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April 11, 2007

Dean Tagliaferro
EPA Project Coordinator and On-Scene Coordinator
U.S. Environmental Protection Agency
c/o Weston Environmental Engineering
One Lyman Street
Pittsfield, MA 01201

Re: GE Pittsfield/Housatonic River Site
Upper ½-Mile Reach Removal Action (GECD800)
2006 Annual Monitoring Report

Dear Mr. Tagliaferro:

The General Electric Company (GE) has completed the 2006 monitoring events in general accordance with the requirements of the *Removal Action Work Plan – Upper ½-Mile Reach of Housatonic River*. This letter transmits the *2006 Annual Monitoring Report* summarizing the post-construction monitoring activities performed during 2006.

Please contact me if you have any questions.

Sincerely,

Andrew T. Silfer, P.E.
GE Project Coordinator

Attachments

cc: Holly Inglis, USEPA
Tim Conway, USEPA
Rose Howell, USEPA (cover letter only)
K.C. Mitkevicius, USACE
R. Goff, USACE
Linda Palmieri, Weston
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Susan Steenstrup, MDEP (2 copies)
Jane Rothchild, MDEP (cover letter only)
Anna Symington, MDEP (cover letter only)
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Mark Gravelding, BBL

Todd Cridge, BBL
Mike Chelminski, Woodlot Alternatives
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Public Information Repositories
GE Internal Repositories

ARCADIS BBL
Infrastructure, environment, facilities

General Electric Company
Pittsfield, Massachusetts

2006 Annual Monitoring Report

Upper ½-Mile Reach of the Housatonic River

April 2007

ARCADIS BBL

2006 Annual Monitoring Report

Upper ½-Mile Reach of the Housatonic River

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General Electric Company

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Date:
April 2007

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1. Introduction

1.1 Purpose and Scope

This *2006 Annual Monitoring Report* summarizes the results of various post-restoration monitoring activities conducted by the General Electric Company (GE) during 2006 for the Upper ½-Mile Reach of the Housatonic River in Pittsfield, Massachusetts, under the Consent Decree (CD) for the GE-Pittsfield/Housatonic River Site. This report was prepared on GE's behalf by ARCADIS of New York, Inc. (ARCADIS BBL, formerly Blasland, Bouck & Lee, Inc.) and AMEC Earth & Environmental (AMEC). These monitoring activities were performed in accordance with the requirements of the *Removal Action Work Plan for the Upper ½-Mile Reach of the Housatonic River* (Work Plan) (BBL, 1999) (Appendix F to the CD).

During 2006, monitoring activities for the Upper ½-Mile Reach were performed for the restored bank and river areas addressing the following categories:

- Restored bank vegetation;
- Restored bank erosion;
- Aquatic habitat enhancement structures;
- Armor stone layer; and
- Water column.

This report describes the 2006 monitoring activities and associated response actions, where conducted, for the above components.

1.2 Report Organization

Following this introductory section, this report is organized into the following sections.

- Section 2 – Restored Bank Vegetation Monitoring. This section summarizes the restored bank vegetation monitoring and associated response actions conducted during 2006. As detailed in the Work Plan, these activities were performed in those bank areas that were restored as part of the Upper ½-Mile Reach Removal Action – i.e., those areas where bank soils were excavated as part of that Removal Action and areas that were cleared to allow access for the removal activities.

- Section 3 – Restored Bank Erosion Monitoring. This section summarizes the restored bank erosion monitoring conducted during 2006, as well as the evaluation of the need and timing for response actions. These activities do not include the approximately 170-foot-long section previously excavated and restored as part of the Building 68 Area Removal Action.

- Section 4 – Aquatic Habitat Enhancement Structures and Armor Stone Layer Monitoring. This section summarizes the monitoring conducted in 2006 for the aquatic habitat enhancement structures and armor stone layer and presents the results of these monitoring activities.

- Section 5 – Water Column Monitoring. This section summarizes the water column monitoring conducted in 2006 and presents the results of these monitoring activities.

- Section 6 – Summary and Future Activities. This section summarizes the overall activities completed as part of the 2006 monitoring program and describes future monitoring activities as prescribed in the Work Plan.

- Section 7 – References. This section presents references cited throughout this report.

2. Restored Bank Vegetation Monitoring

2.1 General

Vegetative restoration activities were implemented in those areas where bank soils were excavated as part of the Upper ½-Mile Reach Removal Action and in areas cleared to allow access for the removal activities (see Figure 2-1). The restoration techniques outlined in the Work Plan were intended to restore the vegetative community in such disturbed riparian areas to a functional value that exceeds that of the riparian habitat present prior to the Removal Action. All soil removal activities along the riverbank were completed in 2002 and all disturbed riparian areas have been restored. As part of the restoration process, GE, in conjunction with representatives of the Natural Resource Trustees (Trustees), monitors those areas that were restored to verify the success and biological integrity of the intended vegetative community.

2.2 Monitoring Program

An annual summary monitoring report is required to document the results of that year's monitoring visits and the conditions of the restored areas within the Upper ½-Mile Reach. This section fulfills the annual summary monitoring report requirement for the calendar year 2006.

As outlined in the Work Plan, GE and the Trustees agreed to a monitoring methodology that was used in 2001 and revised for implementation in 2002 and beyond. The Standard Operating Procedure that was agreed upon at that time for conducting the restored banks vegetation monitoring is included as Appendix A.

In 2005, GE proposed certain modifications to the existing vegetation monitoring program in response to changing conditions and vegetative growth on the restored banks. The proposed modifications were submitted to the Trustees, with a copy to the U.S. Environmental Protection Agency (EPA) in a communication dated August 3, 2005. The proposed modifications were conditionally approved in a communication from the Trustees dated February 27, 2006. For reference, the modified monitoring approach is summarized in Appendix B. In general, the modified monitoring program includes the use of smaller sub-plots in older planting areas to allow for a more focused assessment of representative portions of those areas. As further discussed below, during the 2006 monitoring visit, the revised monitoring program was implemented in planting areas 4B and 10 for the assessment of canopy, understory, herbaceous groundcover, and invasive species performance standards.

For each planting area restored following completion of removal activities, the Work Plan required that the vegetative monitoring program consist of two visits per year for the first 3 years after planting and an annual visit during the fifth and seventh years after planting. In each of the first 3 years after planting, visits were required to be conducted in the late spring after the first leaf flush (May/June) and in the summer (July/August) to assess plant survival. The single visits in the fifth and seventh years after planting are to be conducted in the summer (July/August). In the event of a significant loss of plantings (greater than ¼ acre), the schedule for monitoring must be restarted following actions to replant the lost trees or shrubs (except in the case where a third party is responsible for such losses).

Survival rates, based on stem counts of planted trees and shrubs and the extent of areal coverage for herbaceous cover, are the key components of measuring the success of planted areas. The following performance standards are used to assess the adequacy of the restoration efforts over the Upper ½-Mile Reach:

1. All planted trees, shrubs, and vines must meet an 80% survival rate of the amount originally planted. To confirm this survival rate, supplemental plantings of appropriate species must be made if a monitoring event indicates a loss greater than 20%. Any dead trees or shrubs in excess of 20% of the original planting are to be replaced in the year in which monitoring occurs.

2. Herbaceous coverage of 100% must be maintained outside the foliar extent of the trees. Supplemental seeding or other activities are to be used to maintain 100% herbaceous coverage.

3. No greater than 5% of the restoration area of either bank may be allowed to be covered by invasive plant species. Any invasive species in excess of the 5% coverage limit must be removed in accordance with the requirements of the *Invasives Control Plan* (BBL, 2001).

The survivability of the plants is to be determined by both mortality and apparent vigor. Monitoring also assesses whether supplemental activities, such as stem protection, fertilization, or watering, are necessary.

In accordance with the Work Plan, a certified arborist (selected in consultation with the Trustees) assists in the completion of the monitoring program. The arborist, Chris Frank of C.L. Frank & Company of Northampton, Massachusetts, uses best professional judgment to assess the apparent vigor of the planted specimens. To the extent practicable, Mr. Frank observes any supplemental plantings and is present for the restored bank vegetation monitoring visits.

During each of the monitoring visits, the restoration areas must also be inspected for the presence of the following invasive plant species:

- Asiatic Bittersweet *Celastrus orbiculatus*
- Common Buckthorn *Rhamnus cathartica*
- Norway Maple *Acer platanoides*
- Staghorn Sumac *Rhus typhina*
- Morrows Honeysuckle *Lonicera morrowii*
- Amur Honeysuckle *Lonicera maackii*
- Tatarian Honeysuckle *Lonicera tatarica*
- Autumn-olive *Elaeagnus umbellata*
- Russian-olive *Elaeagnus angustifola*
- Black Locust *Robinia pseudoacacia*
- Buckthorn *Rhamnus frangula*
- Japanese Honeysuckle *Lonicera japonica*
- Japanese Barberry *Berberis thunbergii*
- European Barberry *Berberis vulgaris*
- Porcelain Berry *Ampelopsis brevipedunculosa*
- Black Swallow-wort *Vincetoxicum nigrum*
- Garlic Mustard *Allaria petiolata*
- Goutweed *Aegopodium podagraria*
- Japanese Knotweed *Polygonum cuspidatum*
- Multiflora Rose *Rosa multiflora*

- Common Reed *Phragmites australis*
- Purple Loosestrife *Lythrum salicaria*
- Yellow Iris *Iris pseudacorus*
- Winged Euonymus (or Burning Bush) *Euonymus alata*

Each monitoring visit consists of a pedestrian survey of all areas on both banks where restoration activities have occurred. During the field visit, personnel conducting the inspection, supported by the certified arborist, perform a stem count of planted trees and shrubs to determine respective survival rates. The inspection team estimates groundcover by herbaceous species to verify coverage outside the foliar extent of the planted trees, and notes any indications of damage from trespassing or herbivory. The inspection team also makes observations related to the necessary initiation, if any, of actions to address invasive species. The monitoring visits are documented through field notes and photographs. Based on the results of each visit, the inspection team recommends response actions, such as replanting, watering, fertilization, and implementing measures to reduce herbivory.

Full details of each of the restored bank vegetation monitoring visits are reported in trip reports submitted to EPA as prescribed in the Work Plan. Trip reports submitted to EPA in 2006 are included in Appendix C. The remainder of this section summarizes the results of the vegetation monitoring visits performed in 2006.

2.3 2006 Monitoring Activities

During 2006, there was one scheduled restored bank vegetation inspection – performed on August 24, 2006 (i.e., a late summer inspection). Planting areas 4B, 6, 7, 8, 8A, 9, 9A, 10, 11, and 11A were quantitatively monitored in 2006, satisfying the Year 5 inspection requirements for these areas. Representatives of GE and the Trustees jointly conducted the vegetation monitoring visits. Table 2-1 presents a summary of planting activities completed in 2006 and previous years, and the quantities of materials planted in respective planting areas. All planting areas are shown on Figure 2-1. A trip report summarizing the results of this monitoring visit was submitted to EPA on December 15, 2006, with a copy to the Trustees. For ease of reference, that trip report is included in Appendix C.

Note that as discussed in the 2005 Annual Monitoring Report, planting areas 13, 15, and 16 could not be inspected during 2005 due to remedial activities being performed in the Newell Street Area II parking lot, and were scheduled to be inspected in 2006 to satisfy a deferred

Year 3 inspection. However, at the time of the rescheduled inspection in 2006, restoration activities in some of these planting areas had not been fully completed, and planted species in the other areas had not yet had time for full establishment. As a result, the inspection scheduled for these areas was postponed. As detailed in Section 6, GE proposes to revisit these areas in 2007 for a deferred Year 3 inspection, and again in 2008 as a deferred Year 5 inspection.

The summer 2006 restored banks vegetation monitoring visit was conducted on August 24, 2006 by Charles Harman of AMEC as a representative of GE. Todd Chadwell of Woodlot Alternatives was present for the Trustees, and Chris Frank of C. L. Frank accompanied the monitoring party as the certified arborist. As in 2004 and 2005, water levels in the river were generally below the red-osier dogwood band.

For canopy species, all areas exceeded the performance standard. Canopy species monitoring results are summarized in Table 2-2.

For understory species, each of the areas was below the performance standard. Planting area 4B, which was visited for the first time since August 2004, exhibited a negative variance of 13 shrubs. Nevertheless, planting area 4B showed significant vegetative growth from the previous inspection. Planting area 10, which was also visited for the first time since August 2004, did not meet the performance standard with a variance of 1 shrub less than the standard. Planting areas 8, 9, 9A, 11, 11A appeared to have lost understory species, with a total negative variance of 24 shrubs. This was likely a result of the apparent narrowing of the riparian area and a corresponding loss of a portion of the shrub patch during the performance of remedial activities related to the Newell Street Area II parking lot. All planting areas met the performance standard for red-osier dogwoods and grapevines. Understory species monitoring results are summarized in Table 2-3. Red-osier dogwood and grapevine monitoring results are summarized in Tables 2-4 and 2-5. Herbaceous cover and invasive species both met the required performance standard in all planting areas. Results of the herbaceous ground cover and invasive species monitoring surveys are shown in Tables 2-6 and 2-7, respectively

2.4 Response Actions

In November 2006, GE implemented response activities to correct the negative variances that were identified in the planting areas for understory species. Understory plantings were comprised of northern arrowwood (*Viburnum dentatum*), silky dogwood (*Cornus amomum*), winterberry (*Ilex verticillata*), and choke-cherry (*Prunus virginiana*), depending upon species availability. The number of shrubs, and shrub species, installed in each planning area by C. L. Frank and Associates is listed below:

Planting area 4B: 13 shrub specimens
(4 northern arrowwood, 3 silky dogwood, 3 winterberry, and 3 chokecherry)

Planting area 10: 1 shrub specimen
(1 northern arrowwood)

Note that shrubs were not installed in planting areas 8, 9, 9A, 11, and 11A in anticipation of the performance of removal actions in these areas as proposed for the 2007 construction season. Shrub plantings necessary to meet the performance standards for these areas will be installed following the completion of removal actions, as further discussed below. A summary of the planting completed in 2006 and all plantings completed in previous years is presented in Table 2-1.

3. Restored Bank Erosion Monitoring

3.1 General

In 2006, restored bank erosion monitoring activities were implemented in those bank areas disturbed and restored as part of the Upper ½-Mile Reach Removal Action. Specifically, the cleared and restored bank areas of the Upper ½-Mile Reach (excluding those portions of the river included in the Building 68 Area Removal Action) are required to be inspected for significant areas of soil erosion or bank failure. In areas where a significant amount of erosion (e.g., ruts, gullies, washouts, or sloughing) is observed within the cleared and restored or riprap protective areas, GE is required to implement measures to replace/restore the eroded soil or riprap to the original restoration design conditions.

3.2 Monitoring Program

The Work Plan required that the post-restoration monitoring program consist of a visual inspection of the cleared and restored bank areas for signs of erosion on a semi-annual basis during the first year after restoration of the herbaceous cover and annually in years 2 through 5. At the end of the 5-year period, GE is required to propose a long-term monitoring program that will be implemented upon EPA approval. 2006 was the fourth year of erosion monitoring for the restored banks.

3.3 2006 Monitoring Activities

To complete the monitoring requirements set forth in the Work Plan, the restored banks in the Upper ½-Mile Reach were inspected to assess cleared and restored areas for evidence of erosion. The restored bank erosion monitoring visit was conducted on June 2, 2006. Andrew Silfer of GE performed the inspection, and was accompanied by Dean Tagliaferro of EPA, Randy Sujat of the U.S. Army Corps of Engineers (USACE), and Mark Gravelding of ARCADIS BBL. During this visit, six areas of measurable erosion were noted. In accordance with the Work Plan, GE identified, to the extent practicable, the likely cause of the erosion and evaluated the source, dispersal, and quantity, if any, of eroded soil in the River. In addition, GE evaluated the need and timing for response actions. The results of the 2006 restored bank inspection are summarized in Table 3-1, and the six areas where measurable erosion was observed are shown on Figure 3-1. A summary of these six areas is provided below. GE anticipates performance of the remedial activities discussed below during the course of the 2007 construction season, and will inform EPA of the anticipated schedule as it becomes evident. A trip report, initially submitted on December 14, 2006, documented the results of this inspection. Following the receipt of comments from EPA related to remedial actions proposed in the December 14, 2006 submittal, the trip report

was revised, and a final version was submitted on April 6, 2007. The final version of the 2006 erosion inspection trip report, including photographs of specific erosion areas, is included in Appendix C.

During the June 2, 2006 bank inspection, flow in the river was approximately 199 cubic feet per second (cfs), as measured at U.S. Geological Survey (USGS) River Gauge Station No. 0119700 on the East Branch of the Housatonic River in Coltsville, MA. It should be noted that although the flow in the river was less than 200 cfs at the time of the inspection, an extreme high-flow event had occurred in October of 2005 (several months after the 2005 bank erosion inspection), during which recorded flows at the Coltsville gauge exceeded approximately 6,300 cfs, a flow which exceeds the calculated 50-year flood in the river.

3.3.1 Area 1

Area 1 consists of approximately 25 feet of undercut bank in an area where no remedial activities were performed either in the river or on the riverbank (Figure 3-1). In this area, less than 10 cubic yards (cy) of bank soil appear to have eroded from the bank. The source of the eroded material appears to be native material from the low- and mid-bank area directly down-slope from established grassy vegetation. The cause of erosion appears to be a combination of the transition from riprap to unprotected bank soils and the high velocity flows associated with the extreme flood event discussed above. No eroded soil was observed in the adjacent portion of the river and, therefore, no removal activities are planned at this location. As discussed during the inspection, the proposed response action in this area will consist of placement of armor stone to replace eroded materials and protect against further such erosion.

3.3.2 Area 2

Area 2 includes two areas (see Figure 3-1). The first area consists of approximately 40 feet of undercut bank, located on the southern bank directly across the river from Building 64W in a non-remediated bank area directly upstream of a riprap swale. The second area is a slight undercut of the lower banks that extends for approximately 100 feet downstream of the same drainage swale. In these areas, a total of less than 10 cy of bank soil appears to have eroded from the bank. The source of the eroded material appears to be native material from the low- and mid-bank area. The cause of erosion appears to be high velocity water flow, likely associated with the extreme flood event discussed above. No evidence of eroded soil was observed in the adjacent portion of the river and, therefore, no removal activities are planned at this location. The proposed response action in this area will consist of placement of armor stone to replace eroded materials and protect against further such erosion.

