NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

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October 11, 2017

Ms. Jill Fonte
Environmental Engineer
Lockheed Martin Mission Systems & Sensors
Post Office Box 4840
Syracuse, NY 13221-4840

RE: Annual Post-Construction Restoration Monitoring Summary Report
Bloody Brook, Onondaga County, New York
Voluntary Cleanup Agreement Index #D8-0001-01-09 (VCP Site No. V00501-7)

Dear Ms. Fonte

The New York State Department of Environmental Conservation (Department) has reviewed the Annual Post-Construction Restoration Monitoring Summary Report received on July 31, 2017 and the response letter received on September 21, 2017. The Annual Post-Construction Restoration Monitoring Summary Report is hereby approved.

Sincerely,

Jacky Luo
Project Manger
Remedial Bureau D
Division of Environmental Remediation

ec: Margaret Sheen, Esq. – NYSDEC, Syracuse
Harry Warner – NYSDEC, Syracuse
Christopher Balk – NYSDEC, Cape Vincent
Maureen Schuck – NYSDOH
Mark Sergott – NYSDOH
Robert Nunes – USEPA, NYC
Argie Cirillo, Esq. – USEPA, NYC
Benjamin Yaus, Esq. – Onondaga County DOL
Travis Glazier – Onondaga County Office of Environment
Nicholas Capozza – Onondaga County WEP
Lisa Letteney – Onondaga County DOH
Mark Nicotra – Town of Salina Supervisor
Laura Cassalia – Town of Salina Engineer
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Alma Lowry, Esq. – Onondaga Nation
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Christine Stanitski, Esq. – LMC, Syracuse
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Jill Fonte – LMC, Syracuse
Virgina Robbins, Esq.
Nickcole Evans – AECOM

LOCKHEED MARTIN

Lockheed Martin Rotary and Mission Systems
497 Electronics Parkway
Liverpool, NY 13088

September 21, 2017

Mr. Jacky Luo
Project Manager
New York State Department of Environmental Conservation
625 Broadway
Albany, New York 12233-7010

Re: *Response to NYSDEC Comments on*
Annual Post-Construction Restoration Monitoring Summary Report
Bloody Brook, Onondaga County, New York
Voluntary Cleanup Agreement Index #D7-0001-01-09 (VCP Site No. V00501-7)

Dear Mr. Luo:

Lockheed Martin Corporation (Lockheed Martin) has prepared this document to respond to your letter dated September 15, 2017 commenting on the *Annual Post-Construction Restoration Monitoring Summary Report* dated July 2017 for the Bloody Brook site located in Onondaga County, New York. The NYSDEC comments are repeated below in numbered, italic font and followed by Lockheed Martin's responses in regular font.

1. The text needs to provide a clarification on the management of invasive species. What prompts a response for the removal of invasive species in the wetlands? Does the type of response vary depending on the types of invasive species? The monitoring program needs to describe or referred in section 2.

A response for the removal of invasive species is prompted when greater than 5 percent coverage of such species is observed. The type of response does not vary depending on the types of species being removed. Manual removal of invasive species was implemented, but a formal program was not established at the time of the monitoring event. A monitoring and removal program for invasive species will be summarized in a restoration maintenance work plan, which will be submitted following the NYSDEC's approval of the *Annual Post-Construction Restoration Monitoring Summary Report*.

2. Was the amount of rainfall in 2017 considered in the adjustment of the boundaries of the different wetlands?

The amount of rainfall in 2017 was considered in the adjustment of the wetland boundaries. Accumulated rainfall data for 2017 (NOWData-NOAA) was compared with the average accumulated rainfall data for the Syracuse area. Accumulated rainfall for 2017 was above average. However, other factors including

vegetation, soil conditions, hydrology, and field observations in May of 2017 were also used to refine the habitat boundaries.

3. Attachment A: The wetland photos here labeled "PEM-1 Plot 3" should be revised to "PEM-2 Plot 3".

This requested revision has been completed and is included as an attachment to this letter.

This response letter along with the revised attachment (PEM-2 Plot 3) is submitted as a final document. Please let me know if you have any additional comments.

If you have any questions or you would like to discuss the responses, please contact me at (315) 456-1993 or Nickcole Evans at 315-243-1624.

Sincerely,

Jill Fonte

Jill Fonte
Environmental Engineer

Enclosure – Attachment A Wetland Photos PEM-2 Plot 3

cc (with enclosure): Christine Stanitski, Esq. – Lockheed Martin, Syracuse
Myron Parkolap– Lockheed Martin, Syracuse
Robert Nunes – USEPA, Region II, New York
Rebecca Quail – NYSDEC, Albany
Harry Warner, P.E. – NYSDEC, Region 7, Syracuse
Virginia Robbins, Esq. – Bond, Schoeneck & King, Syracuse
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Wetland PEM-2 Plot 3*
May 2017
*** See Figure 3 for PEM-2 Plot 3 locations**

Outline of PEM-2 Plot 3 (May 30, 2017)

PEM-2 Plot 3 (May 30, 2017)

LOCKHEED MARTIN

Lockheed Martin Rotary and Mission Systems
497 Electronics Parkway
Liverpool, NY 13088

July 28, 2017

Mr. Jacky Luo
Project Manager
New York State Department of Environmental Conservation
625 Broadway
Albany, New York 12233-7010

Re: *Annual Post-Construction Restoration Monitoring Summary Report*
Bloody Brook, Onondaga County, New York
Voluntary Cleanup Agreement Index #D7-0001-01-09 (VCP Site No. V00501-7)

Dear Mr. Luo:

Enclosed please find the *2017 Annual Post-Construction Restoration Monitoring Summary Report* for the Lockheed Martin Corporation Bloody Brook site for your review and approval. This summary report discusses results and recommendations from the May 2017 annual inspection to evaluate the success of the restoration at the Bloody Brook site in accordance with the March 2014 *Decision Document*.

If you have any questions or you would like to discuss the monitoring summary report, please contact me at (315) 456-1993 or Nickcole Evans at 315-243-1624.

Sincerely,

Jill Fonte

Jill Fonte
Environmental Engineer

Enclosure

cc (with enclosure): Christine Stanitski, Esq. – Lockheed Martin, Syracuse
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cc (w/out enclosure): Argie Cirillo, Esq. – USEPA, Region II, New York
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Maureen Schuck – NYSDOH, Albany
Curtis Waterman – HETF

AECOM Environment

Prepared for:
Lockheed Martin Corporation

Prepared by:
AECOM
40 British American Blvd.
Latham, NY 12110

Annual Post-Construction Restoration Monitoring Summary Report

West Branch of Bloody Brook
Bloody Brook Voluntary Cleanup Program
Onondaga County, New York

July 2017

Prepared for:

Lockheed Martin Corporation
Syracuse, New York

Prepared by:

AECOM Technical Services Northeast, Inc.
40 British American Boulevard
Latham, New York 12110

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1.0 Introduction

This *Annual Post-Construction Restoration Monitoring Summary Report* (RMSR) has been prepared to summarize the results of the monitoring activities completed in May 2017 including an evaluation of the success of the vegetation planting and established hydraulic regimes and an inspection for areas of erosion at the Bloody Brook site. The remediation, including construction and restoration activities completed from June 2014 through July 2017, was conducted in accordance with a Voluntary Cleanup Agreement (VCA) between Lockheed Martin and the New York State Department of Environmental Conservation (NYSDEC) (Index #: D7-0001-01-09, effective July 20, 2002). The remediation included the West Branch of Bloody Brook (WBBB) and Bloody Brook from below the confluence of the West and Middle Branches of Bloody Brook and adjacent property located between the New York State Thruway (Thruway) and Onondaga Lake Parkway (approximately 5,000 foot long section of stream) in the Town of Salina and a portion of the Village of Liverpool, Onondaga County, New York, as shown on Figure 1.[1]

Annual inspections are to be completed for five years following completion of restoration activities to ensure no erosion of the channel and banks is occurring and that the vegetation is growing as intended. The annual inspections are to be completed in accordance with the March 2014 Decision Document prepared by NYSDEC, property-specific owner restoration agreements, and the NYSDEC approved work plans listed below.

- *Revised Restoration Work Plan* dated August 2014 (2014 Revised RWP),
- *2015 Construction and Restoration Work Plan* dated February 2015, and
- *2016 Construction and Restoration Work Plan* dated March 2016.

The May 2017 inspection was the first of these annual inspections. At the time the 2017 inspection was completed, restoration was still in progress at the areas listed below and identified on Figure 2. Consequently, these areas were excluded from this inspection and will be added for the annual inspection in 2018. These areas will be monitored monthly until the vegetation is established.

- Apartment complex area including the stream side banks and bottom
- Portion of the commercial property outside of the stream side banks and located between the Old Liverpool Road culvert and the railroad tracks
- Construction access area at Onondaga Lake Parkway

[1] The term “site” in the VCA is defined as: a portion of the banks, surface waters and sediments of the West and Middle Branches of Bloody Brook located in the Town of Salina with a portion of the site located in the Village of Liverpool and commences downstream of Interstate 90, the New York State Thruway, and extends generally southward past the confluence of the West Branch and the Middle Branch of Bloody Brook creating Bloody Brook, and ends on the upstream side of Onondaga Lake Parkway. After examining data developed during remedial investigation work in the Middle Branch, NYSDEC determined that no further action was required for that branch of Bloody Brook. For this reason, the “site” in this document relates only to those areas within the VCA site where the remedial program has been implemented.

The monitoring activities were completed per the NYSDEC approved May 2017 *Post-Restoration Vegetation Monitoring Plan* (VMP) and included the following:

- Inspection of the brook channel side banks and channel bottom for signs of erosion;
- Inspection of vegetation planted during restoration activities on the residential, commercial, and other upland properties; and
- Inspection of the wetland areas to evaluate development of the restored wetlands.

Results for each of these inspections are presented and discussed in Section 3 of this report.

1.1 Site Description

The Bloody Brook site was broken into four distinct areas based on land use and characteristics as shown on Figure 2 and described below**.**

- Wooded Area – This portion of the site extends from the Thruway south (downstream) approximately 1,050 feet. This undeveloped area is irregularly shaped and relatively wide (i.e., greater than 150 feet) and includes three wetlands. The wooded area is entirely within the Onondaga County Bloody Brook Drainage District (Drainage District) easement and is owned by the Town of Salina. The Drainage District easement provides Onondaga County personnel permanent access for various projects to improve and maintain drainage. Storm water drainage from the surrounding development enters the WBBB from the west via a drainage channel at the southern end of the wooded area.

- Residential Area – The residential area surrounds the wooded area commencing at the Thruway and extending downstream of the wooded area with residential properties abutting the Drainage District easement along the WBBB to the downstream side of Floradale Road.

- Apartment Complex Area – The apartment complex area is located on Pearl Street and Town Gardens Drive between the residential properties along Floradale Road and the commercial properties along Old Liverpool Road. As noted above, the construction activities were completed in the apartment complex area during the spring of 2017, and this portion of the site was not inspected as part of this annual monitoring event.

- Commercial Area – The commercial area extends from commercial properties located along Old Liverpool Road to Onondaga Lake Parkway. As noted above, construction activities were completed in portions of this area during the spring of 2017, and those portions of this area were not inspected as part of this annual monitoring event.

2.0 Restoration Monitoring Activities

Restoration monitoring for the wooded, residential, and commercial areas, with the exceptions noted in Section 1.0, was completed during the week of May 29, 2017 in accordance with the NYSDEC approved May 2017 VMP. Monitoring activities included vegetation and wetland inspections completed by a qualified biologist, and an erosion inspection completed by a qualified engineer. Sections 2.1 through 2.3 below discuss the activities that were completed in the different areas during this first annual monitoring event, and Section 3 summarizes the results. Recommendations are provided in Section 4.

2.1 Wooded Area

Vegetation monitoring in the wooded area, which includes three wetlands, upland habitat areas, and riparian areas (transitional areas between wetland and upland areas and areas along the stream channel), was completed in accordance with the 2014 Revised RWP and the June 6, 2014 United States Army Corps of Engineers (USACE) Nationwide Permit (NWP) 38 to perform remediation activities in the WBBB and adjacent wetlands (USACE NWP 38). The information collected during the inspection was used to calculate the percent survival of the targeted plant species and the percent vegetation cover in the different habitat areas in order to assess the progression of development and natural sustainability of the wetlands and habitat areas. Target plant species include all planted shrubs and trees.

2.1.1 Vegetation Monitoring

The site vegetation inspections in the wooded area included inspections of the vegetative cover (e.g., planted seed mixes and emergent plants), trees, and shrubs for each of the wetland, upland, and riparian habitat types. The vegetative cover in these areas was inspected to ensure that germination is covering all areas and that no large bare spots (larger than 1 square foot) exist. Plot and transect procedures were used, in accordance with the 2014 Revised RWP and the January 1987 *Corps of Engineers Wetland Delineation Manual*. These procedures are described in the sections below.

In addition, the survival rate was determined by counting and inspecting individual planted trees and shrubs to ensure healthy development and identifying and noting dead trees and shrubs.

2.1.1.1 Plot Procedure

Three 10-foot by 10-foot permanent plots were marked at the corners with 1-inch PVC pipes extending at least 4 feet above the ground surface as shown on Figure 3. The percent cover of foliage of each species of herbaceous vegetation in the square was recorded with bare ground included as a cover type. The average percent cover for the entire plot was calculated, and photos were taken of each plot (Attachment A).

2.1.1.2 Transect Procedure

Permanent transects were established across palustrine shrub/scrub (PSS)-1, PSS-2, and palustrine forested (PFO)-1 as shown on Figure 3. Each tree and shrub that has a canopy extending into the 2-foot wide transect were recorded. In addition, the approximate area of canopy (as projected on the

ground) was recorded. The area of coverage for each planted seed mix and emergent plant species was summed and expressed as a percent coverage of the total transect area with bare ground included as a cover type. The data set collected included a species frequency count, a coverage area for each individual species, a total coverage in square feet (sq. ft.) for each species, and a relative coverage as a percent cover. In PFO-1, trees and understory shrubs were evaluated separately.

2.1.2 Habitat Area Monitoring

The monitoring procedure for each habitat area differed depending on the type of habitat and restored vegetation. The quantitative measures used in each of the habitat types are summarized below and in Table 1, and the habitat locations, as designed, are shown on Figure 3.

- PEM-1 and PEM-2 (Palustrine Emergent) – For these two wetland areas containing only emergent plants and wetland habitat seed mix (PA New England Province FACW Mix ERNMX-251), the plot procedure, as described above was used to estimate percent cover. The compositions of the seed mixes used are provided in Attachment C.

- PSS-1, PSS-2, and PFO-1 – For these three wetland areas, containing trees, shrubs, and wetland habitat seed mix (PA New England Province FACW Mix ERNMX-251), the transect procedure, as described above was used to estimate percent cover. Additionally, the habitat area was walked, and dead and live trees and shrubs were noted and/or counted. A count of the dead trees and shrubs in the areas was compiled to calculate the percent survival for the targeted species (Attachment B).

  To monitor the success of the seed mix, vegetation cover was monitored in each habitat area by a walkthrough including a visual inspection. The compositions of the seed mixes used are provided in Attachment C.

- UPF-1 and UPF-2 (Forested Upland) – For these two upland areas (containing trees and shrubs as well as forested floor seed mix [partially shaded area road Mix ERNMX-140]), the habitat area was walked, and any dead and live trees and shrubs were noted and/or counted. A count of the dead trees and shrubs in the areas was compiled to calculate the percent survival for the targeted species (Attachment B).

  To monitor the success of the seed mix, vegetation cover was monitored in each habitat area by a walkthrough including a visual inspection. The compositions of the seed mixes used are provided in Attachment C.

- RIP-1 (Riparian) – For the riparian habitat (containing trees, shrubs, and a riparian habitat seed mix [PA New England Province Riparian Mix ERNMX-253]), the habitat area was walked, and any dead and live trees and shrubs were noted and/or counted. A count of the dead trees and shrubs in the areas was compiled to calculate the percent survival for the targeted species (Attachment B).

  To monitor the success of the seed mix, vegetation cover was monitored by a walkthrough including a visual inspection. The compositions of the seed mixes used are provided in Attachment C.

- USS-1 (Shrub/Scrub Upland) - For the upland shrub/scrub habitat (containing shrubs and a forest floor habitat seed mix [partially shaded area road Mix ERNMX-140]), the habitat area was walked to locate any dead shrubs. It was determined that all planted shrubs had survived (Attachment B).

  To monitor the success of the seed mix, vegetation cover was monitored by a walkthrough including a visual inspection. The compositions of the seed mixes used are provided in Attachment C.

- MOW-1, MOW-2, and LAWN (Upland Meadow and Lawn) - For these areas, either an upland meadow or cool season lawn seed mix (northeastern U.S. road native mix (ERNMX-105) was used. Visual inspections included a walkthrough of the areas to confirm the seed mix was successful and there are no large bare spots. The compositions of the seed mixes used are provided in Attachment C.

2.1.3 Wetlands Groundwater and Surface Water Level Monitoring

During restoration activities in the wetland areas, three weirs were installed to allow for adjustment of the height of water retained in the wetlands (Figure 3). With NYSDEC approval, adjustments would be made, as needed, to improve the hydrology to support the different habitat types. During a 2015 high flow event, Weir 2 was damaged and required reconstruction. Following repairs, it was observed that conditions in the wetland behind the repaired weir were drier than anticipated. In May 2017, a field change was submitted to and approved by NYSDEC to permanently raise the height of Weir 2. These adjustments, planned for the summer of 2017 once conditions at the site become suitable (i.e., dry enough), will raise the height of Weir 2 by 8 inches from the current weir height to lengthen the retention time of water and increase the water level in this wetland area.

Shallow piezometers, installed in four locations at the edge of inundation in the constructed wetlands, were used to monitor groundwater levels in the wetlands. Surface water was monitored using four staff gauges installed in each of the three constructed wetlands. The approximate locations of the piezometers and staff gauges are shown on Figure 3.

2.1.4 Wetlands Photographic Monitoring

Progress in germination and growth of vegetation were monitored using panoramic photographs from five permanent photo points established in uplands surrounding the constructed wetlands. The locations of the permanent photo points are shown in Figure 3. Photos have been taken monthly, weather permitting during the winter months, from these monitoring points with a photo taken in each direction shown on Figure 3 (i.e., Direction A, B, C, and D) since restoration was completed in each of the areas and during this first annual monitoring event. Photos will be taken from the same permanent photo points during each subsequent annual monitoring event in order to compare the progress between years. Photos taken during the 2017 annual monitoring event are included in Attachment A.

2.1.5 Phragmites Removal

During construction activities, a “Bloody Brook *Phragmites* Control Procedure” was developed and approved by the NYSDEC to control the growth and spread of *Phragmites* adjacent to the restored wooded area of the site and near the site access off of Brookview Lane (see Figure 3). In accordance with the procedure, *Phragmites* was removed in June 2015, and light-proof tarps were placed over

the area. In May 2017, prior to the monitoring event, the tarps were removed, and the previously covered areas were seeded with a PA New England Province riparian seed mix (i.e., ERNMX-253) (Attachment C) at a rate of 20 pounds per acre. This area will be monitored monthly until the vegetation is established.

Periodically following completion of the restoration activities, with the most recent effort in May 2017 prior to the monitoring event, *Phragmites* was manually removed from portions of the site adjacent to but outside the area the tarps had been placed as well as other areas throughout the site.

