ Revise and Resubmit ☐ Rejected

_____
Engineer's Signature, Date and Stamp (Stamp if applicable)

20 Cotluss Road, Suite 10
Riverdale, NJ 07457
973-831-5807

February 26, 2013

Mr. John Geary, Project Manager
EQ – The Environmental Quality Company
EQ Northeast, Inc**.**
185 Industrial Road
Wrentham, MA 02093

Re: Topsoil for EQ Ramapo Site

Dear Mr. Geary:

This Letter is to certify that RER Supply's topsoil is blended and screened at our facility located at Block 3, Lot 2.01, Wantage NJ. Our topsoil is a blend of 60% leaf compost and 40% sandy loam. We compost the leaves on-site, and blend it with virgin sand.

Very truly yours,
RER SUPPLY, LLC

Andrew Flockhart, president

GeoTesting EXPRESS

Technologies to manage risk for infrastructure

Boston
Atlanta
Chicago
Los Angeles
New York
www.geotesting.com

Transmittal

TO:

John Geary
Viasant
175 Capital Blvd.
Rocky Hill, CT 06067

DATE: 7/31/2015	GTX NO: 303485
RE: Ramapo OU-2 Site	

COPIES	DATE	DESCRIPTION
	7/31/2015	**July 2015 Laboratory Test Report**

REMARKS:

SIGNED:

Joe Tomei, Laboratory Manager

CC:

APPROVED BY:

Nancy Hubbard, Project Manager

GeoTesting EXPRESS

Technologies to manage risk for infrastructure

Boston
Atlanta
Chicago
Los Angeles
New York
www.geotesting.com

July 31, 2015

John Geary
Viasant
175 Capital Blvd.
Rocky Hill, CT 06067

RE: Ramapo OU-2 Site, Ramapo, NY (GTX-303485)

Dear John:

Enclosed are the test results you requested for the above referenced project. GeoTesting Express, Inc. (GTX) received 11 samples from you on 7/17/2014. These samples were labeled as follows:

RER-TOP1
RER-TOP2
RER-TOP3
RER-TOP4
Tilcon-#4-1
Tilcon-#4-2
Tilcon-DGA1
Tilcon-Screen1
Tilcon-Screen2
Tilcon-Type 2-2
Tilcon-Type2-1

GTX performed the following tests on these samples:

6 ASTM D2216 - Moisture Contents
6 ASTM D2974 - Moisture, Ash and Organic Matter
6 ASTM D422 - Grain Size Analyses - Sieve Only
5 ASTM C136 - Sieve Analyses
6 ASTM D4318 - Atterberg Limits

A copy of your test request is attached.

The results presented in this report apply only to the items tested. This report shall not be reproduced except in full, without written approval from GeoTesting Express. The remainder of these samples will be retained for a period of sixty (60) days and will then be discarded unless otherwise notified by you. Please call me if you have any questions or require additional information. Thank you for allowing GeoTesting Express the opportunity of providing you with testing services. We look forward to working with you again in the future.

Respectfully yours,

Joe Tomei
Laboratory Manager

GeoTesting EXPRESS

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Los Angeles
New York
www.geotesting.com

Geotechnical Test Report **7/31/2015**

GTX-303485

Ramapo OU-2 Site

Ramapo, NY

Client Project No.: 15112

Prepared for:

Viasant

GeoTesting EXPRESS

Client:	Viasant				
Project:	Ramapo OU-2 Site				
Location:	Ramapo, NY			Project No:	GTX-303485
Boring ID:	---	Sample Type:	---	Tested By:	jbr
Sample ID:	---	Test Date:	07/29/15	Checked By:	emm
Depth :	---	Test Id:	339455		

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
---	RER- TOP1	---	Moist, very dark brown silty sand with organics	32.9
---	RER- TOP2	---	Moist, very dark brown silty sand with organics	31.4
---	RER- TOP3	---	Moist, very dark brown silty sand with organics	33.5
---	RER- TOP4	---	Moist, very dark brown silty sand with organics	30.4
---	Tilcon- Screen1	---	Moist, gray silty sand	11.6
---	Tilcon- Screen2	---	Moist, dark gray silty sand	6.8

Notes: Temperature of Drying : 110º Celsius

printed 7/30/2015 6:10:27 PM

GeoTesting EXPRESS

Client:	Viasant				
Project:	Ramapo OU-2 Site				
Location:	Ramapo, NY			Project No:	GTX-303485
Boring ID:	---	Sample Type:	---	Tested By:	cam
Sample ID:	---	Test Date:	07/29/15	Checked By:	emm
Depth :	---	Test Id:	339443		

Moisture, Ash, and Organic Matter - ASTM D2974

Boring ID	Sample ID	Depth	Description	Moisture Content,%	Ash Content,%	Organic Matter,%
---	RER-TOP1	---	Moist, very dark brown silty sand with organics	31	90.8	9.2
---	RER-TOP2	---	Moist, very dark brown silty sand with organics	34	88.9	11.1
---	RER-TOP3	---	Moist, very dark brown silty sand with organics	32	91.2	8.8
---	RER-TOP4	---	Moist, very dark brown silty sand with organics	30	90.4	9.6
---	Tilcon-Screen1	---	Moist, gray silty sand	6	99.7	.3
---	Tilcon-Screen2	---	Moist, dark gray silty sand	7	99.7	.3

Notes: Moisture content determined by Method A and reported as a percentage of oven-dried mass; dried to a constant mass at temperature of 105º C
Ash content and organic matter determined by Method C; dried to constant mass at temperature 440º C