3.3.3 Area 3

Area 3 is located on the northern bank in a non-remediated area (see Figure 3-1). In this area, less than 1 cy of bank soil appears to have eroded from within a 5-foot long slight undercut just above a riprap area in the channel. The source of the eroded material appears to be native material from the mid-bank area. The cause of erosion appears to be high velocity water flow, likely associated with the extreme flood event discussed above. No evidence of eroded soil was observed in the adjacent portion of the river and, therefore, no removal activities are planned at this location. Armor stone will be placed in this area to replace eroded materials and protect against further such erosion.

3.3.4 Area 4

Area 4 consists of a slightly undercut bank in a non-remediated area (see Figure 3-1). In this area, less than 1 cy of bank soil appears to have eroded from the bank. The source of the eroded material appears to be native material from the low-bank area. The cause of erosion appears to be high velocity water flow, likely associated with the extreme flood event discussed above. No evidence of eroded soil was observed in the adjacent portion of the river and, therefore, no removal activities are planned at this location. Armor stone will be placed in this area to replace eroded materials and protect against further such erosion.

3.3.5 Area 5

Area 5 is located on the southern bank adjacent to the Newell Street Area II Parking Lot (see Figure 3-1). Within Area 5 there are several intermittent areas of undercut bank, from which bank soils have been eroded, and steep, near-vertical slopes are present that potentially could further erode or fail. The observed erosion is likely a result of the high velocity flow associated with the extreme flood event discussed above, but may also be related, to some extent, to settling of the riprap in this area. The sources of eroded materials in this area appear to be native materials or clean backfill, as portions of Area 5 proposed for removal intersect areas that have been previously remediated. No evidence of eroded soil was observed in the adjacent portion of the river and, therefore, no removal activities in the river are planned at this location. During the inspection, it was discussed that this area would likely require excavation of the remaining steep slopes to tie into post-construction Newell Street Area II grades, as well as armor stone placement to restore this area to grade and reduce the potential for further erosion. GE has made preliminary assessments of the removal of certain bank materials in this area to reduce the grade of the remaining slopes, and in the December 15, 2006 trip report, proposed the performance of remedial activities to mitigate further erosion. In general, the proposed activities include bank soil removal and regrading, and armor stone placement, as required. Additional

information detailing the remedial activities proposed for Area 5 is provided in the 2006 Bank Erosion Inspection trip report (see Appendix C).

3.3.6 Area 6

This area is located on the northern bank between Building 62 and the Lyman Street Parking Lot (see Figure 3-1). In this area, an approximate 30-foot long section of the top of bank appears to have sloughed to the bottom of the bank. Despite this sloughing, there does not appear to have been any erosion or material loss in this area, and there were no observations of eroded materials in the adjacent portion of the river. In this area, GE proposes the removal of the sloughed portions of the bank, and placement of armor stone to provide increased stabilization.

4. Aquatic Habitat Enhancement Structures and Armor Stone Layer Monitoring

4.1 General

Periodic monitoring of the aquatic habitat enhancement structures is required to evaluate structural stability, effect on aquatic habitat, and potential for increased bank-side erosion. The armor stone layer placed over the isolation layer within the riverbed must also be monitored periodically to confirm that it effectively prevents erosion of the underlying sediment cap isolation layer.

4.2 Monitoring Program

The Work Plan required that the post-restoration monitoring program for both the aquatic habitat enhancement structures and armor stone layer consist of annual visual inspections during low-flow conditions for 5 years following completion of remedial activities. 2006 represented the fourth year of monitoring. At the end of the 5-year period, GE is required to propose a long-term monitoring program that will be implemented upon EPA approval.

4.3 2006 Monitoring Activities

During 2006, monitoring activities for the armor stone layer were performed in conjunction with the monitoring event for the aquatic habitat enhancement structures. The combined monitoring event was conducted on August 23, 2006, one day prior to the summer vegetative monitoring survey. Charles Harman of AMEC (representing GE) conducted the inspection and Michael Chelminski of Woodlot was present for the Trustees. The results of that monitoring event were included in the December 15, 2006 trip report that outlined the results of the summer 2006 restored bank vegetation monitoring event. This trip report is included in Appendix C.

The inspection consisted of visual observation of the condition of each of the aquatic habitat structures and the armor stone layer from a canoe. At the time of inspection, the water level of the Upper ½-Mile Reach was seasonably low, as recorded by the United States Geological Survey (USGS) flow gauge located in Coltsville, MA (USGS 0119700 East Branch Housatonic River); flow in the river on the day of the inspection was approximately 38 cfs.

4.3.1 Aquatic Habitat Enhancement Structures

The aquatic habitat enhancement structures that were monitored during the 2006 survey included:

- Wing deflectors;
- Vortex weirs;
- Modified vortex weirs;
- W-weir; and
- Habitat enhancement boulders and boulder clusters.

As defined by the Work Plan, the general objectives of the placement of the aquatic habitat structures were to:

- Recreate riffle/pool structural variability in the instream habitat;
- Provide instream and bankside cover for aquatic organisms;
- Increase variability in water flow and depth;
- Increase bank stability; and
- Improve substrate conditions.

The approximate location of each habitat enhancement structure is presented on Figure 4-1.

The aquatic habitat enhancement structures that were monitored appeared to be stable, with no evidence of bankside erosion, and appear to be creating areas of improved aquatic habitat. Areas of deposition and scouring of recently deposited sediment on top of the armor stone were observed around most of the habitat enhancement structures. Detailed results of the aquatic habitat enhancement structures inspection are included in the previously submitted trip report found in Appendix C.

4.3.2 Armor Stone Layer

As in past years, the armor stone layer appeared to be stable with no evidence of erosion observed. In many areas, the armor layer has been covered with sediment deposits – an indication of the presence of sedimentation processes. Detailed results of the armor stone layer inspection are included in the previously submitted trip report found in Appendix C.

5. Water Column Monitoring

5.1 General

The objectives of the post-restoration water column monitoring program are to identify and evaluate water column impacts that may be a result of post-removal and restoration activities in the Upper ½-Mile Reach. Water column monitoring activities use procedures consistent with the monitoring previously performed for the during-construction water column monitoring program, as set forth in the Work Plan.

5.2 Monitoring Program

The Work Plan required that water column monitoring be conducted for the first 5 years following completion of remedial activities. 2006 represented the fourth year of such monitoring. The monitoring program consists of water column sampling performed three times annually – during a high-flow event (flow > 440 cfs), a storm-flow event (i.e., following a rainfall of > 0.25 inch in a 24-hour period), and a low-flow period (flow < 100 cfs). Samples are collected at the Newell and Lyman Street Bridge locations and are analyzed for polychlorinated biphenyls (PCBs) in both unfiltered and filtered form and for total suspended solids (TSS). Field data such as turbidity, temperature, and depth are also collected for each event. Following the performance of 5 years of such monitoring, GE will, if appropriate, submit a plan to EPA for modification or elimination of water column monitoring.

5.3 2006 Monitoring Activities

The low-flow monitoring event for 2006 was conducted on March 28, 2006, while flow in the river was approximately 45 cfs. During this event, low-flow samples were collected at the Lyman and Newell Street bridges

GE was unable to collect water column samples during 2006 that adequately captured storm-flow conditions (i.e., rainfall of > 0.25 inch in a 24-hour period). However, the storm-flow monitoring event for 2006 was conducted on January 8, 2007, following a 24-hour period in which the Pittsfield area received approximately 0.82 inch of precipitation. Flow in the river at this time was approximately 308 cfs. During this event, storm-flow samples were collected at the Lyman and Newell Street bridges.

During 2006, there were only five events during which flow in the Upper ½-Mile Reach exceeded 440 cfs, three of which occurred on weekend days. In these circumstances, GE was unable to collect high-flow samples during the 2006 monitoring year.

At each monitoring event, the flow in the river was reported from data collected at the USGS flow gauge located in Coltsville, MA. Precipitation data were compiled from daily National Oceanic and Atmospheric Administration's National Weather Service (NOAA/NWS) data reported for the Pittsfield, MA airport.

The complete results of the 2006 water column monitoring are presented in Table 5-1. PCBs were not detected in any water column samples except in one unfiltered low-flow sample collected at the Newell Street Bridge. PCBs in this sample were detected at a level of 0.069 parts per billion (ppb). TSS results across the entire water column data set ranged from 2.20 to 27.8 parts per million (ppm).

6. Summary and Future Activities

6.1 Restored Bank Vegetation Monitoring

During 2006, a late summer vegetative monitoring inspection was conducted in August. During the inspection, negative variances for understory species were noted in certain areas. As a result, GE performed corrective actions (i.e., plantings) in November of that year. Sufficient shrub specimens were planted to bring the survival rate back up to 80%.

In 2007, vegetation monitoring will be conducted once during the late summer time period (July/August). As per the monitoring schedule, planting areas 1, 2, 3, 4A, 5, 12, 13, 14, 15, 16 and 17 will be quantitatively monitored once during the late summer (July/August). The August 2007 monitoring visit will be the seventh yearly and therefore last planned monitoring visit for planting areas 1, 2, 3, 4A, and 5. Planting areas 4B, 6, 7, 8, 8A, 9, 9A, 10, 11, and 11A will be in their sixth year of monitoring and as such are not scheduled to be inspected during 2007.

As discussed above and in the December 15, 2006 trip report, Year 3 monitoring activities initially scheduled in 2004, and re-scheduled for 2005, have not been performed in planting areas 13, 15, and 16 due to disturbances related to the Newell Street Area II remedial activities. These areas will be revisited in 2007 and GE proposes that, following this supplemental visit, these planting areas (13, 15, and 16) be monitored in 2008 as part of a deferred Year 5 effort, and monitored a final time in 2009 as part of the originally scheduled Year 7 effort. Results of each monitoring event will be summarized and submitted to EPA in a trip report and in the pertinent *Annual Monitoring Report*. A summary of the future restored bank vegetation monitoring activities is included in Table 6-1. Restored bank vegetation monitoring is expected to continue through 2009.

During the 2006 monitoring visit, GE implemented the modifications proposed in the *2005 Annual Monitoring Report* by using modified monitoring plots in planting areas 4B and 10. GE plans to implement the modified approach again during the 2007 monitoring activities. In 2007, the modified monitoring approach will be used in planting areas 1, 2, 4A, 5, 12, 13, and 14.

Basic maintenance activities to address the state of the wire tree cages and the stem protectors will be ongoing in 2007. GE will continue maintenance actions to prune back some of the more rapid growing canopy species, as appropriate, allowing for a more extensive development of the tree trunk, and thereby preventing such loss of trees. The Trustees will be informed of the schedule for any such pruning activities.

GE anticipates performing the 2007 restored banks vegetation inspection in August, and will coordinate scheduling of 2007 inspection visits with EPA and the Trustees' representative to avoid potential high-water events in the Upper ½-Mile Reach or other scheduling conflicts.

6.2 Restored Bank Erosion Monitoring

Restored bank erosion monitoring was conducted in June 2006. During the monitoring event, erosion was noted in six areas. GE has proposed response actions for these areas, and plans to complete these activities during the 2007 construction season.

2006 represented the fourth year of monitoring following completion of restoration activities. Monitoring of restored bank areas will be performed a fifth and final time in 2007. GE anticipates performing the restored banks erosion inspection in the late summer (e.g., August) during an extended period of low flow conditions, and following the completion of the remedial activities discussed in Section 3. A summary of the future monitoring activities is included in Table 6-1. As part of the 2007 restored bank erosion inspection trip report, GE will discuss the conclusion of the 5-year monitoring program described in the Work Plan, and propose a long-term monitoring program for EPA approval.

6.3 Monitoring of Aquatic Habitat Enhancement Structures and Armor Stone Layer

Monitoring of the aquatic habitat enhancement structures and armor stone layer was conducted in August 2006. The aquatic habitat enhancement structures appeared to be performing as intended, and no side-bank or armor layer erosion was noted. The armor stone layer appeared to be stable with no areas of erosion noted.

2006 represented the fourth year of monitoring following completion of restoration activities. Monitoring of the aquatic habitat enhancement structures and armor stone layer will be conducted again in 2007. GE anticipates performing the aquatic habitat enhancement structures and armor stone layer inspection in the late summer (e.g., August) during an extended period of low flow conditions. A summary of the future monitoring activities is included in Table 6-1. As part of the 2007 aquatic habitat enhancement structures and armor stone layer inspection trip report, GE will discuss the conclusion of the 5-year monitoring program described in the Work Plan, and propose a long-term monitoring program for EPA approval.

6.4 Water Column Monitoring

The 2006 water column monitoring was performed on two occasions (i.e., a low-flow event in March 2006 and a storm-flow event in early January 2007) at the Newell and Lyman Street Bridge locations. PCBs were detected at low levels in only one unfiltered low-flow water sample.

2006 represented the fourth year that water column monitoring was conducted following restoration of the Upper ½-Mile Reach. To the extent practicable, GE will perform water column monitoring three times (i.e., following high-, low-, and storm-flow events) annually in 2007. A complete summary of the future monitoring activities is included in Table 6-1. Following the collection of the 2007 water column data and the evaluation of 5 consecutive years of such data, GE will submit to EPA a plan for modification or elimination of water column monitoring.

6.5 Sediment Cap Isolation Layer Monitoring

Sediment cap isolation layer monitoring was not performed in 2006. Isolation layer sampling performed in 2003 fulfilled the requirement of 1-year post-cap placement monitoring for all monitoring locations. As stated in the Work Plan, isolation layer monitoring would have been required in 2005 (5-year monitoring requirements for three of the eight locations). However, in the *2003 Annual Monitoring Report*, GE proposed, and EPA subsequently agreed, that the monitoring for all eight locations would be consolidated and performed in 2007 (i.e., the 5- to-7-year interval) (BBL, 2004). The performance of the isolation layer material sampling was previously scheduled for October 2007. However, GE is currently considering whether to perform this sampling earlier in the year – e.g., based on field conditions and/or coordination with other investigative activities. GE will coordinate the scheduling for the collection of the sediment cap isolation layer samples with EPA. GE will submit a report to EPA detailing GE's 2007 sediment cap isolation layer monitoring and related analytical results. A summary of the future monitoring activities is included in Table 6-1. Following the 2007 monitoring activities, GE will propose a long-term monitoring program for EPA approval.

In 2002, in response to EPA concerns regarding the levels of total organic carbon (TOC) in some isolation layer materials placed during remedial activities, GE developed and proposed a plan for TOC sampling of those isolation layer materials, the performance of a seepage meter study, and the submission of a report presenting these results and evaluating the effectiveness of the isolation layer. This plan was conditionally approved by EPA in letters dated September 25 and December 31, 2002, and February 27, 2003. The TOC sampling was completed in 2002; however, due to unfavorable weather conditions

and EPA's installation of a temporary dam in the 1½-Mile Reach, GE was not able to collect the seepage meter data until 2006. GE submitted a report on the results of the TOC sampling and seepage meter monitoring to EPA on March 14, 2007. Following EPA approval of that report, GE will proceed with development of a Final Completion Report on the Upper ½-Mile Reach Removal Action.

6.6 Restored Sediments Monitoring

The Work Plan requires the performance of three rounds of sampling of the sediments on top of the cap in the Upper ½-Mile Reach at 5-year intervals, beginning 5 years after completion of construction on the sediment removal/replacement activities. 2007 will be the first performance of the restored sediments monitoring program, and will involve the collection of 39 sediment grab samples at locations specified in the Work Plan. The performance of the restored sediments monitoring was anticipated to be conducted in October 2007. However, GE is considering whether to collect these samples earlier in the year – e.g., based on field conditions and/or coordination with other investigative activities. GE will coordinate the scheduling of the collection of the restored sediment samples with EPA. GE will submit a report to EPA detailing GE's monitoring activities associated with the 2007 restored sediments monitoring and related analytical results. The restored sediment sampling monitoring program will be conducted again in 2012 and 2017. A summary of the future monitoring activities is included in Table 6-1.

7. References

BBL. 2006. *2005 Annual Monitoring Report – Upper ½-Mile Reach of the Housatonic River.* Prepared for GE, Pittsfield, MA.

BBL. 2005. *2004 Annual Monitoring Report – Upper ½-Mile Reach of the Housatonic River*. Prepared for GE, Pittsfield, MA.

BBL. 2004. *2003 Annual Monitoring Report – Upper ½-Mile Reach of the Housatonic River*. Prepared for GE, Pittsfield, MA.

BBL. 2001. *Invasives Control Plan*. Prepared for GE, Pittsfield, MA.

BBL. 1999. Removal Action Work Plan for Upper ½-Mile Reach of Housatonic River. Prepared for GE, Pittsfield, MA.

