



Memo

To:	Joe Martella, RIDEM
From:	David Heislein and Steve Herzog, Amec Foster Wheeler
cc:	Greg Simpson, Textron
Date:	September 14, 2016
Re.	Parcel C-1 Restored Wetlands Assessment Monitoring Final Report, Mashapaug Inner Cove and Mashapaug Pond Former Gorham Manufacturing Site, Providence, Rhode Island

Consistent with the approved Remedial Action Work Plan and Order of Approval, Amec Foster Wheeler conducted a final assessment of the restored wetlands along Mashapaug Inner Cove (Parcel C-1, southern and eastern shoreline) and Mashapaug Pond (Parcel C-1 Phase III Area north-slope). Wetland planting activities were completed by Charter Contracting Company (Charter) on November 6, 2015 and completion of Parcel C and C-1 remediation activities occurred in December 2015. Amec Foster Wheeler conducted the first inspection in May/June 2016 and conducted the second and final inspection of the restored wetlands on September 7, 2016. Our observation was that the restored wetlands were healthy and vegetation was well-established. The summer drought did not negatively impact the restored wetlands. No further work or reporting is required after meeting Condition #4 of the Order of Approval and the wetland monitoring specified in the approved Remedial Action Work Plan.

During our site visits May 19 and June 9, 2016, AMEC Foster Wheeler observed many healthy plants in both the restored fringe and perimeter wetland areas. However, some of the fringe wetland plants required repair or replacement. The perimeter areas appeared healthy and we therefore didn't recommend any repair work in the perimeter areas at that time. These repairs were completed by Charter in June 2016. During the same spring site visits, we also observed a female fox with her pups living on the western peninsula and white swans, Canadian geese, blue herons, mallards, fish, turtles and other species that returned to the Mashapaug Inner Cove indicating a healthy return of the habitat.

The following is a summary of the Mashapaug Cove wetland restoration conditions. Representative photos are included as an attachment to this memorandum.

Wetland Restoration Criteria: The USACE permit for work impacting wetlands (NAE 2013-2359) states that "monitoring of the restored fringe wetland and perimeter wetland areas will be conducted over a one-year growth period to provide early indication of problems and corrective actions. Observations were made two times during the growing season (late spring, late summer)." The restored areas were monitored for the following criteria:

- Minimum 80% vegetation coverage in both the fringe wetland and perimeter wetland;
- Successful establishment of species with a wetland indicator status of facultative, facultative-wetland, or obligate within the fringe wetland;
- Absence of invasive species.

September's monitoring also included observations of plant health, hand-removal of small incursions of invasive plant species as appropriate, and inspection for evidence of soil stability or erosion.

Vegetation: Since our May/June 2016 inspection of the fringe wetland, the herbaceous species have grown up from seed and become very well-established. Vegetation cover was 95–100% (Photos 1-4). Only small areas (several square feet) of the fringe wetland exhibited less than 100% coverage (Photo #5). The woody herbaceous plants were not counted due to the obvious health of the plants and tall (up to five feet) dense herbaceous cover. Herbaceous and woody vegetation in the fringe wetland was dominated by species with a wetland indicator status of facultative or wetter.

All areas of the perimeter wetlands were densely vegetated with grasses and herbaceous species. Vegetation coverage in the perimeter wetlands was 100%. As with the fringe wetland, herbaceous growth was sufficiently dense as to obscure the woody planted species, so these were not counted in this final inspection. Woody plants observed were healthy.

Soil Stability: No evidence of soil erosion was observed in the fringe wetland or perimeter wetland. Several erosion washouts had been documented in the perimeter wetland during the May 2016 monitoring. Those washouts have been repaired and were observed during this inspection to contain 100% vegetation cover.