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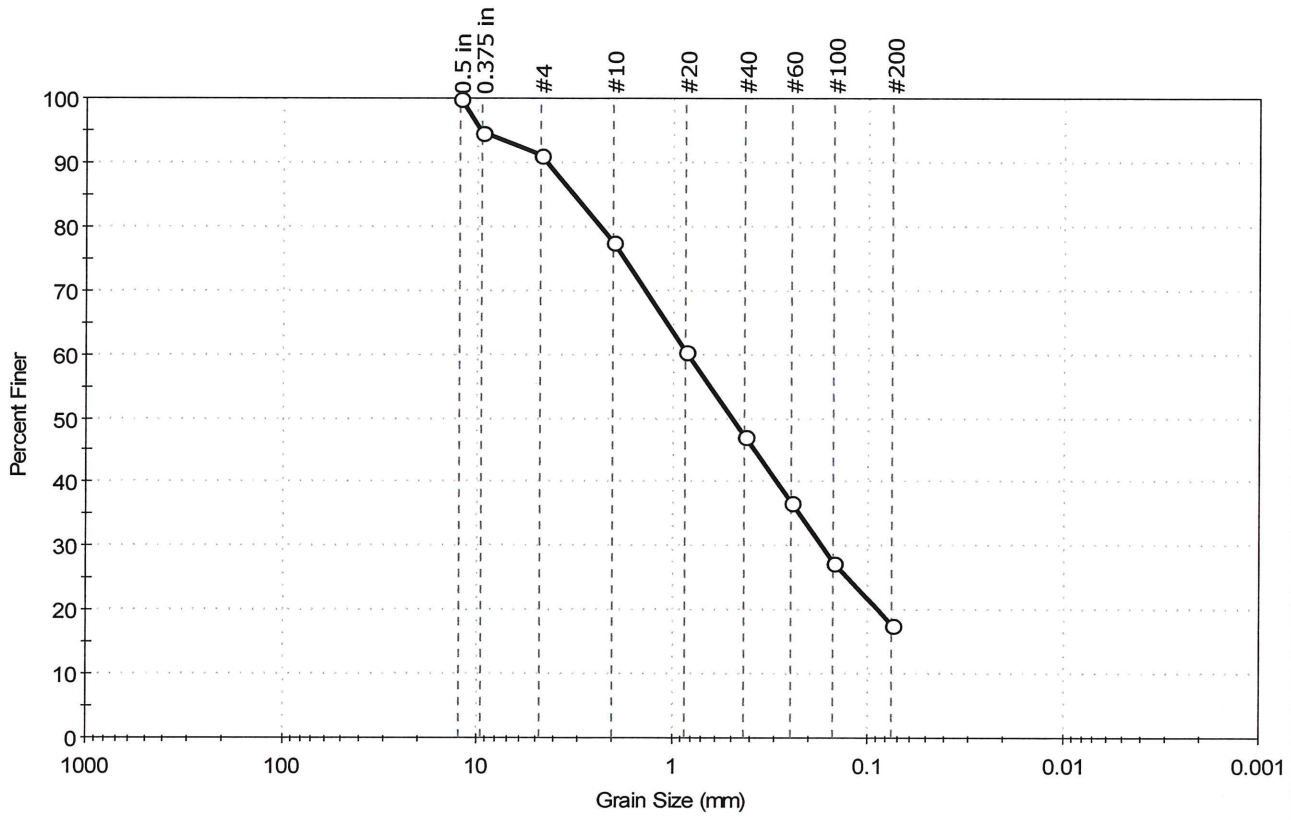
GeoTesting EXPRESS

Client:	Viasant				
Project:	Ramapo OU-2 Site				
Location:	Ramapo, NY			Project No:	GTX-303485
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	RER-TOP1	Test Date:	07/29/15	Checked By:	emm
Depth :	---	Test Id:	339444		
Test Comment:	---				
Visual Description:	Moist, very dark brown silty sand with organics				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	8.9	73.3	17.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	95		
#4	4.75	91		
#10	2.00	78		
#20	0.85	60		
#40	0.42	47		
#60	0.25	37		
#100	0.15	27		
#200	0.075	18		

Coefficients

D_{85} =3.2007 mm	D_{30} =0.1722 mm
D_{60} =0.8311 mm	D_{15} =N/A
D_{50} =0.4943 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM Silty sand (SM)

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : SOFT

GeoTesting EXPRESS

Client:	Viasant				
Project:	Ramapo OU-2 Site				
Location:	Ramapo, NY			Project No:	GTX-303485
Boring ID:	---	Sample Type:	bag	Tested By:	cam
Sample ID:	RER-TOP1	Test Date:	07/30/15	Checked By:	emm
Depth :	---	Test Id:	339432		
Test Comment:	---				
Visual Description:	Moist, very dark brown silty sand with organics				
Sample Comment:	---				

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	RER-TOP1	---	---	33	n/a	n/a	n/a	n/a	Silty sand (SM)

53% Retained on #40 Sieve
Dry Strength: LOW
Dilatancy: RAPID
Toughness: n/a
The sample was determined to be Non-Plastic

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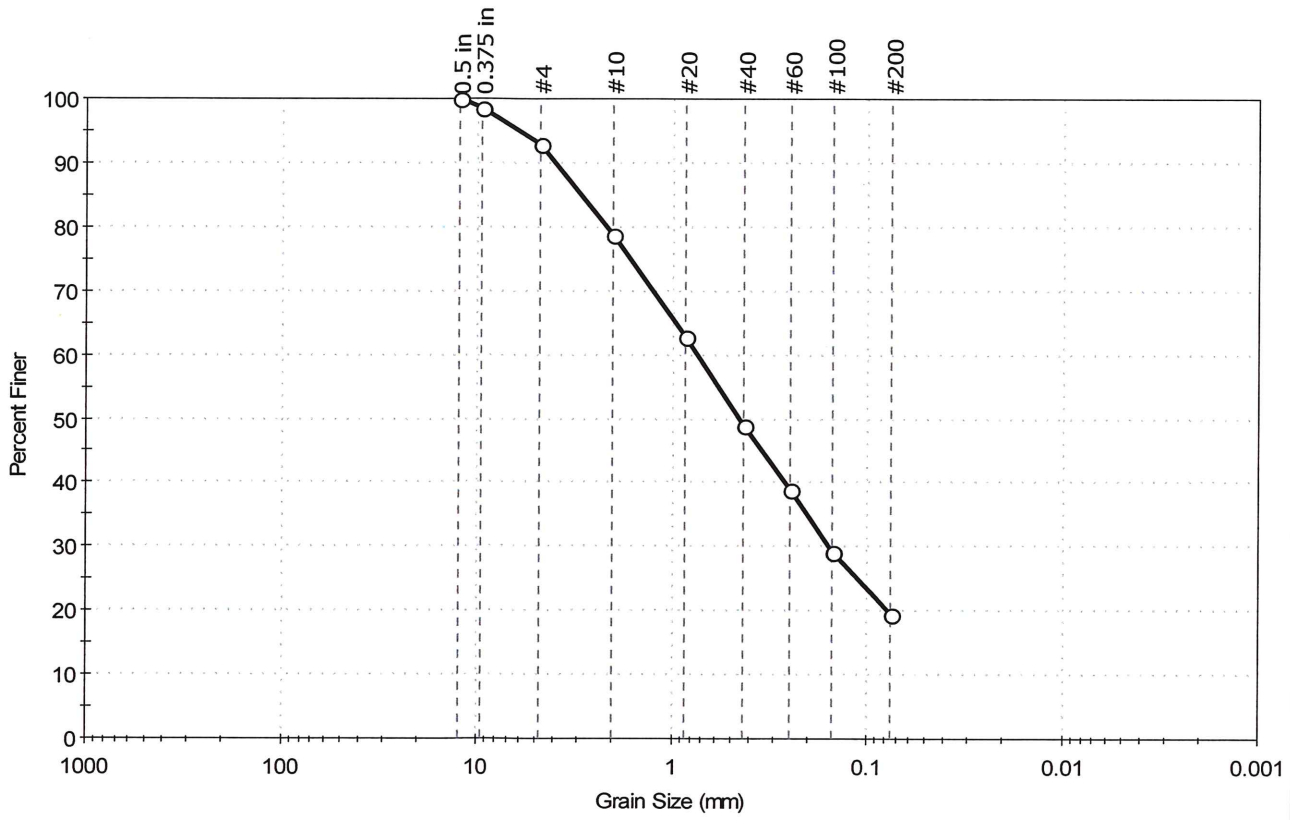
GeoTesting EXPRESS