2.2 Residential and Commercial Areas

All residential and commercial plantings included in this annual inspection were visually inspected to ensure they are successfully becoming established. Any fences restored on properties were also inspected to ensure they remain as placed. Results for the inspections completed on private residential and commercial properties will be discussed, as needed, with the property owner. Field forms for private properties will be retained in the project files, but they are not included in this summary report.

2.3 Erosion Monitoring

In accordance with the March 2014 Decision Document and the August 2014 *Revised* RWP, the site was inspected for ponding on the side banks and for erosion of the brook bottom and side banks. Results from this inspection are summarized below in Section 3.3, and related field forms, notes, and photos are included in Attachment D.

3.0 Restoration Monitoring Summary

Results for the monitoring activities discussed above are provided in the following sections. Section 3.1 discusses the types of habitats and results for the vegetation monitoring in the wooded area, including the wetland and upland habitats, Section 3.2 discusses results for the vegetation monitoring for the residential and commercial properties, and Section 3.3 discusses the results for the erosion monitoring. Recommendations are provided in Section 4.

3.1 Wooded Area Monitoring

The inspection in the wooded area consisted of monitoring the restored vegetation in the different upland and wetland habitat areas as well as monitoring the conditions of the wetlands to ensure they are suitable for establishment of the intended wetland plants. Current boundaries of the different developing wetland habitat types were compared to the 56,822 sq. ft. of wetlands proposed in the 2014 Revised RWP and shown on Figure 3 (27,832 sq. ft. PEM; 12,161 sq. ft. PSS; 16,829 sq. ft. PFO). The results from the monitoring in the wooded area are presented in the following subsections.

3.1.1 Habitat Area Monitoring

Restoration in the wooded area created seven types of habitat, including wetland and upland habitats, listed in Table 1 in order of hydraulic condition (wettest to driest) along with the method used to quantitatively measure the plant growth in each habitat area (see Section 2.0 of this report). The restored wetland habitats for the Bloody Brook site were constructed with weirs between the different wetland areas to control the flow in the system. The elevations of the weirs are set to control the water levels behind them to promote the development of different types of wetland habitat. The lining of the wetlands was designed to allow all water to infiltrate into the subsurface over four weeks. The wetland and weir locations are shown on Figure 3.

The wetland areas were designed by constructing the wetland habitats in and around the floodplain of the brook channel. During high flow events, PSS-1 is flooded by backflow from the channel. Additionally, this habitat receives water input by seepage of groundwater from the northeast. When the water overtops the height of Weir 1, it floods PEM-1, PFO-1, PSS-2, and PEM-2 before re-entering WBBB below Weir 3. Additionally, PSS-2, PEM-1, PEM-2, and PFO-1 receive water input from seepage of groundwater.

The upland areas were designed by constructing riparian habitat RIP-1 as a transitional area between the wetlands and upland habitats and the habitat along the stream channel. The upland habitats included shrub/scrub habitat USS-1, two upland forested habitats (UPF-1 and UPF-2), and the remaining upland meadow areas (MOW-1 and MOW-2). The results of the monitoring are summarized below.

3.1.1.1 Emergent Wetland

Two emergent wetlands were created during restoration activities. PEM-1 located between Weir 1 and Weir 2, and PEM-2 located between Weir 2 and Weir 3. A shallow emergent wetland is defined as a shallow, emergent marsh occurring on mineral rich soil or deep muck soil that is permanently saturated and seasonally flooded. Water depths may range from 15 centimeter (cm) to 1 meter (m),

but the soil surface is usually exposed and dry at some point in the year. Typical plants include cattails, sedges, marsh fern, spike rushes, bulrushes, sweetflag, joe-pye weed, and smartweed. They may have scattered shrubs including speckled alder, water willow, and buttonbush (Edinger et al, 2014[2]).

PEM-1

Under current conditions, only a portion of PEM-1 is permanently saturated. On the day of the inspection, PEM-1 had a maximum water depth of about 0.5 feet, with 0.41 feet at Staff Gauge 2 (see Figure 3 for staff gauge location). As discussed in Section 2.1.3, the final elevation of Weir 2 will be adjusted in accordance with the May 2017 NYSDEC approved field change to lengthen the retention time of water and increase the water level in this wetland area.

Within the saturated area of PEM-1, a healthy stand of cattails with bulrush and other desirable wetland species was evident. Invasive species were not observed within this saturated area. Groundwater seepage into the wetland was noted in the northwest corner of PEM-1.

Outside of the saturated area, PEM-1 is relatively dry, and a large number of more terrestrial species are present (e.g., grasses). The adjustment to the elevation for Weir 2 will increase the depth and duration of inundation of PEM-1 which will improve the habitat conditions for the growth of wetland plant species and reduce the number of terrestrial plant species. Prior to the inspection, this area had been heavily infested with *Phragmites*, which were manually removed to control the growth of invasive species. During the inspection, occasional *Phragmites* was observed in this area of PEM-1, with some purple loosestrife apparent along the edges of the wetter areas.

The data for the two plots in PEM-1 are presented in Tables 2 and 3 and are discussed below. The locations of the plots are shown on Figure 3, and photos taken during the monitoring event are included in Attachment A.

PEM-1 PLOT 1

Plot 1 was subdivided into 16 subplots to facilitate assessment of the thick vegetation (Table 2). Percent cover for each species observed within a subplot was recorded for the subplot. The percent cover for all species in each subplot was summed and divided by the number of subplots to estimate the average percent coverage for the subplot. The percent coverage for each subplot was summed to estimate the total percent coverage for the plot. The percent cover of all species in Plot 1 is 81.5 percent. Water occupies the remaining 18.5 percent.

The data for Plot 1 shows a domination of desirable species with cattail, soft rush, spiked rush, and bulrush dominating with a few sedge species. Invasive species (i.e., purple loosestrife) made up 7 percent of the total.

[2] Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.

PEM-1 PLOT 2

PEM-1 Plot 2 was subdivided into four subplots to facilitate assessment of the vegetation. Percent cover for each species observed within a subplot was recorded for the subplot (Table 3). The percent cover for all species in each subplot was summed and divided by the number of subplots to estimate the average percent coverage for the subplot. The percent coverage for each subplot was summed to estimate the total percent coverage for the plot. The percent cover of all species in Plot 2 is 38.5 percent. Water occupies the remaining 61.5 percent. The species present are representative of an upland site, and the percent coverage is less than 80 percent. Once the elevation of Weir 2 is adjusted, more frequent inundation during the growing season is expected, and wetland plants will spread into the area.

Plot 2 is dominated by terrestrial grass species. Invasive species (e.g., purple loosestrife and *Phragmites*) represented 13 percent of the total coverage.

PEM-2

The elevation of saturation and surface water in PEM-2 is controlled by the elevation of Weir 3. However, a large amount of groundwater seeps into this wetland from the west, which likely maintains the water levels higher than originally designed. The central portion of PEM-2 was approximately 3- to 4-foot deep and consisted of open water habitat. Depth of surface water at Staff Gauge 4 was approximately 2 feet (see Figure 3 for the staff gauge location). Emergent vegetation (e.g., cattail, iris, etc.) was evident in the shallower portions of PEM-2.

Plot 3 is located in the center of PEM-2 (Figure 3). Under current conditions, the plot is completely inundated with no emergent vegetation. The dominant vegetation that has developed in the area, but not yet within Plot 3, is the broad-leafed cattail.

3.1.1.2 Shrub/Scrub Wetland

Two shrub/scrub wetlands were constructed, PSS-1 at the northern edge of the site, and PSS-2 in the wetland area between Weirs 2 and 3 (Figure 3).

A shrub/scrub wetland is dominated by tall shrubs. The substrate is usually mineral rich soil or deep muck soil. Shrub/scrub wetlands are variable, but dominant plants may include alder, red osier silky dogwood, willows, buttonbush, blueberry, arrow wood, wild raisin, swamp azalea, and mulberry, among others. Scattered trees such as red maple, elm, and green ash may be present. (Edinger et al, 2014[3]).

[3] Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.

PSS-1

PSS-1 had standing water up to 18 inches deep through the entire wetland during the May 2017 monitoring activities, with about 8.4 inches measured at Staff Gauge 1 (see Figure 3 for staff gauge location). This was likely due to the large amount of groundwater seeping into the wetland from the northeast. This area is wetter than is typical for shrub/scrub wetlands and likely caused a high mortality rate for the planted shrubs, except for the more water tolerant buttonbush. At the same time, a robust stand of broad-leafed cattails has developed, which is more typical of emergent wetlands.

In addition, the area around the channel draining into PSS-1 was found to be maintaining wet conditions (i.e., standing water and saturated soils) likely due to the continuous flow of water from the seeps into PSS-1 from the northeast. These conditions are supporting vegetation typical of emergent wetlands (e.g., primarily cattail). This area of additional wetland is labeled as W-10 on Figure 4.

Prior to the inspection, PSS-1 had been heavily infested with *Phragmites*, and a portion of the *Phragmites* were manually removed to control the growth of invasive species. This removal was conducted up to the northern edge of the wetland, near the fence line with the NYS Thruway where there is an extensive stand of *Phragmites*. This stand may be a future source of *Phragmites* moving into the site. The impact of the removal program can be seen in the contrast between the southern portions of the wetland and the northern portion (where the *Phragmites* was not removed), discussed in more detail below with the transect data.

A count of all surviving planted shrubs is presented in the field forms in Attachment B and revealed only a 20 percent survival rate overall. Most of the surviving shrubs were button bush, which had an 87 percent survival rate. Figure 5 shows the current status of the planted shrubs in PSS-1 based on the May 2017 inspection.

The transect data for PSS-1, which was 2 feet wide and 55 feet long, are presented in Table 4 and show the transect dominated by cattails in the area cleared of *Phragmites*. Invasive species (*Phragmites* and purple loosestrife) made up 13 percent of the total. This transect crosses the boundary of where *Phragmites* was not removed. The frequency of *Phragmites* changes from 12 percent of the total plant count in areas where it was removed to 89 percent of the total plant count in areas where it was not removed, and it overwhelmed the species composition. Only two living shrubs (Buttonbush) were captured in the transect, and there is a relatively large coverage of open water (average of about 52 percent).

PSS-2

As noted above, a large amount of groundwater is entering the wetland areas from the west between Weirs 2 and 3, which is likely responsible for maintaining conditions that are wetter than designed.

Inspection of the vegetation in PSS-2 showed growth of emergent vegetation (e.g., cattail), but severe mortality of the planted shrubs. A count of all of the surviving planted shrubs is presented in the field forms in Attachment B and revealed a 21 percent survival rate overall.

The transect data for PSS-2, which was 2 feet wide and 105 feet long, are presented in Table 5 and show the transect dominated by cattails with other emergent vegetation such as bulrush and cursed buttercup.

3.1.1.3 Forested Wetland

One forested wetland, PFO-1, was constructed between Weirs 2 and 3. There are several forested wetland types in New York which tend to be differentiated by the dominate tree species, with hydraulic conditions providing underlying factors favoring one group of species over others. Forested flood plains typically are flooded in the spring and are relatively dry the rest of the year and have a large number of trees species.

PFO-1 contained standing water 12 to 18 inches deep throughout the wetland boundaries. The water depth is greater than the original design and is likely due to the large amount of groundwater seeping in from the north. The hydraulic conditions are more typical of an emergent wetland. Consequently a large, thick stand of cattails has developed which dominated the area. The shrubs planted to provide interim cover during tree growth had almost no survival (less than 5 percent), with only elderberry along the edges surviving. With the exception of black willow which had 100 percent survival, the planted trees also did poorly, with an overall survival of 45 percent (Figure 6 and Attachment B).

The transect data for PFO-1, which was 2 feet wide and 102 feet long, are presented in Table 6 and show the transect dominated by cattail, indicative of an emergent wetland.

In addition, the area west of PFO-1 and PSS-2 (near the access from Brookview Lane where *Phragmites* removal [see Section 2.1.5 of this report] was completed) exhibits a large amount of groundwater seepage from the west and has a thriving volunteer population of cursed buttercup (a native wetland species). This added wetland area is shown as W-11 on Figure 4.

3.1.1.4 Riparian and Upland Habitats

RIP-1 was constructed as a transitional area between the wetlands and the upland habitats and along the stream channel. The upland habitats included one shrub/scrub habitat (USS-1), two upland forested habitats (UPF-1 and UPF-2), and the remaining upland meadow areas (MOW-1 and MOW-2) (Figure 3). These habitat areas were inspected, and survival rate of target trees and shrubs was determined (Attachment B). The areas where a seed mixture was placed were visually inspected for large bare spots. The following observations were made in these transitional and upland habitat areas:

- **RIP-1:** RIP-1 is the planned riparian forest community in the area west of Weir 1, the area planted on the berm around PEM-2 and PSS-2 and includes the stream side banks. Sixty-six of 104 planted trees have survived (63 percent survival), and 251 of 549 proposed shrubs have survived (46 percent survival). Shrubs were planted in groups of three, so if one or two of the cluster died, the cluster could continue to grow and reproduce at that location (Attachment B and Figure 7). No large bare spots were observed in the seeded areas.

- **USS-1:** USS-1 is the planned upland shrub community located between Weir 2 and Weir 3. Thirty-nine shrubs were planted and all survived (Attachment B and Figure 8). No large bare spots were observed in the seeded areas.

- **UPF-1:** UPF-1 is the planned upland forest community in the area west of Weir 1. Twenty-three of 42 planted trees have survived (55 percent survival). Sixty of 90 planted shrubs have survived (67 percent survival). Shrubs were planted in groups of three, so if one or two of the cluster died, the cluster could continue to grow and reproduce at that location (Attachment B and Figure 9). No large bare spots were observed in the seeded areas.

- **UPF-2:** UPF-2 is the planned upland forest community in the area east of Weir 3. Twenty-four of 37 planted trees have survived (65 percent survival). Eighty of 138 planted shrubs have survived (58 percent survival). Shrubs were planted in groups of three, so if one or two of the cluster died, the cluster could continue to grow and reproduce at that location (Attachment B and Figure 10). No large bare spots were observed in the seeded areas.

- **MOW-1 and MOW-2:** MOW-1 and MOW-2 are the upland areas where an upland meadow seed mix was applied. During the May 2017 monitoring event, a large bare spot was observed in the area of the 2014/2015 construction staging area in MOW-1 (Figure 3).

3.1.2 Wetlands Photographic Monitoring

Progress in germination and growth of vegetation were monitored using panoramic photographs from five permanent photo points with a photo taken in each direction (i.e., Direction A, B, C, and D) established in uplands surrounding the constructed wetlands. The locations of the permanent photo points are shown in Figure 3. Attachment A includes a photo log which compares early restoration photos taken from these locations in 2015 and 2016 to those taken during the May 2017 monitoring event.

3.1.3 Invasive Species

Two primary invasive species were found on the site during the May 2017 monitoring, *Phragmites* and purple loosestrife. These are discussed in more detail in the sections below. Additionally, while not observed within the site boundaries, Japanese knotweed was observed near the extreme northeast corner of the site (above PSS-1), which could act as a source in the future.

3.1.3.1 *Phragmites*

During the May 2017 inspection, *Phragmites* was apparent in a few random locations south of PSS-1. In the two PEM-1 plots (PEM-1 Plot 1 and PEM-1 Plot 2) used for quantitative assessments in these areas, *Phragmites* was only 1 percent of the vegetative cover in Plot 1 and was not found in Plot 2. Since completion of restoration activities, *Phragmites* was quite prevalent in PEM-1 and continued to require periodic manual removal activities to control the presence of the invasive species. In PFO-1 and PSS-2, no *Phragmites* was reported in the quantitative transects.

As discussed above in Section 3.1.1.2, the transect in PSS-1 crosses the boundary of where *Phragmites* was not removed. The frequency that the invasive species was encountered changes from 12 percent of the total plant count in areas where it was removed to 89 percent of the total plant count in areas where it was not removed and where it overwhelmed the species composition. In addition, areas where water depth was sufficient to allow vigorous growth of cattail, *Phragmites* was generally absent (e.g., PFO-1 and central portion of PEM-1).

3.1.3.2 Purple Loosestrife

Purple loosestrife was observed in low numbers in the wetland areas but did not dominate any habitat where it was found. In the quantitative assessment, purple loosestrife made up less than 1 to 4 percent of the cover in the transects in PSS-1, PFO-1, and PSS-2. In contrast, in PEM-1, purple loosestrife comprised 7 and 12 percent in Plot 1 and Plot 2, respectively, both being higher that the target of less than 5 percent. However, as noted above in Section 3.1.1.1, Weir 2, which controls the

water depth in PEM-1, will be adjusted, which is expected to change the conditions and surviving species.

3.1.4 Additional Wetland Observations

While the monitoring plan detailed certain items to be measured (e.g., water levels, plant species, quantitative plant counts), additional observations were made in terms of the site functioning as a wetland associated habitat.

3.1.4.1 Vertebrates

One purpose of the restoration was to provide wildlife habitat. While the plant growth is still in its early stages, the wetland is already providing habitat for various vertebrate species. The following birds were noted at the Bloody Brook site: mallard ducks, red winged blackbirds, spotted sandpiper, a great blue heron, common grackle, and barn and tree swallows. Muskrats were seen several times, along with evidence of feeding and nesting. Amphibians observed included spring peepers, green frogs, and American toads.

3.1.4.2 Loosestrife beetles

While purple loosestrife, an undesirable invasive species, was observed in the wetland areas, more than half of the plants were heavily infested with purple loosestrife leaf beetles (*Galerucella calmariensis*), which had caused heavy damage to the plants. It is possible that the extent of purple loosestrife is being controlled by these insects, which had been released by the state for this purpose. Consideration should be given to not pursuing the removal of the purple loosestrife as it may not be necessary, and to provide a resident population of *G. calmariensis.*

3.2 Residential and Commercial Areas

All residential and commercial plantings included in this annual inspection were visually inspected to ensure they are successfully becoming established in accordance with the property-specific access/restoration agreements between Lockheed Martin and the property owner. Results for the inspections completed on private residential and commercial properties will be discussed, as needed, with the property owner. Field forms for private properties will be retained in the project files, but they are not included in this summary report.

3.3 Erosion Inspection

In accordance with the March 2014 Decision Document and the August 2014 *Revised Restoration Work Plan*, the site was inspected for ponding on the side banks and for erosion of the brook bottom and side banks. Field forms, notes, and photos from the May 2017 erosion inspection are provided in Attachment D. Several areas were noted as requiring over seeding, placement of additional rip rap, or adjustment of the rip rap present. However, overall, the inspection indicated the stream bottom and side banks are intact and show little signs of damage.

4.0 Discussion and Recommendations

4.1 Wooded Area and Wetland Restoration

In accordance with the NYSDEC and USACE permitting for the remediation construction activities in the WBBB and its floodplain, Lockheed Martin upgraded the stream habitat of WBBB by constructing 1.31 acres of replacement wetland habitat and replanting all disturbed areas of upland habitat within the project footprint. During the May 2017 inspection, a total of 1.57 acres of wetland were found and delineated (Figure 4 and Table 7). Thus, an excess of 0.26 acres of wetlands currently occupy the project area. This has resulted primarily from the presence of previously unidentified groundwater seeps. The post-remediation hydrology is sufficiently different from the design hydrology to alter the preferred placement of the proposed emergent, shrub/scrub, and forested wetlands. Following an adaptive management approach to the development of the wetlands, revised habitat areas are proposed below to accommodate future replacement planting activities. Upon NYSDEC concurrence with the proposed adjustment to habitat boundaries, a detailed planting plan listing specific species, numbers, and locations for planting will be prepared.