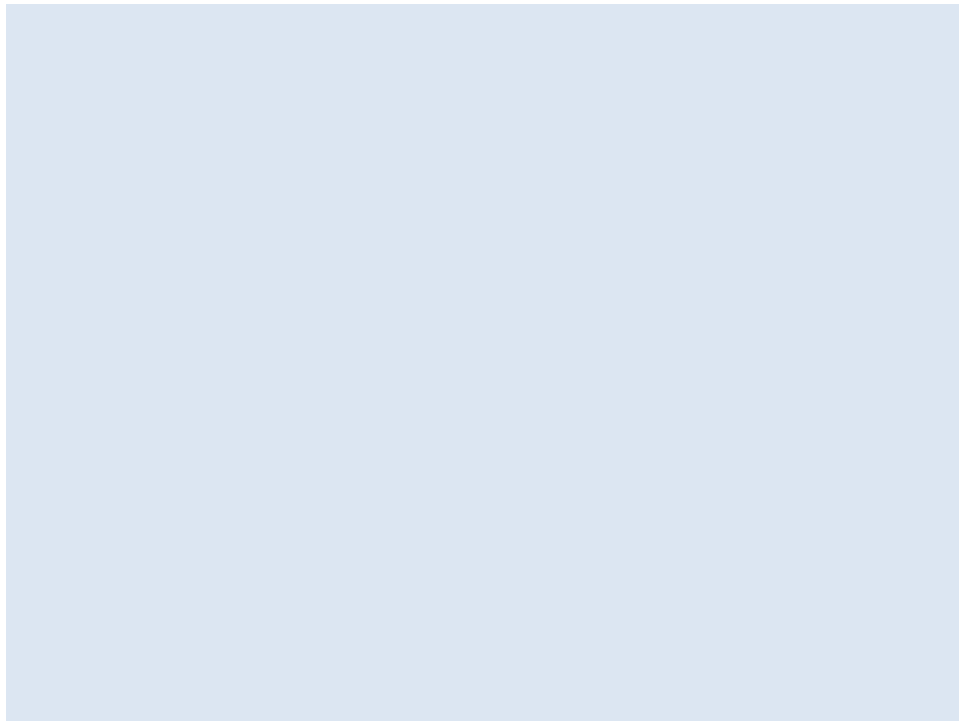
Invasive Species: Two invasive plant species were observed in the fringe wetland (Photo #6): Japanese knotweed (*Fallopia japonica*) and purple loosestrife (*Lythrum salicaria*). Small Japanese knotweed plants were observed in many locations in the western and central portion of the fringe wetland, generally at higher reaches away from the water's edge, and near the mature shrubs and trees that were present prior to the wetland restoration work. Purple loosestrife occurrences were sparse and mainly at the water's edge. All observed occurrences of these two noxious species were hand-pulled during the inspection and bagged for off-site disposal. The invasives removal produced two full garbage bags containing mostly Japanese knotweed.

Conclusions: No corrective actions are needed because the restored wetlands are densely-vegetated and appear to be functioning well. Both the fringe and perimeter wetlands meet the USACE permit restoration growth requirements. No further work or reporting is required after meeting Condition #4 of the Order of Approval and the wetland monitoring specified in the approved Remedial Action Work Plan.

For long-term success of the restored wetlands, it is recommend that the City of Providence initiate a simple invasive species management program consisting of twice-yearly monitoring with hand-removal and/or herbicide treatment of any invasive species observed. Japanese knotweed, in particular, is difficult to eradicate, and has been shown to be best managed by cut-stem herbicide treatment. The spread of knotweed may be retarded by the native herbaceous and woody vegetation in the fringe wetland as the native plants grow denser and the soil remains stable. If left untreated, the invasive knotweed may become a dominant species in the wetland within several years. If monitoring and treatment are continued for the next several years, control of knotweed in the fringe wetland is possible.



5. Small area of relatively thin vegetation cover in fringe wetland, view to north.



6. Fringe wetland with minor incursion of purple loosestrife, view to south.



7. Densely vegetated perimeter wetland (50' buffer) view to west.



8. Repaired former erosion washout in 50' buffer, Parcel C-1 north, view upslope to south.