Client:	Viasant				
Project:	Ramapo OU-2 Site				
Location:	Ramapo, NY			Project No:	GTX-303485
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	RER-TOP2	Test Date:	07/29/15	Checked By:	emm
Depth :	---	Test Id:	339445		
Test Comment:	---				
Visual Description:	Moist, very dark brown silty sand with organics				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	7.2	73.4	19.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	98		
#4	4.75	93		
#10	2.00	79		
#20	0.85	63		
#40	0.42	49		
#60	0.25	39		
#100	0.15	29		
#200	0.075	19		

Coefficients

D_{85} =2.9341 mm	D_{30} =0.1556 mm
D_{60} =0.7396 mm	D_{15} =N/A
D_{50} =0.4454 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM Silty sand (SM)

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : SOFT

GeoTesting EXPRESS

Client:	Viasant				
Project:	Ramapo OU-2 Site				
Location:	Ramapo, NY			Project No:	GTX-303485
Boring ID:	---	Sample Type:	bag	Tested By:	cam
Sample ID:	RER-TOP2	Test Date:	07/29/15	Checked By:	emm
Depth :	---	Test Id:	339433		
Test Comment:	---				
Visual Description:	Moist, very dark brown silty sand with organics				
Sample Comment:	---				

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

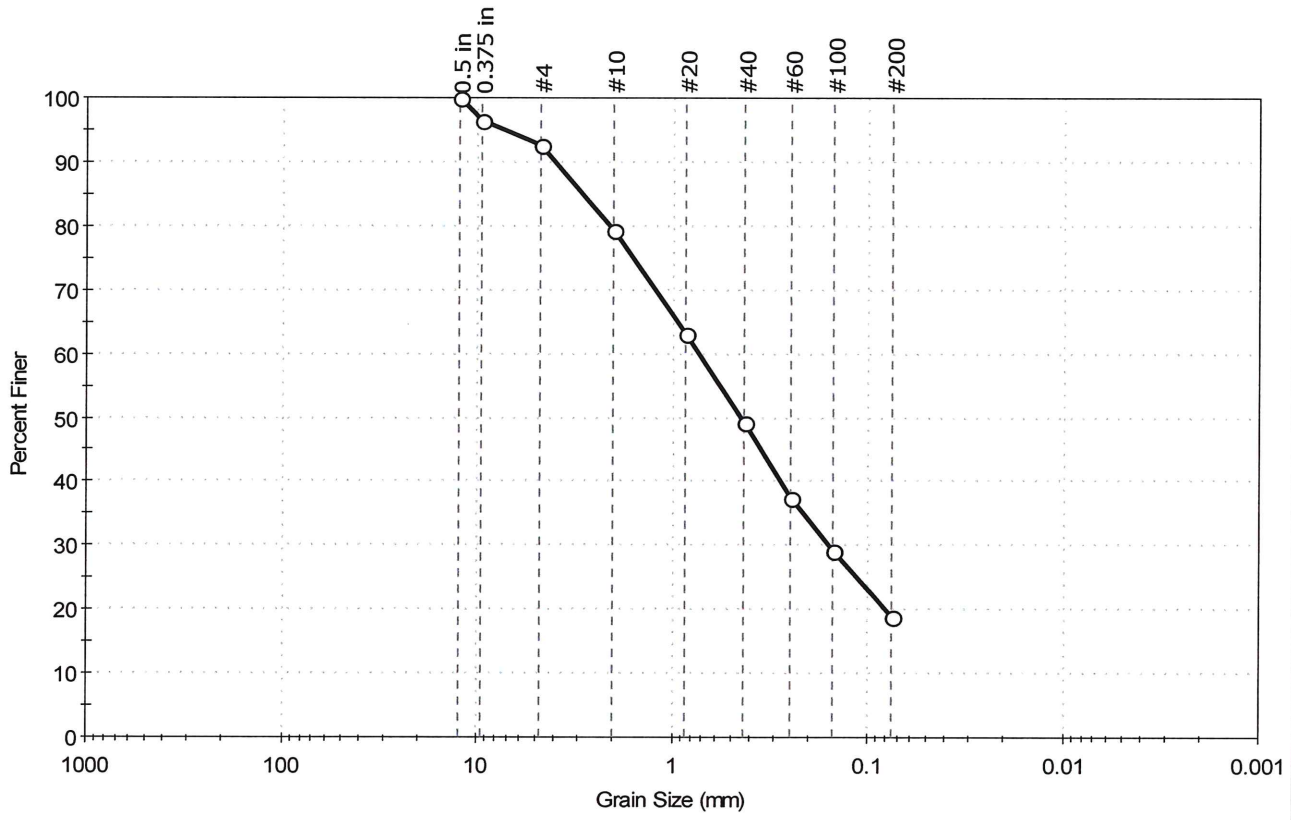
Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	RER-TOP2	---	---	31	n/a	n/a	n/a	n/a	Silty sand (SM)

51% Retained on #40 Sieve
Dry Strength: LOW
Dilatancy: RAPID
Toughness: n/a
The sample was determined to be Non-Plastic

GeoTesting EXPRESS

Client:	Viasant				
Project:	Ramapo OU-2 Site				
Location:	Ramapo, NY			Project No:	GTX-303485
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	RER-TOP3	Test Date:	07/29/15	Checked By:	emm
Depth :	---	Test Id:	339446		
Test Comment:	---				
Visual Description:	Moist, very dark brown silty sand with organics				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	7.4	73.8	18.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	96		
#4	4.75	93		
#10	2.00	79		
#20	0.85	63		
#40	0.42	49		
#60	0.25	37		
#100	0.15	29		
#200	0.075	19		

Coefficients

D_{85} =2.8973 mm	D_{30} =0.1579 mm
D_{60} =0.7319 mm	D_{15} =N/A
D_{50} =0.4434 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM Silty sand (SM)

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : SOFT

GeoTesting EXPRESS

Client:	Viasant				
Project:	Ramapo OU-2 Site				
Location:	Ramapo, NY			Project No:	GTX-303485
Boring ID:	---	Sample Type:	bag	Tested By:	cam
Sample ID:	RER-TOP3	Test Date:	07/29/15	Checked By:	emm
Depth :	---	Test Id:	339434		
Test Comment:	---				
Visual Description:	Moist, very dark brown silty sand with organics				
Sample Comment:	---				

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	RER-TOP3	---	---	33	n/a	n/a	n/a	n/a	Silty sand (SM)

51% Retained on #40 Sieve
Dry Strength: LOW
Dilatancy: RAPID
Toughness: n/a
The sample was determined to be Non-Plastic