4.1.1 Adjustment of Wetland Boundaries

The approximate wetland boundaries were reestablished and mapped during the May 2017 monitoring activities (Figure 4). The northeast corner of PSS-1 is further north due to groundwater seepage in the area. The boundaries of PFO-1 are further west and south. Two areas of PFO-1, the western side and northeastern corner, are more suitable for PEM vegetation due to groundwater seepage in this area. The area west of PSS-2 has undergone *Phragmites* removal, discussed in Section 2.1.5. It is now an upgraded wetland upland area that has been seeded with wetland emergent species (W-11 in Table 7 and Figure 4). An emergent wetland (W-10 in Table 7 and Figure 4) has also developed adjacent to WBBB at the outfall of PSS-1.

4.1.2 Development of Habitat Areas

The tree and shrub counts are summarized on the Post-Remediation Vegetation Monitoring field forms (Attachment B). The upland and riparian habitat is developing essentially as designed, although tree and shrub survival is less than the target of 80 percent. The wetland habitat areas have developed slightly different than expected due to more saturated conditions related to groundwater seepage. The remainder of this section discusses the existing habitat areas and summarizes the proposed habitat areas.

PSS-1: PSS-1 has developed a robust emergent wetland community interspersed with buttonbush which withstands the constant inundation of PSS-1 due to seepage from the northeast corner. PSS-1 does not dry between inundations from the brook as planned. The majority of this wetland is developing as a PEM habitat. PSS-1 is being proposed to be split into a PEM and PSS habitat. The saturated areas would be considered PEM habitat (shown on Figure 4 as Proposed PEM-3), and the dryer areas would be considered PSS habitat (shown on Figure 4 as Proposed PSS-1). Shrubs will be planted in Proposed PSS-1 to fill in the open space, as needed.

PEM-1: PEM-1 has developed three saturated areas that are supporting PEM plant growth. The majority of the area has not developed wetland vegetation because Weir 2 does not retain water in the wetland long enough between rain events and inundations from the brook to support wetland vegetation. As previously discussed, the adjustment planned for Weir 2 is expected to solve this deficiency. Following the weir adjustments, the area is expected to better support PEM habitat. Changes to this habitat area, if needed, will be proposed following the 2018 annual monitoring event.

PFO-1: PFO-1 has a 45 percent survival rate for trees. The loss appears to be related to prolonged inundation as the black willow, which is very tolerant of inundation, showed 100 percent survival. In addition, a robust community of emergent wetland plants has developed in areas of constant inundation. There is seepage of groundwater into the wetland from the upland area immediately south of PFO-1. This seepage, combined with some apparent subsidence, does not allow PFO-1 to dry sufficiently between rain events and inundation events from WBBB to properly support a PFO habitat. It is proposed that the western and northeastern sides of PFO-1 be reclassified as a PEM wetland (see Figure 4 Proposed PFO-1, Proposed PEM-4, and Proposed PEM-5) to correspond with the new hydrologic regime and the survival of the emergent wetland plants and the black willow. Trees will be planted in Proposed PFO-1 to fill in open space between existing trees, as needed.

PSS-2: PSS-2 is located immediately southeast of PFO-1 and has a shrub survival rate of 21 percent. The low survival rate of planted shrubs is due to constant inundation, similar to PFO-1. It is being proposed that a portion of PSS-2 located adjacent to Proposed PEM-5 be developed as a PEM habitat. This would expand the area of Proposed PEM-5 to include a portion of PSS-2 as shown on Figure 4. The remaining portion of PSS-2 would continue to be a PSS habitat with a mix of emergent plants and shrubs. Shrubs will be planted in Proposed PSS-2 to fill in open space between existing shrubs, as needed.

PEM-2: PEM-2 is developing a robust community of emergent wetland plants. Although the plant community has not developed 80 percent coverage, the hydrology supports continued natural expansion of PEM habitat. The portion of PEM-2 located adjacent to PSS-2 is drier than the majority of the area. The drier area is being proposed to be a PSS habitat and extend the area of PSS-2 as shown on Figure 4.

USS-1: USS-1 is the planned upland shrub habitat located between Weir 2 and Weir 3. The area of USS-1 is slightly smaller from the designed area as shown on Figure 4. Thirty-nine shrubs were planted, and all survived (Figure 8). Additional shrubs will be planted to fill in the open space between the existing shrubs, as needed.

UPF-1: UPF-1 is the planned upland forest community in the area west of Weir 1 with a tree survival rate of 55 percent and a shrub survival rate of 67 percent (see Figure 9). Additional trees and shrubs will be planted, to fill in open space between existing trees and shrubs, as needed.

UPF-2: UPF-2 is the planned upland forest community in the area east of Weir 3 with a tree survival rate of 65 percent and a shrub survival rate of 58 percent. The area of Proposed UPF-2 has increased slightly to include a portion of MOW-2 along the channel as shown on Figure 4. Additional trees and shrubs will be planted, to fill in open space between existing trees and shrubs, as needed.

RIP-1: RIP-1 is the planned riparian forest community in the area west of Weir 1 and planted on the berm around PEM-2 and PSS-2 and includes the steam channel. A portion of RIP-1 is saturated and is included in W-11 as shown on Figure 4. RIIP-1 has a tree survival rate of 63% and a shrub survival

rate of 46% (see Figure 7). Additional trees and shrubs will be planted, to fill in open space between existing trees and shrubs, as needed.

MOW-1, MOW-2, and MOW-5: For the majority of MOW-1 and MOW-2, the seed mixture placed during restoration activities has been successful. However, there are large bare spots in MOW-1 (where the temporary construction staging area was setup). Those bare spots should be reseeded with the upland meadow seed mix (Appendix C). The area of MOW-1 was expanded slightly to include a portion of Proposed PFO-1, and the area of MOW-2 was decreased slightly between the channel and UPF-2. In addition, MOW-5 was reduced as the majority of this area is saturated and is included in W-11. The proposed MOW areas are shown on Figure 4.

4.1.3 Volunteer Trees

After any land is cleared in the Syracuse area, a variety of early successional plants, including trees, seed themselves and begin to grow. A number of these "volunteers" have begun growing in the project area and will add to the diversity of the plant communities that have established. Volunteer seedling tree species documented on site include:

- Red Maple (*Acer rubrum*)
- Box elder (*Acer negundo*)
- Silver maple (*Acer saccharinum*)
- Cottonwood (*Populus deltoides*)
- Green ash (*Fraxinus pennsylvanicus*)
- Staghorn sumac (Rhus typhina)
- Willows (*Salix sp*.)

4.1.4 Invasive Species

There were two primary invasive species noted, *Phragmites* and purple loosestrife. Manual removal was successful at reducing the population of *Phragmites* and will continue to be implanted at the site.

The presence of purple loosestrife leaf beetles appears to be keeping this species under control. The continued presence of a reduced population of loosestrife would provide forage for a resident population of leaf beetles, and an intensive effort to remove purple loosestrife is not being proposed at this time.

4.2 Residential and Commercial Areas

No major issues were identified on the private properties during the monitoring event. Results and recommendations for these inspections completed on private properties will be discussed as needed with the property owner. Field forms for private properties will be retained in the project files, but they are not included in this summary report.

4.3 Erosion

No major areas of concern along the brook channel were noted. The stream bottom and side banks were intact and showed little signs of damage during the May 2017 erosion inspection. However, several areas were noted as requiring over seeding, placement of additional rip rap, or adjustment of the rip rap currently present. The Restoration Inspection Form and erosion inspection notes and photos from the May 2017 erosion inspection are provided in Attachment D and identify 12 separate

areas that should be monitored more frequently and that should be addressed this season. Specifically, these areas are showing some minor vegetation loss and minor erosion of bank material and/or rip rap. Corrective measures will include over seeding, adjustment of rip rap, or placement of additional rip rap. These areas will be monitored monthly or following any significant rainfall event until the corrective actions can be implemented.

5.0 Conclusions and Next Steps

This RMSR has been prepared to summarize the results of the monitoring activities completed in May 2017 including an evaluation of the success of the vegetation planting and established hydraulic regimes and an inspection for areas of erosion at the Bloody Brook site. This was the first of the annual inspections to be completed for five years following completion of restoration activities to ensure no erosion of the channel and banks is occurring and that the vegetation is developing as intended.

No major issues were identified during the inspection of the restoration on residential and commercial properties. The erosion inspection identified 12 areas showing some minor vegetation loss and minor erosion of bank material and/or rip rap. Corrective measures will include over seeding, adjustment of rip rap, or placement of additional rip rap.

In accordance with NYSDEC and USACE permitting for the remediation construction activities in the WBBB and its floodplain, Lockheed Martin upgraded the stream habitat of WBBB by constructing 1.31 acres of replacement wetland habitat and replanting all disturbed areas of upland habitat within the project footprint. During the May 2017 inspection, a total of 1.57 acres of wetland were found and delineated. Thus, an excess of 0.26 acres of wetlands currently occupy the project area. This has resulted mainly from the presence of previously unidentified groundwater seeps.

The post-remediation hydrology is different than the design hydrology and has altered the placement of the proposed emergent, shrub/scrub, and forested wetlands. Although the constructed layout and elevations of the replacement wetlands closely match the design, the existing hydrology requires an adaptive management approach to ensure the successful development of the restored habitat areas. Groundwater is entering the PSS-1 and PFO-1/PSS-2 areas, and these wetlands remain constantly inundated instead of drying between rain and brook flooding events. As a result of the increased hydrology, significant mortality of planted nursery stock (especially shrubs) has occurred. This has also led to a proliferation of PEM species that thrive in the constantly inundated areas.

Following an adaptive management approach, proposed habitat areas are identified below to adapt the designed habitat areas to the altered hydrologic regime. The proposed habitat areas include shifting some of the habitat boundaries as shown on Figure 4 and listed below:

- PSS-1 is being proposed to be split into a PEM and PSS habitat. The saturated areas would be considered PEM habitat (shown on Figure 4 as Proposed PEM-3), and the dryer areas would be considered PSS habitat (shown on Figure 4 as Proposed PSS-1).

- PEM-1 has saturated areas, and an area that is too dry to support wetland vegetation. As previously discussed, the adjustment planned for Weir 2 is expected to solve this deficiency. Following the weir adjustment, PEM-1 is expected to better support a PEM habitat. It is proposed that this area continue to be monitored after the Weir 2 adjustments to confirm suitable vegetation is developing in this habitat area.

- PFO-1 has developed two saturated areas that would be better classified as PEM habitats. To correspond with the hydrologic regime and the survival of the emergent wetland plants

and black willows in the saturated portions of this area, the western and northeastern sides of PFO-1 is being proposed to be reclassified as a PEM wetland and the remaining portions of this area remain as PFO wetland (see Figure 4 Proposed PFO-1, Proposed PEM-4, and Proposed PEM-5).

- The portion of PSS-2 located adjacent to Proposed PEM-5 on Figure 4 is saturated and would be better classified as a PEM habitat. This would expand the area of Proposed PEM-5 to include a portion of PSS-2 as shown on Figure 4. The remaining portion of PSS-2 would continue be a PSS habitat with a mix of emergent plants and shrubs.

- PEM-2 is developing a robust community of emergent wetland plants. Although the plant community has not developed 80 percent coverage, the hydrology supports continued natural expansion of PEM habitat. The portion of PEM-2 located adjacent to PSS-2 is drier than the majority of the PEM-2. The drier area is being proposed to be a PSS habitat and extend the area of PSS-2 as shown on Figure 4.

- Wetlands W-10 and W-11 require no further action at this time. Monitoring of the growth of the wetland plants in these areas will continue along with the control of invasive species. species.

- A portion of USS-1 located adjacent to Proposed PFO-1 has developed as a wetland and will expand the area of Proposed PFO-1 as shown on Figure 4.

- UPF-1 is the planned upland forest community in the area west of Weir 1. No adjustments were made to this habitat area.

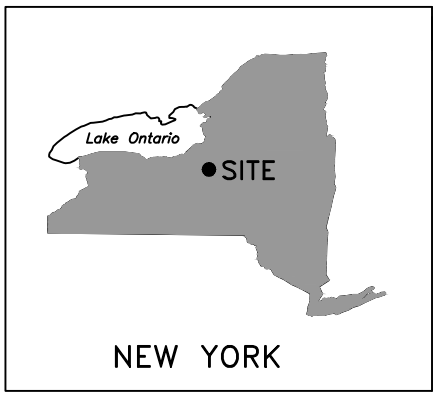
- UPF-2 is the planned upland forest community in the area east of Weir 3. The area of UPF-2 was increased slightly to include a portion of MOW-2 along the channel as shown on Figure 4.

- RIP-1 is the planned riparian forest community in the area west of Weir 1 and planted on the berm around PEM-2 and PSS-2. A portion of RIP-1 is saturated and is included in W-11 as shown on Figure 4.

- For MOW areas, the area of MOW-1 was expanded slightly to include a portion of Proposed PFO-1, and the area of MOW-2 was decreased slightly between the channel and UPF-2. In addition, MOW-5 was reduced as the majority of this area is saturated and is included in W-11. The proposed MOW areas are shown on Figure 4.

Following receipt of NYSDEC's acceptance of the proposed habitat boundaries as shown on Figure 4 and summarized above, a maintenance work plan will be submitted to NYSDEC for review and approval. That work plan will include a detailed planting plan and activities to repair any erosion issues noted in Section 4.3. It is anticipated that maintenance activities, including planting and erosion repair activities, will occur in October/November 2017.

Figures



0' 2000' 4000'

APPROXIMATE SCALE

REFERENCE:

1. NYSDOT 7.5 MIN TOPOGRAPHIC MAP OF SYRACUSE WEST, QUADRANGLE 1990, SCALE: 1" = 2000'.

AECOM

LOCKHEED MARTIN CORPORATION

SITE LOCATION MAP

WEST BRANCH OF BLOODY BROOK
ONONDAGA COUNTY, NEW YORK

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE NO.
A1FIG1.dwg	RNB	60540930	7 / 2017	1

Plotted By: Bookasr
Layout-Sheet Name: LAYOUT1
Plot File Date Created: Jul/17/2017 8:36 AM

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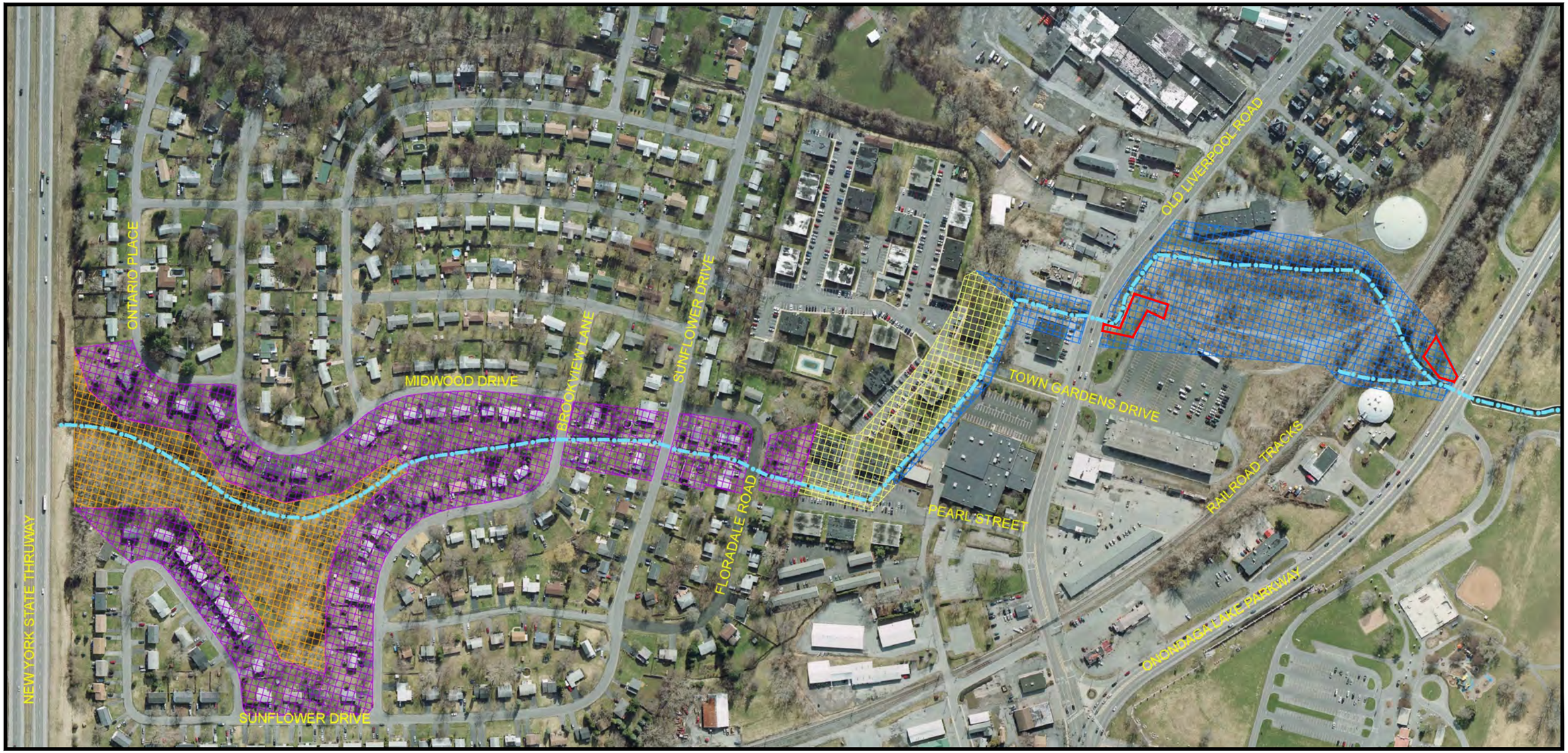

Legend

- CURRENT BROOK ALIGNMENT
- WOODED AREA
- RESIDENTIAL AREA
- APARTMENT COMPLEX AREA
- COMMERCIAL-LIGHT INDUSTRIAL AREA
- COMMERCIAL AREAS EXCLUDED FROM MAY 2017 MONITORING

0' 1,200' 2,400'

APPROXIMATE SCALE

AECOM

LOCKHEED MARTIN CORPORATION

SITE AREA MAP

WEST BRANCH OF BLOODY BROOK
ONONDAGA COUNTY, NEW YORK

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE NO.
SiteAreaMap.dwg	---	60540930	7 / 2017	2