Tables

TABLE 2-1
SUMMARY OF BANK PLANTING AREAS

2006 ANNUAL MONITORING REPORT
UPPER 1/2-MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS

					Vines	Understory				Dogwood Band	Canopy				
Area	Planting Date	Cell Area	Planting Area (ac)	Toe Planting Length (lf)	Woody Vines *Vitus riparia*	Serviceberry *Amelanchier canadensis* *Amelanchier arborea*	Northern Arrowwood *Viburnum dentatum*	Silky Dogwood *Cornus amomum*	Winterberry Holly *Ilex verticillata*	Red-Osier Dogwood *Cornus sericea*	Eastern Cottonwood *Populus deltoides*	Boxelder *Acer negundo*	Black Willow *Salix nigra*	Silver Maple *Acer saccharinum*	Total
1	May-00	A,C	0.30	328	0	0	37	37	36	82	79	79	26	26	**402**
1	Oct-00	A,C	--	--	0	36	0	0	0	0	0	0	0	0	**36**
1	Jun-01	A,C	--	--	22	0	1	1	0	0	0	0	0	0	**24**
1	Oct-01	A,C	--	--	0	10 *	10	9	10	8	10	10	24	21	**112**
1	Oct-02	A,C	--	--	0	6 *	5	6	6	6	0	0	0	0	**29**
1	Oct-03	A,C	--	--	0	0	0	36	0	9	0	0	0	0	**45**
2	May-00	D	0.17	NA	0	0	0	0	0	0	44	44	15	15	**118**
2	Oct-01	D	--	--	0	0	0	0	0	0	9	9	14	8	**40**
2	Oct-03	D	--	--	0	0	0	0	0	0	0	30	0	0	**30**
3	May-00	E	0.05	45	0	0	18	18	19	11	13	13	4	4	**100**
3	Oct-00	E	--	--	0	18	0	0	0	0	0	0	0	0	**18**
3	Jun-01	E	--	--	0	0	0	0	1	0	1	1	0	0	**3**
3	Oct-01	E	--	--	0	5 *	4	4	4	0	5	5	4	4	**35**
3	Oct-02	E	--	--	0	6 *	0	6	0	8	3	0	0	2	**25**
3	Oct-03	E	--	--	0	0	0	12	0	0	0	0	0	0	**12**
3	Nov-05	E	--	--	0	0	0	0	0	0	4	3	3	3	13
4A	Oct-00	G1,G2	0.16	395	0	19	18	18	18	74	64	63	5	10	**289**
4A	Oct-01	G1,G2	--	--	0	12 *	6	6	6	12	3	4	10	5	**64**
4A	Oct-02	G1,G2	--	--	0	8 *	4	4	10	8	30	10	0	0	**74**
4A	Oct-03	G1,G2	--	--	0	0	0	12	0	0	0	33	0	0	**45**
4A	Nov-05	G1,G2	--	--	0	4	4	4	4	0	5	4	4	4	**33**
4B	Jun-01	G2,G3	0.40	416	22	54	56	56	0	134	95	95	33	33	**578**
4B	Oct-01	G2,G3	--	--	0	0	0	0	53	0	0	0	0	0	**53**
4B	Oct-02	G2,G3	--	--	0	8 *	4	6	2	8	10	0	10	10	**58**
4B	Oct-03	G2,G3	--	--	0	0	0	34	0	0	0	0	0	0	**34**
4B	Oct-04	G2,G3	--	--	0	0	12	12	12	0	0	0	0	0	**36**
4B	**Nov-06**	**G2,G3**	**--**	**--**	**0**	**3 ***	**4**	**3**	**3**	**0**	**0**	**0**	**0**	**0**	**13**
5	Oct-00	F1,F2	0.10	NA	0	19	18	18	18	0	25	25	8	8	**139**
5	Oct-03	F1,F2	--	--	0	0 0	0	21	0	0	0	10	0	0	**31**
5	Nov-05	F1,F2	--	--	0	6	6	6	6	0	3	3	3	2	35
6	Jun-01	F3	0.07	226	0	0	0	0	0	57	21	21	7	7	**113**
6A	Jun-01	F3	0.05	NA	0	0	0	0	0	0	8	8	3	3	**22**
7	Jun-01	F3	0.01	NA	0	0	0	0	0	0	3	3	1	1	**8**
8	Oct-01	H1	0.02	32	0	0	0	0	0	6	6	4	2	2	**20**
8	Oct-02	H1	--	--	0	0	0	0	0	2	0	0	0	0	**2**
8	**Nov-06**	**H1**	**--**	**--**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
8A	Oct-01	H1	0.05	104	0	0	0	0	0	29	12	7	4	4	**56**
9	Oct-01	H1	0.01	NA	0	0	0	0	0	0	3	2	1	1	**7**
9	**Nov-06**	**H1**	**--**	**--**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
9A	Oct-01	H1,H2	0.06	187	0	0	0	0	0	31	12	7	4	4	**58**
9A	Oct-02	H1	--	--	0	0	0	0	0	2	0	0	0	0	**2**
9A	**Nov-06**	**H1**	**--**	**--**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
10	Oct-01	B68	0.18	NA	0	36 *	36	37	37	0	47	47	16	16	**272**
10	Oct-04	B68	--	NA	0	0	3	3	2	0	0	0	0	0	**8**
10	**Nov-06**	**B68**	**--**	**NA**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
11	Oct-01	H2	0.04	88	0	0	0	0	0	20	8	6	3	3	**40**
11	Oct-02	H2	--	--	0	0	0	0	0	2	0	0	0	0	**2**
11	Oct-03	H2	--	--	0	0	0	19	0	0	0	0	0	0	**19**
11	**Nov-06**	**H2**	**--**	**--**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
11A	Oct-01	H2	0.06	83	0	0	0	0	0	28	12	7	4	4	**55**
11A	Oct-02	H2	--	--	0	0	0	0	0	2	0	0	0	0	**2**
11A	**Nov-06**	**H2**	**--**	**--**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
12	May-02	J1	0.19	269	0	18 *	0	19	18	67	50	50	0	17	**239**
12	Oct-02	J1	--	--	22	0	18	0	0	0	0	0	17	0	**57**
12	Oct-03	J1	--	--	0	0	0	12	0	13	0	0	0	0	**25**
12	Oct-04	J1	--	--	0	0	3	3	2	0	0	0	0	0	**8**
13	May-02	I1	0.10	234	0	18 *	0	18	19	41	26	26	0	9	**157**
13	Oct-02	I1	--	--	0	0	18	0	0	18	0	0	9	0	**45**
14	Oct-02	J3	0.21	192	22	37 *	37	36	36	48	56	56	19	19	**366**
15	May-02	I2	0.00	40	0	0	0	0	0	10	0	0	0	0	**10**
16	Oct-02	I2	0.01	72	0	0	0	0	0	18	3	3	1	1	**26**
17	Oct-02	I3	0.04	108	0	0	0	0	0	27	10	10	3	3	**53**
Total			--	--	***88***	***323***	***323***	***476***	***322***	***781***	***680***	***698***	***257***	***249***	***4197***

Notes:
1. Most recent planting activities are shown in bold.
2. Woody vines planted at an approximate density of 40 vines/acre on 4' centers in a 15'x30' patch with a minimum of 150' between patches.
3. Understory planted at an approximate density of 730 shrubs/acre (including red-osier dogwood) on 4' centers in a 30'x50' patch with a minumum of 40' between patches.
4. Canopy planted in varying densities, clumps, or if necessary, sinuous lines.
5. Dogwood band planted on 4' centers in a single row along the toe of the bank.
6. * - In consultation with EPA and Trustees, Chokecherry (*prunus virg*iniana) was planted in substitution of Serviceberry for these areas.

TABLE 3-1
RESTORED BANK EROSION INSPECTION SUMMARY

2006 ANNUAL MONITORING REPORT
UPPER 1/2-MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS

Area	Description	Approximate Size	Action
Areas with Measurable Erosion			
1 - North bank of river, directly across from Hibbard Playground	Erosion of soil and undercut banks. Non-remediated bank area. No evidence of eroded soil in river.	~25-ft of undercut banks	Restoration activities to include installation of armor stone to protect against further erosion.
2 - South bank of river, ~200' downstream of Hibbard Playground	Erosion of soil and slightly undercut banks. Non-remediated bank area. No evidence of eroded soil in river.	Two areas: total of ~140-ft of slightly undercut banks	Restoration activities to include installation of armor stone to protect against further erosion.
3 - North bank of river, behind Building 63	Erosion of soil and undercut banks above riverbed armor layer. Non-remediated bank area. No evidence of eroded soil in river.	~5-ft of undercut banks	Restoration activities to include installation of armor stone to protect against further erosion.
4 - South bank of river, directly upstream of the Newell St. II parking lot	Erosion of soil from lower banks above riverbed armor layer. Non-remediated bank area. No evidence of eroded soil in river.	~30-ft of undercut banks	Restoration activities to include installation of armor stone to protect against further erosion.
5 - South bank of river, directly behind Newell St. II parking lot	Erosion of soil and undercut banks above riverbed armor layer. Remediated and non-remediated bank areas. No evidence of eroded soil in river.	Several areas: total of ~510-ft of undercut banks	Restoration activities to include removal and re-grading of bank materials and installation of armor stone to protect against further erosion.
6 - North bank of river, directly upstream of Lyman St. parking lot	Sloughing of top-of-bank: sloughed materials have slid to bottom of slope. Remediated bank areas. No evidence of eroded soils in river.	~300 ft2 (an approximate 30-ft long section of the top-of-bank)	Remove sloughed materials, regrade affected areas and install additional riprap at toe of slope, if necessary, to stabilize remaining bank materials.

TABLE 5-1
WATER COLUMN MONITORING

2006 ANNUAL MONITORING REPORT
UPPER 1/2-MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS
(Results are presented in parts per million, ppm)

Parameter	Sample ID: / Sample Location: / Date Collected: / Sampling Event:	LOCATION-2 Newell St. Bridge 03/28/06 Low Flow	LOCATION-4 Lyman St. Bridge 03/28/06 Low Flow	LOCATION-2 Newell St. Bridge 01/08/07 Storm Flow	LOCATION-4 Lyman St. Bridge 01/08/07 Storm Flow
PCBs-Unfiltered					
Total PCBs		0.0000690	ND(0.0000220)	ND(0.0000220)	ND(0.0000220)
PCBs-Filtered					
Total PCBs		ND(0.0000220)	ND(0.0000220)	ND(0.0000220)	ND(0.0000220)
Conventional Parameters					
Particulate Organic Carbon		0.369	0.443	--	--
Total Suspended Solids		2.30	2.20	27.8	27.4
Chlorophyll (a)		0.0012	0.0012	--	--
Field Measurements					
Conductivity (mS/cm)		0.359	0.368	0.167	0.168
pH (Standard Units)		7.24	7.22	6.30	5.88
Sample Depth (m)		0.17	0.15	0.53	0.55
Turbidity (ntu)		2	2	21	26
Water Temperature (^{o}C)		8.79	8.92	4.72	4.81

Notes:

1. Samples were collected by Blasland, Bouck & Lee, Inc. and submitted to Northeast Analytical, Inc. for analysis of filtered and unfiltered PCBs, total suspended solids (TSS), particulate organic carbon (POC), and chlorophyll (a).
2. Sampling methods involved the collection of composite grab samples at each location, representative of three stations (25, 50, and 75 percent of the total river width at each location) at 50 percent of the total river depth at each station. Reported sample depth is the average of the three depths at the composite sample locations.
3. ND - Analyte was not detected. The number in parentheses is the associated reporting limit.

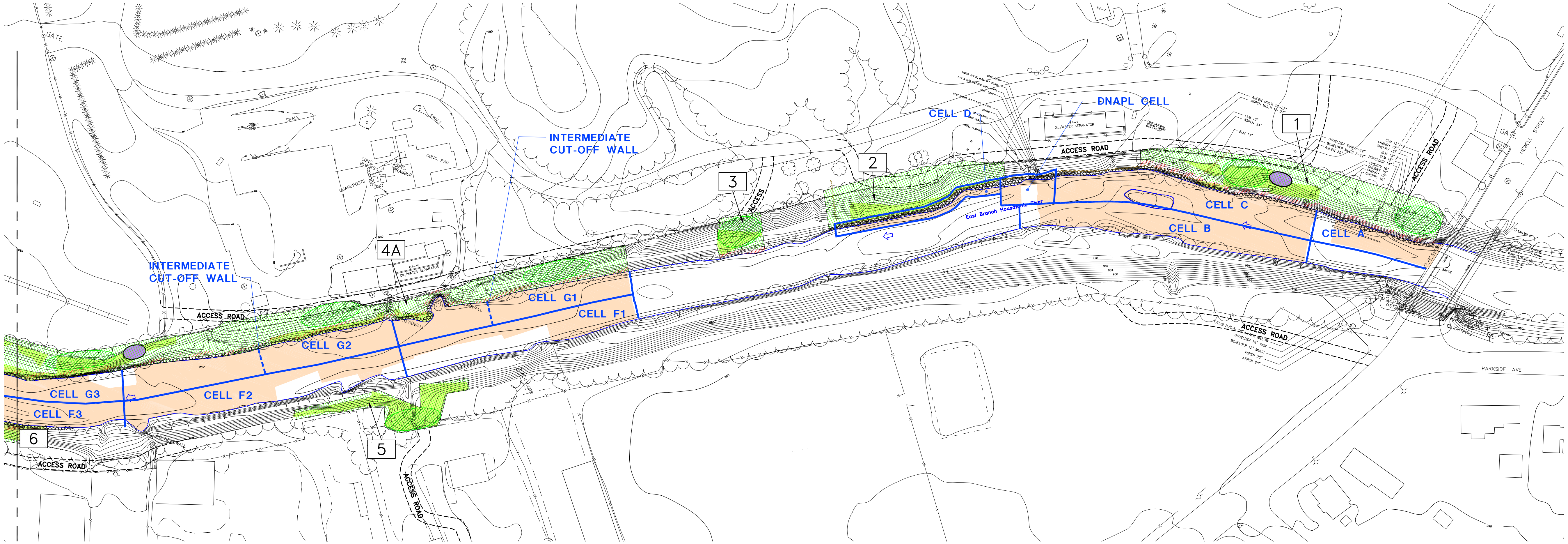
TABLE 6-1
SUMMARY OF FUTURE POST-CONSTRUCTION MONITORING ACTIVITIES[1]

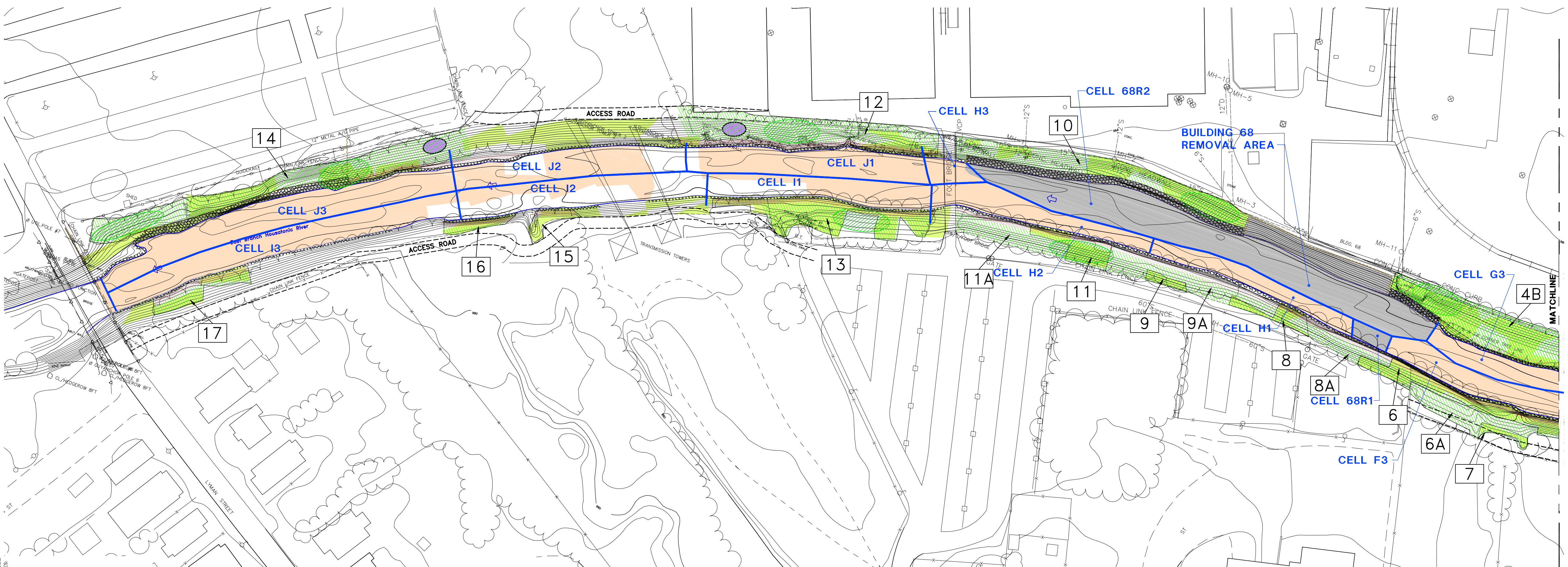
2006 ANNUAL MONITORING REPORT
UPPER 1/2-MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC COMPANY - PITTSFIELD, MASSACHUSETTS

Monitoring Activity[2]	Year to be Performed			Comments
	2007	2008	2009	
Sediment Cap Isolation Layer (CAP-MON-1 through CAP-MON-8)	Year 5-7[3]	---	---	Consists of periodic sampling (i.e., one year after cap placement, and at the end of the initial five-year period after cap placement) of the isolation layer at select locations along the Upper 1/2-Mile Reach.
Armor Stone Layer	Year 5	---	---	Visual inspection and photographs following first ice-out and high water condition (i.e., a flow of 440 cfs or greater) during low flow conditions (includes inspection of rip rap along toe of slope)
Aquatic Habitat Enhancement Structures	Year 5	---	---	Visual inspection to be performed in the summer during a period of low-flow condition on an annual basis for five years.
Restored Sediments[4]	Year 5	---	---	Sampling to consist of 39 grab samples, collected at the locations identified in the Upper 1/2-Mile Work Plan. See note 3 for additional information.
Cleared and Restored Bank Soil Areas	Year 5	---	---	Visual inspection of the cleared and restored bank areas for signs of erosion on a semi-annual basis during the first year and on an annual basis in years 2 through 5.
Restored Bank Vegetation				
Planting Areas 1, 2, 3, 4A, and 5	Year 7	---	---	Consists of 2 visits during each of the first three years after planting, and an annual visit during the fifth and seventh years after planting. In each of the first three years, visits are conducted in the late spring after the first leaf flush (May/June) and in the summer (July/August). The single visit in the fifth and seventh year will be conducted in the summer (July/August).
Planting Areas 4B, 6, 7, 8, 8A, 9, 9A, 10, 11, and 11A	---	Year 7	---	
Planting Areas 13, 15, and 16 [5]	Deferred Year 3	Deferred Year 5	Year 7	
Planting Areas 12, 14, and 17	Year 5	---	Year 7	
Water Column Monitoring	Year 5	---	---	Consists of sampling performed three times annually (high flow, storm flow, and low flow) for the first five years at the Newell and Lyman Street sampling locations.