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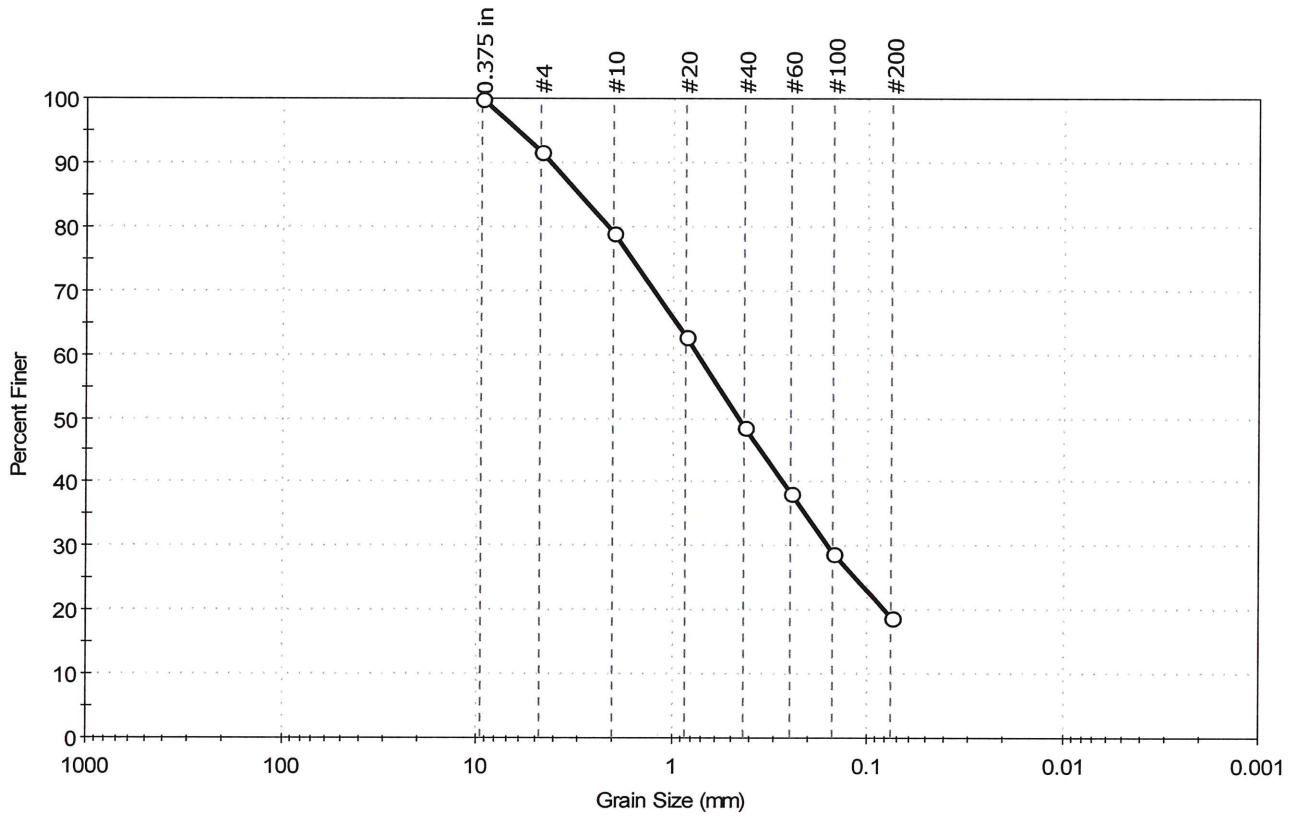
GeoTesting EXPRESS

Client:	Viasant				
Project:	Ramapo OU-2 Site				
Location:	Ramapo, NY			Project No:	GTX-303485
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	RER-TOP4	Test Date:	07/29/15	Checked By:	emm
Depth :	---	Test Id:	339447		
Test Comment:	---				
Visual Description:	Moist, very brown silty sand with organics				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	8.3	72.7	19.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	92		
#10	2.00	79		
#20	0.85	63		
#40	0.42	49		
#60	0.25	38		
#100	0.15	29		
#200	0.075	19		

Coefficients

D_{85} =2.9941 mm
D_{30} =0.1589 mm
D_{60} =0.7399 mm
D_{15} =N/A
D_{50} =0.4543 mm
D_{10} =N/A
C_u =N/A
C_c =N/A

Classification

ASTM Silty sand (SM)

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : SOFT

GeoTesting EXPRESS

Client:	Viasant				
Project:	Ramapo OU-2 Site				
Location:	Ramapo, NY			Project No:	GTX-303485
Boring ID:	---	Sample Type:	bag	Tested By:	cam
Sample ID:	RER-TOP4	Test Date:	07/29/15	Checked By:	emm
Depth :	---	Test Id:	339435		
Test Comment:	---				
Visual Description:	Moist, very brown silty sand with organics				
Sample Comment:	---				

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	RER-TOP4	---	---	30	n/a	n/a	n/a	n/a	Silty sand (SM)

51% Retained on #40 Sieve
Dry Strength: LOW
Dilatancy: RAPID
Toughness: n/a
The sample was determined to be Non-Plastic

printed 7/30/2015 6:08:46 PM

GeoTesting EXPRESS

SR Copy

SOIL CHAIN OF CUSTODY & TEST REQUEST

CLIENT		INVOICE (complete if different from Client)	
Company: Viasant, LLC		Company: SAME	
Address: 175 Capitol Blvd Suite 412		Address:	
City, State, Zip: Rocky Hill, Ct 06067		City, State, Zip:	
Contact: John Geary	Phone: 508-789-0190	Contact:	Phone:
E-mail: jgeary@viasant.com	Cell: 508-789-0190	E-mail:	Cell:

PROJECT		
Project Name: Ramapo OU-2	Client Project #: 15112	Purchase Order#: VPR15112-002
Project Location: Torne Valley Rd Hillburn, NY	GTX Sales Order #: 303052	Requested Turnaround: Standard
On-site Contact: John Geary	E-mail: jgeary@viasant.com	Phone: 508-789-0919

GeoTesting Express, Inc.
125 Nagog Park
Acton, MA 01720
800 434 1062 Toll Free
978 635 0266 Fax

2358 Perimeter Park Drive, Suite 320
Atlanta, GA 30341
770 645 6575 Tel
770 645 6570 Fax

www.geotesting.com

SOIL			Atterberg Limits (ASTM D 4318)	USCS – Classification (ASTM D 2487)	Grain Size: ASTM D 422 ☑ Sieve Only ☐ Sieve & Hydrometer ☐	Density: ASTM D 2937 ☐ ASTM D 7263 ☐	Moisture Content (ASTM D 2216)	Organic Content (ASTM D 2974)	pH (ASTM D 4972)	Specific Gravity (ASTM D 854)	Electrical Resistivity (ASTM G 57)	Proctor Compaction: Standard – ASTM D 698 ☐ Modified – ASTM D 1557 ☐	California Bearing Ratio * (ASTM D 1883)	Direct Shear* (ASTM D 3080)	Triaxial Shear*: UU – ASTM D 2850 ☐ CU – ASTM D 4767 ☐ CD – ASTM D7181 ☐	Incremental Consolidation* (ASTM D 2435)	Permeability/ Hydraulic Conductivity*: Fixed Wall – ASTM D 2434 ☐ Flexible Wall – ASTM D 5084 ☐	Unconfined Compression (ASTM D 2166)	Other: Sieve for Coarse materials ASTM C136	Other:
Boring ID	Sample ID	Depth																			
	RER-TOP1	1 gallon Bags	x		x		x	x													
	RER-TOP2		x		x		x	x													
	RER-TOP3		x		x		x	x													
	RER-TOP4		x		x		x	x													
	Tilcon-Screen1		x		x		x	x											x		
	Tilcon Screen2		x		x		x	x											x		
	also a bucket																				

cancelled

*Specify Test Conditions (Undisturbed or Remolded, Density and moisture, Test Normal Loads, Test Confining Stresses, etc.):