Plotted By: Bookasr
Layout-Sheet Name: FIGURE 1--2
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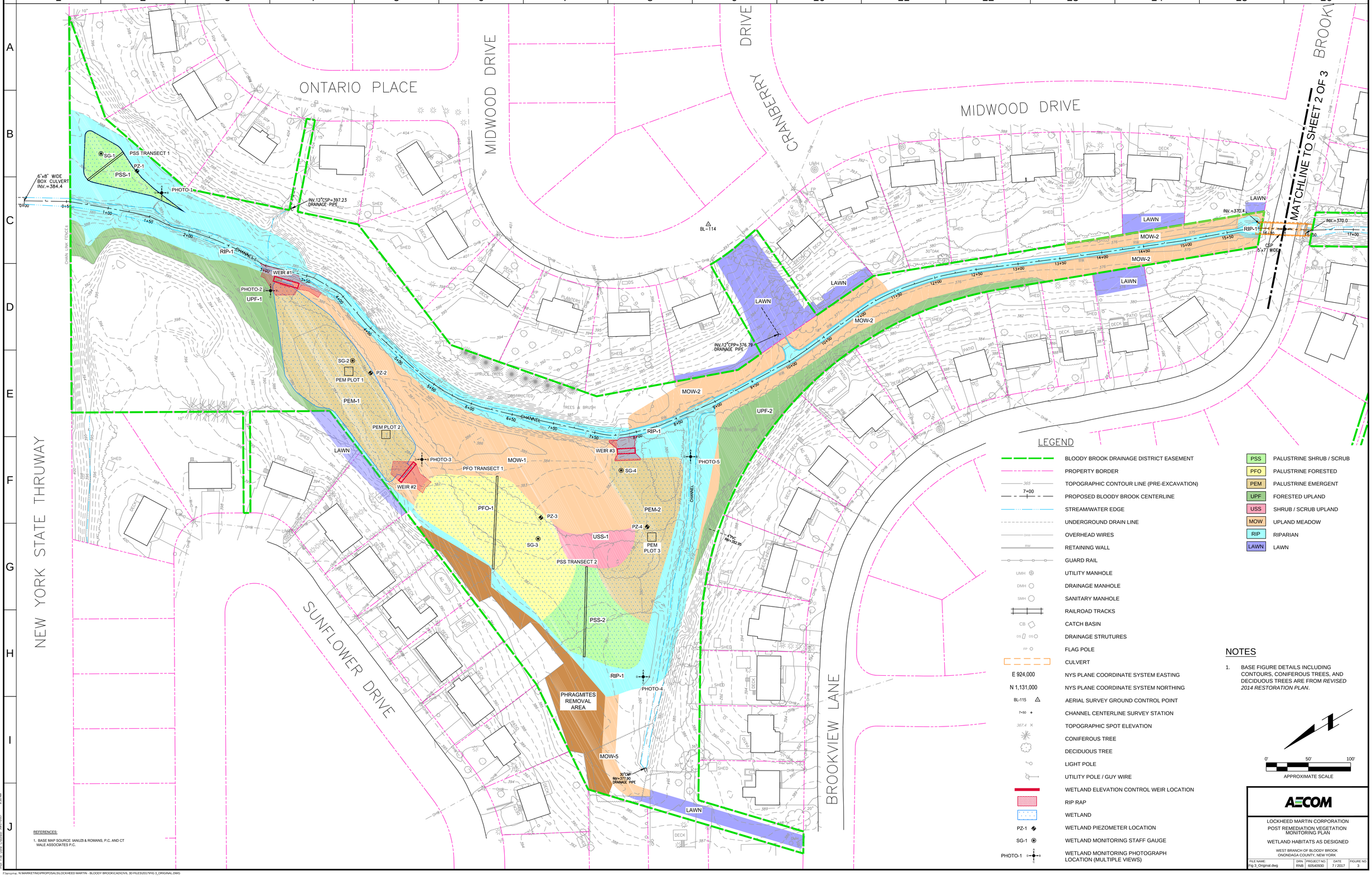


LEGEND

- BLOODY BROOK DRAINAGE DISTRICT EASEMENT
- PROPERTY BORDER
- TOPOGRAPHIC CONTOUR LINE (PRE-EXCAVATION)
- PROPOSED BLOODY BROOK CENTERLINE
- STREAM/WATER EDGE
- UNDERGROUND DRAIN LINE
- OVERHEAD WIRES
- RETAINING WALL
- GUARD RAIL
- UTILITY MANHOLE
- DRAINAGE MANHOLE
- SANITARY MANHOLE
- RAILROAD TRACKS
- CATCH BASIN
- DRAINAGE STRUTURES
- FLAG POLE
- CULVERT
- NYS PLANE COORDINATE SYSTEM EASTING
- NYS PLANE COORDINATE SYSTEM NORTHING
- AERIAL SURVEY GROUND CONTROL POINT
- CHANNEL CENTERLINE SURVEY STATION
- TOPOGRAPHIC SPOT ELEVATION
- CONIFEROUS TREE
- DECIDUOUS TREE
- LIGHT POLE
- UTILITY POLE / GUY WIRE
- WETLAND ELEVATION CONTROL WEIR LOCATION
- RIP RAP
- WETLAND
- WETLAND PIEZOMETER LOCATION
- WETLAND MONITORING STAFF GAUGE
- WETLAND MONITORING PHOTOGRAPH LOCATION (MULTIPLE VIEWS)

- PSS PALUSTRINE SHRUB / SCRUB
- PFO PALUSTRINE FORESTED
- PEM PALUSTRINE EMERGENT
- UPF FORESTED UPLAND
- USS SHRUB / SCRUB UPLAND
- MOW UPLAND MEADOW
- RIP RIPARIAN
- LAWN LAWN

NOTES

1. BASE FIGURE DETAILS INCLUDING CONTOURS, CONIFEROUS TREES, AND DECIDUOUS TREES ARE FROM *REVISED 2014 RESTORATION PLAN*.

0' 50' 100'
APPROXIMATE SCALE

REFERENCES:

1. BASE MAP SOURCE: IANUZI & ROMANS, P.C. AND CT MALE ASSOCIATES P.C.

AECOM

LOCKHEED MARTIN CORPORATION
POST REMEDIATION VEGETATION MONITORING PLAN

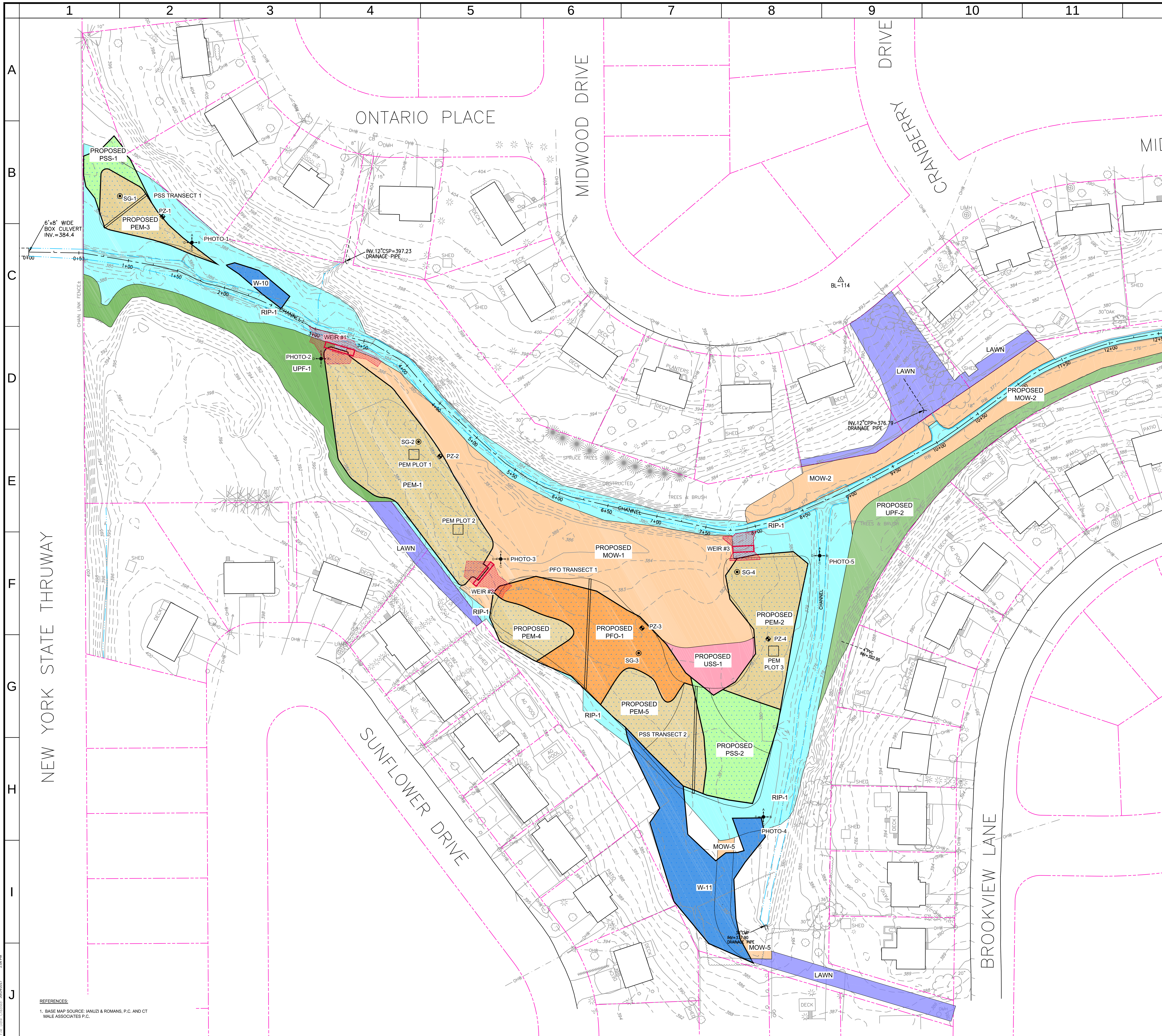
WETLAND HABITATS AS DESIGNED

WEST BRANCH OF BLOODY BROOK
ONONDAGA COUNTY, NEW YORK

FILE NAME:	DRN.	PROJECT NO.	DATE	FIGURE NO.
Fig 3_Original.dwg	RNB	60540930	7 / 2017	3

Plotted By: Barker
Layout: Sheet Name: FIGURE 3_ORIGINAL COMMUNITIES
July 24, 2017 - 10:09AM

Filename: N:\MARKETING\PROPOSALS\LOCKHEED MARTIN - BLOODY BROOK\CAD\CIVIL 3D FILES\2017\FIG 3_ORIGINAL.DWG



LEGEND

Symbol	Description
	BLOODY BROOK DRAINAGE DISTRICT EASEMENT
	PROPERTY BORDER
	TOPOGRAPHIC CONTOUR LINE (PRE-EXCAVATION)
7+00	PROPOSED BLOODY BROOK CENTERLINE
	STREAM/WATER EDGE
	UNDERGROUND DRAIN LINE
	OVERHEAD WIRES
	RETAINING WALL
	GUARD RAIL
UMH	UTILITY MANHOLE
DMH	DRAINAGE MANHOLE
SMH	SANITARY MANHOLE
	RAILROAD TRACKS
CB	CATCH BASIN
DS	DRAINAGE STRUTURES
FP	FLAG POLE
	CULVERT
E 924,000	NYS PLANE COORDINATE SYSTEM EASTING
N 1,131,000	NYS PLANE COORDINATE SYSTEM NORTHING
BL-115	AERIAL SURVEY GROUND CONTROL POINT
7+50	CHANNEL CENTERLINE SURVEY STATION
387.4	TOPOGRAPHIC SPOT ELEVATION
	CONIFEROUS TREE
	DECIDUOUS TREE
	LIGHT POLE
	UTILITY POLE / GUY WIRE
	WETLAND ELEVATION CONTROL WEIR LOCATION
	RIP RAP
	EXISTING WETLAND
PZ-1	WETLAND PIEZOMETER LOCATION
SG-1	WETLAND MONITORING STAFF GAUGE
PHOTO-1	WETLAND MONITORING PHOTOGRAPH LOCATION (MULTIPLE VIEWS)

Code	Description
PSS	PALUSTRINE SHRUB / SCRUB
PFO	PALUSTRINE FORESTED
PEM	PALUSTRINE EMERGENT
PEM/PFO	PALUSTRINE EMERGENT/ PALUSTRINE FORESTED
UPF	FORESTED UPLAND
USS	SHRUB / SCRUB UPLAND
MOW	UPLAND MEADOW
RIP	RIPARIAN
LAWN	LAWN
W	WETLAND

NOTES

1. BASE FIGURE DETAILS INCLUDING CONTOURS, CONIFEROUS TREES, AND DECIDUOUS TREES ARE FROM *REVISED 2014 RESTORATION PLAN*.

0' 50' 100'
APPROXIMATE SCALE

REFERENCES:

1. BASE MAP SOURCE: IANUZI & ROMANS, P.C. AND CT MALE ASSOCIATES P.C.

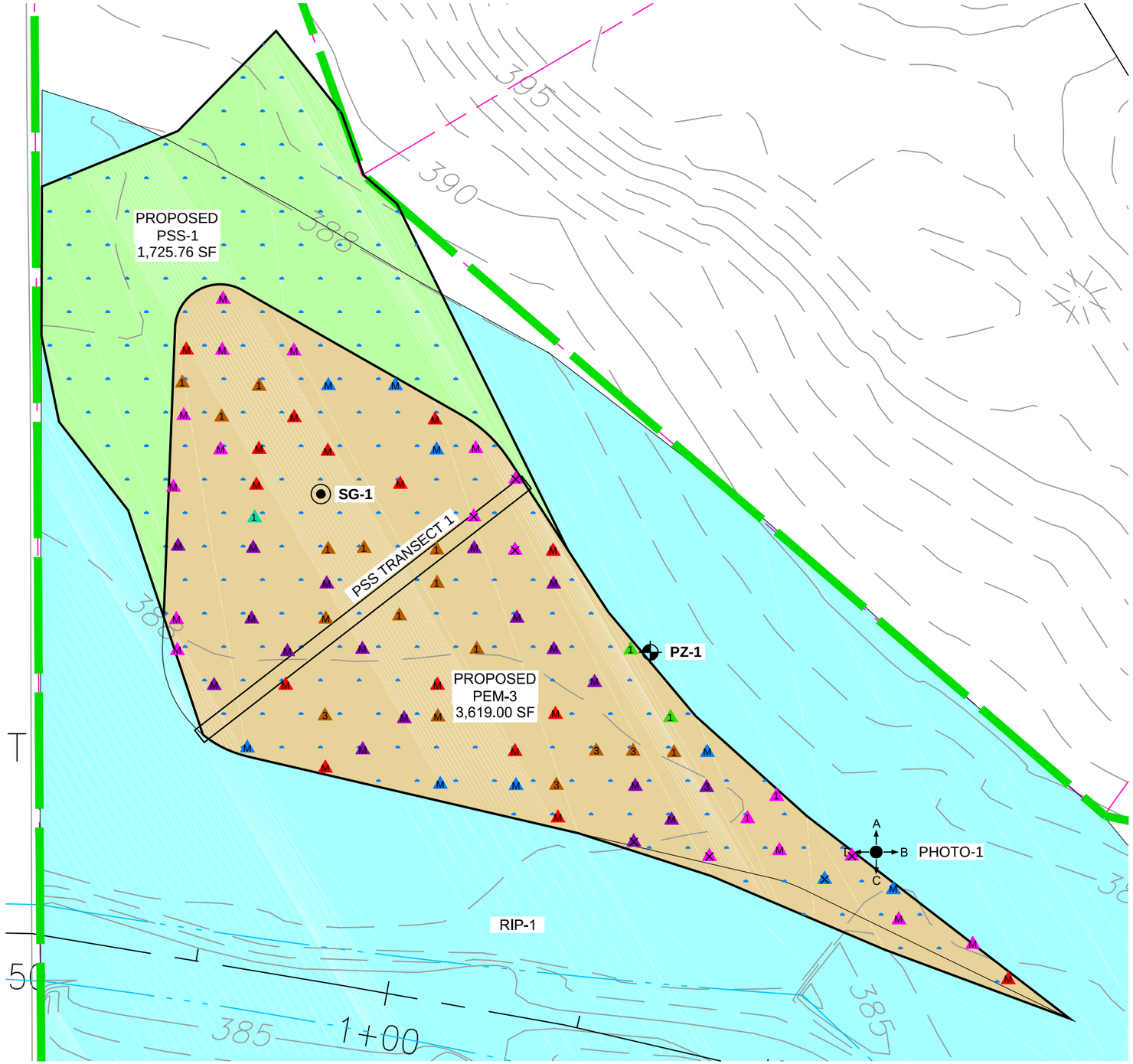
AECOM

LOCKHEED MARTIN CORPORATION

POST REMEDIATION VEGETATION MONITORING PLAN
PROPOSED WETLAND HABITATS

WEST BRANCH OF BLOODY BROOK
ONONDAGA COUNTY, NEW YORK

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE NO.
2017 Planting Plan.dwg	RNB	60540930	7 / 2017	4



LEGEND

- PZ-1 — WETLAND PIEZOMETER LOCATION
- SG-1 — WETLAND MONITORING STAFF GAUGE
- PHOTO-1 — WETLAND MONITORING PHOTOGRAPH LOCATION (MULTIPLE VIEWS)
- PSS — PALUSTRINE SHRUB / SCRUB
- PEM — PALUSTRINE EMERGENT
- RIP — RIPARIAN
- EXISTING WETLAND

SHRUBS

- BUTTONBUSH
- ELDERBERRY
- NORTHERN ARROWWOOD
- RED CHOKEBERRY
- RED OSIER DOGWOOD
- SILKY DOGWOOD
- SPECKLED ALDER

PLANT STATUS

- \ — STRESSED
- × — DEAD
- M — MISSING*
- 3 — NUMBER OF LIVING SHRUBS

NOTES

1. EXCEPT FOR THE LOWEST AREAS OF THE WETLANDS, SHRUBS WERE PLANTED AND SURVEYED IN GROUPS OF THREE.
2. BASE FIGURE DETAILS INCLUDING CONTOURS, CONIFEROUS TREES, AND DECIDUOUS TREES ARE FROM *REVISED 2014 RESTORATION PLAN*.
3. THE PROPOSED WETLAND BOUNDARIES BASED ON THE MAY 2017 INSPECTION ARE SHOWN.
4. * SHRUB COULD NOT BE LOCATED.

