December 16, 2002

Dean Tagliaferro
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)
2002 Annual Monitoring Report

Dear Mr. Tagliaferro:

Enclosed please find the 2002 Annual Monitoring Report for the Upper ½-Mile Reach of the Housatonic River. The Annual Report summarizes the results of various post construction monitoring activities conducted by the General Electric Company (GE) during 2002 for the Upper ½-Mile Reach.

If you have any questions regarding the Annual Report, please feel free to contact me.

Sincerely,

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

ATS/dmn

Attachments

cc: R. Bell, DEP
J. Bieke, Shea & Gardner
M. Carroll, GE*
R. Howell, EPA (electronic)
T. Conway, EPA
S. Steenstrup, DEP (2 copies)
Mayor Sara Hathaway, City of Pittsfield
C. Fredette, CDEP
R. Goff, USACE
M. Gravelding, BBL
N. Harper MA AG
H. Inglis, EPA
J. Morris, Weston (electronic)
S. Messur, BBL
K.C. Mitkevicius, USACE
T. O'Brien, EOEA
B. Olson, EPA
A. Weinberg, DEP
D. Young, EOEA
Public Information Repositories
GE Internal Repositories

(*Cover Letter Only)

TECHNICAL REPORT

2002 Annual Monitoring Report Upper ½-Mile Reach of the Housatonic River

General Electric Company
Pittsfield, Massachusetts

December 2002

BBL®
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

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1. Introduction

1.1 Purpose and Scope

This *2002 Annual Monitoring Report* (Monitoring Report) summarizes the results of various post-construction monitoring activities conducted by the General Electric Company (GE) during 2002 for the Upper ½-Mile Reach of the Housatonic River in Pittsfield, Massachusetts. This Monitoring Report has been prepared by Blasland, Bouck & Lee, Inc. (BBL) and AMEC Earth & Environmental, Inc. (AMEC). The monitoring activities for the Upper ½-Mile Reach were conducted to evaluate certain aspects of the Upper ½-Mile Reach Removal Action being implemented by GE pursuant to the Consent Decree (CD) for the GE-Pittsfield/Housatonic River Site. These activities were performed in accordance with the requirements of the *Removal Action Work Plan for Upper ½-Mile Reach of Housatonic River* (the Work Plan) (BBL, 1999), which is part of Appendix F to the CD.

During 2002, monitoring activities for restored sections of the Upper ½-Mile Reach were performed for two primary areas: the restored bank areas and the restored river areas. Specific monitoring activities associated with these areas are presented in the Upper ½-Mile Work Plan.

Activities associated with the restored bank areas include the following monitoring components:

- Restored bank vegetation; and
- Cleared and restored bank soil areas.

Activities associated with the restored river areas include the following monitoring components:

- Sediment cap isolation layer;
- Aquatic habitat enhancement structures; and
- Armor stone layer.

A description of monitoring activities for each of the above-listed components, response actions (if appropriate), and future activities are presented in the following sections.

1.2 Report Organization

After this introductory section, this Monitoring Report is organized into the following sections.

- Section 2 – Restored Bank Vegetation Monitoring. This section summarizes the results of restored bank vegetation monitoring conducted during 2002 along the Upper ½-Mile Reach of the Housatonic River. As detailed in the Work Plan, 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.

- Section 3 - Restored Bank Areas. This section describes the monitoring program for the cleared and restored bank areas of the Upper ½-Mile Reach, excluding the approximately 170-foot-long section excavated and restored as part of the Building 68 Area Removal Action. Section 3 also presents the response actions to be completed for these restored bank areas.

- Section 4 - Sediment Cap Isolation Layer Monitoring. This section describes the 2002 monitoring of the sediment cap isolation layer, present the results of the monitoring activities, and provides the response actions to be completed for the sediment cap isolation layer.

- Section 5 - Aquatic Habitat Structures and Armor Stone Layer Monitoring. Section 5 provides information on the monitoring program for the aquatic habitat enhancement structures and armor stone layer.

- Section 6 - Summary and Future Activities. This section summarizes activities completed for the 2002 monitoring program and presents future activities related to vegetation monitoring, sediment cap isolation layer monitoring, restored bank areas, aquatic habitat structures and armor stone layer monitoring, water column monitoring, biota monitoring, and restored sediments monitoring.