Notes:
1. Please refer to the *Removal Action Work Plan - Upper 1/2-Mile Reach of Housatonic River* (Upper 1/2-Mile Work Plan; BBL, August 1999) for additional details.
2. EPA and EOEA shall be notified at least one week prior to conducting monitoring activities.
   EPA contact is Dean Tagliaferro: (413) 236-0969
   EOEA contact is Dale Young: (413) 447-9771
   GE contact is Andy Silfer: (413) 448-5904
3. To consolidate sampling efforts, GE proposed, and EPA concurred, that 5-year monitoring for all isolation layer locations would be performed in 2007.
4. GE is required to conduct three rounds of periodic sampling of the restored sediments at five-year intervals, beginning five-years after completion of construction on the sediment removal/replacement activities. As indicated in the above table, the first sampling round will occur in 2007. The second and third round of sampling is anticipated to be performed in 2012 and 2017. Sampling shall be performed in accordance with the Upper 1/2-Mile Work Plan.
5. Planting area 13, 15, and 16 will be revisited in 2007 to fulfill Year 3 monitoring requirements, 2008 to fulfill Year 5 monitoring requirements, and will return to the regularly scheduled Year 7 inspections in 2009.

Figures





LEGEND:

- SEDIMENT WORK AREA
- BANK SOIL REMOVAL AREA
- TOP OF BANK
- BUILDING 68 REMOVAL AREA
- CLEARING LIMITS/PLANTING AREA
- CONTAINMENT BARRIER LOCATION
- UNDERSTORY SPECIES
- VINE PATCHES
- STONE/RIP-RAP
- RED-OSIER-DOGWOOD
- 4A APPROXIMATE RESTORED BANKPLANTING AREA

NOTES:

1. ALL DIMENSIONS AND LOCATIONS ARE APPROXIMATE.
2. AREAS 6A, 8A, 9A, AND 11A WERE ADDED AT THE REQUEST OF THE EOEA.
3. MAPPING IS BEST AVAILABLE INFORMATION AS OF 12/10/98 BASED ON MAPPING PROVIDED BY LOCKWOOD MAPPING, INC. PREPARED FROM 1990 AERIAL PHOTOGRAPHY; DATA PROVIDED BY GENERAL ELECTRIC; AND BLASLAND AND BOUCK, P.C. CONSTRUCTION PLANS. RIVERBANK AND RIVER BED TOPOGRAPHIC INFORMATION PROVIDED BY BBL FROM OCTOBER 12–23, 1998 FIELD SURVEY.
4. COORDINATE GRID BASED ON 1927 STATE PLANE COORDINATES.
5. ELEVATION DATUM REFERENCED TO NGVD 1929.

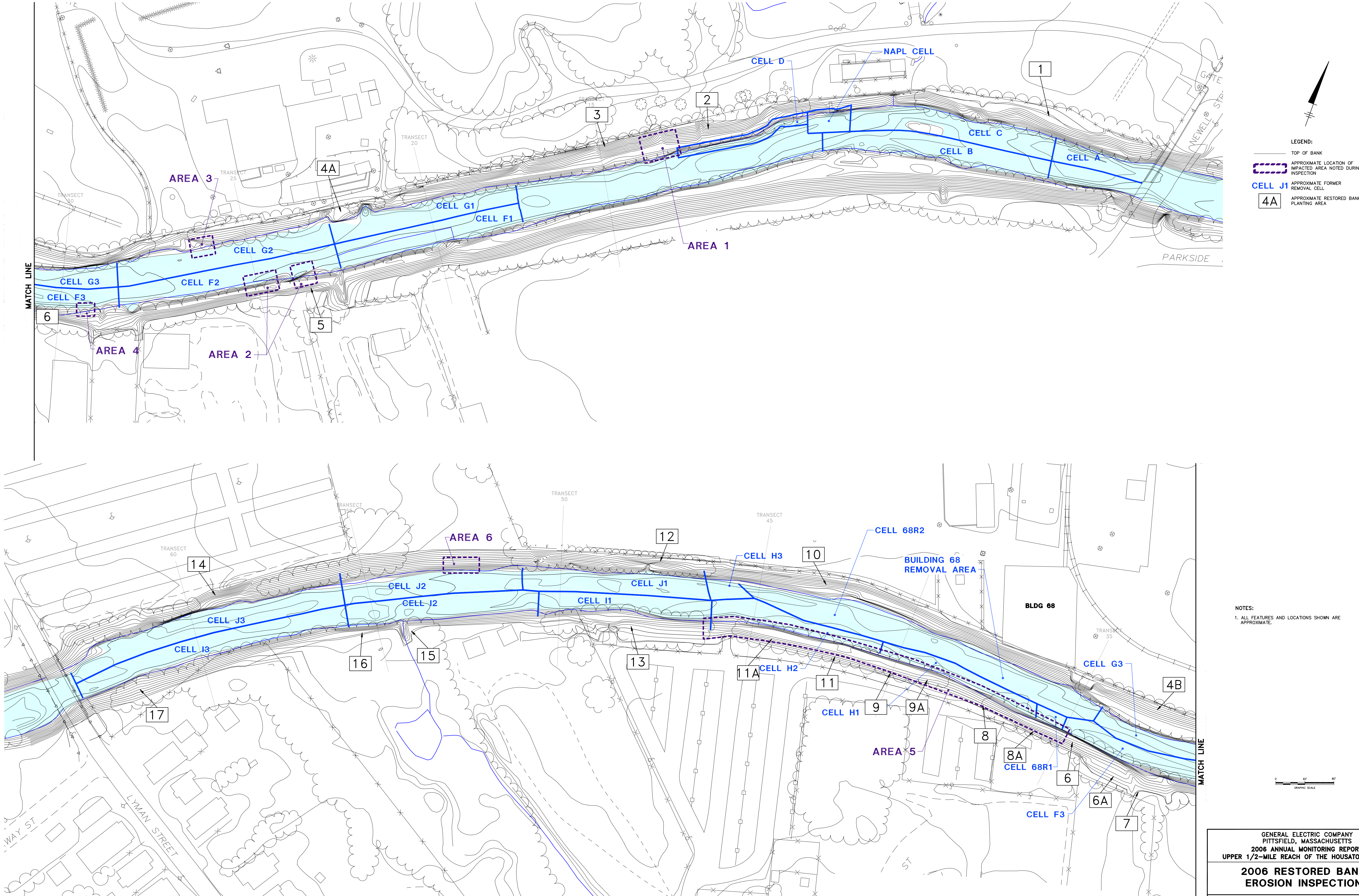
GRAPHIC SCALE

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
2006 ANNUAL MONITORING REPORT
UPPER 1/2-MILE REACH OF THE HOUSATONIC RIVER

RESTORED BANK PLANTING AREAS

ARCADIS BBL

FIGURE
2-1

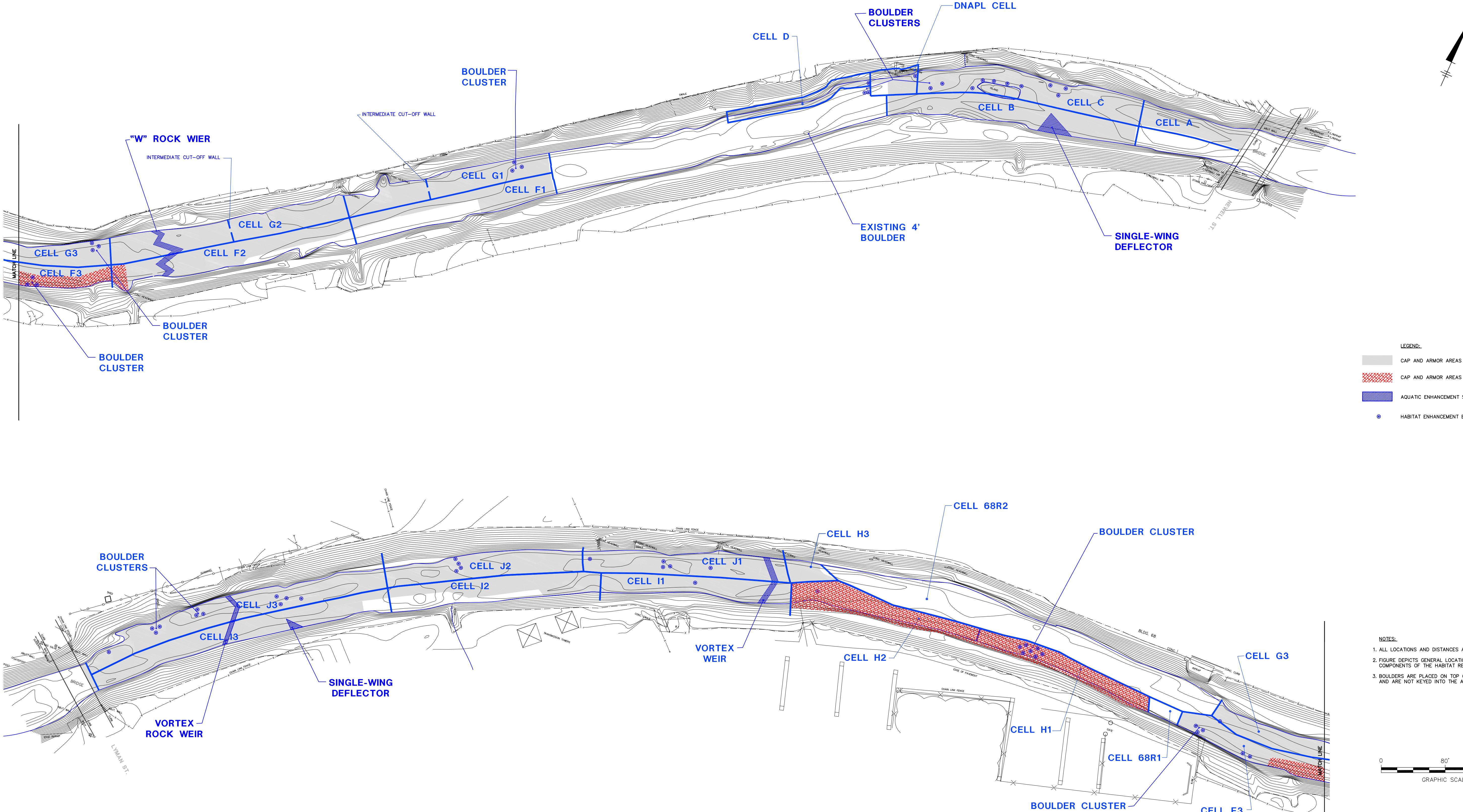


GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
2006 ANNUAL MONITORING REPORT
UPPER 1/2-MILE REACH OF THE HOUSATONIC RIVER

2006 RESTORED BANK EROSION INSPECTION

ARCADIS BBL

FIGURE
3-1



LEGEND:

- CAP AND ARMOR AREAS (ARMOR STONE D100, 9")
- CAP AND ARMOR AREAS (ARMOR STONE D100, 12")
- AQUATIC ENHANCEMENT STRUCTURES
- HABITAT ENHANCEMENT BOULDERS

NOTES:

1. ALL LOCATIONS AND DISTANCES ARE APPROXIMATE.
2. FIGURE DEPICTS GENERAL LOCATIONS OF MAJOR COMPONENTS OF THE HABITAT RESTORATION PLAN.
3. BOULDERS ARE PLACED ON TOP OF THE ARMOR LAYER AND ARE NOT KEYED INTO THE ARMOR LAYER.

0 80' 160'
GRAPHIC SCALE

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
2006 ANNUAL MONITORING REPORT
UPPER 1/2-MILE REACH OF THE HOUSATONIC RIVER

HABITAT ENHANCEMENT STRUCTURE LOCATIONS

ARCADIS BBL
infrastructure, environment, facilities

FIGURE
4-1

Appendices

ARCADIS BBL

Appendix A

Standard Operating Procedure for Restored Bank Vegetation Monitoring

Appendix A –
Standard Operating Procedure for Riverbank Vegetation Monitoring Program

The General Electric Company (GE) and the Massachusetts NRD Trustees (NRD Trustees) agreed to an approach to the restored bank vegetation monitoring methodology for the Upper ½–Mile Reach of the Housatonic River that was utilized in 2001 and refined in 2002. From these earlier monitoring methodologies a detailed approach to the monitoring program was created and has been utilized since 2003 as described below.

1. The monitoring team is to include representatives of GE and representatives of NRD Trustees. The team will assemble at the onsite construction trailer, or similar central location, on the day of the inspection in order to coordinate activities and cover any issues.

2. The stem count is to be performed; and data recorded, by GE. The representative for the NRD Trustees will observe to ensure the accuracy of the count. Specifically, the NRD's Trustees representative will: ensure agreement over species identification, assist with the determination of stressed species, assist with the identification of invasive plant species, assist with the determination of percent herbaceous and invasive cover, and advise on other technical issues as required. The certified arborist will assist in the assessment of the apparent health and vigor of installed plants. Copies of all data sheets will be provided to the NRD Trustee's representative at the conclusion of the monitoring event. The identification of all parties involved in an inspection event will be made in the results section of the report.

3. In general, the planting areas will be inspected beginning with the furthest upstream on the north side of the Housatonic River (planting area 1) and will proceed downstream. Once the north side of the river has been inspected, the monitoring team will move to the most upstream planting area on the south side of the Housatonic River (planting area 5) and proceed downstream.

4. If the inspection is being held in the spring, only planting areas planted up to the fall of the previous year will be inspected. Similarly, if the inspection is being held in the summer, only the planting areas planted up to the fall of the previous year will be inspected.

5. As a means of streamlining the inspection process, an agreement was made between GE and the NRD Trustee's representative concluding that planting areas 6, 6A, 7, and 8A would be inspected as a single unit and planting areas 8, 9, 9A, 11, and 11A would be inspected as a single unit. An easily identifiable landmark was noted as the boundary between these two composite areas. An easily identifiable landmark was also noted as the boundary between planting areas 4A and 4B.

6. Where the linear distance of the planting area exceeds 100 feet, the planting area will be divided into sections of 100 feet or shorter to increase the accuracy of the count. As of this date, that includes planting areas 1, 4A, 4B, composite planting area 6, 6A, 7, and 8A, and composite planting area 8, 9, 9A, 10, 11, and 11A.

7. Where the riverbank width (slope length) is greater than 25 feet, and/or the density and height of vegetation obscures the observer's vision to clearly see the entire riverbank slope, a line or tape will be used to divide the bank into upper and lower bank areas to increase the accuracy of the count.

8. The areas of planting will be monitored by slowly walking from one end of a specific planting area to the other. As the team walks through an area, the counter will visually note the number of planted trees, shrubs, and vines based on observation of stems, as well as the number of resprouts of species consistent with those planted species. After the woody plants have been inspected in an area, the team will stop and estimate herbaceous cover and percent coverage of invasive species. The recorder will take down the inspection information as the team proceeds through a given planting area.

9. The recorder will keep the tally of results on a field datasheet developed by GE for the monitoring program. On the tally sheet, woody vegetation will be listed as either live (either stressed or unstressed) or dead. Any additional general observations of the planting area will also be reported on the tally sheet.

10. The decision as to whether some specimens are stressed will be based on visual observation of the plant and the agreed judgment of the two observers (representatives of GE and the NRD Trustees); however, to meet performance criteria, replanting needs are to be based on the number of dead specimens or those missing from the final count for a particular species. Stressed plants are still alive, but physical indicators such as leaf wilt, nutrient deficiency, bug infestation, die back, herbicide injury, and animal damage (e.g., woodchuck) may represent evidence of diminished vigor. Plants are also to be considered stressed if they are reduced in height (less than four feet for trees, though the plant may be a stump sprout following topping of the planted specimen from

herbivorous activity or other action). Non-stressed plants show very limited signs of these stress indicators (<5%) and are growing vigorously as determined by the certified arborist based on such characteristic as annual growth, leaf color, stem integrity, and fruit and flower production.

11. For the Red-osier dogwood band, it was determined that the ability to count individual stems was made problematic by the multiple-stem nature of the developing plant. Therefore, it has been decided that performance determination for the band would be made by visually determining, based on best professional judgment of the observers, whether the band in a planting area appears to meet the 4-foot on-center planting scheme. Areas of the band that were noted as not meeting the 4-foot on-center planting scheme were measured, and identified as to location, then noted on the tally sheets.

12. Stump resprouts from trees and shrubs cut during clearing or cut by herbivorous actions are counted in the live-but-stressed column. If the stump has multiple resprouts, it is still counted as a single specimen.

13. Canopy and understory stump resprouts from specimens cut during clearing activities are only to be counted as part of the tally if the stump was one of the species that was listed in the planting plan. However, if the specimen is a different species, it will be noted on the tally sheets for information purposes.

14. Aerial herbaceous cover will be determined by walking through each planting area (or 100-foot section) and visually estimating the total cover to the nearest 5%. For riverbank areas that are predominately covered by vegetation, estimating the percentage of bare ground first, and then subtracting that from 100% most accurately determines herbaceous cover. Litter is considered to be bare ground. Minor gaps between herbaceous plant branches and the bare soil (mulch) beneath trees and shrubs are not counted as bare ground. Determination of the percentage of open/bare ground in a planting area will be made based on visual observation using best professional judgment of the two observers; agreement on the percentage is to be reached before the value is noted on the tally sheet.

15. In addition to herbaceous coverage, an estimation of the percentage of significant areas of bare soil will be included in the tally. This is a qualitative assessment based on best professional judgment of those significant areas of bare soil in which there is no plant growth of any kind. This is not intended to assess bare ground between individual plant stems, but large (>15-20 square feet) areas where herbaceous growth does not occur.

16. A determination of the percentage of invasive species will be made based on visual observation using the best professional judgment of the two observers, with agreement of the percentage to be reached before the value is noted on the tally sheet. Identification of the dominant invasive species in a given area will also be noted on the tally sheets. Areas of invasive species will be flagged if necessary to facilitate remediation.