Spec Section 31 23 23
1ea Gallon Bag for each sample and a 5 gal pail for each of the screen samples is provided

AUTHORIZE BY SIGNING AND DATING:

SIGNATURE: _____ **PRINT NAME:** _____ **DATE:** _____

For GTX Use Only
Incoming Sample Inspection Performed ☐
Adverse conditions: _____

Relinquished By: for Viasant	**DATE:** 7/16/15	**Received By:**	**DATE:** 7/16/15
	TIME: 847		**TIME:** 8:47
Relinquished By:	**DATE:**	**Received By:**	**DATE:**
	TIME:		**TIME:**

SR Copy

GeoTesting EXPRESS

AGGREGATE CHAIN OF CUSTODY & TEST REQUEST

CLIENT		INVOICE (complete if different from Client)	
Company: Viasant, LLC.		Company:	
Address: 175 Capital Blvd Floor 4 Suite 412		Address:	
City, State, Zip: Rocky Hill, CT 06067		City, State, Zip:	
Contact: John Geary	Phone: 508-789-0919	Contact:	Phone:
E-mail: jgeary@viasant.com	Cell: 508-789-0919	E-mail:	Cell:

GeoTesting Express, Inc.
125 Nagog Park
Acton, MA 01720
800 434 1062 Toll Free
978 635 0266 Fax

2358 Perimeter Park Drive, Suite 320
Atlanta, GA 30341
770 645 6575 Tel
770 645 6570 Fax

www.geotesting.com

PROJECT		
Project Name: Ramapo Ou-2	Client Project #: 15112	Purchase Order#: VPR15112-002
Project Location: Torne Valley Rd Hillburn, NY	GTX Sales Order #:	Requested Turnaround: Standard
On-site Contact: John Geary	E-mail: jgeary@viasant.com	Phone: 508-789-0919

AGGREGATE			Calcium Carbonate Content of Aggregate (ASTM D 3042)	Flat and Elongated Particles* (ASTM D 4791)	LA Abrasion (Small sized aggregate) (ASTM C 131/T 96) *Provide 2 five gallon buckets	LA Abrasion (Large sized aggregate) (ASTM C 535) *Please provide 2 five gallon buckets	Lightweight Pieces in Aggregate (ASTM C 123/T113)	Organic Impurities in Fine Aggregate (ASTM C 40/T 21)	Percent Passing #200 Sieve (ASTM C 117/T 11)	Sieve Analysis for Coarse Aggregate (ASTM C 136/T27)	Soundness of Aggregate* (ASTM C 88/T 104)	Specific Gravity and Absorption of Coarse Aggregate (ASTM C 127/T 255)	Specific Gravity and Absorption of Fine Aggregate (ASTM C 128/T 84)	Total Moisture of Aggregate (ASTM C 566/T 255)	Unit Weight and Voids in Aggregate (ASTM C 29/T19)	Fractured Faces (ASTM D 5821)	Sand Equivalent (ASTM D 2419/T 176)	Void Content (ASTM C 1252)	Other:_____	Other:_____
Boring ID	Sample ID	Depth																		
	Tilcon-DGA1	x2 Bags								✓										
	Tilcon-DGA2	Did not Receive								✓										
	Tilcon-#4-1									✓										
	Tilcon#4-2									✓										
	Tilcon-Type2-1									✓										
	Tilcon-Type2-2									✓										

*Specify Test Conditions (Undisturbed or Remolded, Density and moisture, Test Normal Loads, Test Confining Stresses, etc.):

1ea 5gal pail of each sample

AUTHORIZE BY SIGNING AND DATING:

SIGNATURE:_____ PRINT NAME: _____ DATE: _____

For GTX Use Only
Incoming Sample Inspection Performed ☐
Adverse conditions: _____

Relinquished By: for Viasant	DATE: 7/16/15 TIME: 8:47	Received By: Stephen Lowry	DATE: 7/16/15 TIME: 8:47
Relinquished By:	DATE: TIME:	Received By:	DATE: TIME:

GeoTesting EXPRESS

WARRANTY and LIABILITY

GeoTesting Express (GTX) warrants that all tests it performs are run in general accordance with the specified test procedures and accepted industry practice. GTX will correct or repeat any test that does not comply with this warranty. GTX has no specific knowledge as to conditioning, origin, sampling procedure or intended use of the material.

GTX may report engineering parameters that require us to interpret the test data. Such parameters are determined using accepted engineering procedures. However, GTX does not warrant that these parameters accurately reflect the true engineering properties of the *in situ* material. Responsibility for interpretation and use of the test data and these parameters for engineering and/or construction purposes rests solely with the user and not with GTX or any of its employees.

GTX's liability will be limited to correcting or repeating a test which fails our warranty. GTX's liability for damages to the Purchaser of testing services for any cause whatsoever shall be limited to the amount GTX received for the testing services. GTX will not be liable for any damages, or for any lost benefits or other consequential damages resulting from the use of these test results, even if GTX has been advised of the possibility of such damages. GTX will not be responsible for any liability of the Purchaser to any third party.

