

Appendix D
Wetland Restoration Plan
Former Gorham Manufacturing Site
333 Adelaide Ave.
Providence, RI

Three natural environments will require restoration following remediation: Mashapaug Inner Cove (sediment); fringe wetlands that form a narrow band along the shore of the Inner Cove; and perimeter wetlands that extend 50 feet upgradient of the delineated wetland edge. Figure 4 shows the conceptual plan for Site restoration.

This proposed restoration is consistent with the requirements of the Rhode Island Rules and Regulations Governing the Administration and Enforcement of the Fresh Water Wetlands Act Rule 6.00 (Exempt Activities), Section 6.08 Site Remediation. Tectron will also obtain a U.S. Army Corps of Engineers General Permit - Category 2 or an Individual Permit under Section 404 of the Clean Water Act. The 404 Permit application is included within Appendix G of the Remedial Action Work Plan.

Mashapaug Inner Cove

The bottom sediments of the Inner Cove will be excavated to an average depth of one to two feet below existing grade for dewatering, stabilization and placement in the former Carriage House Area. A one foot thick layer of sand will then be placed on the Inner Cove bottom, partially restoring the grade. This restoration of the Inner Cove floor will be similar to the sediment surface material of the Outer Cove and Mashapaug Pond. Backfill material within the Inner Cove will consist of sand and organic mix (10% compost/organic material) and the material source area(s) will be tested to meet Remediation Regulation Residential Direct Exposure Criteria (RDEC) prior to its use onsite.

Within approximately ten feet of the shoreline of the Inner Cove, a mixture of sand and organic material will be laid down to replace the organic-rich soils in this shallow shoreline portion of the Inner Cove. This area will receive up to two-feet of clean backfill and will be graded to meet the surrounding grade of the capped fringe wetland discussed below. The Inner Cove is anticipated to naturally recover its functions of plant habitat, nutrient cycling, biological production, animal habitat, and other functions. Backfill material within 10 feet of the shoreline will consist of sand and organic mix (20% compost/organic material) and the material source area(s) will be tested to meet RDEC (Appendix C) prior to its use onsite.

Fringe Wetland

A vegetated wetland extends up to approximately 10 feet from the water's edge around the Inner Cove and Outer Cove (Figure 4). The wetland is presently vegetated with herbaceous plants, shrubs, and some trees. Dominant species include red maple, silver maple, black willow, sweet pepperbush, red osier dogwood, buttonbush, sensitive fern, poison ivy, along with other herbs and graminoids. The non-native invasive species purple loosestrife was observed in the fringe wetland along the Inner Cove; all occurrences of this plant in the restoration area will be mechanically removed prior to soil placement.

The restoration plan proposes to avoid site grading within this area and instead use the placement of a variable thickness layer of organic-rich soil over the existing ground surface. The soil will be placed to a maximum thickness of up to 12 inches over this fringe wetland. The soil thickness will be tapered to a minimum around existing large woody vegetation to maintain existing plantings where possible. Soil thickness will be determined in the field to avoid or

minimize damage to existing trees, and to match the contours of organic-rich soil to be placed off shore (below water level) within the Inner Cove shoreline. This thickness of soil is proposed so as to maintain wetland hydrology, but still serve as a physical barrier to impacted soil until vegetation is well-established. The area of the wetland is approximately 11,000 square feet. A volume of up to 8,250 cubic feet of soil is estimated to be required to cap the fringe wetland. Soil cover material within the fringe wetland will be amended with compost to achieve an organic content of 20%. The material source area will be tested to meet Remediation Regulation RDEC prior to its use onsite. This soil cover will be placed by hand to minimize damage to the existing vegetation.

A seed mixture of native New England wetland species will be spread over the emplaced soil. New England Wetland Plants “Wetmix” or a similar mixture is proposed. The seed mix consists of sedges, other graminoids, and other herbaceous species with wetland indicator status from obligate to facultative. The seed mix will provide a native community of wetland herbaceous plants to form the ground cover in this fringe wetland. The range in wetland indicator species in the seed mix will promote local establishment of species best suited to the varied hydrology and microtopography expected to result after soil placement. The New England Wetmix recommended application rate is 1 pound per 2,500 square feet over the 11,000 square feet of wetlands. The seed will be placed by hand to ensure thorough and even coverage in this relatively narrow wetland area.