Appendix B

Modifications to Restored Bank Vegetation Monitoring Program

Appendix B –
Proposed Modifications to Restored Bank Vegetation Monitoring Program

As outlined in Section 9.2 of the *Removal Action Work Plan – Upper ½ Mile Reach of Housatonic River* (BBL, 1999), habitat restoration activities were implemented in sections of the riparian area bordering the Housatonic River where bank soils were excavated as part of remedial activities implemented by GE, and in areas that were cleared to allow access for the removal activities. As part of the habitat restoration process and as specified in Section 11.6.2 of the *Removal Action Work Plan – Upper ½ Mile Reach of Housatonic River* (Work Plan; BBL, 1999), GE agreed to monitor those areas that were restored to ensure the success and biological integrity of the intended vegetative community.

Based on the state of vegetative development in planting areas that were planted in 2000 and 2001; in 2005, GE requested approval of a modification to the existing vegetative monitoring program as described in the Work Plan. The proposed modifications were conditionally approved in a communication from the Trustees dated February 27, 2006. The proposed alteration in the monitoring methodology changed how the planting areas are monitored in their later years of development, but did not change the monitoring period or frequency, reporting requirements for monitoring, or the performance standards. The following sections summarize the existing monitoring program and outline the proposed changes to the vegetative monitoring program.

1.1 Existing Vegetation Monitoring Program Overview

As detailed in the Work Plan, for each planting area, the current vegetative monitoring program consists of two visits per year for the first 3 years after planting, and an annual visit to be conducted during the fifth and seventh years after planting. In each of the first 3 years after planting, visits were scheduled to be conducted in the late spring after the first leaf flush (May/June) and in the summer (July/August), while the single visits in the fifth and seventh years after planting were scheduled to be conducted in the summer (July/August). In the event of a significant loss of plantings (greater than 1/4 acre) being noted in any vegetation monitoring visit, the existing monitoring plan calls for the timing for monitoring to be restarted following appropriate actions to replant the lost trees or shrubs (except in the case where a third party is responsible for growth failure). Table 1 summarizes the monitoring schedule for the Upper ½ Mile Reach as specified in the Work Plan.

Under the existing monitoring plan, survival rates, based on stem counts of trees and shrubs and percent of herbaceous cover, are the key components of measuring the success of planted areas. The following performance standards are currently used to assess the adequacy of the restoration efforts over the Upper ½-Mile Reach:

1. All planted trees, shrubs, and vines must meet an 80% survival rate of the amount originally planted. To confirm this survival rate, supplemental plantings of appropriate species will be made if a monitoring event indicates a loss greater than 20%. Any dead trees or shrubs in excess of 20% of the original planting will be replaced in the fall of the year in which monitoring occurs.

2. Herbaceous coverage of 100% will be maintained outside the foliar extent of the trees. Supplemental seeding or other activities will be utilized to maintain 100% herbaceous coverage.

3. No greater than 5% of the restoration area of either bank will be allowed to be covered by invasive plant species. Any invasive species in excess of the 5% coverage limit will be removed in accordance with the requirements of the *Invasives Control Plan* (BBL, 2001).

The survivability of the plants is to be determined both by mortality and by apparent vigor. Monitoring also assesses whether supplemental activities, such as additional fertilizing or watering, may be necessary.

Each monitoring visit is to consist of a pedestrian survey of all areas on both banks where restoration activities have occurred. During the field visit, personnel conducting the inspection, supported by the certified arborist, are to perform a stem count of planted trees and shrubs to determine survival rates. The inspection team is to estimate groundcover by herbaceous species to verify aerial coverage, and note any indications of damage from trespassing or herbivory. Additionally, the inspection team is to note signs of erosion and initiate any actions to address invasive species. The monitoring visits are to be documented through field notes and photographs. Based on the results of each visit, the inspection team is able to recommend remedial actions, such as replanting, watering, repairing areas impacted by erosion, and implementing measures to reduce herbivory.

1.2 Rationale for Methodology Change

In older planting areas, significant growth has made the ability to count individual stems difficult to complete. While it is accepted that stem counts are an appropriate means of determining vegetative success in newly planted areas, in areas that are more mature and established, such as many of those on the Upper ½-Mile Reach, stem counts over the entire planting area are not necessarily the most appropriate means of documenting the development of the vegetative community. For purposes of meeting the overall objective of the stream bank restoration (i.e., a plant community that affords increased habitat function

relative to the pre-existing system), GE requested the opportunity to modify the monitoring methodology approach, in those planting areas where it is appropriate and feasible, to one that is more appropriate for a mature planted community.

1.3 Proposed Methodology

GE proposed to modify the vegetative monitoring program to include the integration of quantitative and qualitative activities to evaluate the vegetative success of certain older planting areas. The proposed approach is modeled after the restoration monitoring program used by the U.S. Environmental Protection Agency (EPA) on the 1½-Mile Reach of the Housatonic River.

Instead of conducting stem counts for the entire planting area, GE proposed to conduct stem counts in monitoring plots to be established within those individual planting areas larger than 2,500 ft^2. Planting areas less than 2,500 ft^2 in size will continue to be evaluated as in previous monitoring visits. The use of such monitoring plots allows for a more focused assessment of select representative portions of the planting areas, under the assumption that environmental conditions and vegetative growth are generally uniform across the planting areas – an assumption that has been shown to be accurate based on monitoring that has occurred at the site to date. Additionally, the use of monitoring plots will allow for the continued use of existing performance standards and the comparison to data from previous monitoring events. Plant survey techniques such as the line intercept method or point-centered-quarter technique that generally provide data more specific to density, frequency, and dominance were initially considered, then discounted in favor of monitoring plots because of the difficulties in correlating that information to existing performance standards and to historical survivability data.

The monitoring plots will be fixed in place at select locations within the planting areas in order to evaluate both canopy and understory species. Each plot will measure approximately 50 feet by 25 feet (1,250 square feet). In each planting area where such monitoring plots are appropriate, at least one plot will be located such that it encompasses approximately ½ (lengthwise) of an understory plot (oval shapes measuring approximately 50 feet long by 30 feet wide), should one exist in that planting area. Additionally, a sufficient number of plots will be placed in each planting area to cover a minimum of 20% of the planting area.

In addition to the stem counts within the monitoring plots, GE will conduct a random pedestrian survey of each of the planting areas with the objective of providing a qualitative assessment of the overall condition of the plant growth within the planting area. The focus

of this survey will be to determine whether there are any large areas of plant loss outside of the planting plots, or any areas outside the plots that might raise some level of concern with vegetative vigor.

GE will continue to monitor the red-osier dogwood band, grape vines, invasive species and herbaceous coverage in the same manner as is currently performed.

1.4 Performance Standards

As part of the modified monitoring program, the performance standard for planted trees and shrubs within the monitoring plot will continue to be an 80% survival rate of the amount originally planted. Stem counts of canopy species and understory species within the monitoring plot will be used to confirm that performance standards are being met. Under the assumption that plant growth and development is uniform across the planting areas, stem counts from the monitoring plots will then be extrapolated across the entire planting area to assess area-wide survival.

In the event that the calculated survival rate for trees and shrubs shows a significant negative variance from the performance standard in comparison to the last full monitoring event, GE reserves the right to resurvey the entire planting area to verify the planting results.

1.5 References

BBL. 1999. Removal Action Work Plan for Upper ½-Mile Reach of Housatonic River. Prepared for GE, Pittsfield, MA.

APPENDIX B
TABLE 1

UPPER ½-MILE VEGETATIVE MONITORING PROGRAM
MONITORING SCHEDULE
2006 ANNUAL MONITORING REPORT
UPPER ½-MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC COMPANY – PITTSFIELD, MASSACHUSETTS

Planting Areas	2001		2002		2003		2004		2005		2006		2007		2008		2009	
	sp	s	sp	s	sp	s	sp	s	sp	s	sp	s	sp	s	sp	s	sp	s
1	X	X	X	X	X	X				X				X				
2	X	X	X	X	X	X				X				X				
3	X	X	X	X	X	X				X				X				
4A	X	X	X	X	X	X				X				X				
4B			X	X	X	X	X	X				X				X		
10			X	X	X	X	X	X				X				X		
5	X	X	X	X	X	X				X				X				
6, 6A, 7, 8A			X	X	X	X	X	X				X				X		
8, 9, 9A, 11, 11A			X	X	X	X	X	X				X				X		
12					X	X	X	X	X	X				X				X
13					X	X	X	X	X	X				X				X
14					X	X	X	X	X	X				X				X
15					X	X	X	X	X	X				X				X
16					X	X	X	X	X	X				X				X
17					X	X	X	X	X	X				X				X

Notes: sp. = spring
s. = summer

ARCADIS BBL

Appendix C

Previously Submitted Trip Reports

GE
159 Plastics Avenue
Pittsfield, MA 01201
USA

December 15, 2006

Mr. Dean Tagliaferro
EPA Project Coordinator
US Environmental Protection Agency
c/o Weston Solutions, Inc.
One Lyman Street
Pittsfield, MA 01201

Re: GE-Piitsfield/Housatonic River Site
Upper ½-Mile Reach of the Housatonic River (GECD800)
Trip Report - Summer 2006 Inspection of Restored Bank Vegetation, Aquatic Habitat Structures, and Armor Stone

Dear Mr. Tagliaferro:

Enclosed is a memorandum providing a report on the Summer 2006 inspection of restored bank vegetation on the banks of the Upper ½-Mile Reach of the Housatonic River, as well as the 2006 inspection of the aquatic habitat structures and the armor stone layer within the Upper ½-Mile Reach of the River.

Please call me with any questions.

Yours truly,

Andrew T. Silfer /dmn

Andrew T. Silfer, P.E.
GE Project Coordinator

TLC/dmn
Attachment

cc: Susan Steenstrup, MDEP
Jane Rothchild, MDEP (without attachments)
Anna Symington, MDEP (without attachments)
Holly Inglis, EPA
Tim Conway, EPA
Rose Howell, EPA
K.C. Mitkevicius, USACE
R. Goff, USACE
Dale Young MA EOEA
Nancy Harper, MA AG (without attachments)
Linda Palmieri, Weston
Mayor James Ruberto, City of Pittsfield
Michael Carroll, GE (without attachments)
Rod McLaren, GE (without attachments)

James Bieke, Goodwin Procter
Mark Gravelding, BBL
Todd Cridge, BBL
Public Information Repositories
GE Internal Repositories

MEMORANDUM

TO: Andrew Silfer, P.E.
General Electric

FM: Charles R. Harman, P.W.S.
AMEC Earth & Environmental

CC: Todd Cridge
Mark Gravelding, P.E.
Blasland, Bouck & Lee, Inc.

SUBJ: Trip Report;
Summer 2006 Monitoring Visit
Upper ½-Mile Reach of the Housatonic River
Pittsfield, Massachusetts

DATE: December 15, 2006

This document reports the results of the summer 2006 Restored Bank Vegetation Inspection of select areas of the Upper ½-Mile Reach of the Housatonic River. This inspection was performed on August 24, 2006 and included planting areas 4B, 6, 7, 8, 8A, 9, 9A, 10, 11, and 11A. Additionally, this document reports the results of the 2006 Aquatic Habitat Enhancement Structures and Armor Storm Layer Inspection, which was performed on August 23, 2006.

As outlined in Section 9.2 of the *Removal Action Work Plan – Upper ½ Mile Reach of Housatonic River* (Work Plan; BBL, 1999), habitat restoration activities were implemented in those areas where bank soils were excavated as part of the Upper ½-Mile Reach Removal Action and in areas that were cleared to allow access for the removal activities.

As part of the habitat restoration process specified in Section 11.6.2 of the Work Plan, GE agreed to monitor the restored areas to ensure the success and biological integrity of the intended vegetative community. For each specific planting area, the monitoring program was required to consist of two visits during each of the first three years after planting (one in the late spring and one in the summer), and an annual visit during the fifth year and seventh year after planting (to be conducted in summer). Complete details of the monitoring program can be found in the Work Plan. The restored bank vegetation inspection conducted on August 24, 2006 constituted the required 5th-year inspection of the vegetation placed in planting areas 4B, 6, 7, 8, 8A, 9, 9A, 10, 11, and 11A. These activities were also intended to constitute the required 3rd-year inspection of the vegetation placed in planting areas 13, 15, and 16; however, as discussed below, these areas were not inspected due to the remedial activities at the Newell Street Area II parking lot.

In addition to the vegetative survey, annual monitoring inspections are required for 5 years to visually assess the condition of the aquatic habitat structures that were placed within the Upper

½-Mile Reach of the River and to evaluate the armor stone layer placed within that reach for evidence of erosion. The inspection conducted on August 23, 2006 of the aquatic habitat enhancement structures and armor stone constituted the 4th year of required inspections of these items.

2006 INSPECTION RESULTS FOR AQUATIC HABITAT ENHANCEMENT STRUCTURES AND ARMOR STONE

On August 23, 2006, an inspection was conducted of the aquatic habitat enhancement structures and armor stone that have been placed in the Upper ½-Mile Reach as part of the remediation and restoration of that reach. Charles Harman of AMEC conducted this inspection on behalf of GE and Michael Chelminski was present on behalf of the Natural Resource Trustees. The following observations were made during this visit:

1. At the time of inspection, water in the channel was at a seasonably low level allowing for observation of the aquatic habitat structures. As recorded by the United States Geological Survey (USGS) flow gauge located in Coltsville, MA (USGS 0119700 East Branch Housatonic River), flow in the river on August 23, 2006 was approximately 38 cubic feet per second.

2. In general, those aquatic habitat enhancement structures that were visible appeared to be providing good cover and habitat. These structures appeared to be structurally stable, creating variations in water velocity and flow patterns, as evidenced by the presence of scour and depositional areas in the sediment surrounding the structures. The development of these variations in sediment elevation and the creation of flow changes in the water column appear to be providing good habitat for fish and aquatic invertebrates.

3. There did not appear to be any evidence of erosion of the armor stone layer.

Photographs and notes regarding the condition of the aquatic habitat enhancement structures and armor stone layer are presented in Attachment A.

2006 INSPECTION RESULTS FOR RESTORED BANK VEGETATION

On August 24, 2006, an inspection was conducted of the restored vegetation on the banks of the Upper ½-Mile Reach. Charles Harman of AMEC conducted the vegetative inspection on behalf of GE and Todd Chadwell of Woodlot Alternatives was present on behalf of the Natural Resource Trustees. Chris Frank of C. L. Frank & Associates accompanied the streambank monitoring party as the certified arborist. A description of the 2006 monitoring visit and the observations made during this visit is presented below:

1. In accordance with the monitoring schedule, planting areas 4B, 6, 7, 8, 8A, 9, 9A, 10, 11 and 11A were quantitatively monitored during this event. Note that as proposed in the 2005 Annual Monitoring Report, 2006 was the first year that a modified monitoring program has been employed in assessing the success of individual

planting areas. As fully described in the 2005 Annual Monitoring Report, the modified program includes the use of smaller sub-plots in specific planting areas to allow for a more focused assessment of representative portions of selected planting areas. During the 2006 monitoring visit, such sub-plots were used in planting areas 4B and 10 for the assessment of canopy, understory, herbaceous groundcover, and invasive species performance standards.

2. As discussed in the 2005 Annual Monitoring Report, planting areas 13, 15, and 16 were scheduled to be reinspected in 2006, as previous inspections were impacted by, or could not be performed because of, remedial activities in the Newell Street Area II parking lot. At the time of inspection, restoration activities in these planting areas had not been fully completed and/or planted species had not yet had time for full establishment. As such, the inspection of these areas was not performed. These areas will be reexamined in 2007.

3. The weather during the monitoring visit was clear and warm, with the temperature at approximately 70^{o} F at the beginning of the inspection. Similar to the inspections in 2004 and 2005, water levels in the river were generally below the red-osier band.

4. Planting area 4B was visited for the first time since August 2004. This area showed significant vegetative growth for all vegetative components of the restoration. Though growth was excellent, the understory species did not meet the performance standard, with a variation of 13 shrubs less than the standard. (The corrective action for this variation is discussed below.) All other components of the vegetative community (e.g. canopy, red-osier dogwood, herbaceous coverage, and invasive species) met their performance standards.

5. Planting area 10 was also visited for the first time since August 2004. This area met the performance standard for canopy species, though it did not meet the performance standard for understory specimens, with a variation of 1 shrub less than the standard. (The corrective action for this variation is discussed below.) All other components of the vegetative community (e.g. herbaceous coverage and invasive species) met their performance standards.

6. Planting areas 6, 6A, 7 and 8A were visited for the first time since August 2004. These areas met the performance standard for canopy specimens. No understory patches were planted in these areas. All other components of the vegetative community (e.g. red-osier dogwood, herbaceous coverage, and invasive species) met their performance standards.

7. Planting areas 8, 9, 9A, 11, 11A were also visited for the first time since August 2004. These areas met the performance criteria for canopy and for red-osier dogwood. However, the understory species were below the performance standard, with a variation of 24 shrubs less than the standard. It appears that the recent Newell Street Area II parking lot construction resulted in a narrowing of the riparian area and a corresponding loss of a portion of the shrub patch. (The corrective action for this

variation is discussed below.) While a grape vine patch was initially planned for planting area 9A in the fall of 2005, it was not planted due to lack of available stock. However, a sufficient number of wild grapes have colonized across this combination of planting areas to meet the performance standard. All other components of the vegetative community (e.g. herbaceous coverage and invasive species) met their performance standards.

8. Protective screens were placed around the canopy specimens in the fall of 2001. These screens continue to provide good protection from herbivorous animals.

9. Invasive control activities are still ongoing and are being performed along the banks of the entire Upper ½-Mile Reach.

The specific results of the monitoring visit are presented in the attached tables. Photographs of the vegetative communities observed during the monitoring visit can be found in Attachment B.

The next monitoring visit is scheduled for August 2007. Planting areas to be monitored include 1, 2, 3, 4A, 5, 12, 13, 14, 15, 16, and 17. In accordance with the monitoring schedule, the August 2007 monitoring visit will be the last planned monitoring visit for planting areas 1, 2, 3, 4A, and 5.