Commonly Used Symbols

A	pore pressure parameter for $\Delta\sigma_1 - \Delta\sigma_3$
B	pore pressure parameter for $\Delta\sigma_3$
CIU	isotropically consolidated undrained triaxial shear test
CR	compression ratio for one dimensional consolidation
C_c	coefficient of curvature, $(D_{30})^2 / (D_{10} \times D_{60})$
C_u	coefficient of uniformity, D_{60}/D_{10}
C_c	compression index for one dimensional consolidation
C_α	coefficient of secondary compression
c_v	coefficient of consolidation
c	cohesion intercept for total stresses
c'	cohesion intercept for effective stresses
D	diameter of specimen
D_{10}	diameter at which 10% of soil is finer
D_{15}	diameter at which 15% of soil is finer
D_{30}	diameter at which 30% of soil is finer
D_{50}	diameter at which 50% of soil is finer
D_{60}	diameter at which 60% of soil is finer
D_{85}	diameter at which 85% of soil is finer
d_{50}	displacement for 50% consolidation
d_{90}	displacement for 90% consolidation
d_{100}	displacement for 100% consolidation
E	Young's modulus
e	void ratio
e_c	void ratio after consolidation
e_o	initial void ratio
G	shear modulus
G_s	specific gravity of soil particles
H	height of specimen
PI	plasticity index
i	gradient
K_o	lateral stress ratio for one dimensional strain
k	permeability
LI	Liquidity Index
m_v	coefficient of volume change
n	porosity
PI	plasticity index
P_c	preconsolidation pressure
p	$(\sigma_1 + \sigma_3) / 2$, $(\sigma_v + \sigma_h) / 2$
p'	$(\sigma'_1 + \sigma'_3) / 2$, $(\sigma'_v + \sigma'_h) / 2$
p'_c	p' at consolidation
Q	quantity of flow
q	$(\sigma_1 - \sigma_3) / 2$
q_f	q at failure
q_o, q_i	initial q
q_c	q at consolidation
S	degree of saturation
SL	shrinkage limit
s_u	undrained shear strength
T	time factor for consolidation
T	temperature
t	time
U, UC	unconfined compression test
UU, Q	unconsolidated undrained triaxial test
u_a	pore gas pressure
u_e	excess pore water pressure
u, u_w	pore water pressure
V	total volume
V_g	volume of gas
V_s	volume of solids
V_v	volume of voids
V_w	volume of water
V_o	initial volume
v	velocity
W	total weight
W_s	weight of solids
W_w	weight of water
w	water content
w_c	water content at consolidation
w_f	final water content
w_l	liquid limit
w_n	natural water content
w_p	plastic limit
w_s	shrinkage limit
w_o, w_i	initial water content
α	slope of q_f versus p_f
α'	slope of q_f versus p_f'
γ_t	total unit weight
γ_d	dry unit weight
γ_s	unit weight of solids
γ_w	unit weight of water
ε	strain
ε_{vol}	volume strain
ε_h, ε_v	horizontal strain, vertical strain
μ	Poisson's ratio, also viscosity
σ	normal stress
σ'	effective normal stress
σ_c, σ'_c	consolidation stress in isotropic stress system
σ_h, σ'_h	horizontal normal stress
σ_v, σ'_v	vertical normal stress
σ_1	major principal stress
σ_2	intermediate principal stress
σ_3	minor principal stress
τ	shear stress
φ	friction angle based on total stresses
φ'	friction angle based on effective stresses
φ'_r	residual friction angle
φ_{ult}	φ for ultimate strength

[illegible] 2 [illegible]

[illegible]	8 5 2015 7 58
[illegible]	M 40110

[illegible]	[illegible]	[illegible]	M 1	M 2	M 3	M 4	M 5	M 6	M 7	M 8	M [illegible]	M 10	M 11	M 12	M 13	M 14	M 15	M 16	M 17	M 18	M 1[illegible]	M 20	M 21	M 22	M 23	M 24	M 25
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[illegible]	[illegible]	[illegible]																									
M[illegible]M																											
Arsenic	7440-38-2	13	3.7	3.2	3.7	3.3	3.7	3.1	3	3	2.8	2.6	3.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	7440-39-3	350	66.6	68.8	68.2	68.7	69.5	60.8	72.3	65.7	66.4	70.3	65.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	7440-41-7	7.2	0.34	0.35	0.34	0.36	0.38	0.35	0.35	0.34	0.32	0.31	0.34	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	7440-43-9	2.5	0.17	0.18	0.2	0.14	0.19	0.17	0.14	0.16	0.14	0.15	0.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium, hexavalent	18540-29-9	1	0.88	0.69	<0.53	<0.53	0.83	0.51	<0.51	<0.52	<0.52	<0.51	0.96	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium, trivalent	16065-83-1	30	19.7	20.4	20	19.6	19.7	21	19.8	17.2	18.6	23.5	20.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	7440-50-8	50	91.4	56.8	45.8	43.7	53.4	44.7	40.8	36.5	43.5	42.5	108	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Cyanide		27	<0.16	<0.16	<0.16	0.16	<0.16	<0.15	0.15	<0.15	<0.15	<0.15	<0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	7439-92-1	63	22.7	17.1	18.8	16.3	17.8	17.7	16.9	15.7	15.5	15.5	16.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	7439-96-5	1600	309	331	316	317	345	341	330	308	292	277	302	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Mercury		0.18	0.032	0.028	0.031	0.039	0.028	0.03	0.027	0.027	0.028	0.079	0.027	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	7440-02-0	30	12.4	12.1	11.7	11.1	13.3	11.7	13.3	11.2	10.8	12.3	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	7782-49-2	3.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	7440-22-4	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	7440-66-6	109	55.2	57.4	59.5	52.1	54.9	54.7	54.1	49.6	49.6	48.4	50.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
[illegible]d[illegible]M																											
2,4,5-TP Acid (Silvex)	93-72-1	3.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDE	72-55-9	0.0033	0.0087	0.0094	0.0078	0.0091	0.0103	0.0085	0.006	0.0057	0.0054	0.0038	0.0033	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDT	50-29-3	0.0033	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4'-DDD	72-54-8	0.0033	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aldrin	309-00-2	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-
alpha-BHC	319-84-6	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-
beta-BHC	319-85-7	0.036	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlordane (alpha)	5103-71-9	0.094	0.0075	0.0088	0.0077	0.0084	0.0101	0.0108	0.0065	0.0097	0.0094	0.0069	0.0086	-	-	-	-	-	-	-	-	-	-	-	-	-	-
delta-BHC	319-86-8	0.04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenzofuran	132-64-9	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dieldrin	60-57-1	0.005	ND	0.0021	0.0024	0.0025	0.003	0.0022	0.0019	0.0021	0.0021	0.0019	0.002	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan I	959-98-8	2.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan II	33213-65-9	2.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan sulfate	1031-07-8	2.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin	72-20-8	0.014	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor	76-44-8	0.042	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lindane	58-89-9	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polychlorinated biphenyls	1336-36-3	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-
[illegible]r[illegible]d[illegible]M																											
Acenaphthene	83-32-9	20	0.0191	ND	ND	ND	ND	ND	ND	0.0172	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenapthylene	208-96-8	100	0.0142	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.013	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	120-12-7	100	0.0273	0.0273	0.0229	0.0235	0.0259	0.0193	0.0196	0.268	0.243	0.0226	0.0225	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benz(a)anthracene	56-55-3	1	0.118	0.133	0.111	0.136	0.102	0.106	0.120	0.173	0.106	0.108	0.133	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	50-32-8	1	0.111	0.135	0.1	0.127	0.0895	0.100	0.13	0.162	0.0915	0.0976	0.141	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	205-99-2	1	0.167	0.197	0.168	0.191	0.17	0.151	0.202	0.244	0.149	0.18	0.199	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	191-24-2	100	0.107	0.124	0.102	0.111	0.0889	0.0943	0.134	0.143	0.0921	0.0985	0.117	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	207-08-9	0.8	0.128	0.147	0.109	0.117	0.0881	0.113	0.121	0.166	0.104	0.095	0.141	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	218-01-9	1	0.195	0.222	0.182	0.203	0.174	0.171	0.198	0.258	0.178	0.177	0.206	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	53-70-3	0.33	0.0449	0.0552	0.0402	0.0401	0.0385	0.0423	0.046	0.0668	0.0376	0.0383	0.0475	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	206-44-0	100	0.303	0.331	0.28	0.273	0.273	0.234	0.283	0.407	0.284	0.267	0.275	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	86-73-7	30	0.0282	0.025	0.0224	0.0184	0.0199	ND	0.0216	0.0224	0.0224	0.0184	0.0196	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	193-39-5	0.5	0.0985	0.116	0.0864	0.103	0.0771	0.0836	0.106	0.132	0.0805	0.0859	0.111	-	-	-	-	-	-	-	-	-	-	-	-	-	-
m-Cresol	108-39-4	0.33	0.0434	ND	0.0336	ND	0.0322	ND	0.03639	0.0404	0.0375	0.0318	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	91-20-3	12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-
o-Cresol	95-48-7	0.33	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-
p-Cresol	106-44-5	0.33	0.0434	ND	0.0336	ND	0.0322	ND	0.03639	0.0404	0.0375	0.0318	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pentachlorophenol	87-86-5	0.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	85-01-8	100	0.152	0.158	0.134	0.123	0.125	0.106	0.123	0.156	0.135	0.129	0.133	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenol	108-95-2	0.33	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	129-00-0	100	0.231	0.244	0.214	0.198	0.205	0.171	0.206	0.317	0.202	0.2	0.237	-	-	-	-	-	-	-	-	-	-	-	-	-	-
[illegible]r[illegible]d[illegible]M																											
1,1,1-Trichloroethane	71-55-6	0.68	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	75-34-3	0.27	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	75-35-4	0.33	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	95-50-1	1.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	107-06-2	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis -1,2-Dichloroethene	156-59-2	0.25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	156-60-5	0.19	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	541-73-1	2.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	106-46-7	1.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dioxane	123-91-1	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	67-64-1	0.05	0.137	0.114	0.137	0.128	0.121	0.0971	0.13	0.141	0.155	0.13	0.131	0.114	0.155	0.117	0.128	0.136	0.122	0.121	0.122	0.141	0.13	0.124	0.15	0.15	0.136
Benzene	71-43-2	0.06	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
n-Butylbenzene	104-51-8	12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	56-23-5	0.76	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	108-90-7	1.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	67-66-3	0.37	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	100-41-4	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobenzene	118-74-1	0.33	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Methyl ethyl ketone	78-93-3	0.12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl tert-butyl ether	1634-04-4	0.93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	75-09-2	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
n - Propylbenzene	103-65-1	3.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
sec-Butylbenzene	135-98-8	11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
tert-Butylbenzene	98-06-6	5.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	127-18-4	1.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	108-88-3	0.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	79-01-6	0.47	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	95-63-6	3.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	108-67-8	8.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride	75-01-4	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (mixed)	1330-20-7	0.26	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
M[illegible]																										
Solids (%)	-	-	74.6		74.6	73.9	74.9	77.5	77.6	77.3	76.3	76.6	77.2	78.8	74.7	78.4	77.6	70.9	76.5	78.9	77.7	75.5	74.8	79.6	75.7	75.1	78
pH (su)	-	-	7.7		7.7	7.8	7.8	7.8	7.8	7.8	7.7	7.8	7.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-