0’ 15’ 30’

AECOM

LOCKHEED MARTIN CORPORATION

POST REMEDIATION VEGETATION MONITORING PLAN

EXISTING PLANTING LOCATIONS FOR PROPOSED PEM-3

WEST BRANCH OF BLOODY BROOK
ONONDAGA COUNTY, NEW YORK

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE
2017 Planting Plan.dwg	RNB	60540930	7 / 2017	5

Plotted By: Bookasr
Layout-Sheet Name: FIG 5_PLANTING PLAN PSS-1
Plot File Date Created: Jul/27/2017 10:37 AM

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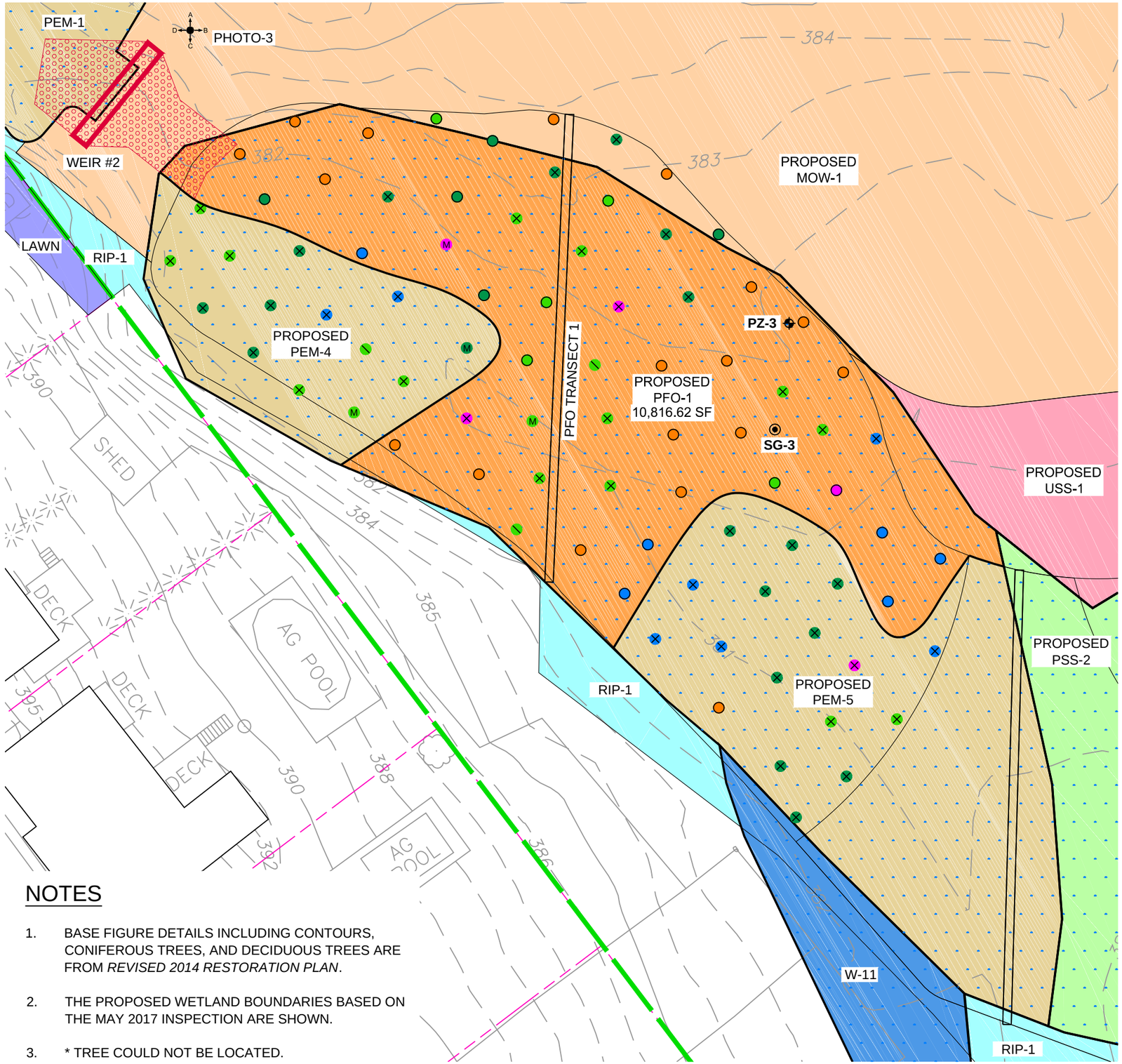

NOTES

1. BASE FIGURE DETAILS INCLUDING CONTOURS, CONIFEROUS TREES, AND DECIDUOUS TREES ARE FROM *REVISED 2014 RESTORATION PLAN*.
2. THE PROPOSED WETLAND BOUNDARIES BASED ON THE MAY 2017 INSPECTION ARE SHOWN.
3. * TREE COULD NOT BE LOCATED.

LEGEND

- PZ-3 — WETLAND PIEZOMETER LOCATION
- SG-3 — WETLAND MONITORING STAFF GAUGE
- PHOTO-3 — WETLAND MONITORING PHOTOGRAPH LOCATION (MULTIPLE VIEWS)
- PSS — PALUSTRINE SHRUB / SCRUB
- PFO — PALUSTRINE FORESTED
- PEM — PALUSTRINE EMERGENT
- PEM/PFO — PALUSTRINE EMERGENT/ PALUSTRINE FORESTED
- USS — SHRUB / SCRUB UPLAND
- MOW — UPLAND MEADOW
- RIP — RIPARIAN
- LAWN — LAWN
- W — WETLAND
- EXISTING WETLAND

TREES

- BLACK WILLOW
- PIN OAK
- RED MAPLE
- RIVER BIRCH
- SWAMP WHITE OAK

PLANT STATUS

- LIVING TREES
- STRESSED
- DEAD
- M — MISSING*

0’ 25’ 50’

AECOM

LOCKHEED MARTIN CORPORATION
POST REMEDIATION VEGETATION MONITORING PLAN
EXISTING PLANTING LOCATIONS FOR PROPOSED PFO-1
WEST BRANCH OF BLOODY BROOK
ONONDAGA COUNTY, NEW YORK

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE
2017 Planting Plan.dwg	RNB	60540930	7 / 2017	6

Plotted By: Bookasr
Layout–Sheet Name: FIG 6_PLANTING PLAN PFO-1
Plot File Date Created: 10:37 AM 7/7/2017

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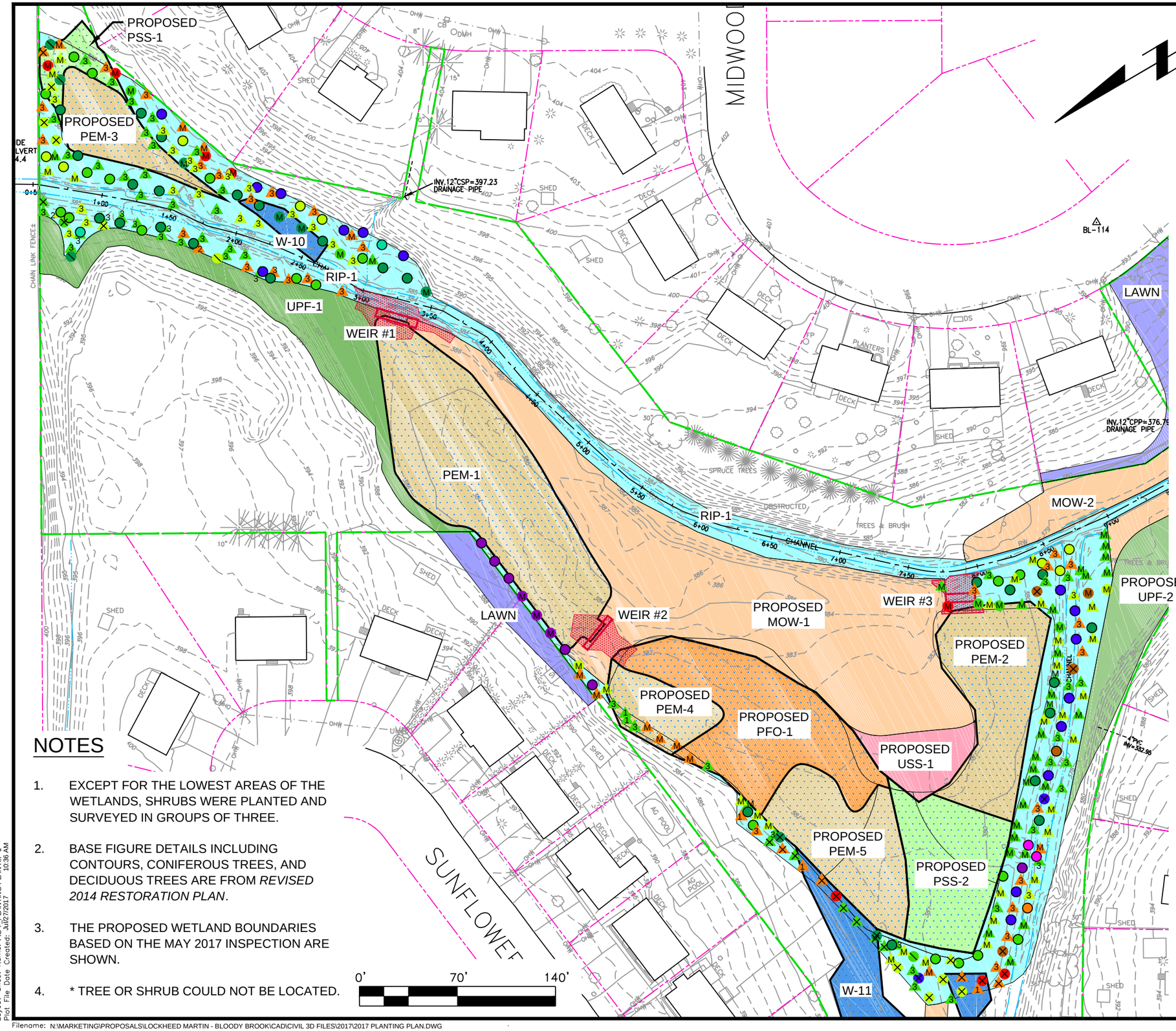

LEGEND

PSS	PALUSTRINE SHRUB / SCRUB
PFO	PALUSTRINE FORESTED
PEM	PALUSTRINE EMERGENT
PEM/ PFO	PALUSTRINE EMERGENT/ PALUSTRINE FORESTED
UPF	FORESTED UPLAND
USS	SHRUB / SCRUB UPLAND
MOW	UPLAND MEADOW
RIP	RIPARIAN
LAWN	LAWN
W	WETLAND
	EXISTING WETLAND

TREES

- AMERICAN BEECH
- BLACK CHERRY
- BLACK WILLOW
- EASTERN HEMLOCK
- PIN OAK
- RED MAPLE
- SILVER MAPLE
- SUGAR MAPLE
- SWAMP WHITE OAK
- WHITE PINE

SHRUBS

- GREY DOGWOOD
- NANNYBERRY
- NORTHERN ARROWWOOD

PLANT STATUS

- LIVING TREES
- STRESSED
- DEAD
- M — MISSING*
- 3 — NUMBER OF LIVING SHRUBS

NOTES

1. EXCEPT FOR THE LOWEST AREAS OF THE WETLANDS, SHRUBS WERE PLANTED AND SURVEYED IN GROUPS OF THREE.
2. BASE FIGURE DETAILS INCLUDING CONTOURS, CONIFEROUS TREES, AND DECIDUOUS TREES ARE FROM *REVISED 2014 RESTORATION PLAN*.
3. THE PROPOSED WETLAND BOUNDARIES BASED ON THE MAY 2017 INSPECTION ARE SHOWN.
4. * TREE OR SHRUB COULD NOT BE LOCATED.

AECOM

LOCKHEED MARTIN CORPORATION

POST REMEDIATION VEGETATION MONITORING PLAN
EXISTING PLANTING LOCATIONS FOR RIP-1

WEST BRANCH OF BLOODY BROOK
ONONDAGA COUNTY, NEW YORK

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE
2017 Planting Plan.dwg	RNB	60540930	7 / 2017	7

Plotted By: Bookasr
Layout-Sheet Name: FIG 7_PLANTING PLAN RIP-1
Plot File Date Created: Jul/27/2017 10:36 AM

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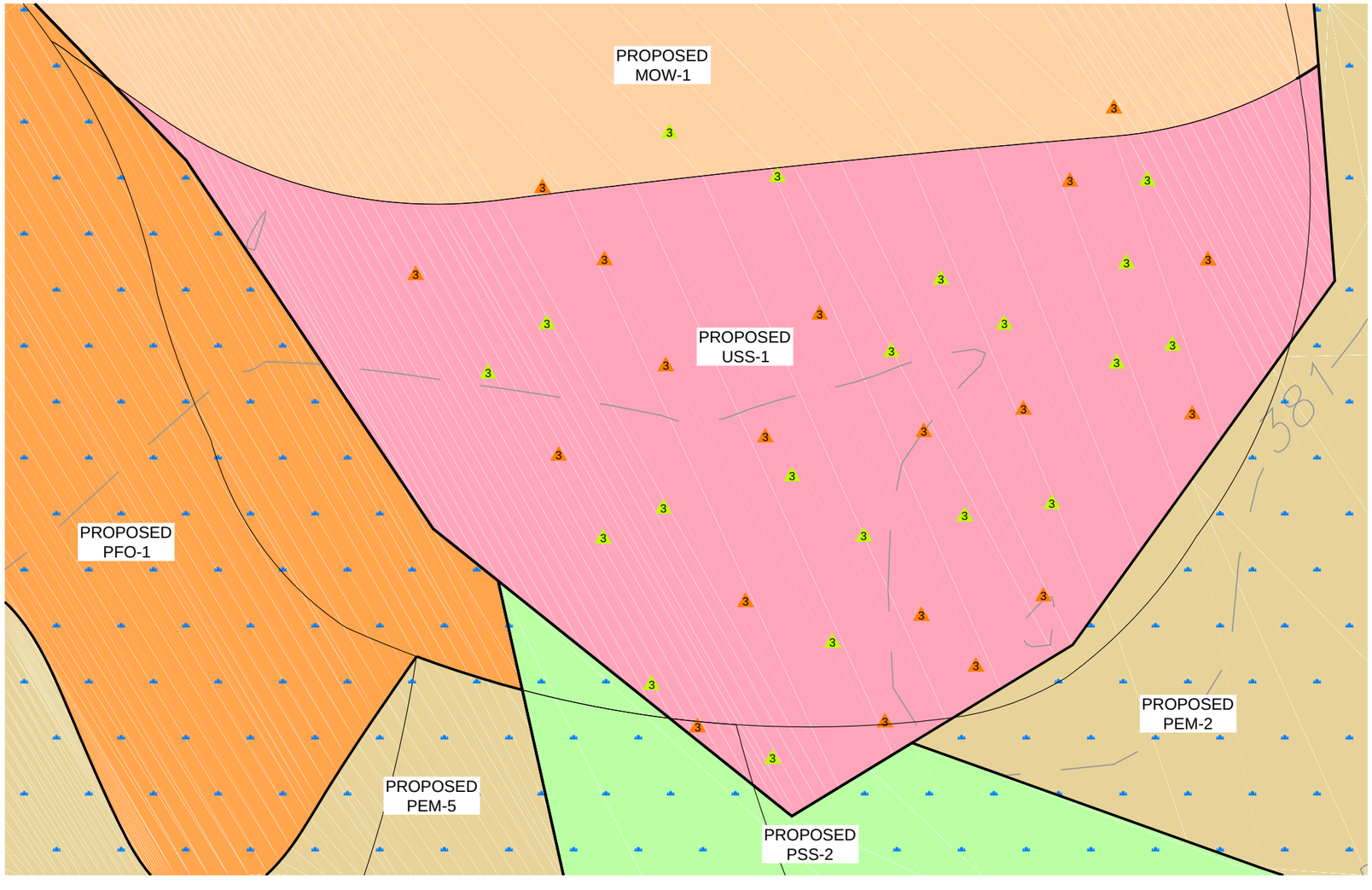

LEGEND

PSS	PALUSTRINE SHRUB / SCRUB
PEM	PALUSTRINE EMERGENT
PEM/ PFO	PALUSTRINE EMERGENT/ PALUSTRINE FORESTED
USS	SHRUB / SCRUB UPLAND
MOW	UPLAND MEADOW
	EXISTING WETLAND

SHRUBS

- GREY DOGWOOD
- NANNYBERRY

PLANT STATUS

3 NUMBER OF LIVING SHRUBS

NOTES

1. EXCEPT FOR THE LOWEST AREAS OF THE WETLANDS, SHRUBS WERE PLANTED AND SURVEYED IN GROUPS OF THREE.
2. BASE FIGURE DETAILS INCLUDING CONTOURS, CONIFEROUS TREES, AND DECIDUOUS TREES ARE FROM *REVISED 2014 RESTORATION PLAN*.
3. THE PROPOSED WETLAND BOUNDARIES BASED ON THE MAY 2017 INSPECTION ARE SHOWN.

0’ 10’ 20’

AECOM

LOCKHEED MARTIN CORPORATION

POST REMEDIATION VEGETATION MONITORING PLAN

EXISTING PLANTING LOCATIONS FOR PROPOSED USS-1

WEST BRANCH OF BLOODY BROOK
ONONDAGA COUNTY, NEW YORK

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE
2017 Planting Plan.dwg	RNB	60540930	7 / 2017	8

Plotted By: Bookasr
Layout–Sheet Name: FIG 8_PLANTING PLAN USS-1
Plot File Date Created: Jul/24/2017 11:42 AM

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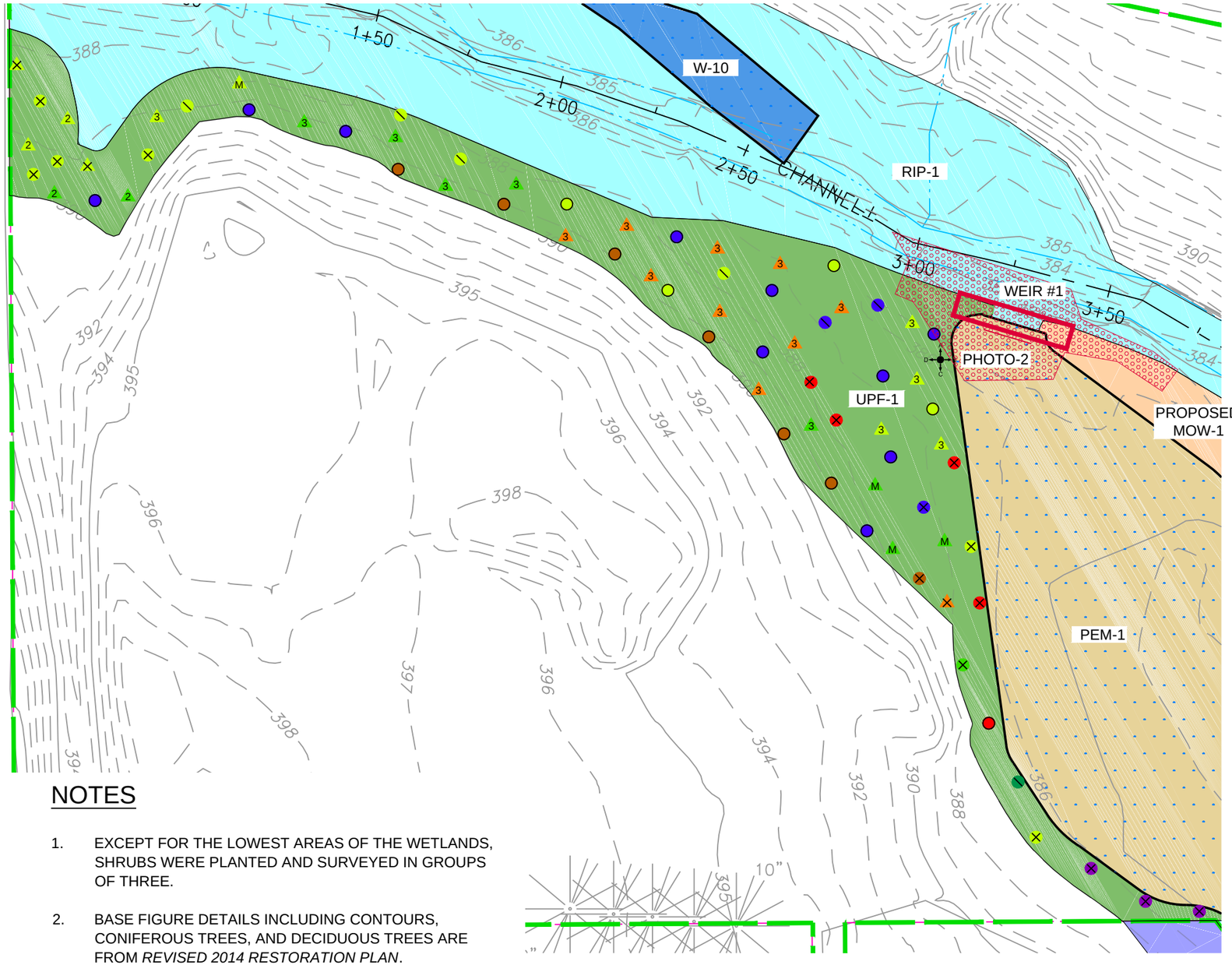

LEGEND

PHOTO-2 — WETLAND MONITORING PHOTOGRAPH LOCATION (MULTIPLE VIEWS)

- PEM — PALUSTRINE EMERGENT
- UPF — FORESTED UPLAND
- MOW — UPLAND MEADOW
- RIP — RIPARIAN
- W — WETLAND
- EXISTING WETLAND

TREES

- AMERICAN BEECH
- BLACK CHERRY
- EASTERN HEMLOCK
- PIN OAK
- RED MAPLE
- SUGAR MAPLE
- WHITE PINE

SHRUBS

- GREY DOGWOOD
- NANNYBERRY
- NORTHERN ARROWWOOD

PLANT STATUS

- ○ LIVING TREES
- \ STRESSED
- × DEAD
- M MISSING*
- 3 NUMBER OF LIVING SHRUBS

NOTES

1. EXCEPT FOR THE LOWEST AREAS OF THE WETLANDS, SHRUBS WERE PLANTED AND SURVEYED IN GROUPS OF THREE.
2. BASE FIGURE DETAILS INCLUDING CONTOURS, CONIFEROUS TREES, AND DECIDUOUS TREES ARE FROM *REVISED 2014 RESTORATION PLAN*.
3. THE PROPOSED WETLAND BOUNDARIES BASED ON THE MAY 2017 INSPECTION ARE SHOWN.
4. * TREE OR SHRUB COULD NOT BE LOCATED.