Woody vegetation remaining in place in the fringe wetland will be amended by planting shrub species. A select list of species will be planted with emphasis on locations where existing vegetation is sparse or has been unavoidably damaged or removed by the soil placement process. Native shrub species were selected for their wildlife habitat value, and their ability to grow readily in this disturbed area, in order to prevent erosion and rapidly establish a dense community that will resist incursion by non-native invasive species. Importantly, greenbrier, swamp rose, and blackberry/rubus species have been specified because of their dense spines and propensity to form shrub thickets, which will serve as a barrier to human access to this area. The following species are proposed (if available to the trade in restoration grade):

- ▶ greenbrier (*Smilax rotundifolia*)
- ▶ swamp rose (*Rosa palustris*) – obligate wetland species
- ▶ blackberry (*Rubus* spp.)

Plants will be installed only within approximately four feet of the water’s edge, with an average spacing of four feet on center, placed in clusters. This dense planting is required to aid in resisting incursion by invasive species and create thickets to prevent access to the water’s edge by trespassers.

Perimeter Wetland

The remediation of the perimeter wetland within Parcel C-1 Phase III Area consists of variably steep forested uplands with mature trees, a thin mixed herbaceous and woody understory, and patches of woody invasive species. The perimeter wetland plant community presently includes oak species (white, red, black), gray birch, black birch, black cherry, mountain laurel, low-bush blueberry, huckleberry, ailanthus, oriental bittersweet, Japanese knotweed, and honeysuckle. The crowns of many of the mature trees in the perimeter wetland have been damaged, apparently by an ice storm within the last several years. These damaged trees are now more susceptible to other injury, and are expected to have significantly shortened expected life spans.

The remedial action proposed for the perimeter wetland includes site grading for slope stabilization (maximum 3:1 slope) where needed, placement of a permeable fabric warning

barrier, and placement of a one-foot thick soil cover (six inches cover soil and six inches topsoil) to serve as a physical barrier to underlying impacted soils. Trees and shrubs will be saved where possible. To facilitate soil placement (as a remedy) damaged trees will be removed prior to Site grading. In addition, some other trees and shrubs may require removal to allow equipment access and soil cover placement. The eradication or control of invasive species is proposed as one aspect of the perimeter wetland restoration. All invasive plants will be cut and treated with an herbicide by stump application prior to placement of the soil cover.

A seed mixture of native New England herbaceous species will be spread over the emplaced soil in order to stabilize the soil cap, promote native species and exclude invasive species in the understory, and rapidly restore the vegetated community that will be impacted by the cap. An area of 34,500 square feet will require seeding. To aid in stabilizing the emplaced soil, a hydromulch with tackifier will be applied with the seed mix. The seed mix New England Wetland Plants “New England Erosion Control/Restoration Mix for Dry Sites” or a similar mixture is proposed. This restoration seed mix contains native and naturalized grasses to ensure that dry or recently disturbed sites will be quickly re-vegetated and the soil surface stabilized. The seed application rate is one pound per 1,250 square feet.

Trees and woody shrubs remaining in the perimeter wetland will be amended by planting with native species. A select list of species will be planted with emphasis on places where existing vegetation is sparse or has been unavoidably damaged or removed by the site grading and soil placement process. Native species were selected for wildlife habitat value, ability to thrive in a disturbed area, in order to prevent erosion and rapidly establish a dense community that will resist incursion by non-native invasive species. Importantly, greenbrier and blackberry/rubus species are included because of their dense spines and propensity to form shrub thickets, which will serve as a barrier to human access. The following species are proposed:

- ▶ greenbrier (*Smilax rotundifolia*)
- ▶ blackberry (*Rubus* spp.)
- ▶ highbush blueberry (*Vaccinium corymbosum*) – thick-growth with high wildlife value
- ▶ red osier dogwood (*Cornus sericea*)
- ▶ sweet pepperbush (*Clethra alnifolia*)
- ▶ black willow (*Salix nigra*)
- ▶ red maple (*Acer rubrum*)

Plants will be installed randomly in clusters, with an average spacing of eight feet on center.

Monitoring and Reporting

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 will be made at least two times during the growing season (late spring, late summer). The restored areas will be monitored for performance standards to include the minimum 80 % vegetation coverage in 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; and absence of invasive species. Monitoring reports will be prepared bi-annually and will be submitted to RIDEM and the City of Providence.

As requested by RIDEM, a no cut zone of vegetation will be implemented 60 feet (10 feet fringe and 50 feet perimeter wetlands) from the water’s edge within the Phase I and Phase III areas of Parcel C-1 (Figure 4). This no-cut zone will allow the wetland plants and grasses to naturally restore the habitat for the Site. This no-cut zone requirement has been included within the Environmental Land Use Restrictions for Parcel C and C-1 (Appendix E).