APPENDIX D

Site Photographs

View of restored areas in the southern portions of OU-2 showing thick warm season grass coverage with large trees in October 2018.

View north of the southern areas of OU-2 showing average cover within monitoring plot 2 (MP-2).

View south of the northern portion of OU-2 showing an overview of a large portion of the site from Plot MP-6.

View north of the northern portions of OU2 established warm season grasses near Plot MP-4.

View of the rip rap spillway that flows to Torne Brook showing the establishment of willow live stakes near MP-3.

View of invasive species Japanese hops and mugwort along the Torne River embankment.

View south showing an overview of the northern portions of OU-2 during May 2018.

View of the treatment of mugwort throughout the site in October 2018.

APPENDIX E

Field Data Sheets

OU-2 2018
Rancho

VEGETATION MONITORING DATA SHEET – Seedling/Sapling Data Sheet

Team: CLM Plot: 6 Date: 10/12/18 Page 1 of 2

Species	Code	Seedling / Sapling Height						
		0 – 1 ft	1 – 2 ft	2 –3 ft	3 – 4 ft	4 – 5 ft	5 – 6 ft	6 – 7 ft
red oak							1	
white pine						1		1
red maple								
ERC				1				
moto rose			1	1		1		
Sycamore						1		

Species	Code	Seedling / Sapling Height						
		7 – 8 ft	8 – 9 ft	9 – 10 ft	10 – 11 ft	11 –12 ft	12-13 ft	13 – 14 ft
Sycamore				1	1	1	1	
Cottonwood							1	1
white pine		1		1				
red oak		1			1			
sycamore				1	1			

VEGETATION MONITORING DATA SHEET – Herbaceous Module Data Sheet

Team: CPM Plot: 6 Date: 10/12/18 Page 2 of 2

Species	Cover Classes Module: 1A										Cover Classes Module: 1B									
	+	1-5	6-10	11-15	16-20	21-25	26-50	51-75	76-90	90-100	+	1-5	6-10	11-15	16-20	21-25	26-50	51-75	76-90	90-100
Bermuda				✓									✓							
Barnyard grass		✓										✓								
Blackeyed Susan				✓										✓						
Va. buttercup		✓										✓								
Switchgrass					✓										✓					
Indiangrass						✓									✓					
mugwort			✓									✓								
Calico aster		✓											✓							
LL Coneflower		✓										✓								
Little Bluestem		✓										✓								

34378
Ou-a Ranch
2018

VEGETATION MONITORING DATA SHEET – Seedling/Sapling Data Sheet

Team: CPM Plot: 5 Date: 10/12/18 Page 1 of 2

Species	Code	Seedling / Sapling Height						
		0 – 1 ft	1 – 2 ft	2 –3 ft	3 – 4 ft	4 – 5 ft	5 – 6 ft	6 – 7 ft
ERI					1		1	
Sycamore		1	1	1				
shellbark							1	
mf cor				1				
hackberry				1				

Species	Code	Seedling / Sapling Height						
		7 – 8 ft	8 – 9 ft	9 – 10 ft	10 – 11 ft	11 –12 ft	12-13 ft	13 – 14 ft
Box elder		1						
Red Mulb		11						
Cottonwood							1	1
red oak					11			
white pine						1		
white ash							1	
Sycamore					1			

VEGETATION MONITORING DATA SHEET – Herbaceous Module Data Sheet

Team: CPM Plot: 5 Date: 10/2/18 Page 1 of 2

Species	Cover Classes Module:										Cover Classes Module:									
	+	1-5	6-10	11-15	16-20	21-25	26-50	51-75	76-90	90-100	+	1-5	6-10	11-15	16-20	21-25	26-50	51-75	76-90	90-100
Va Wildrye				✓										✓						
Blackeye Susan				✓										✓						
Wild Bergamot					✓										✓					
Switchgrass						✓									✓					
Lil Bluestem		✓										✓								
Y. Foxtail		✓										✓								
LL Coneflr			✓										–							
Fahnestock			✓										–							
Fragrant		✓											–							
Mugwort		✓										✓								
Bearded grass		✓										✓								
Celtis AL		✓										✓								
Bl Sanford		✓										✓								
Cattail		-										✓								
E Pr		✓									-									