0' 15' 30' 60'

AECOM

LOCKHEED MARTIN CORPORATION

POST REMEDIATION VEGETATION MONITORING PLAN
EXISTING PLANTING LOCATIONS FOR UPF-1

WEST BRANCH OF BLOODY BROOK
ONONDAGA COUNTY, NEW YORK

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE
2017 Planting Plan.dwg	RNB	60540930	7 / 2017	9

Plotted By: Bookasr
Layout–Sheet Name: FIG 9_PLANTING PLAN UPF-1
Plot File Date Created: Jul/27/2017 10:35 AM

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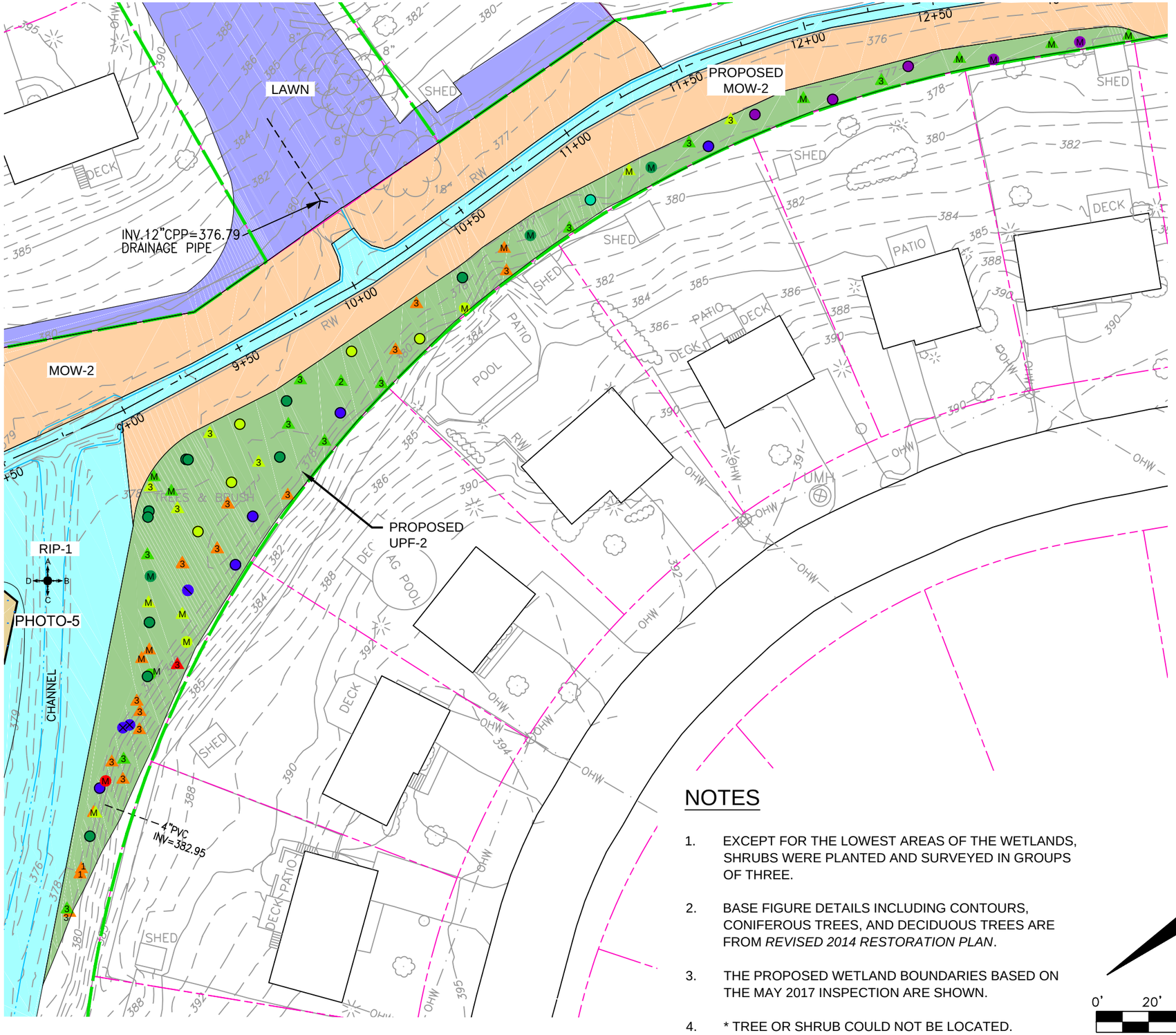

LEGEND

PHOTO-5 — WETLAND MONITORING PHOTOGRAPH LOCATION (MULTIPLE VIEWS)

- UPF — FORESTED UPLAND
- MOW — UPLAND MEADOW
- RIP — RIPARIAN
- LAWN — LAWN
- EXISTING WETLAND

TREES

- BLACK CHERRY
- EASTERN HEMLOCK
- PIN OAK
- RED MAPLE
- SILVER MAPLE
- SUGAR MAPLE
- WHITE PINE

SHRUBS

- ELDERBERRY
- GREY DOGWOOD
- NANNYBERRY
- NORTHERN ARROWWOOD

PLANT STATUS

- ○ LIVING TREES
- \ STRESSED
- × DEAD
- M MISSING*
- 3 NUMBER OF LIVING SHRUBS

NOTES

1. EXCEPT FOR THE LOWEST AREAS OF THE WETLANDS, SHRUBS WERE PLANTED AND SURVEYED IN GROUPS OF THREE.
2. BASE FIGURE DETAILS INCLUDING CONTOURS, CONIFEROUS TREES, AND DECIDUOUS TREES ARE FROM *REVISED 2014 RESTORATION PLAN*.
3. THE PROPOSED WETLAND BOUNDARIES BASED ON THE MAY 2017 INSPECTION ARE SHOWN.
4. * TREE OR SHRUB COULD NOT BE LOCATED.

0’ 20’ 40’ 80’

AECOM

LOCKHEED MARTIN CORPORATION

POST REMEDIATION VEGETATION MONITORING PLAN

EXISTING PLANTING LOCATIONS FOR PROPOSED UPF-2

WEST BRANCH OF BLOODY BROOK
ONONDAGA COUNTY, NEW YORK

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE
2017 Planting Plan.dwg	RNB	60540930	7 / 2017	10

Plotted By: Bookasr
Layout–Sheet Name: FIG 10_PLANTING PLAN UPF-2
Plot File Date Created: Jul/27/2017 10:36 AM

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Tables

Table 1. Restored Wooded and Wetland Habitat Types

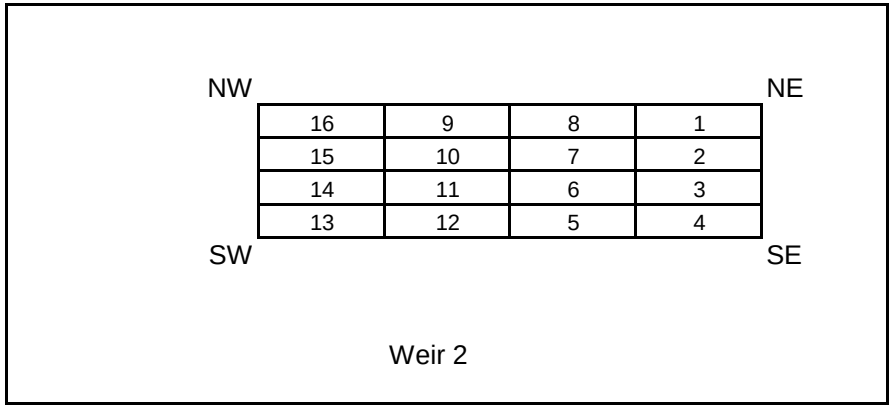
Habitat Type	Habitat ID*	Quantitative Measure*
Palustrine Emergent	PEM-1	Plot 1 and Plot 2
	PEM-2	Plot 3
Palustrine Shrub/Scrub	PSS-1	PSS Transect 1
	PSS-2	PSS Transect 2
		Survival Rate
Palustrine Forested	PFO-1	PFO Transect 1
		Survival Rate
Riparian	RIP-1	Survival Rate
Upland Shrub/Scrub	USS-1	Survival rate
Forested Upland	UPF-1	Survival Rate
	UPF-2	
Upland Meadow	MOW-1	Only qualitative measure used – visual inspection of ground cover.
	MOW-2	
	MOW-5	

* See Figure 3 for habitat, plot, and transect locations.

Table 2. Emergent Vegetation Percent Cover for PEM-1 Plot 1 (May 2017)

Block	Cattail	Soft Rush	Soft Stemmed Bulrush	Beaked Spike Rush	Wool-Grass	Purple Loosestrife	Twig Rush	Lurid Sedge	Block Total	Block Percent Cover
1	5	30		5		10	10		60	3.7
2	5	15	3		10	5	40	2	80	5
3	15	15	20		20				70	4.4
4	10		40	5					55	3.4
5	50		35	10		3			98	6.1
6	10		45	10		2	15		82	5.1
7	30	5	30	3		8	2		78	4.9
8	10	30	5	10	5	8	20		88	5.5
9	10	20	8	25	2	15	20		100	6.3
10	15	5	25	5		10	5		65	4.1
11	30	2	40	5	3				80	5
12	60		20	5					85	5.3
13	70		10	15		2			97	6.1
14	40		35	25					100	6.3
15	5		30	40		8			83	5.2
16	3	20	5	20		20	15		83	5.2
Total	368	142	351	183	40	91	127	2	1,304	**81.5**

Permanent PEM-1 Plot 1



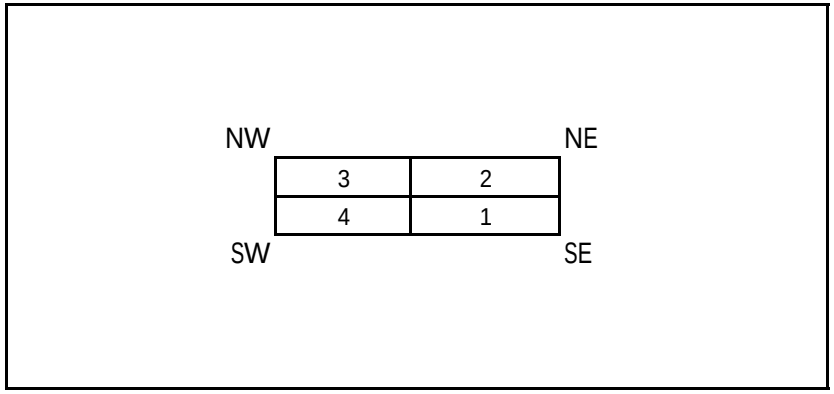
Notes:

1. The numbers in the grids above correspond to the block number in PEM-1 Plot 1.
2. See Figure 3 for Permanent PEM Plot 1 location.

Table 3. Emergent Vegetation Percent Cover for PEM-1 Plot 2 (May 2017)

Block	Cotton-Wood	Silver Maple	Swamp Milkweed	White Clover	Box Elder	*Phragmites*	Purple Loosetrife	Kentucky Bluegrass	Reed Canary Grass	Red-Stemmed Golden-Rod	Block Total	Block Percent Cover
1	3	1	4	1		1	10	25	5	2	52	13
2	4			8	1	1	2	35	15		66	16.5
3	1		5				5	1			12	3
4	2		5				1	10	5	1	24	6
Total	10	1	14	9	1	2	18	71	25	3	154	**38.5**

Permanent PEM-1 Plot 2



Notes:

1. The numbers in the grids above correspond to the block number in PEM-1 Plot 2.
2. See Figure 3 for Permanent PEM Plot 2 location.

Table 4. Vegetation Plant Count for PSS-1 Monitoring Transect (May 2017)

Distance from Eastern Edge (ft)		Cattails	*Phragmites*	Purple Loosestrife	Buttonbush	Soft Rush	Sedge	Rush	Total
0	5	7	2	1		1	1	1	13
5	10	15							15
10	15	32							32
15	20	15			1				16
20	25	7	1						8
25	30	5	9						14
30	35	11	1		1				13
35	40	7							7
40	45	15	4						19
45*	50	4	25E						29
50*	55	6	55E						61
	Total	124	97	1	2	1	1	1	**227**

Notes:

1. * Outside area of *Phragmites* removal

2. E = Estimated number

Table 5. Vegetation Plant Count for PSS-2 Monitoring Transect (May 2017)

Distance from Eastern Edge (ft)		Cattails	Purple Loosestrife	Soft Rush	Bulrush	Rush	Butter-Cup	Duck-Weed	Grasses	Elder-Berry	Total
0	5	5					5		present		10
5	10	5	1				2				8
10	15						2			1	3
15	20	1				1					2
20	25	1									1
25	30	12									12
30	35	13		1							14
35	40	9									9
40	45	12									12
45	50	19			2						21
50	55	18									18
55	60	9			1						10
60	65	13									13
65	70	17									17
70	75	22									22
75	80	12			4			present			16
80	85	16									16
85	90	14			3			trace			17
90	95	7									7
95	100	23			2						25
100	105	1	2				1				4
	Total	229	3	1	12	1	10	0	0	1	**257**

Table 6. Vegetation Plant Count for PFO 1 Monitoring Transect (May 2017)

Distance from Southern Edge (ft)		Cattail	Soft Rush	Soft Stemmed Bulrush	Nerveless Woodland Sedge	Wool-Grass	Purple Loosetrife	Water Plantain	Elder-berry	Kentucky Bluegrass	Total
100	102					1				1	2
95	100				1			1			2
90	95	1					1				2
85	90										0
80	85	15					2				17
75	80	9	1								10
70	75	10	3								13
65	70	9	1	8							18
60	65	10		9							19
55	60	13	5				2		1		21
50	55	10	5				1				16
45	50	6	2								8
40	45	19									19
35	40	12									12
30	35	11		5							16
25	30	7	1	2							10
20	25	6	1	7			2				16
15	20	9							1		10
10	15	12		4			1				17
5	10	18									18
0	5						1				1
Total		177	19	35	1	1	10	1	2	1	**247**

Table 7. Comparison of Wetland Areas as Designed and as Proposed (May 2017)

Wetland Areas as Proposed			**Wetland Areas as Designed**		
Name	Area - ft^2	Area - acres	Name	Area - ft^2	Area - acres
Proposed PSS-1	1,726	0.04	PSS-1	3,533	0.08
Proposed PSS-2	6,940	0.16	PSS-2	8,628	0.20
Total Proposed PSS	8,666	0.20	Total PSS	12,161	0.28
Proposed PFO-1	10,817	0.25	PFO-1	16,829	0.39
Total Proposed PFO	10,817	0.25	Total PFO	16,829	0.39
PEM-1	16,426	0.38	PEM-1	16,829	0.39
Proposed PEM-2	8,082	0.19			
Proposed PEM-3	3,619	0.08			
Proposed PEM-4	3,109	0.07	PEM-2	11,405	0.26
Proposed PEM-5	6,962	0.16			
Proposed W-11	9,824	0.23			
Proposed W-10	910	0.02			
Total Proposed PEM	48,931	1.12	Total PEM	28,234	0.65
Total wetland area		**1.57**	**Total wetland area**		**1.31**

Attachment A

Photographic Logs

Wetland PEM-1 Plot 1* (Grids 1 through 16)
May 2017
* See Figure 3 for PEM-1 Plot 1 locations

Outline of PEM-1 Plot 1 (May 30, 2017)

PEM-1 Plot 1, Grid 1 (May 30, 2017)

PEM-1 Plot 1, Grid 2 (May 30, 2017)

PEM-1 Plot 1, Grid 3 (May 30, 2017)

Wetland PEM-1 Plot 1* (Grids 1 through 16)
May 2017
* See Figure 3 for PEM-1 Plot 1 locations

PEM-1 Plot 1, Grid 4 (May 30, 2017)

PEM-1 Plot 1, Grid 5 (May 30, 2017)

PEM-1 Plot 1, Grid 6 (May 30, 2017)

PEM-1 Plot 1, Grid 7 (May 30, 2017)

Wetland PEM-1 Plot 1* (Grids 1 through 16)
May 2017
* See Figure 3 for PEM-1 Plot 1 locations

PEM-1 Plot 1, Grid 8 (May 30, 2017)

PEM-1 Plot 1, Grid 9 (May 30, 2017)

PEM-1 Plot 1, Grid 10 (May 30, 2017)

PEM-1 Plot 1, Grid 11 (May 30, 2017)

Wetland PEM-1 Plot 1* (Grids 1 through 16)
May 2017
* See Figure 3 for PEM-1 Plot 1 locations

PEM-1 Plot 1, Grid 12 (May 30, 2017)

PEM-1 Plot 1, Grid 13 (May 30, 2017)

PEM-1 Plot 1, Grid 14 (May 30, 2017)

PEM-1 Plot 1, Grid 15 (May 30, 2017)

Wetland PEM-1 Plot 1* (Grids 1 through 16)
May 2017
* See Figure 3 for PEM-1 Plot 1 locations

PEM-1 Plot 1, Grid 16 (May 30, 2017)

Wetland PEM-1 Plot 2*
May 2017
* See Figure 3 for PEM-1 Plot 2 locations

PEM-1 Plot 2 (May 30, 2017)

Outline of PEM-1 Plot 2 (May 30, 2017)

PEM-1 Plot 2 (May 30, 2017)

Wetland PEM-1 Plot 3*
May 2017
* See Figure 3 for PEM-1 Plot 3 locations

Outline of PEM-1 Plot 3 (May 30, 2017)

PEM-1 Plot 3 (May 30, 2017)