2. Restored Bank Vegetation Monitoring

2.1 General

This section summarizes the results of restored bank vegetation monitoring conducted during 2002 along the Upper ½-Mile Reach of the Housatonic River. As detailed in the Work Plan, 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. The ecorestoration techniques outlined in the Work Plan are intended to restore the vegetative community in those disturbed riparian areas to a functional value that exceeds that of the riparian habitat prior to the removal action.

As part of the habitat restoration process, GE agreed to monitor those areas that were restored to confirm the success and biological integrity of the intended vegetative community. The monitoring program consists of two visits during each of the first three years after planting, and an annual visit to be conducted during the fifth and seventh years after planting. In each of the first three years after planting, visits are conducted in the late spring after the first leaf flush (May/June) and in the summer (July/August) to assess plant survival. The single visit in the fifth year and seventh year after planting will be conducted in the summer (July/August). In the event of a significant loss of plantings (greater than 1/4 acre), the timing for monitoring will be restarted for those areas following actions to replant the lost trees or shrubs (except in the case where a third party is responsible for growth failure).

An annual summary monitoring report is required to be prepared documenting the results of that year's monitoring visits and the conditions of the restored areas within the Upper ½-Mile Reach. This section of the report fulfills the annual summary monitoring report requirement for the calendar year 2002. This is the second year of monitoring for the areas originally planted in 2000 and the first year of monitoring for the areas originally planted in 2001. Table 2-1 presents a summary of the planting areas, the planting dates, and the quantities of materials planted. The planting areas are shown on Figure 2-1.

During 2002, monitoring visits were conducted on May 20 and 21, and on August 12, 13, and 14. Representatives from GE and the Massachusetts Executive Office of Environmental Affairs (EOEA) jointly conducted the monitoring visits. Information regarding the results of each monitoring visit was prepared and submitted to the Agencies in two trip reports (Attachment A). The remainder of this section describes the agreed-upon monitoring approach and summarizes the results of the monitoring. More detailed information regarding the results of the monitoring events is provided in Attachment A

2.2 General Monitoring Approach

Survival is determined based on a stem count of trees and shrubs and percent of herbaceous cover. The following performance standards are used to address the adequacy of the restoration efforts over the Upper ½-Mile Reach:

1. Planted trees and shrubs must meet an 80% survival rate for the amount originally planted; supplemental plantings will be made to confirm that this survival rate is met 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 before the first of October of the years in which monitoring occurs.
2. Herbaceous coverage of 100% outside the foliar extent of the trees will be maintained. 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 species. Invasive species in excess of the 5% coverage limit will be removed by appropriate means.

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

During each of the monitoring visits, the restoration areas are inspected for the presence of invasive species. Invasive species of concern are:

- 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 umbellate*
- 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*

This list is based on information provided in Weatherbee, 1996.

A certified arborist has been selected (in consultation with EPA and EOEA) to assist in the completion of the monitoring program. The arborist, Chris Frank of C.L. Frank & Company of Northampton, Massachusetts, utilizes professional judgment to assess the apparent vigor of the planted specimens. The arborist observes the plantings and is involved with each monitoring visit.

Each monitoring visit consists of a pedestrian survey of all areas on both banks in which restoration activities 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 survival rates. Estimates of groundcover by herbaceous species are made to verify aerial coverage. Any indications of damage from trespassing or herbivory are noted. Signs of erosion are also noted and any actions to address invasive species will be initiated. The monitoring visits are documented through field notes and photographs. Based on the results of each visit,

recommendations for remedial actions such as replanting, watering, repair of erosional areas, and implementation of measures to reduce herbivory are made.

The trip reports for each monitoring event are included as Attachment to this Monitoring Report, while a photographic log detailing the conditions of the planting areas is included as Attachment B.