CORRECTIVE ACTIONS

The results of the monitoring visit indicated that there were three planting areas that did not meet the performance standards with respect to shrub specimens. As such, corrective actions were required to bring up the plant numbers. As discussed above and summarized in the table below, planting area 4B was missing 13 shrub specimens; planting area 10 was missing 1 shrub; and combined planting areas 8, 9, 9A, 11, 11A were missing 24 shrubs.

To meet the performance standards, the following numbers of shrubs were installed by C. L. Frank and Associates on November 14, 2006:

Planting Area	Replacement Number
4B	13 shrub specimens
10	1 shrub specimen
8, 9, 9A, 11, 11A	24 shrub specimens

All such plantings were performed in accordance with the practices set forth in the Work Plan. The shrub plantings were divided equally between the four shrub species used on-site – specifically, northern arrowwood (*Viburnum dentatum*), silky dogwood (*Cornus amomum*), winterberry (*Ilex verticillata*), and choke-cherry (*Prunus virginiana*), depending upon species availability.

TABLE 1
CANOPY MONITORING RESULTS

SUMMER 2006 RESTORED BANK VEGETATION INSPECTION
UPPER ½ MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC CORPORATION – PITTSFIELD, MASSACHUSETTS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens			Dead	Variance
					Non-stressed	Stressed	Total		
8/24/2006	4B[1]	June 01	256	205	295	0	295	0	+90
	10[2]	Oct 01	126	101	126	0	126	0	+25
	6, 6A, 7, 8A	June/Oct 01	113	90	91	0	91	0	+1
	8, 9, 9A, 11, 11A	Oct 01	95	76	85	2	85	0	+9

[1] – Monitoring was conducted using the modifications to the protocol and was based on sampling of three monitoring plots; Monitoring plots accounted for 22% of Area 4B.
[2] – Monitoring was conducted using the modifications to the protocol and was based on sampling of three monitoring plots; Monitoring plots accounted for 27% of Area 10.

TABLE 2
UNDERSTORY MONITORING RESULTS

SUMMER 2006 RESTORED BANK VEGETATION INSPECTION
UPPER ½ MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC CORPORATION – PITTSFIELD, MASSACHUSETTS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens			Dead	Variance
					Non-stressed	Stressed	Total		
8/24/2006	4B[1]	June 01	219	175	162	0	162	0	-13
	10[2]	Oct 01	73	58	57	0	57	0	-1
	6, 6A, 7, 8A	June/Oct 01	--	--	--	--	--	--	--
	8, 9, 9A, 11, 11A	Oct 01	73	58	34	0	34	0	-24

[1] – Monitoring was conducted using the modifications to the protocol and was based on sampling of three monitoring plots; Monitoring plots accounted for 22% of Area 4B.
[2] – Monitoring was conducted using the modifications to the protocol and was based on sampling of three monitoring plots; Monitoring plots accounted for 27% of Area 10 and 50% of the shrub plot.

TABLE 3
RED-OSIER DOGWOOD MONITORING RESULTS

SUMMER 2006 RESTORED BANK VEGETATION INSPECTION
UPPER ½ MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC CORPORATION – PITTSFIELD, MASSACHUSETTS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count		Comments
					Gaps in Dogwood Line, Missing Plants	Meets target performance standard, <4 foot on center	
8/24/2006	4B	June 01	134	107	---	None missing	Meets performance standard
	10	Oct 01	---	---	---	--	---
	6, 6A, 7, 8A	June/Oct 01	89	71	---	None missing	Meets performance standard
	8, 9, 9A, 11, 11A	Oct 01	82	66	---	None missing	Meets performance standard

TABLE 4
GRAPEVINE MONITORING RESULTS

SUMMER 2005 RESTORED BANK VEGETATION INSPECTION
UPPER ½ MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC CORPORATION – PITTSFIELD, MASSACHUSETTS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens			Dead	Wild Grapes or Grape Patches	Comments
					Non-stressed	Stressed	Total Vines			
8/24/ 2006	4B	June 01	22	18	10	0	10	0	40+	The number of planted grapes plus the number of individual native grape plants noted in this planting area meet the performance criteria.
	8, 9, 9A, 11, 11A	--	22	18	0	0	0	0	40+	The number of individual native grape plants noted in this planting area meet the performance criteria, without the aid of supplemental planting.

Notes on Herbaceous Coverage Surveys:

a. Due to limitations in stock, area 9A has not been planted with grape vine as scheduled. However, based on comments made by the trustees on the 2003, Upper ½ Mile Monitoring Results Report, this area will be monitored for natural regeneration of grape vines.

TABLE 5
HERBACEOUS GROUNDCOVER MONITORING RESULTS

SUMMER 2006 RESTORED BANK VEGETATION INSPECTION
UPPER ½ MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC CORPORATION – PITTSFIELD, MASSACHUSETTS

Date	Area	Date Planted	Target Performance Standard (Cover)	General Monitoring Results (Total Percent Herbaceous Coverage)	Meets Performance Standard (Yes/No)	Comments
8/24/ 2006	4B[1]	June 01	100%	Plot 1 ~100% coverage Plot 2 ~100% coverage Plot 3 ~100% coverage	Yes	Herbaceous cover has closed in, except to a minor extent under canopy specimens (which is allowed under Monitoring Plan). Meets performance standard. No areas outside of the monitoring plots were missing herbaceous cover
	10[2]	Oct 01	100%	Plot 1 ~100% coverage Plot 2 ~100% coverage	Yes	Herbaceous cover has closed in, except to a minor extent under canopy specimens (which is allowed under Monitoring Plan). Meets performance standard. No areas outside of the monitoring plots were missing herbaceous cover
	6, 6A, 7, 8A	June/ Oct 01	100%	First 100' ~90% coverage Second 100' ~95% coverage Third 100' ~95% coverage	Yes	Herbaceous cover has closed in, except to a minor extent under canopy specimens (which is allowed under Monitoring Plan). Meets performance standard.
	8, 9, 9A, 11, 11A	Oct 01	100%	First 100' ~95% coverage Second 100' ~90% coverage Third 100' ~95% coverage Fourth 100' ~95% coverage	Yes	Herbaceous cover has closed in, except to a minor extent under canopy specimens (which is allowed under Monitoring Plan). Meets performance standard.

[1] – Monitoring was conducted using the modifications to the protocol and was based on sampling of three monitoring plots; Monitoring plots accounted for 22% of Area 4B.
[2] – Monitoring was conducted using the modifications to the protocol and was based on sampling of three monitoring plots; Monitoring plots accounted for 27% of Area 10.

TABLE 6
INVASIVE SPECIES MONITORING RESULTS

SUMMER 2006 RESTORED BANK VEGETATION INSPECTION
UPPER ½ MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC CORPORATION – PITTSFIELD, MASSACHUSETTS

Date	Area	Date Planted	Target Performance Standard (Invasive Species)	Monitoring Results (Percent Invasive Species)	Meets Performance Objectives (Yes/No)	Primary Observed Invasive Species
8/24/2006	4B[1]	June 01	< 5%	Plot 1 <5% Plot 2 <5% Plot 3 <5%	Yes	Purple loosestrife; no significant invasive species presence outside of the monitoring plots
	10[2]	Oct 01	< 5%	Plot 1 <5% Plot 2 <5%	Yes	Purple loosestrife; no significant invasive species presence outside of the monitoring plots
	6, 6A, 7, 8A	June/ Oct 01	< 5%	First 100' <5% Second 100' <5% Third 100' <5%	Yes	Purple loosestrife, bittersweet
	8, 9, 9A, 11, 11A	Oct 01	< 5%	First 100' <5% Second 100' <5% Third 100' <5%	Yes	Purple loosestrife, bittersweet

[1] – Monitoring was conducted using the modifications to the protocol and was based on sampling of three monitoring plots; Monitoring plots accounted for 22% of Area 4B.
[2] – Monitoring was conducted using the modifications to the protocol and was based on sampling of three monitoring plots; Monitoring plots accounted for 27% of Area 10.

ATTACHMENT A
AQUATIC STRUCTURES/ARMOR STONE MONITORING DATA SHEETS

2006 AQUATIC HABITAT ENHANCEMENT STRUCTURE INSPECTION
UPPER ½ MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC CORPORATION – PITTSFIELD, MASSACHUSETTS

Monitoring Date: 8/23/2006

Persons Conducting the Monitoring: Chuck Harman (AMEC) and Mike Chelminski (Woodlot Alternatives)

Daily Stream Flow at Time of Monitoring (Based on USGS Station Coltsville, MA): 38 cfs

General River Stage/Depth Observations: River stage appears to be seasonably low; the majority of the habitat structures were exposed for observation

General Weather Observations: Skies were clear with temps in the 80's

Cell	Aquatic Structures	Armor Stone Condition/General Biological Observations
B	1. Single wing deflector	 1. Structures appear stable. 2. Structure induced variations in flow patterns observed in areas immediately downstream of the deflector. 3. Numerous benthic invertebrates were observed on stone pulled up from around the deflector.

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AQUATIC STRUCTURES/ARMOR STONE MONITORING DATA SHEETS

2006 AQUATIC HABITAT ENHANCEMENT STRUCTURE INSPECTION
UPPER ½ MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC CORPORATION – PITTSFIELD, MASSACHUSETTS

Cell	Aquatic Structures	Armor Stone Condition/General Biological Observations
C	1. Boulders 2. Island	  1. Structures appear stable. 2. Structure induced variations in flow patterns observed in areas immediately downstream of the island. 3. The island appears well vegetated with wetland herbaceous species and cottonwood seedlings. 4. Boulders near island appear to be creating scour holes in the immediate area; good cover.

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2006 AQUATIC HABITAT ENHANCEMENT STRUCTURE INSPECTION
UPPER ½ MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC CORPORATION – PITTSFIELD, MASSACHUSETTS

Cell	Aquatic Structures	Armor Stone Condition/General Biological Observations
D	1. Boulders	 1. Structures were functional and appear to be providing variation in habitat. 2. Numerous benthic invertebrates observed on stone pulled up in the area.
G1	1. Boulder Cluster	 1. Structures were functional and appear to be providing variation in habitat. 2. Numerous benthic invertebrates observed on stone pulled up in the area.

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AQUATIC STRUCTURES/ARMOR STONE MONITORING DATA SHEETS

2006 AQUATIC HABITAT ENHANCEMENT STRUCTURE INSPECTION
UPPER ½ MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC CORPORATION – PITTSFIELD, MASSACHUSETTS

Cell	Aquatic Structures	Armor Stone Condition/General Biological Observations
G2/F2	1. W-weir	  1. Much of the weir appears to be buried in soft silt/sand; above-grade portion of structure appears to offer good cover for aquatic organisms

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2006 AQUATIC HABITAT ENHANCEMENT STRUCTURE INSPECTION
UPPER ½ MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC CORPORATION – PITTSFIELD, MASSACHUSETTS

Cell	Aquatic Structures	Armor Stone Condition/General Biological Observations
G3	1. Three-boulder cluster	1. Structure appeared stable. 2. Structure was functional and appears to be providing variation in habitat.

ATTACHMENT A
AQUATIC STRUCTURES/ARMOR STONE MONITORING DATA SHEETS

2006 AQUATIC HABITAT ENHANCEMENT STRUCTURE INSPECTION
UPPER ½ MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC CORPORATION – PITTSFIELD, MASSACHUSETTS

Cell	Aquatic Structures	Armor Stone Condition/General Biological Observations
F3	1. Three-boulder cluster 2. Two-boulder cluster 3. Three-boulder cluster	  1. All structures in this cell appear stable. 2. Structures appear to be providing diversity in habitat.

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2006 AQUATIC HABITAT ENHANCEMENT STRUCTURE INSPECTION
UPPER ½ MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC CORPORATION – PITTSFIELD, MASSACHUSETTS

Cell	Aquatic Structures	Armor Stone Condition/General Biological Observations
H1	1. Boulder cluster	1. Structure is stable and appears to be providing diversity in habitat. 2. Structure induced variations in velocity and flow patterns appear to be producing variations in stream bottom topography; good habitat.
I1/J1	1. Rock weir	 1. Structure is stable and appears to be providing diversity in habitat. 2. Structure induced variations in velocity and flow patterns appear to be producing variations in stream bottom topography; good habitat.
H2	1. Single boulder	1. Structure is stable and appears to be providing diversity in habitat. 2. Structure induced variations in velocity and flow patterns appear to be producing variations in stream bottom topography; good habitat.

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AQUATIC STRUCTURES/ARMOR STONE MONITORING DATA SHEETS

2006 AQUATIC HABITAT ENHANCEMENT STRUCTURE INSPECTION
UPPER ½ MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC CORPORATION – PITTSFIELD, MASSACHUSETTS

Cell	Aquatic Structures	Armor Stone Condition/General Biological Observations
J1	1. Two-boulder cluster 2. Three-boulder cluster 3. Single-boulder	 1. Structure is stable and appears to be providing diversity in habitat. 2. Structure induced variations in velocity and flow patterns appear to be producing variations in stream bottom topography; good habitat. 3. Boulders observed as being used as perches for feeding birds
J2	1. "J"- boulder formation	 ~~1.~~1. Structure is stable and appears to be providing diversity in habitat. ~~2.~~2. Structure induced variations in velocity and flow patterns appear to be producing variations in stream bottom topography; good habitat.

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2006 AQUATIC HABITAT ENHANCEMENT STRUCTURE INSPECTION
UPPER ½ MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC CORPORATION – PITTSFIELD, MASSACHUSETTS

Cell	Aquatic Structures	Armor Stone Condition/General Biological Observations
I3	1. Single-wing deflector	 1. Structure is stable and appears to be providing diversity in habitat. 2. Structure induced variations in velocity and flow patterns appear to be producing variations in stream bottom topography; good habitat.
I3/J3	1. Vortex rock weir	 1. Structure is stable and appears to be providing diversity in habitat. 2. Structure induced variations in velocity and flow patterns appear to be producing variations in stream bottom topography; good habitat.

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AQUATIC STRUCTURES/ARMOR STONE MONITORING DATA SHEETS

2006 AQUATIC HABITAT ENHANCEMENT STRUCTURE INSPECTION
UPPER ½ MILE REACH OF THE HOUSATONIC RIVER
GENERAL ELECTRIC CORPORATION – PITTSFIELD, MASSACHUSETTS

Cell	Aquatic Structures	Armor Stone Condition/General Biological Observations
J3	1. Boulder cluster 2. Three-boulder cluster 3. Three-boulder cluster	 1. Structure is stable and appears to be providing diversity in habitat. 2. Structure induced variations in velocity and flow patterns appear to be producing variations in stream bottom topography; good habitat.

Photograph 1: Planting Area 4B

Photograph 2: Planting Area 4B; Note fruit of northern arrowwood

Photograph 3: Planting Area 10

Photograph 4: Planting Area 10

Photograph 5: Planting Area 6, 6A, 7, 8A

Photograph 6: Planting Area 6, 6A, 7, 8A

Photograph 7: Planting Area 8, 9, 9A, 11, 11A

Photograph 8: Planting Area 8, 9, 9A, 11, 11A

GE
159 Plastics Avenue
Pittsfield, MA 01201
USA

April 6, 2007

Dean Tagliaferro
EPA Project Coordinator and On-Scene Coordinator
U.S. Environmental Protection Agency
c/o Weston Environmental Engineering
One Lyman Street
Pittsfield, MA 01201

Re: GE Pittsfield/Housatonic River Site
Upper ½-Mile Reach Removal Action (GECD800)
2006 Bank Erosion Inspection Report - Revised

Dear Mr. Tagliaferro:

Consistent with the requirements set forth in the final *Removal Action Work Plan – Upper ½-Mile Reach of the Housatonic River* (Work Plan; Blasland, Bouck & Lee, Inc. [BBL], August 1999), the General Electric Company (GE) has performed the 2006 inspection of the restored banks of the Upper ½-Mile Reach to assess both the cleared and restored areas of the riverbank for evidence of erosion. This inspection occurred on June 2, 2006 with representatives of the U.S. Environmental Protection Agency (EPA), U.S. Army Corps of Engineers (USACE), GE, and BBL in attendance. The following people performed the inspection:

- Dean Tagliaferro, EPA;
- Randy Sujat, USACE;
- Andrew Silfer, GE and
- Mark Gravelding, BBL.

This trip report has been prepared to describe the findings of the 2006 bank erosion inspection – i.e., the areas identified with evidence of measurable erosion or armoring material movement – and the response actions proposed to address those areas. (This trip report was originally submitted to EPA on December 14, 2006, and has been revised to take account of EPA comments on that prior version.) Figure 1 illustrates the location of the areas at which measurable erosion or material movement was observed. In addition, in accordance with requirements of the Work Plan, GE has identified, to the extent practicable, the likely cause of the erosion and has evaluated the source, dispersal, and quantity of eroded soil (if any) in the river. This evaluation, and GE's proposed measures to restore the identified areas to previous conditions and to protect against further erosion, are described below for each area, and are summarized in Table 1.

During the June 2, 2006 bank inspection, flow in the river was approximately 199 cubic feet per second (cfs), as measured at U.S. Geological Survey (USGS) River Gauge Station No. 0118700 on the East Branch of the Housatonic River in Coltsville, MA. It should be noted that although the flow in the river was less than 200 cfs at the time of the inspection, an extreme high-flow event had occurred in October of 2005 (several months after the 2005 bank erosion inspection), during which recorded flows at the

Coltsville gauge exceeded approximately 6,300 cfs, a flow which exceeds the calculated 50-year flood in the river.

At the time of the inspection, several areas were noted with either a visually observable loss of bank soil or movement of bank armoring. These areas are identified on Figure 1. Where appropriate, certain areas may require protection from further erosion through the placement of armor stone. Armor stone placed as part of these activities will be similar to that used during the implementation of the Upper ½ Mile Reach Removal Action (i.e., graded riprap, D_{100}=12-inch), as fully described in the Work Plan. GE plans to complete the remedial activities discussed below during the 2007 construction season, and will coordinate scheduling with EPA as the construction season approaches.

Descriptions of areas of erosion identified during the 2006 inspection, along with proposed area-specific response actions, are presented below.