Wetland Panoramic Photos from Permanent Photo Station 1*
July 2015
* See Figure 3 for photo station locations

Direction A, July 21, 2015

Direction B, July 21, 2015

Direction C, July 21, 2015

Direction D, July 21, 2015

Wetland Panoramic Photos from Permanent Photo Station 1*
May 2016
* See Figure 3 for photo station locations

Direction A, May 23, 2016

Direction B, May 23, 2016

Direction C, May 23, 2016

Direction D, May 23, 2016

Wetland Panoramic Photos from Permanent Photo Station 1*
May 2017
* See Figure 3 for photo station locations

Direction A, May 31, 2017

Direction B, May 31, 2017

Direction C, May 31, 2017

Direction D, May 31, 2017

Wetland Panoramic Photos from Permanent Photo Station 2*
August 2015
* See Figure 3 for photo station locations

Direction A, August 2015

Direction B, August 2015

Direction C, August 2015

Direction D, August 2015

Wetland Panoramic Photos from Permanent Photo Station 2*
May 2016
* See Figure 3 for photo station locations

Direction A, May 23, 2016

Direction B, May 23, 2016

Direction C, May 23, 2016

Direction D, May 23, 2016

Wetland Panoramic Photos from Permanent Photo Station 2*
May 2017
* See Figure 3 for photo station locations

Direction A, May 31, 2017

Direction B, May 31, 2017

Direction C, May 31, 2017

Direction D, May 31, 2017

Wetland Panoramic Photos from Permanent Photo Station 3*
August 2015
* See Figure 3 for photo station locations

Direction A, August 25, 2015

Direction B, August 25, 2015

Direction C, August 25, 2015

Direction D, August 25, 2015

Wetland Panoramic Photos from Permanent Photo Station 3*
May 2016
* See Figure 3 for photo station locations

Direction A, May 23, 2016

Direction B, May 23, 2016

Direction C, May 23, 2016

Direction D, May 23, 2016

Wetland Panoramic Photos from Permanent Photo Station 3*
May 2017
* See Figure 3 for photo station locations

Direction A, May 31, 2017

Direction B, May 31, 2017

Direction C, May 31, 2017

Direction D, May 31, 2017

Wetland Panoramic Photos from Permanent Photo Station 4*
September 2015
* See Figure 3 for photo station locations

Direction A, September 28, 2015

Direction B, September 28, 2015

Direction C, September 28, 2015

Direction D, September 28, 2015

Wetland Panoramic Photos from Permanent Photo Station 4*
May 2016
* See Figure 3 for photo station locations

Direction A, May 23, 2016

Direction B, May 23, 2016

Direction C, May 23, 2016

Direction D, May 23, 2016

Wetland Panoramic Photos from Permanent Photo Station 4*
May 2017
* See Figure 3 for photo station locations

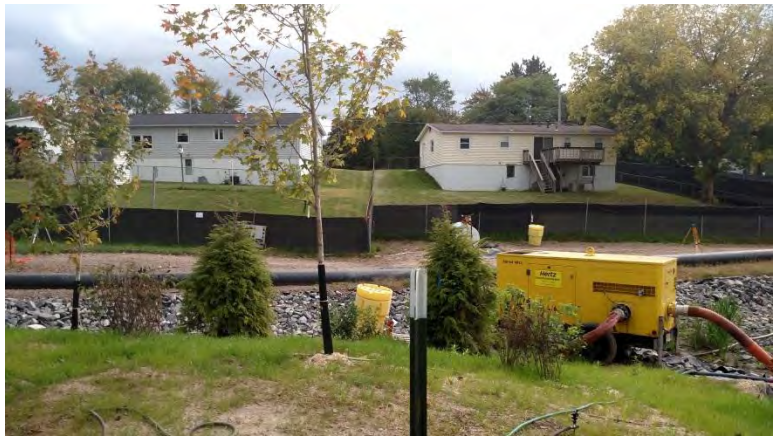
Direction A, May 31, 2017

Direction B, May 31, 2017

Direction C, May 31, 2017

Direction D, May 31, 2017

Wetland Panoramic Photos from Permanent Photo Station 5*
September 2015
* See Figure 3 for photo station locations



Direction A, September 28, 2015

Direction B, September 28, 2015

Direction C, September 28, 2015

Direction D, September 28. 2015

Wetland Panoramic Photos from Permanent Photo Station 5*
May 2016
* See Figure 3 for photo station locations

Direction A, May 23, 2016

Direction B, May 23, 2016

Direction C, May 23, 2016

Direction D, May 23, 2016

Wetland Panoramic Photos from Permanent Photo Station 5*
May 2017
* See Figure 3 for photo station locations

Direction A, May 31, 2017

Direction B, May 31, 2017

Direction C, May 31, 2017

Direction D, May 31, 2017

Attachment B

Vegetation Field Monitoring Forms for Wooded Area

Post-Remediation Vegetation Monitoring
West Branch of Bloody Brook - (WBBB)
Onondaga, New York

Habitat Area: PSS-1

Date: 5/30/2017

Weather: partly cloudy, 73 degrees

Inspector(s): Robert Rung, Jeff Briggs, Robert Montione

Planting Type	Species	Common Name	Number Proposed	Number Planted	Number Survived	Percent Survival	Comments/Notes
Shrub	*Cornus amomum*	Silky dogwood	20	19	2	11%	
Shrub	*Cephalanthus occidentalis*	Buttonbush	15	15	13	87%	
Shrub	*Sambucus canadensis*	Elderberry	15	16	0	0%	Heavy cattail cover throughout wetland seemed to be out competing shrub planting.
Shrub	*Alnus incana*	Speckled alder	20	20	1	5%	
Shrub	*Aronia arbutifolia*	Red chokeberry	10	10	0	0%	
Total # Shrubs			**80**	**80**	**16**	**20%**	Not included in total were two planted Northern Arrowoods and one Red-osier Dogwood noted at this site.

Notes:

1. Percent survival for shrubs is based on the total number of shrubs planted in each area.

Post-Remediation Vegetation Monitoring
West Branch of Bloody Brook - (WBBB)
Onondaga, New York

Habitat Area: PSS-2

Date: 5/31/2017

Weather: Cloudy with intermittent showers, 73 degrees

Inspector(s): Robert Rung, Jeff Briggs, Robert Montione

Planting Type	Species	Common Name	Number Proposed	Number Planted	Number Survived	Percent Survival	Comments/Notes
Shrub	*Cornus amomum*	Silky dogwood	52	53	2	4%	
Shrub	*Salix exigua*	Sandbar willow	25	25	2	8%	
Shrub	*Salix discolor*	Pussy willow	40	41	19	46%	
Shrub	*Sambucus canadensis*	Elderberry	30	30	12	40%	
Shrub	*Lindera benzoin*	Spice bush	30	30	3	10%	The three surviving shrubs were all stressed.
Shrub	*Aronia arbutifolia*	Red chokeberry	20	20	3	15%	
Total # Shrubs			**197**	**199**	**41**	21%	

Notes:

1. Percent survival for shrubs is based on the total number of shrubs planted in each area.

Post-Remediation Vegetation Monitoring
West Branch of Bloody Brook - (WBBB)
Onondaga, New York

Habitat Area: PFO-1

Date: 5/31/2017

Weather: Cloudy with intermittent showers, 73 degrees

Inspector(s): Robert Rung, Jeff Briggs, Robert Montione

Planting Type	Species	Common Name	Number Proposed	Number Planted	Number Survived	Percent Survival	Comments/Notes
Tree	*Acer rubrum*	Red maple	See Note 1	24	6	25%	
Tree	*Quercus palustris*	Pin oak	See Note 1	24	6	25%	
Tree	*Salix niger*	Black willow	See Note 1	18	18	100%	
Tree	*Betula nigra*	River birch	See Note 1	13	7	54%	
Tree	*Quercus bicolor*	Swamp white oak	See Note 1	5	1	20%	
Total # Trees				**84**	**38**	**45%**	
Shrub	*Cornus amomum*	Silky dogwood	108	104	0	0%	
Shrub	*Alnus incana*	Speckled alder	45	47	0	0%	
Shrub	*Sambucus canadensis*	Elderberry	57	57	<10	<20%	
Shrub	*Cephalanthus occidentalis*	Buttonbush	NA	1	0	0%	
Total # Shrubs			**210**	**209**	**<10**	**<5%**	

Notes:

1. Per the November 12, 2014 NYSDEC approved field change, the total number of trees planted was reduced. A total of 270 trees was the final approved number to be planted, with no particular habitat area having a definitive approved quantity.
2. Percent survival for shrubs is based on the total number of shrubs planted in each area.

Post-Remediation Vegetation Monitoring
West Branch of Bloody Brook - (WBBB)
Onondaga, New York

Habitat Area: UPF-1
Date: 5/30/2017
Weather: partly cloudy, 73 degrees **Inspector(s):** Robert Rung, Jeff Briggs, Robert Montione

Planting Type	Species	Common Name	Number Proposed	Number Planted	Number Survived	Percent Survival	Comments/Notes
Tree	*Acer saccharum*	Sugar maple	See Note 1	13	10	77%	
Tree	*Fagus grandifolia*	American beech	See Note 1	7	6	86%	
Tree	*Prunus serotina*	Black cherry	See Note 1	8	1	13%	
Tree	*Pinus strobus*	White pine	See Note 1	3	0	0%	
Tree	*Quercus palustris*	Pin oak	See Note 1	1	0	0%	
Tree	*Tsuga canadensis*	Eastern hemlock	See Note 1	10	6	60%	Three of the six living eastern hemlocks were very stressed.
Total # Trees				**42**	**23**	**55%**	One stressed red maple also noted - not included in total.
Shrub	*Viburnum dentatum*	Northern arrowwood	40	30	19	63%	
Shrub	*Viburnum lentago*	Nannyberry	40	30	14	47%	Included five stressed plants.
Shrub	*Cornus racemosa*	Grey dogwood	30	30	27	90%	
Total # Shrubs			**110**	**90**	**60**	**67%**	

Notes:

1. Per the November 12, 2014 NYSDEC approved field change, the total number of trees planted was reduced. A total of 270 trees was the final approved number to be planted, with no particular habitat area having a definitive approved quantity.
2. Percent survival for shrubs is based on the total number of shrubs planted in each area.

Post-Remediation Vegetation Monitoring
West Branch of Bloody Brook - (WBBB)
Onondaga, New York

Habitat Area: UPF-2
Date: 5/31/2017
Weather: Cloudy with intermittent showers, 73 degrees **Inspector(s):** Robert Rung, Jeff Briggs, Robert Montione

Planting Type	Species	Common Name	Number Proposed	Number Planted	Number Survived	Percent Survival	Comments/Notes
Tree	*Acer saccharum*	Sugar maple	See Note 1	5	5	100%	
Tree	*Fagus grandifolia*	American beech	See Note 1	0	0	-	
Tree	*Prunus serotina*	Black cherry	See Note 1	4	0	0%	
Tree	*Pinus strobus*	White pine	See Note 1	7	3	43%	
Tree	*Acer rubrum*	Red maple	See Note 1	13	11	85%	
Tree	*Tsuga canadensis*	Eastern hemlock	See Note 1	8	5	63%	
Total # Trees				**37**	**24**	**65%**	
Shrub	*Viburnum dentatum*	Northern arrowwood	40	42	20	48%	
Shrub	*Cornus racemosa*	Grey dogwood	40	60	45	75%	
Shrub	*Viburnum lentago*	Nannyberry	25	36	15	42%	
Total # Shrubs			**105**	**138**	**80**	**58%**	Three northern arrowwood and three elderberry were also noted and not included in the total.

Notes:

1. Per the November 12, 2014 NYSDEC approved field change, the total number of trees planted was reduced. A total of 270 trees was the final approved number to be planted, with no particular habitat area having a definitive approved quantity.
2. Percent survival for shrubs is based on the total number of shrubs planted in each area.

Post-Remediation Vegetation Monitoring
West Branch of Bloody Brook - (WBBB)
Onondaga, New York

Habitat Area: RIP-1

Date: 5/30/2017 - 5/31/17

Weather: partly cloudy, 73 degrees - Cloudy with intermittant showers 73 degrees

Inspector(s): Robert Rung, Jeff Briggs, Robert Montione

Planting Type	Species	Common Name	Number Proposed	Number Planted	Number Survived	Percent Survival	Comments/Notes
Tree	*Acer rubrum*	Red maple	See Notes 1	30	30	100%	
Tree	*Acer saccharum*	Sugar maple	See Notes 1	16	16	100%	
Tree	*Fagus grandifolia*	American beech	See Notes 1	7	0	0%	
Tree	*Quercus palustris*	Pin oak	See Notes 1	13	10	77%	
Tree	*Tsuga canadensis*	Eastern hemlock	See Notes 1	19	6	32%	
Tree	*Prunus serotina*	Black cherry	See Notes 1	12	0	0%	
Tree	*Pinus strobus*	White pine	See Notes 1	7	4	57%	
Total # Trees				**104**	**66**	**63%**	Total does not include 1 planted black willow and 1 planted silver maple noted at this site
Shrub	*Viburnum dentatum*	Northern arrowwood	170	252	104	41%	
Shrub	*Viburnum lentago*	Nannyberry	170	153	54	35%	Only found around PSS-1. None found east of Wier 1.
Shrub	*Cornus racemosa*	Grey dogwood	175	144	93	65%	
Total # Shrubs			**515**	**549**	**251**	46%	

Notes:

1. Per the November 12, 2014 NYSDEC approved field change, the total number of trees planted was reduced. A total of 270 trees was the final approved number to be planted, with no particular habitat area having a definitive approved quantity.
2. Percent survival for shrubs is based on the total number of shrubs planted in each area.

Post-Remediation Vegetation Monitoring
West Branch of Bloody Brook - (WBBB)
Onondaga, New York

Habitat Area: USS-1

Date: 5/31/2017

Weather: Cloudy with intermittent showers, 73 degrees

Inspector(s): Robert Rung, Jeff Briggs, Robert Montione

Planting Type	Species	Common Name	Number Proposed	Number Planted	Number Survived	Percent Survival	Comments/Notes
Shrub	*Cornus racemosa*	Grey dogwood	35	19	19	100%	
Shrub	*Viburnum lentago*	Nannyberry	40	20	20	100%	
Total # Shrubs			**75**	**39**	**39**	100%	

Notes:

1. Percent survival for shrubs is based on the total number of shrubs planted in each area.

Attachment C

Applied Seed Mixtures

PA New England Province Riparian Mix

ERNMX # ERNMX-253
Seeding Rate Approximately 20 lb per acre
Mix Type Wet Meadow & Wetland Sites

- 14% Little Bluestem, Fort Indiantown Gap-PA Ecotype (Schizachyrium scoparium, Fort Indiantown Gap-PA Ecotype)
- 14% Indiangrass, PA Ecotype (Sorghastrum nutans, PA Ecotype)
- 10% Riverbank Wildrye, PA Ecotype (Elymus riparius, PA Ecotype)
- 10% Virginia Wildrye, PA Ecotype (Elymus virginicus, PA Ecotype)
- 9% Deertongue, 'Tioga' (Panicum clandestinum (Dichanthelium c.), 'Tioga')
- 8% Big Bluestem, 'Niagara' (Andropogon gerardii, 'Niagara')
- 7% Fox Sedge, PA Ecotype (Carex vulpinoidea, PA Ecotype)
- 2% Switchgrass, 'Shelter' (Panicum virgatum, 'Shelter')
- 2% Boneset, PA Ecotype (Eupatorium perfoliatum, PA Ecotype)
- 2% Soft Rush (Juncus effusus)
- 2% Swamp Milkweed, PA Ecotype (Asclepias incarnata, PA Ecotype)
- 2% Autumn Bentgrass, PA Ecotype (Agrostis perennans, PA Ecotype)
- 2% Wild Senna, VA & WV Ecotype (Senna hebecarpa (Cassia h.), VA & WV Ecotype)
- 2% Oxeye Sunflower, PA Ecotype (Heliopsis helianthoides, PA Ecotype)
- 2% Blue Vervain, PA Ecotype (Verbena hastata, PA Ecotype)
- 2% Partridge Pea, PA Ecotype (Chamaecrista fasciculata (Cassia f.), PA Ecotype)
- 1% Wild Bergamot, PA Ecotype (Monarda fistulosa, PA Ecotype)
- 1% Redtop Panicgrass, PA Ecotype (Panicum rigidulum (P. stipitatum), PA Ecotype)
- 1% Joe Pye Weed, PA Ecotype (Eupatorium fistulosum, PA Ecotype)
- 1% Flat Topped White Aster, PA Ecotype (Aster umbellatus (Doellingeria umbellata), PA Ecotype)
- 1% Purplestem Aster, PA Ecotype (Aster puniceus (Symphyotrichum puniceum), PA Ecotype)
- 1% Zigzag Aster, PA Ecotype (Aster prenanthoides (Symphyotrichum p.), PA Ecotype)
- 1% New England Aster (Aster novae-angliae (Symphyotrichum n.))
- 1% New York Ironweed, PA Ecotype (Vernonia noveboracensis, PA Ecotype)
- 1% Many Leaved Bulrush, PA Ecotype (Scirpus polyphyllus, PA Ecotype)
- 1% Spotted Joe Pye Weed, PA Ecotype (Eupatorium maculatum (Eupatoriadelphus maculatus), PA Ecotype)

Total: 100%

Northeastern U.S. Roadside Native Mix

ERNMX # ERNMX-105
Seeding Rate Approximately 20 lb per acre, or 1/2 lb per 1,000 sq ft
Mix Type Upland & Meadow Sites

- 24% Big Bluestem, 'Prairie View'-IN Ecotype (Andropogon gerardii, 'Prairie View'-IN Ecotype)
- 20% Sideoats Grama, 'Butte' (Bouteloua curtipendula, 'Butte')
- 19% Virginia Wildrye, PA Ecotype (Elymus virginicus, PA Ecotype)
- 5% Broomsedge, MO Ecotype (Andropogon virginicus, MO Ecotype)
- 5% Blackeyed Susan, Coastal Plain NC Ecotype (Rudbeckia hirta, Coastal Plain NC Ecotype)
- 4% Partridge Pea, PA Ecotype (Chamaecrista fasciculata (Cassia f.), PA Ecotype)
- 4% Purple Coneflower (Echinacea purpurea)
- 3% Ohio Spiderwort, PA Ecotype (Tradescantia ohiensis, PA Ecotype)
- 2% Swamp Milkweed, PA Ecotype (Asclepias incarnata, PA Ecotype)
- 2% Wild Senna, VA & WV Ecotype (Senna hebecarpa (Cassia h.), VA & WV Ecotype)
- 2% Oxeye Sunflower, PA Ecotype (Heliopsis helianthoides, PA Ecotype)
- 2% Zigzag Aster, PA Ecotype (Aster prenanthoides (Symphyotrichum p.), PA Ecotype)
- 2% Blue False Indigo, Southern WV Ecotype (Baptisia australis, Southern WV Ecotype)
- 2% Flat Topped White Aster, PA Ecotype (Aster umbellatus (Doellingeria umbellata), PA Ecotype)
- 1% Wild Bergamot, PA Ecotype (Monarda fistulosa, PA Ecotype)
- 1% Early Goldenrod, PA Ecotype (Solidago juncea, PA Ecotype)
- 1% New England Aster, PA Ecotype (Aster novae-angliae (Symphyotrichum n.), PA Ecotype)
- 1% Marsh (Dense) Blazing Star (Spiked Gayfeather), PA Ecotype (Liatris spicata, PA Ecotype)