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Oak Ranch
2018

VEGETATION MONITORING DATA SHEET – Seedling/Sapling Data Sheet

Team: CPM Plot: 4 Date: 10/5/18 Page 1 of 2

Species	Code	Seedling / Sapling Height						
		0 – 1 ft	1 – 2 ft	2 –3 ft	3 – 4 ft	4 – 5 ft	5 – 6 ft	6 – 7 ft
tulip poplar								1
Chokecherry					1			
grey birch					1			
ERC					1			
Box elder					1			

Species	Code	Seedling / Sapling Height						
		7 – 8 ft	8 – 9 ft	9 – 10 ft	10 – 11 ft	11 –12 ft	12-13 ft	13 – 14 ft
white ash								1
Cottonwood				1		1		
Sycamore						1		
shag bark		1	1					
red oak				1	1			
white pine		1	1					
grey birch			1					
box elder					1			

VEGETATION MONITORING DATA SHEET – Herbaceous Module Data Sheet

Team: CLM Plot: 4 Date: 10/12/17 Page 2 of 2

Species	Cover Classes Module: 3A										Cover Classes Module: 3B									
	+	1-5	6-10	11-15	16-20	21-25	26-50	51-75	76-90	90-100	+	1-5	6-10	11-15	16-20	21-25	26-50	51-75	76-90	90-100
Fall Panicum				✓										✓						
W. Bergamot					✓										✓					
Switchgrass						✓										✓				
Indiangrass				✓										✓						
Bluestem Jun				✓										✓						
V. ironweed		✓										✓								
Bearded grass		✓										✓								
NE Aster	✓											✓								
Ragweed		✓										✓								
dandelion	-										-	-								
Tridens		✓										✓								
Calico aster		✓	✓										✓							

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VEGETATION MONITORING DATA SHEET – Seedling/Sapling Data Sheet

Team: CPM Plot: 9 Date: 10/2/18 Page 1 of 2

Species	Code	Seedling / Sapling Height						
		0 – 1 ft	1 – 2 ft	2 –3 ft	3 – 4 ft	4 – 5 ft	5 – 6 ft	6 – 7 ft
Shadbush								1
Sycamore					11			
tulip poplar							1	
cottonwood		11	11					
Silky dogwood			11	~~TH~~	~~TH~~	1		
Black willow			11	111	~~TH~~ 1	11	1	
Pussy willow			1	111	1			

Species	Code	Seedling / Sapling Height						
		7 – 8 ft	8 – 9 ft	9 – 10 ft	10 – 11 ft	11 –12 ft	12-13 ft	13 – 14 ft
red oak				11				
river birch		1						
gray birch				1				

VEGETATION MONITORING DATA SHEET – Herbaceous Module Data Sheet

Team: CM Plot: 3 Date: 10/12/16 Page 2 of 2

Species	Cover Classes Module:										Cover Classes Module:									
	+	1-5	6-10	11-15	16-20	21-25	26-50	51-75	76-90	90-100	+	1-5	6-10	11-15	16-20	21-25	26-50	51-75	76-90	90-100
Va. Wildrye				✓										✓						
W. Bergamot			✓											✓						
Fireweed				✓									✓							
Blackeyed Susan		✓										✓								
Switchgrass					✓									✓						
Sump Dandelion		✓									—									
NL Goldenrod		✓									—									
LL Coneflower		✓										✓								
Common Milkweed		✓									—									
Barnyard grass		✓										✓								
Tickseed sunflower			✓										✓							
E. Ironweed		✓										✓								
NE aster		✓										✓								
Calico Aster			✓									✓								
Mugwort			✓												✓					
Jewelweed							✓						✓							

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VEGETATION MONITORING DATA SHEET – Seedling/Sapling Data Sheet

Team: CPM Plot: 2 Date: 10/16/18 Page 1 of 2

Species	Code	Seedling / Sapling Height						
		0 – 1 ft	1 – 2 ft	2 –3 ft	3 – 4 ft	4 – 5 ft	5 – 6 ft	6 – 7 ft
Black Cherry				11				1
red oak								
tulip poplar							1	
Silver maple								1
Chokecherry					11			

Species	Code	Seedling / Sapling Height						
		7 – 8 ft	8 – 9 ft	9 – 10 ft	10 – 11 ft	11 –12 ft	12-13 ft	13 – 14 ft
White pine				1				
red oak			1	1				
River birch		1		1				
hackberry		1		1				
Catalpa wood				1	1			
gray birch					1			
Sugar maple			1					

VEGETATION MONITORING DATA SHEET – Herbaceous Module Data Sheet

Team: CM Plot: 2 Date: 10/12/17 Page 1 of 2

Species	Cover Classes Module: 5A										Cover Classes Module: 5B									
	+	1-5	6-10	11-15	16-20	21-25	26-50	51-75	76-90	90-100	+	1-5	6-10	11-15	16-20	21-25	26-50	51-75	76-90	90-100
Switchgrass								✓										✓		
Indiangrass				✓											✓					
Prairie Dropseed					✓									✓						
Bearded		✓											✓							
LL Coreopsis		✓										✓								

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VEGETATION MONITORING DATA SHEET – Seedling/Sapling Data Sheet

Team: CPM Plot: 10 Date: 10/12/18 Page 1 of 2

Species	Code	Seedling / Sapling Height						
		0 – 1 ft	1 – 2 ft	2 –3 ft	3 – 4 ft	4 – 5 ft	5 – 6 ft	6 – 7 ft
FERN					1	1		
Red Oak								
Sycamore			II				1	

Species	Code	Seedling / Sapling Height						
		7 – 8 ft	8 – 9 ft	9 – 10 ft	10 – 11 ft	11 –12 ft	12-13 ft	13 – 14 ft
River Birch		1	1					
Red Maple				II		1		
Cottonwood					1	1		
White Pine					1			
Sycamore		1				II	1	1
red oak		1		1	1			
Box elder			1					
Grey birch					1			
with hunter		1						

VEGETATION MONITORING DATA SHEET – Herbaceous Module Data Sheet

Team: CRM Plot: 1 Date: 6/12/18 Page 2 of 2

Species	Cover Classes Module: 6A										Cover Classes Module: 6B									
	+	1-5	6-10	11-15	16-20	21-25	26-50	51-75	76-90	90-100	+	1-5	6-10	11-15	16-20	21-25	26-50	51-75	76-90	90-100
Switchgrass							✓										✓			
Bermuda grass				✓										✓						
Indiangrass							✓										✓			
Blackeyed Susan			✓										✓							
Bermudagrass			✓									✓								
LL Goldenrod		✓										✓								
Fall Ragweed		✓											✓							