Areas with Measurable Erosion

Area 1 – This area consists of approximately 25 feet of undercut bank, located on the northern bank of the river approximately 200 feet downstream of Building 64X in an area where no remedial activities were performed either in the river or on the riverbank (see Figure 1 and Photo 1). This area of observed erosion is located downstream of rip-rap placed adjacent to sheetpiles installed during past remedial activities, where the bank transitions from riprap to bank soil. In this area, less than 10 cubic yards (cy) of bank soil appear to have eroded from the bank. The source of the eroded material appears to be native material from the low- and mid-bank area directly down-slope from established grassy vegetation. The cause of erosion appears to be a combination of the transition from riprap to unprotected bank soils and the high velocity flows associated with the extreme flood event discussed above. No eroded soil was observed in the adjacent portion of the river and, therefore, no removal activities are planned at this location.

As discussed during the inspection, the proposed response action in this area will consist of placement of armor stone to replace eroded materials and protect against further such erosion. In this area, an approximate 1-ft thick layer of D_{100}=12-inch graded riprap will be placed along the lower portion of the bank extending up the bank to the limit of the undercut. To the extent practicable, armor stone placed in this area will be keyed into the bank, as well as blended with adjacent bank armoring, such that areas receiving armor stone will be restored to previous grades.

Area 2 – Area 2 includes two areas (see Figure 1). The first area consists of approximately 40 feet of undercut bank, located on the southern bank directly across the river from Building 64W in a non-remediated bank area (see Photo 2). In this area, less than 5 cy of bank soil appears to have eroded from the bank. The source of the eroded material appears to be native material from the low- and mid-bank area directly upstream of a riprap swale. The cause of erosion appears to be high velocity water flow, likely associated with the extreme flood event discussed above. No evidence of eroded soil was observed in the adjacent portion of the river and, therefore, no removal activities are planned at this location. As discussed during the inspection, the proposed response action in this area will consist of placement of armor stone to replace eroded materials and protect against further such erosion. In this area, an approximate 1-ft thick layer of D_{100}=12-inch graded riprap will be placed along the lower portion of the bank in this area, extending approximately 4-feet up the bank from the riverbed. To the extent practicable, the installed armor layer will be keyed into the bank such that the eroded areas will be restored to previous grades.

Additionally, there is a slight undercut that extends for approximately 100 feet downstream of the same drainage swale discussed above and that appears to have involved the erosion of less than 5 cy (see Photo 3). To the extent practicable, GE will place armor stone (similar to above) within this undercut to limit any future erosion from this area.

Area 3 – This area is located on the northern bank, in a non-remediated bank area, approximately 200 feet downstream of Building 64W (see Figure 1). In this area, less than 1 cy of bank soil appears to have eroded from within a 5-foot long slight undercut just above the existing riverbed armor layer (see Photo 4). The source of the eroded material appears to be native material from the mid-bank area. The cause of erosion appears to be high velocity water flow, likely associated with the extreme flood event discussed above. No evidence of eroded soil was observed in the adjacent portion of the river and, therefore, no removal activities are planned at this location. As discussed during the inspection, armor stone will be placed in this area to replace eroded materials and protect against further such erosion. In this area, armor stone (i.e., D_{100}=12-inch graded riprap) will be keyed into the bank to fill the undercut such that the lower bank above the existing riverbed armor layer will be restored to previous grades.

Area 4 – This area consists of a slightly undercut bank, extending over approximately 30 feet of the southern riverbank just upstream of riprap-protected banks, in a non-remediated bank area approximately 200 feet upstream of the eastern edge of the Newell Street Area II Parking Lot (see Figure 1 and Photo 5). In this area, less than 1 cy of bank soil appears to have eroded from the bank. The source of the eroded material appears to be native material from the low-bank area above the existing riverbed armor layer. The cause of erosion appears to be high velocity water flow, likely associated with the extreme flood event discussed above. No evidence of eroded soil was observed in the adjacent portion of the river and, therefore, no removal activities are planned at this location. As discussed during the inspection, armor stone will be placed in this area to replace eroded materials and protect against further such erosion. In this area, armor stone (i.e., D_{100}=12-inch graded riprap) will be keyed into the bank to fill the undercut such that the lower bank above the existing riverbed armor layer will be restored to previous grades.

Area 5 – Area 5 is located on the southern bank adjacent to the Newell Street Area II Parking Lot, and extends from a point approximately 15 feet downstream of the former pedestrian bridge to approximately 500 feet upstream of the bridge (see Figure 1). Within Area 5 there are several intermittent areas of undercut bank, from which soils have been eroded from bank areas above the adjacent existing riverbed armor layer (see Photo 6), and steep, near-vertical slopes are present that potentially could further erode or fail (Photo 7). The observed erosion is likely a result of the high velocity flow associated with the extreme flood event discussed above, but may also be related, to some extent, to settling of the riprap in this area. The sources of eroded materials in this area appear to be native materials or clean backfill, as portions of Area 5 proposed for removal intersect areas that have been previously remediated. No evidence of eroded soil was observed in the adjacent portion of the river and, therefore, no removal activities are planned at this location. During the inspection, it was discussed that this area would likely require excavation of the remaining steep slopes to tie into post-construction Newell Street Area II grades, as well as armor stone placement (tied into the existing riverbed armor layer at the toe of the slope) to restore this area to grade and reduce the potential for further erosion. Any such armor stone will be installed in this area such that it is to provide a continuous line of protection against further erosion.

Following the site visit, GE made a preliminary assessment of the removal of certain bank materials in this area to reduce the grade of the remaining slopes. It was assumed that excavation

of bank materials would be performed to reduce the slope in those areas where undercutting has left near-vertical banks. Figure 2 shows the locations of six representative cross sections drawn through Area 5, as well as the extent of Area 5 where GE proposes to remove bank materials. In addition, Figure 2 shows those areas that have previously been remediated, and the concentrations of polychlorinated biphenyls (PCBs) in remaining bank soils. Figure 3 shows the six cross sections of the Area 5 bank, and provides an illustration of those portions of bank materials that GE proposes to remove.

As shown on Figures 2 and 3, removal is proposed to be conducted between Station 1+20 and Station 4+50, and is anticipated to proceed up the bank such that approximate 2:1 (horizontal to vertical) bank slopes will extend from the upper extent of the removal area to the edge of armoring around the perimeter of the engineered barrier placed over the Newell Street Area II Parking Lot. Total removal of in-situ bank material in this area is estimated to be approximately 220 cy. Removal is anticipated to be performed with conventional equipment from the top-of-bank (with appropriate safeguards to protect the engineered barrier in that area).

At this time, soil removal activities are not anticipated to extend into bank soils where existing sampling data (presented on Figure 2) show PCB concentrations exceeding 50 parts per million (ppm). Most of the sampling results within or adjoining the horizontal extent of the removal area show PCB concentrations below 50 ppm (see Figure 2); and at the few locations where samples containing PCBs greater than 50 ppm are within or adjacent to the horizontal extent of the removal area, those samples appear to have been collected at depths well below the proposed soil removals. As such, the majority of materials removed from this area will be directly loaded into appropriate vehicles for staging in one collective pile located within GE's Building 65. However, because of the proximity of the proposed removal areas to certain soil samples with PCB analytical results above 50 ppm, GE will segregate those materials removed from the vicinity of such sample locations (i.e., SL 0106, SL 0107, SL0111, SL0474, and SL0477). These materials will be removed and directly loaded into appropriate vehicles for transfer to and staging within Building 65 in a separate pile.

GE will perform post-excavation sampling of both piles of staged materials for determination of appropriate disposal as dictated by either the Toxic Substances Control Act (TSCA) or the Resource Conservation and Recovery Act (RCRA). Ten-point composite samples (i.e., thoroughly mixed composites of aliquots collected at 10 separate locations) will be collected from each of the staged piles, split, and analyzed both for PCBs and using the Toxicity Characteristic Leaching Procedure (TCLP). In the event that either pile of stockpiled materials are considered subject to TSCA or RCRA hazardous waste disposal regulations, they will be transported for disposal at an appropriate off-site facility. If the stockpiled materials are considered non-TSCA and non-RCRA waste, they will be transported to GE's Hill 78 On-Plant Consolidation Area for disposition.

Alternatively, GE may elect to stockpile all removed materials in one location and collect one 10-point composite sample for waste characterization (i.e., PCB and TCLP analyses) as described above.

Following removal, those portions of the approximate 300-foot length of bank above the river bed armor layer subject to removal will be covered with armor stone to replace eroded materials, restore this area to previous grades (i.e., pre-erosion), stabilize these banks, and protect against further such erosion. At this time, it is not anticipated that additional excavation will be required to accommodate armor stone placement. Because this area will include large areas of disturbed

soils, prior to armor stone placement, a layer of non-woven geotextile will be installed over the removal area to enhance slope stability and protect the soils from erosion. Armor stone placement will include an approximate 1-ft thick layer of D_{100}=12-inch graded riprap, as discussed above, that will be tied into existing armoring at the toe of the slope and extend approximately 10 to 15 feet up the bank. In addition, several small areas of slightly undercut banks were observed between Station 0+00 and Station 1+20, and upstream of Station 4+50 (Photo 8). Following completion of bank soil removal activities described above, armor stone will be keyed into the lower portion of the bank in these undercut areas and blended with the existing riverbed armor layer to protect against further such erosion.

At the conclusion of armor stone placement in these areas of removal, any space that remains between the upper extent of bank armoring and the lower extent of the Newell Street Area II Parking Lot excavation and that has been disturbed as a result of removal activities will be replanted in accordance with the planting specifications described in the Work Plan. At this time, it is anticipated that a single band of red-osier dogwoods will be installed along the top of the newly placed armor stone. In accordance with the Work Plan, the red-osier dogwood band will be installed at a density of one plant every four lineal feet. Following installation of the dogwood plants, the area remaining between this dogwood band and the edge of the Newell Street Area II Parking Lot excavation will be planted with replacement trees on an as-needed basis to replace specific plants and species that may be disturbed or removed as a result of soil removal activities. Following installation, all such plants will be maintained in accordance with the requirements in the Work Plan.

Area 6 - This area is located on the northern bank between Building 62 and the Lyman Street Parking Lot (see Figure 1). In this area, an approximate 30-foot long section of the top of bank appears to have sloughed and slid to the bottom of the bank (see Photo 9). Despite this sloughing, there does not appear to have been any erosion or material loss in this area, and there were no observations of eroded materials in the adjacent portion of the river. As discussed during the inspection, the sloughed portions of the bank (less than 5 cy) in this area will be removed; and, as necessary, armor stone will be placed along the bottom of the bank and blended with the existing riverbed armor layer to provide increased stabilization and a continuous line of protection from further erosion. Similar to plantings in Area 5, and in accordance with the Work Plan, a single band of red-osier dogwoods will be installed above the upper extent of armor stone in this area at a planting density of one plant every four lineal feet.

GE has assessed the anticipated changes to the overall flood storage capacity within the Upper ½-Mile Reach as a result of the proposed armoring and bank materials removal (i.e., the volume of bank materials proposed for removal or lost to erosion, minus the volume of backfill proposed for placement). In general, the estimates of the volume of armor stone placement were made considering that, to the extent practicable, armor stone will be keyed into the riverbed or riverbank and tied into existing armoring to provide a continuous line of protection against additional future erosion. Estimates of material losses related to erosion were made based on field observations recorded during performance of the inspection, as well as site survey and topographic information (see Figure 2). Corresponding estimates of armor stone volumes necessary to fill these undercuts were made using overly conservative assumptions based on field observations, assumed dimensions, and existing design parameters (e.g., stone size, armor layer thickness) as described in the Work Plan. A summary of the estimated materials lost to erosion or proposed for removal, as well as the estimated backfill volumes (and underlying assumptions), for each area is provided in Table 2.

As shown in Table 2, the total estimated volume of bank material losses due to erosion plus the proposed soil removal is approximately 242 cy, and the total estimated volume of armor stone that will be placed to fill observed undercut banks and restore areas is approximately 230 cy. As a result, it is estimated that there will be a net gain in flood storage capacity of approximately 12 cy.

Note that in addition to the areas discussed herein, the Natural Resource Trustees previously identified an area on the north bank of the river, immediately downstream of the Newell Street Bridge, as having been eroded and perhaps requiring additional attention. During the inspection discussed herein, this area was not located, and erosion was not noted in the area of the Newell Street Bridge. GE continued to look for this area of erosion throughout the summer of 2006 during the course of routine site inspections, but was unable to locate or identify the area noted by the Trustees. GE will inspect this area again, with EPA collaboration, during the 2007 Annual Restored Banks Erosion Inspection, and, if necessary, will address any erosion identified in this area at that time.

GE will continue to conduct inspections in accordance with the requirements of the Work Plan. The remaining schedule for bank erosion inspections includes one final inspection to be performed in 2007 before a long-term monitoring plan is proposed.

Please contact me if you have any questions.

Sincerely,

RM Gr /for

Andrew T. Silfer, P.E.
GE Project Coordinator

Attachments

cc: Holly Inglis, USEPA
Tim Conway, USEPA
Rose Howell, USEPA (without attachments)
K.C. Mitkevicius, USACE
R. Goff, USACE
Linda Palmieri, Weston
Dale Young MA EOEA
Susan Steenstrup, MDEP (2 copies)
Jane Rothchild, MDEP (without attachments)
Anna Symington, MDEP (without attachments)
Nancy Harper, MA AG (without attachments)
Mayor James Ruberto, City of Pittsfield
Michael Carroll, GE (without attachments)
Rod McLaren, GE (without attachments)
Mark Gravelding, BBL
Todd Cridge, BBL
Mike Chelminski, Woodlot Alternatives
James Bieke, Goodwin Procter
Public Information Repositories
GE Internal Repositories

TABLE 1
2006 RESTORED BANK EROSION INSPECTION SUMMARY
UPPER 1/2-MILE REACH REMOVAL ACTION MONITORING

GENERAL ELECTRIC COMPANY - PITTSFIELD MASSACHUSETTS

Area	Description	Approximate Size	Action
Areas with Measurable Erosion			
1 - North bank of river, directly across from Hibbard Playground	Erosion of soil and undercut banks. Non-remediated bank area. No evidence of eroded soil in river.	~25-ft of undercut banks	Restoration activities to include installation of armor stone to protect against further erosion.
2 - South bank of river, ~200' downstream of Hibbard Playground	Erosion of soil and slightly undercut banks. Non-remediated bank area. No evidence of eroded soil in river.	Two areas: total of ~140-ft of slightly undercut banks	Restoration activities to include installation of armor stone to protect against further erosion.
3 - North bank of river, behind Building 63	Erosion of soil and undercut banks above riverbed armor layer. Non-remediated bank area. No evidence of eroded soil in river.	~5-ft of undercut banks	Restoration activities to include installation of armor stone to protect against further erosion.
4 - South bank of river, directly upstream of the Newell St. II parking lot	Erosion of soil from lower banks above riverbed armor layer. Non-remediated bank area. No evidence of eroded soil in river.	~30-ft of undercut banks	Restoration activities to include installation of armor stone to protect against further erosion.
5 - South bank of river, directly behind Newell St. II parking lot	Erosion of soil and undercut banks above riverbed armor layer. Remediated and non-remediated bank areas. No evidence of eroded soil in river.	Several areas: total of ~510-ft of undercut banks	Restoration activities to include removal and re-grading of bank materials and installation of armor stone to protect against further erosion.
6 - North bank of river, directly upstream of Lyman St. parking lot	Sloughing of top-of-bank: sloughed materials have slid to bottom of slope. Remediated bank areas. No evidence of eroded soils in river.	~300 ft^2 (an approximate 30-ft long section of the top-of-bank)	Remove sloughed materials, regrade affected areas and install additional riprap at toe of slope, if necessary, to stabilize remaining bank materials.