2.3 Detailed Approach

As there was disagreement over the interpretation of various points outlined in the monitoring program described in the Work Plan, a proposed consensus approach to the monitoring methodology was utilized in the August 23/24, 2001 visit and further revised following the May 20/21, 2002 visit. That approach provided more specific details to the methodology outlined in the Work Plan. The agreed-upon approach for conducting the periodic monitoring is as follows:

1. The monitoring team will include representatives of GE and EOEA. The team will assemble at the on-site construction trailer or similar central location the first thing in the morning the inspection is to begin to coordinate activities and cover any issues.
2. The count is to be performed by GE and data from the count are to be recorded by GE; the representative for EOEA will observe to ensure the adequacy of the count. Specifically, EOEA's representative will confirm agreement over species identification, assist with the determination of stressed species, assist with the identification of invasive species, assist with the determination of percent herbaceous and invasive cover, and advise on other technical issues as required. The certified arborist will have the final authority on the condition of a planted tree or shrub. Copies of all data sheets will be provided to the EOEA'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 *Annual Monitoring Report*.
3. The planting areas will be inspected beginning with the furthest upstream planting area on the north side of the Housatonic River (planting area 1) and proceeding downstream. Once the north side of the river has been inspected, the monitoring team will move to the furthest 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, then only planting areas planted up to the fall of the previous year will be inspected. If the inspection is being held in the summer, again 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 EOEA's representative 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, 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 and shrubs 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 a field data sheet that was 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; general observations will also made of the area on the tally sheet.
10. The decision as to whether some specimen are stressed will be based on visual observation of the plant and the agreed judgment of the two observers; however, replanting needs to meet performance criteria is based on the number of dead specimens or those missing from the final count for a particular species. Stressed plants are still alive, but their vigor is hindered by such physical indicators as leaf wilt, nutrient deficiency, bug infestation, die back, herbicide injury, and animal damage (e.g., woodchuck). Plants are also considered stressed if they are reduced in height (e.g., less than 4 feet for trees or 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 and are growing vigorously as determined by the certified arborist based on such characteristics 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 will be made simply 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 are noted as not meeting the 4-foot on center planting scheme will be measured and identified as to location, then noted on the tally sheets;
12. Stump resprouts, both from trees and shrubs cut during clearing or cut by herbivorous actions are counted in the live, but stressed, column. If the stump has more than one resprout, it is still counted as a single specimen.
13. Canopy and understory stump resprouts from specimens cut during clearing activities will only 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. Areal herbaceous cover will be determined by walking through each planting area 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. A 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 of the percentage will 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 no plant growth of any kind (spoil material, piles from herbivorous or fossorial activity or from the presence of debris). This is not intended to assess bare ground between individual plant stems, but large (multi-square foot areas) where herbaceous growth does not occur.
16. A determination of the percentage of invasive species will be made based on visual observation using best professional judgment of the two observers, agreement of the percentage will be

reached before the value was noted on the tally sheet; identification of the dominate 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 remedial actions of the invasive species.

2.4 Monitoring Results

2.4.1 Spring 2002 Monitoring Visit

The spring 2002 monitoring visit was conducted on May 20 and 21, 2002. A summary of this visit is provided below, and additional details regarding the results are included in the trip report in Attachment A. Charles Harman of AMEC and Brian McKinsey of BBL conducted the monitoring visit for GE, while Bill Stack of Woodlot Alternatives represented EOEA. Chris Frank of C. L. Frank & Associates accompanied the monitoring party as the certified arborist. In general, canopy losses throughout the monitored planting areas were relatively light, except in planting areas 4A and 4B. Losses in understory species were observed in all planting areas that had understory cells, with planting area 4A having the greatest loss.

Protective screens were placed around the canopy specimens beginning in the fall of 2001. This action appeared to have lessened the impact of herbivory on the plants. However, excess rubbing on the protective screen by the plants due to wind movement had resulted in a number of specimens showing distinct scaring and damage to the outer bark. Some plants had even broken at the wear point. A remedial action to correct the problem by installing tree locks between the plantings and the protective screens was implemented by C. L. Frank & Associates in June 2002 and was utilized for future canopy plantings. The canopy inventory indicated the performance standard for survivability was met in four planting areas; five other areas were underperforming.

Regarding specific understory species, winterberry hollies, in general, appeared to have leafed out at the beginning of the growing season, but then were damaged by a subsequent cold snap. Freeze damage was observed in almost every specimen. During the 2001 monitoring visits, it was noted that serviceberries did not appear to be surviving well. Based on discussions with EOEA, subsequent plantings and replantings were, made with chokecherry. However, during the spring 2002 visit, it appeared that serviceberries had not only survived, but had fully leafed out and were thriving. Red-osier dogwoods were thin in some spots and appeared to have been impacted by herbivorous actions. Red-osier dogwoods will grow prolifically and it was expected that future monitoring events would indicate whether the plants had recovered from both the effects of winter and the effects of herbivory. The understory inventory indicated the performance standard was achieved in four areas with three areas underperforming.