Total: 100%

PA New England Province FACW Mix

ERNMX # ERNMX-251

Seeding Rate Approximately 20 lb per acre

Mix Type Wet Meadow & Wetland Sites

- 24% Fox Sedge, PA Ecotype (Carex vulpinoidea, PA Ecotype)
- 20% Virginia Wildrye, PA Ecotype (Elymus virginicus, PA Ecotype)
- 10% Lurid (Shallow) Sedge, PA Ecotype (Carex lurida, PA Ecotype)
- 5% Hop Sedge, PA Ecotype (Carex lupulina, PA Ecotype)
- 4% Blue Vervain, PA Ecotype (Verbena hastata, PA Ecotype)
- 3% Green Bulrush, PA Ecotype (Scirpus atrovirens, PA Ecotype)
- 3% Soft Rush (Juncus effusus)
- 2% Swamp Milkweed, PA Ecotype (Asclepias incarnata, PA Ecotype)
- 2% Wood Reedgrass, PA Ecotype (Cinna arundinacea, PA Ecotype)
- 2% Boneset, PA Ecotype (Eupatorium perfoliatum, PA Ecotype)
- 2% Cosmos (Bristly) Sedge, PA Ecotype (Carex comosa, PA Ecotype)
- 2% Oxeye Sunflower, PA Ecotype (Heliopsis helianthoides, PA Ecotype)
- 2% Redtop Panicgrass, PA Ecotype (Panicum rigidulum (P. stipitatum), PA Ecotype)
- 2% Sensitive Fern (Onoclea sensibilis)
- 1% Joe Pye Weed, PA Ecotype (Eupatorium fistulosum, PA Ecotype)
- 1% Pennsylvania Smartweed, PA Ecotype (Polygonum pensylvanicum, PA Ecotype)
- 1% Spotted Joe Pye Weed, PA Ecotype (Eupatorium maculatum (Eupatoriadelphus maculatus), PA Ecotype)
- 1% Northern Long Sedge, PA Ecotype (Carex folliculata, PA Ecotype)
- 1% Slender Mountainmint (Pycnanthemum tenuifolium)
- 1% Flat Topped White Aster, PA Ecotype (Aster umbellatus (Doellingeria umbellata), PA Ecotype)
- 1% Bladder (Star) Sedge, PA Ecotype (Carex intumescens, PA Ecotype)
- 1% Rattlesnake Grass, PA Ecotype (Glyceria canadensis, PA Ecotype)
- 1% Many Leaved Bulrush, PA Ecotype (Scirpus polyphyllus, PA Ecotype)
- 1% Great Blue Lobelia, PA Ecotype (Lobelia siphilitica, PA Ecotype)
- 1% New York Ironweed, PA Ecotype (Vernonia noveboracensis, PA Ecotype)
- 1% Narrowleaf Blue Eyed Grass (Sisyrinchium angustifolium)
- 1% Brown Bulrush, PA Ecotype (Scirpus pendulus, PA Ecotype)
- 1% New England Aster (Aster novae-angliae (Symphyotrichum n.))
- 1% Zigzag Aster, PA Ecotype (Aster prenanthoides (Symphyotrichum p.), PA Ecotype)
- 1% Purplestem Aster, PA Ecotype (Aster puniceus (Symphyotrichum puniceum), PA Ecotype)
- 1% Square Stemmed Monkeyflower, PA Ecotype (Mimulus ringens, PA Ecotype)

Total: 100%

Partially Shaded Area Roadside Mix

ERNMX # ERNMX-140

Seeding Rate Approximately 20 lb per acre, or 1/2 lb per 1,000 sq ft

Mix Type Woodland Openings, Partially Shaded Sites & Shrubby Sites Associated with Bioengineering

- 20% Virginia Wildrye, PA Ecotype (Elymus virginicus, PA Ecotype)
- 17% Creeping Red Fescue (Festuca rubra)
- 17% Deertongue, 'Tioga' (Panicum clandestinum (Dichanthelium c.), 'Tioga')
- 10% Autumn Bentgrass, Albany Pine Bush-NY Ecotype (Agrostis perennans, Albany Pine Bush-NY Ecotype)
- 6% Tall White Beardtongue (Penstemon digitalis)
- 5% Partridge Pea, PA Ecotype (Chamaecrista fasciculata (Cassia f.), PA Ecotype)
- 4% Purple Coneflower (Echinacea purpurea)
- 4% Zigzag Aster, PA Ecotype (Aster prenanthoides (Symphyotrichum p.), PA Ecotype)
- 4% Blackeyed Susan, Coastal Plain NC Ecotype (Rudbeckia hirta, Coastal Plain NC Ecotype)
- 3% Marsh (Dense) Blazing Star (Spiked Gayfeather), PA Ecotype (Liatris spicata, PA Ecotype)
- 3% Ohio Spiderwort, PA Ecotype (Tradescantia ohiensis, PA Ecotype)
- 2% Thimbleweed, PA Ecotype (Anemone virginiana, PA Ecotype)
- 2% Oxeye Sunflower, PA Ecotype (Heliopsis helianthoides, PA Ecotype)
- 1% Blue False Indigo, Southern WV Ecotype (Baptisia australis, Southern WV Ecotype)
- 1% Wild Bergamot, PA Ecotype (Monarda fistulosa, PA Ecotype)
- 1% Slender Bushclover, VA Ecotype (Lespedeza virginica, VA Ecotype)

Total: 100%

Attachment D

Erosion Field Monitoring

Bloody Brook
Onondaga County, New York
Restoration Inspection Form

Inspection Date: 5/30/17

Item	Yes	No	N/A	Comments
Was ponding observed in any areas of the soil cover outside of the wetlands?		✓		
Were areas of erosion observed in the soil cover or along the stream side banks and bottom?	✓			- Areas of erosion were noted in the 2017 Erosion Inspection
Overall does the soil cover appear to be in good condition?	✓			
Overall do the stream side banks and bottom appear to be in good condition?	✓			
Were the weirs and piezometers within the wetland areas inspected and appear to be in good condition and functioning as designed?	✓			
Were the permanent plot, transect, and photo locations within the wetlands clearly marked?	✓			
Has there been any apparent intrusive activity, excavation, or construction at the site? If so, was Lockheed Martin notified of the activities prior to them being started?		✓		- No apparent intrusive activity
Were vegetation and wetland monitoring completed during this restoraiton inspection? If so, were the vegetation inspection logs completed?	✓			

Note:

Upon completion of the form, any non-conforming items warranting corrective action should be identified above and shown on site figure.

Name of Inspector: Joshua Cesario
Inspector's Company: AECOM

Signature of Inspector: Joshua Cesario
Date: 5/30/17

IMMEDIATELY REPORT ANY FAILURE OR DEFECT TO THE PROJECT MANAGER SO A COUNTERMEASURE PLAN CAN BE IMPLEMENTED.

2017 Bloody Brook Erosion Inspection Notes:

Overall the stream bottom and side banks were intact and showed little sign of damage.

The following locations represent areas of concern:

Location 1

- Minor vegetation loss within area disturbed by remedial activities.
- Some areas will require over seeding.

Location 2

- Minor vegetation loss within area disturbed by remedial activities.
- Some areas will require over seeding.

Location 3

- Portion of side bank shows areas of sparse vegetation growth and rip rap erosion.
- Some areas will require rip rap adjustment.
- Some areas will require over seeding.
- Possible area for additional live stakes.

Location 4

- Portion of side bank shows areas of rip rap erosion.
- Some areas will require installation of additional rip rap.

Location 5

- Portion of side bank shows erosion of areas between rip rap and mature vegetation.
- Some areas will require installation of additional rip rap.

Location 6

- Portion of side bank shows sign of minor erosion.
- Some areas will require rip rap adjustment.

Location 7

- Portion of side bank shows areas of sparse vegetation growth and rip rap erosion.
- Some areas will require rip rap adjustment.
- Some areas will require over seeding.

Location 8

- Portion of side bank shows areas of soil erosion.
- Some areas will require installation of additional topsoil. (approx. $20ft^2$ x 6in deep)
- Some areas will require over seeding.
- Possible area for erosion mat to be used.

Location 9

- Portion of side bank shows areas of rip rap erosion.
- Some areas will require rip rap adjustment.

Location 10

- Portion of side bank shows areas of soil and rip rap erosion.
- Some areas will require installation of additional rip rap.

Location 11

- Portion of side bank vegetation loss within area disturbed by remedial activities.
- Some areas will require over seeding.

Location 12

- Portion of side bank shows erosion of areas between rip rap and mature vegetation.
- Some areas will require installation of additional rip rap.

Erosion Locations
L1
L2
L3
L4
L5
L6
L7
ONTARIO PLACE
MIDWOOD DRIVE
CRANBERRY DRIVE
BROOKVIEW LANE
SUNFLOWER DRIVE
NEW YORK STATE THRUWAY
MATCHLINE TO SHEET 2 OF 3
PSS-1 3,533 SF
PEM-1 16,426 SF
PEM-2 11,405 SF
PFO-1 16,829 SF
PSS-2 8,628 SF
USS-1
RIP-1
UPF-1
UPF-2
MOW-1
MOW-2
MOW-5
LAWN
PSS TRANSECT 1
PSS TRANSECT 2
PFO TRANSECT 1
PEM PLOT 1
PEM PLOT 2
PEM PLOT 3
PHOTO-1
PHOTO-2
PHOTO-3
PHOTO-4
PHOTO-5
PHOTO-6
SG-1
SG-2
SG-3
SG-4
PZ-1
PZ-2
PZ-3
PZ-4
6"x8" WIDE BOX CULVERT INV.=384.4
GABION-LINED CHANNEL
LEGEND
ORIGINAL WETLAND LIMITS
2014 / 2015 PROPOSED FINAL GRADING CONTOUR (1 FT.)
WETLAND ELEVATION CONTROL WEIR LOCATION
PROPOSED WETLAND
WETLAND PIEZOMETER LOCATION
PROPOSED WETLAND MONITORING PHOTOGRAPH LOCATION (MULTIPLE VIEWS)
PROPOSED WETLAND MONITORING STAFF GAUGE
PSS PALUSTRINE SHRUB / SCRUB
PFO PALUSTRINE FORESTED
PEM PALUSTRINE EMERGENT
UPF FORESTED UPLAND
USS SHRUB / SCRUB UPLAND
MOW UPLAND MEADOW
RIP RIPARIAN (PSS / PFO)
LAWN LAWN
NOTE
1. SEE FIGURE 1C FOR IDENTIFICATION OF ADDITIONAL MAP SYMBOLS.
0' 50' 100'
REFERENCES:
1. BASE MAP SOURCE: IANUZI & ROMANS, P.C. AND CT MALE ASSOCIATES P.C.
AECOM
LOCKHEED MARTIN CORPORATION
PROPOSED FINAL GRADING PLAN
1 OF 3
WEST BRANCH OF BLOODY BROOK
ONONDAGA COUNTY, NEW YORK
FILE NAME: Wetland Photo.dwg
DRN RNB
PROJECT NO. 60338140
DATE 7 / 2016
FIGURE NO. 1A

LEGEND

380	2016 PROPOSED FINAL GRADING CONTOUR (1 FT.)
380	2015 PROPOSED FINAL GRADING CONTOUR (1 FT.)
	LIMITS REMEDIAL EXCAVATION
PHOTO-6	PROPOSED MONITORING PHOTOGRAPH LOCATION (MULTIPLE VIEWS)

NOTE

1. SEE FIGURE 1C FOR IDENTIFICATION OF ADDITIONAL MAP SYMBOLS.

REFERENCES:

1. BASE MAP SOURCE: IANUZI & ROMANS, P.C. AND CT MALE ASSOCIATES P.C.

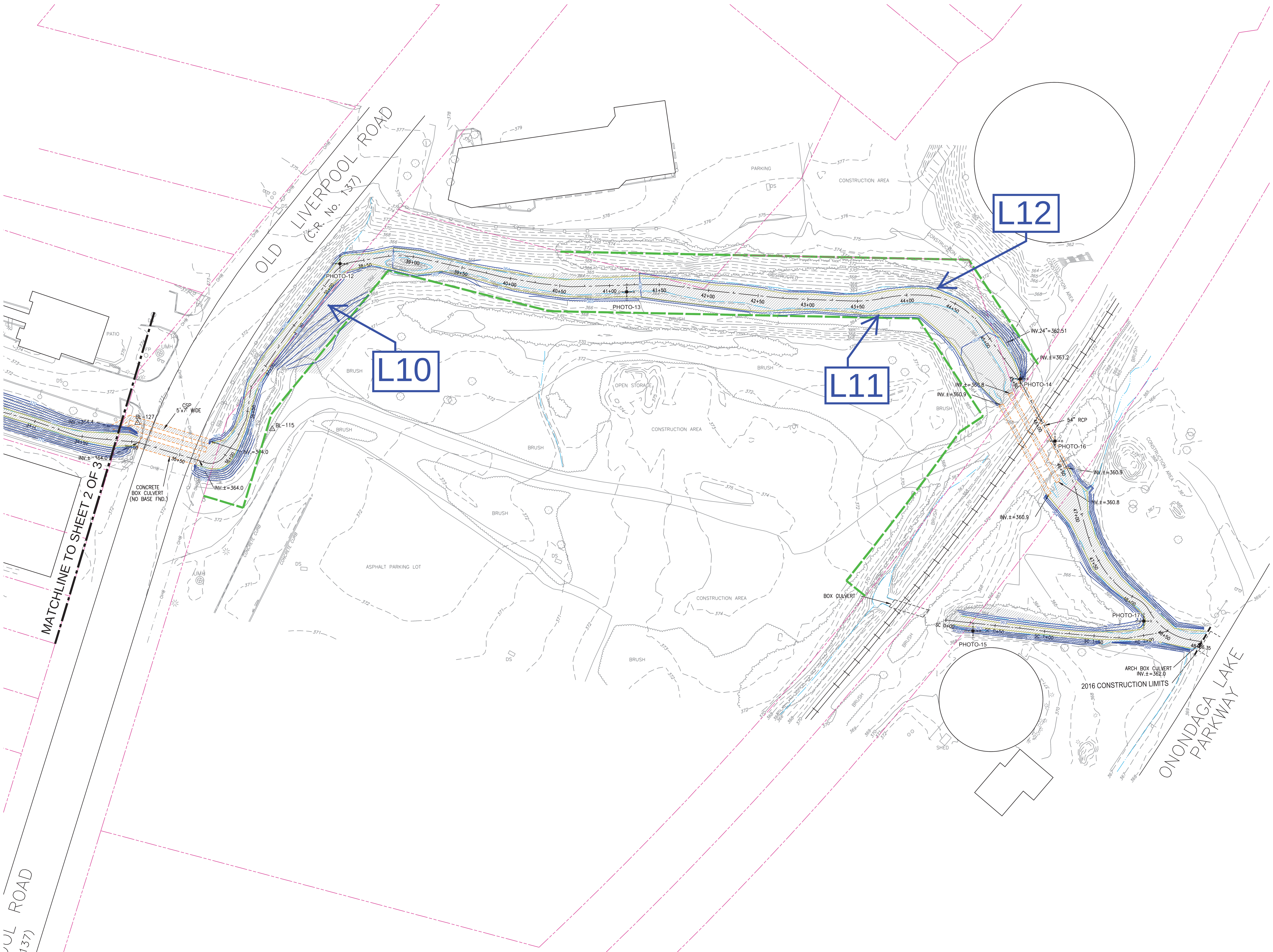
AECOM

LOCKHEED MARTIN CORPORATION

PROPOSED FINAL GRADING PLAN
2 OF 3

WEST BRANCH OF BLOODY BROOK
ONONDAGA COUNTY, NEW YORK

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE NO.
Wetland Photo.dwg	RNB	60338140	7 / 2016	1B



LEGEND

- BLOODY BROOK DRAINAGE DISTRICT EASEMENT
- PROPERTY BORDER
- TOPOGRAPHIC CONTOUR LINE
- PROPOSED BLOODY BROOK CENTERLINE
- STREAM/WATER EDGE
- UNDERGROUND DRAIN LINE
- OVERHEAD WIRES
- RETAINING WALL
- GUARD RAIL
- UTILITY MANHOLE
- DRAINAGE MANHOLE
- SANITARY MANHOLE
- RAILROAD TRACKS
- CATCH BASIN
- DRAINAGE STRUTURES
- FLAG POLE
- CULVERT
- E 924,000 — NYS PLANE COORDINATE SYSTEM EASTING
- N 1,131,000 — NYS PLANE COORDINATE SYSTEM NORTHING
- AERIAL SURVEY GROUND CONTROL POINT
- CHANNEL CENTERLINE SURVEY STATION
- TOPOGRAPHIC SPOT ELEVATION
- CONIFEROUS TREE
- DECIDUOUS TREE
- LIGHT POLE
- UTILITY POLE / GUY WIRE
- 2016 PROPOSED FINAL GRADING CONTOUR (1 FT.)
- LIMITS OF 2016 REMEDIAL EXCAVATION
- PHOTO-12 — PROPOSED MONITORING PHOTOGRAPH LOCATION (MULTIPLE VIEWS)

REFERENCES:

1. BASE MAP SOURCE: IANUZI & ROMANS, P.C. AND CT MALE ASSOCIATES P.C.

0' 50' 100'

AECOM

LOCKHEED MARTIN CORPORATION

PROPOSED FINAL GRADING PLAN
3 OF 3

WEST BRANCH OF BLOODY BROOK
ONONDAGA COUNTY, NEW YORK

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE NO.
Wetland Photo.dwg	RNB	60338140	7 / 2016	1C

May 2017 Bloody Brook Erosion Inspection Photos

Location 1*

*See Figures 1A, 1B, and 1C for Photo Locations

May 2017 Bloody Brook Erosion Inspection Photos

Location 2*

*See Figures 1A, 1B, and 1C for Photo Locations

May 2017 Bloody Brook Erosion Inspection Photos

Location 3*

*See Figures 1A, 1B, and 1C for Photo Locations

May 2017 Bloody Brook Erosion Inspection Photos

Location 4*

*See Figures 1A, 1B, and 1C for Photo Locations

May 2017 Bloody Brook Erosion Inspection Photos

Location 5*

*See Figures 1A, 1B, and 1C for Photo Locations

May 2017 Bloody Brook Erosion Inspection Photos

Location 6*

*See Figures 1A, 1B, and 1C for Photo Locations

May 2017 Bloody Brook Erosion Inspection Photos

Location 7*

*See Figures 1A, 1B, and 1C for Photo Locations

May 2017 Bloody Brook Erosion Inspection Photos

Location 8*

*See Figures 1A, 1B, and 1C for Photo Locations

May 2017 Bloody Brook Erosion Inspection Photos

Location 9*

*See Figures 1A, 1B, and 1C for Photo Locations

May 2017 Bloody Brook Erosion Inspection Photos

Location 10*

*See Figures 1A, 1B, and 1C for Photo Locations

May 2017 Bloody Brook Erosion Inspection Photos

Location 11*

*See Figures 1A, 1B, and 1C for Photo Locations

May 2017 Bloody Brook Erosion Inspection Photos

Location 12*

*See Figures 1A, 1B, and 1C for Photo Locations