TABLE 2
2006 REMOVAL ACTION FLOOD STORAGE COMPENSATION SUMMARY
UPPER 1/2-MILE REACH REMOVAL ACTION MONITORING

GENERAL ELECTRIC COMPANY - PITTSFIELD MASSACHUSETTS

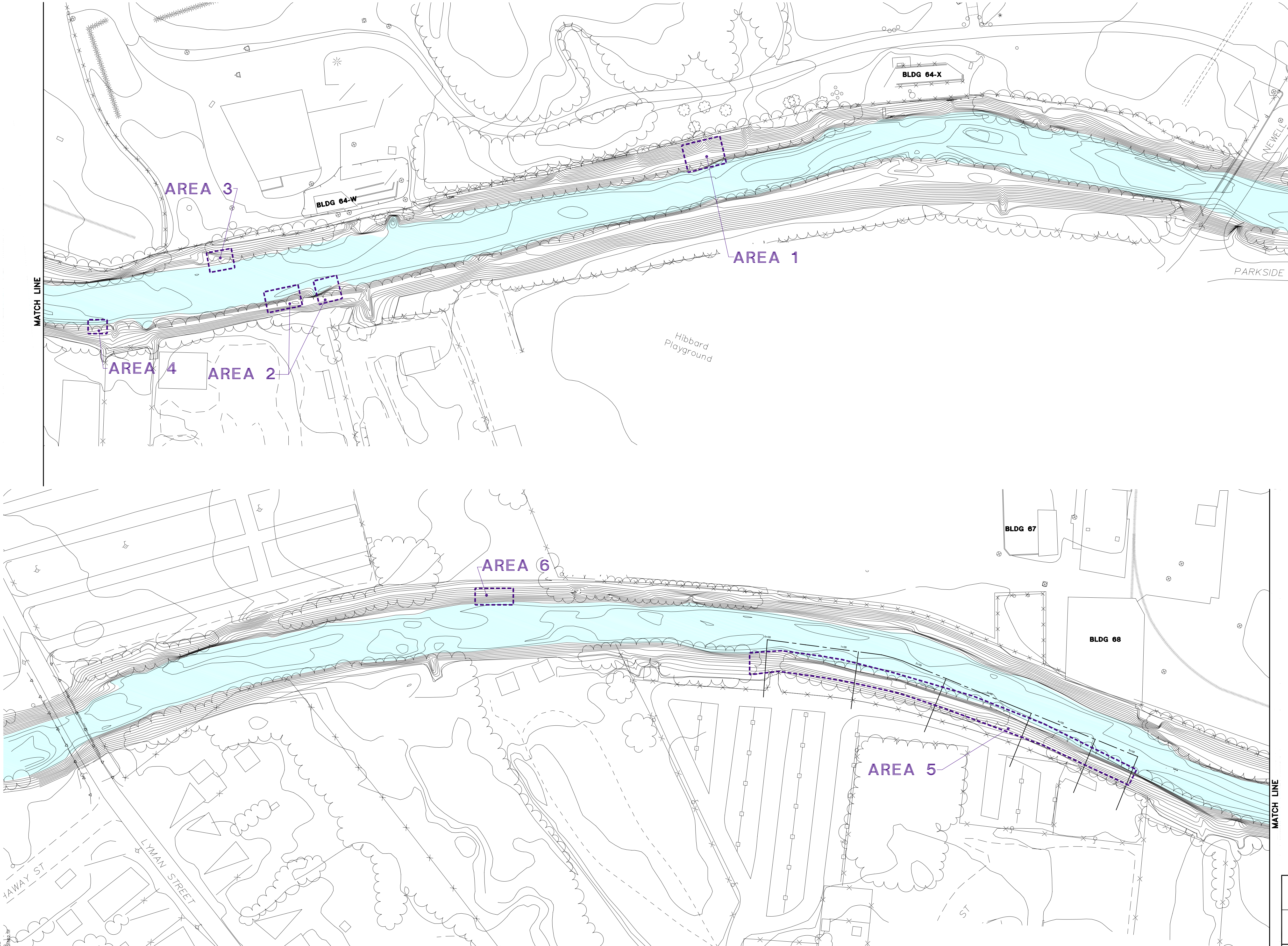
Area	Approximate Size	Estimated Quantity of Bank Material Proposed for Excavation or Lost to Erosion [1] (cy)	Estimated Quantity of Material Proposed for Backfill [2] (cy)	Estimated Net Change in Flood Storage Capacity (cy)
1 - North bank of river, directly across from Hibbard Playground	~25-ft of undercut banks	<10 (See Note 1)	4	4
2 - South bank of river, ~200' downstream of Hibbard Playground	Two areas: total of ~140-ft of slightly undercut banks	<10 (See Note 1)	20	-12
3 - North bank of river, behind Building 63	~5-ft of undercut banks	1	1	0
4 - South bank of river, directly upstream of the Newell St. II parking lot	~30-ft of undercut banks	1	3	-2
5 - South bank of river, directly behind Newell St. II parking lot	Several areas: total of ~510-ft of undercut banks	220	200	20
6 - North bank of river, directly upstream of Lyman St. parking lot	~300 ft^2 (an approximate 30-ft long section of the top-of-bank)	<5 (See Note 1)	2	2
	Total	**242**	**230**	**12**

Notes:

1. Material loss volumes are estimated based on conservative field observations made during the 2006 Erosion Inspection. Note that for those areas where the estimated volume of materials lost is not explicitly stated, 80% of the number shown above has been assumed for calculation purposes.

2. Armor stone volumes are estimated as follows:

Area 1: assumes a 2-ft by 2-ft sloped area at the toe of bank, and a 1-ft thick armor layer extending approximately 2-ft up the bank over the entire approximate 25-ft length.
Area 2: assumes a 2-ft by 2-ft sloped area at the toe of bank, and a 1-ft thick armor layer extending approximately 2-ft up the bank over the entire approximate 140-ft length.
Area 3: assumes a 1-ft thick armor layer extending approximately 2-ft up the bank from the existing riverbed armor layer over the entire approximate 5-ft length.
Area 4: assumes 1-ft thick armor layer extending approximately 2-ft up the bank from the existing riverbed armor layer over the entire approximate 30-ft length.
Area 5: assumes a 1-ft thick armor layer extending approximately 15-ft (maximum) up the bank from the existing riverbed armor layer over the approximate 300-ft long area subject to removal, tapered to meet a 1-ft thick armor layer extending approximately 2-ft up the bank in the remaining 210-ft on either side of the removal area.
Area 6: assumes 1-ft thick armor layer extending approximately 2-ft up the bank from the existing riverbed armor layer over the entire approximate 30-ft length.



LEGEND:

TOP OF BANK

APPROXIMATE LOCATION OF IMPACTED AREAS NOTED DURING INSPECTION

NOTE:

ALL FEATURES AND LOCATIONS SHOWN ARE APPROXIMATE.

0 80' 160'

GRAPHIC SCALE

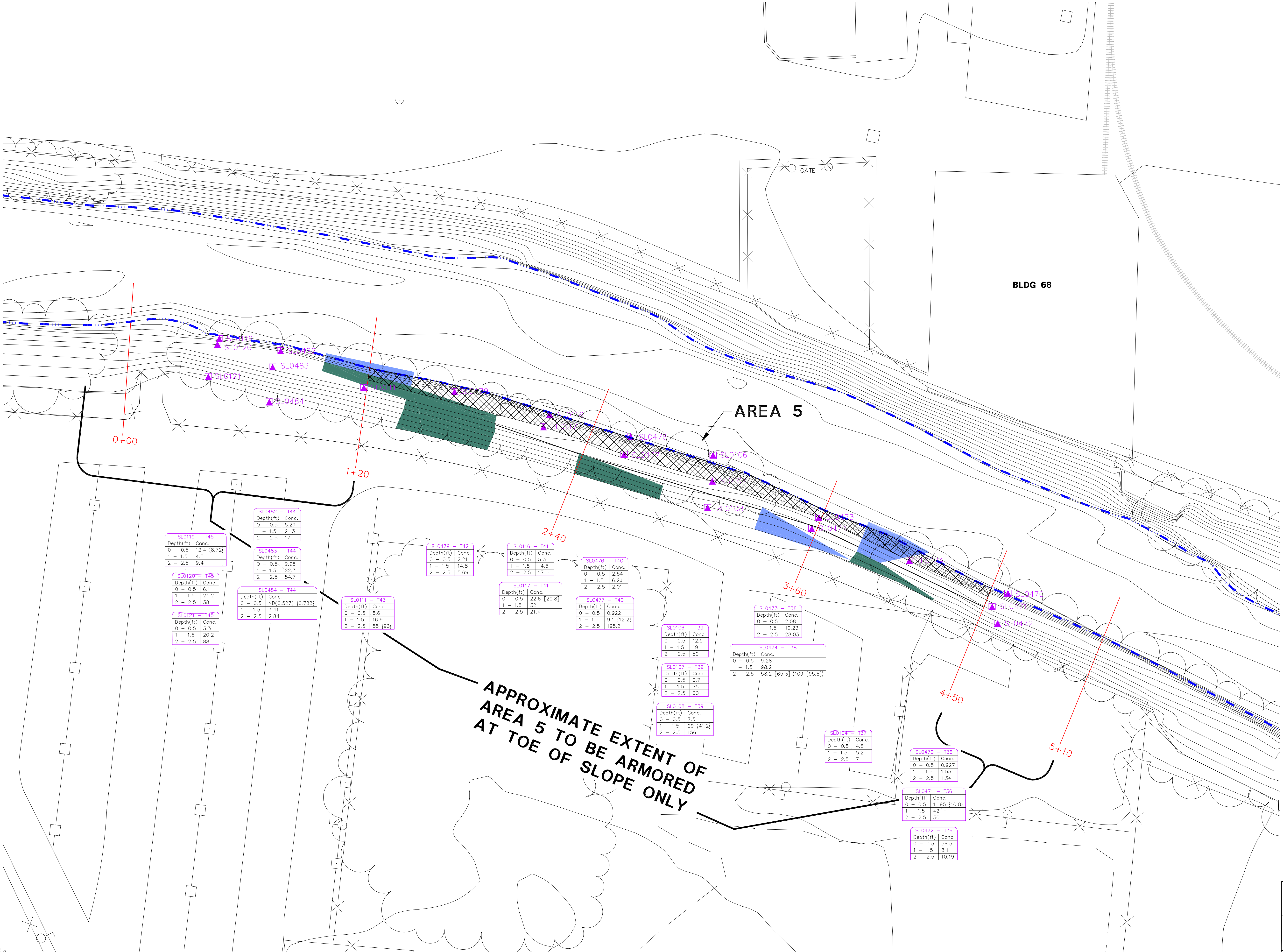
GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS

UPPER 1/2-MILE REACH OF THE HOUSATONIC RIVER

2006 BANK EROSION INSPECTION

BBL an ARCADIS company

FIGURE **1**



SL0119 – T45	
Depth(ft)	Conc.
0 – 0.5	12.4 {8.72}
1 – 1.5	4.5
2 – 2.5	9.4

SL0120 – T45	
Depth(ft)	Conc.
0 – 0.5	6.1
1 – 1.5	24.2
2 – 2.5	38

SL0121 – T45	
Depth(ft)	Conc.
0 – 0.5	3.3
1 – 1.5	20.2
2 – 2.5	88

SL0482 – T44	
Depth(ft)	Conc.
0 – 0.5	5.29
1 – 1.5	21.3
2 – 2.5	17

SL0483 – T44	
Depth(ft)	Conc.
0 – 0.5	9.98
1 – 1.5	22.3
2 – 2.5	54.7

SL0484 – T44	
Depth(ft)	Conc.
0 – 0.5	ND(0.527) {0.788}
1 – 1.5	3.41
2 – 2.5	2.84

SL0111 – T43	
Depth(ft)	Conc.
0 – 0.5	5.6
1 – 1.5	16.9
2 – 2.5	55 {96}

SL0479 – T42	
Depth(ft)	Conc.
0 – 0.5	2.21
1 – 1.5	14.8
2 – 2.5	5.69

SL0116 – T41	
Depth(ft)	Conc.
0 – 0.5	5.3
1 – 1.5	14.5
2 – 2.5	17

SL0117 – T41	
Depth(ft)	Conc.
0 – 0.5	22.6 [20.8]
1 – 1.5	32.1
2 – 2.5	21.4

SL0476 – T40	
Depth(ft)	Conc.
0 – 0.5	2.54
1 – 1.5	6.2J
2 – 2.5	2.01

SL0477 – T40	
Depth(ft)	Conc.
0 – 0.5	0.922
1 – 1.5	9.1 {12.2}
2 – 2.5	195.2

SL0106 – T39	
Depth(ft)	Conc.
0 – 0.5	12.9
1 – 1.5	19
2 – 2.5	59

SL0107 – T39	
Depth(ft)	Conc.
0 – 0.5	9.7
1 – 1.5	75
2 – 2.5	60

SL0108 – T39	
Depth(ft)	Conc.
0 – 0.5	7.5
1 – 1.5	29 {41.2}
2 – 2.5	156

SL0473 – T38	
Depth(ft)	Conc.
0 – 0.5	2.08
1 – 1.5	19.23
2 – 2.5	28.03

SL0474 – T38	
Depth(ft)	Conc.
0 – 0.5	9.28
1 – 1.5	98.2
2 – 2.5	58.2 [65.3] {109 [95.8]}

SL0104 – T37	
Depth(ft)	Conc.
0 – 0.5	4.8
1 – 1.5	5.2
2 – 2.5	7

SL0470 – T36	
Depth(ft)	Conc.
0 – 0.5	0.927
1 – 1.5	1.55
2 – 2.5	1.34

SL0471 – T36	
Depth(ft)	Conc.
0 – 0.5	11.95 {10.8}
1 – 1.5	42
2 – 2.5	30

SL0472 – T36	
Depth(ft)	Conc.
0 – 0.5	56.5
1 – 1.5	8.1
2 – 2.5	10.19

LEGEND:

- TOP OF BANK
- 3+60 TRANSECT LOCATION AND STATION NUMBER
- APPROXIMATE WATER LINE
- PREVIOUS 2 FEET BANK SOIL REMOVAL AREA
- PREVIOUS 3 FEET BANK SOIL REMOVAL AREA
- PROPOSED REMOVAL AREA
- SL0172 LOCATION OF PREVIOUS BANK SOIL SAMPLE LOCATION

NOTES:

1. ALL FEATURES AND LOCATIONS SHOWN ARE APPROXIMATE.
2. FULL DETAILS RELATED TO THE BANK SOIL ANALYTICAL DATA CAN BE FOUND IN THE 1/2-MILE REMOVAL ACTION WORK PLAN.

0 30' 60'
GRAPHIC SCALE

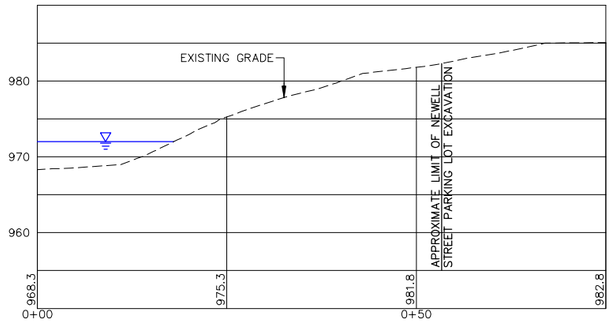
GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS

UPPER 1/2-MILE REACH OF THE HOUSATONIC RIVER

AREA 5 TRANSECT LOCATIONS

BBL an ARCADIS company

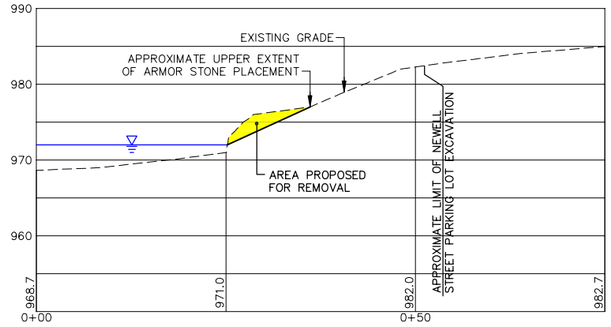
FIGURE 2



STATION 0+00

0 10' 20'

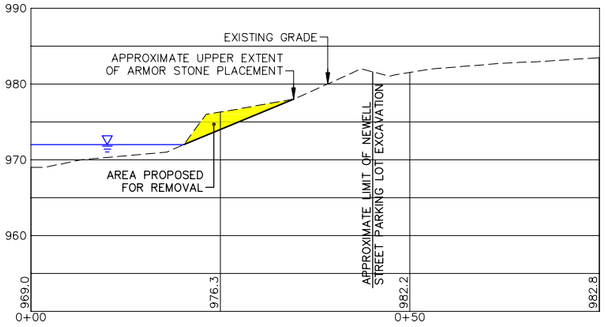
SCALE: 1"=10'



STATION 1+20

0 10' 20'

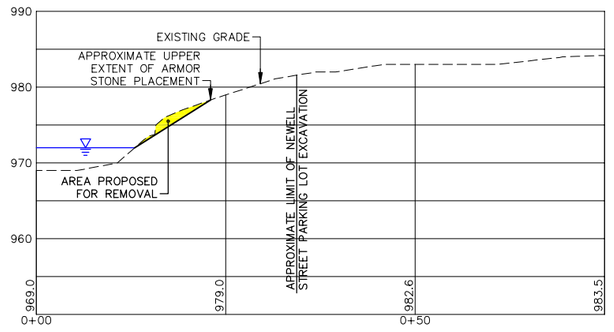
SCALE: 1"=10'



STATION 2+40

0 10' 20'

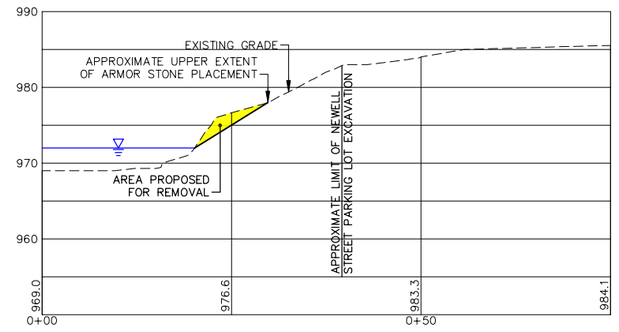
SCALE: 1"=10'



STATION 3+60

0 10' 20'

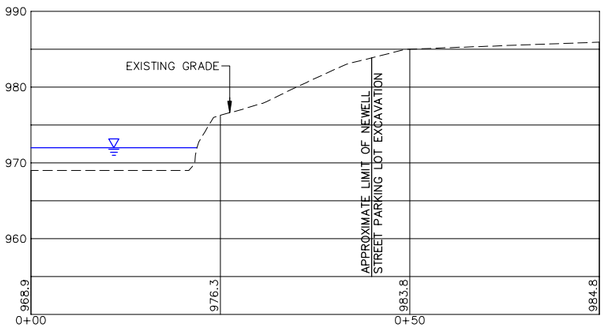
SCALE: 1"=10'



STATION 4+50

0 10' 20'

SCALE: 1"=10'



STATION 5+10

0 10' 20'

SCALE: 1"=10'

NOTE:

ARMOR STONE IS ANTICIPATED TO BE INSTALLED AND KEYED INTO BANK MATERIALS TO RESTORE ERODED AREAS TO PRE-EROSION GRADES SUCH THAT NO CHANGE IN EXISTING FLOOD STORAGE OR CONVEYANCE CAPACITY IS ANTICIPATED.

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
UPPER 1/2-MILE REACH OF HOUSATONIC RIVER

PROPOSED REMOVAL - AREA 5

BBL an ARCADIS company

FIGURE 3

Photo 1 – Area 1: Approximately 25 feet of undercut bank at the end of a section of rip-rap.

Photo 2 – Area 2: Approximately 40 feet of undercut bank upstream of swale.

Photo 3 – Area 2: Approximately 100 feet of slight undercut downstream of swale.

Photo 4 – Area 3: Slight undercut above rip-rap.

Photo 5 – Area 4: Slight undercut between rip-rap.

Photo 6 – Area 5: Several small areas undercut above rip-rap.

Photo 7 – Area 5: Example of near vertical face proposed for removal.

Photo 8 – Area 5: Slight undercut proposed to be armored.

Photo 9 – Area 6: Bank sloughing, no erosion evident.