Regarding the grapevines, in general, these plantings showed very poor survival and did not meet the performance standard in two areas. It was suggested that further consideration be given to the methods used for growth and propagation of grapevine, as they did not appear to be hardy enough to survive through the winter. GE also identified some wild grape vines in some of the planting areas and requested that they be considered toward achievement of the survivability standard of the appropriate species.

Herbaceous cover was less than the required performance standard in all areas. However, in some of the older planting areas such as area 1, the lack of coverage could be the result of the time of year. Observations of the cover composition indicated that grasses dominated it. In particular, composite planting area 8, 9, 9A, 11, and 11A showed poor herbaceous cover.

Invasive species were significantly reduced from 2001 and achieved the required performance standard in all areas. The location of invasive species was identified and noted by C. L. Frank & Associates for further action. Invasive control activities are ongoing and being performed along the banks of the entire Upper ½-Mile Reach.

2.4.2 Summer 2002 Monitoring Visit

The summer 2002 monitoring visit was conducted on August 12 and 13, 2002. A summary of this visit is provided below, and additional details regarding the results are included in the trip report in Attachment A. Charles Harman of AMEC and Brian McKinsey of BBL conducted the August visit for GE, while Bill Stack of Woodlot Alternatives represented the EOEA. Chris Frank of C. L. Frank & Associates accompanied the monitoring party as the certified arborist. Tom O'Brien of EOEA was present on the morning of August 12.

In general, canopy losses were relatively light, except in planting area 4A. Several planting areas demonstrated significant increases in the canopy specimens due to a large number of box elder resprouts. This was particularly noted in planting area 4B and planting area 8, 9, 9A, 11, and 11A. Regarding the canopy inventory, the performance standard for survivability was achieved in six of nine plantings.

Losses in understory species were observed in most plantings areas that had understory cells, with planting area 4A having the greatest loss. The reason for the plant losses in those areas may be poor soil conditions and lack of water. The basis for the conclusion regarding poor soil conditions is the patchy nature of the understory plant loss. Some understory cells were extremely thin, while others in the same planting area were thriving. Red-osier dogwood species appeared to be growing to meet the performance standard. Winterberry hollies appeared to have recovered from the frost damage suffered at the beginning of the growing season. However, all understory specimens, including the winterberry hollies appeared to suffer from the ongoing drought. The understory inventory indicated the performance standard was met in three of seven planting areas.

Planted grape vine appears to be establishing itself. However, wild grape specimens have dramatically increased across the planting areas. EOEA determined that the wild grape vines were the appropriate species and as a result could be included in the survivability count. With the wild grape vines included, the grape vine survivability standard was achieved in all areas.

Herbaceous cover was less than the required performance standard in most planting areas. However, the inability to meet the standard was usually due to thin stands of vegetation or small spots that were bare. Both dry weather and poor soil conditions appear to be partly responsible for the lack of total coverage. Other than supplemental watering, it is not feasible to address these circumstances through most response actions. However, some of the segments within the planting areas that demonstrate poor herbaceous coverage can be addressed through response actions. Such response actions were proposed to the EPA and EOEA (Attachment B) and implemented in September 2002. Composite planting area 8, 9, 9A, 11, and 11A showed poor herbaceous cover.

No unexpected concerns with invasive species were identified during the summer 2002 monitoring events. The required performance standard for invasive species was achieved in all planting areas.

3. Restored Bank Erosion Monitoring

3.1 General

The integrity of the cleared and restored bank areas of the Upper ½-Mile Reach, excluding the approximately 170-foot-long section excavated and restored as part of the Building 68 Area Removal Action, is required to be monitored for five years after project completion. The monitoring program is to consist of visual inspections of the cleared and restored bank areas for signs of erosion after each storm and high-water event (i.e., a flow of 440 cubic feet per second [cfs] or greater at the Coltsville gauging station) until herbaceous cover is established, on a semi-annual basis during the first year after the cover is installed, and annually in years 2 through 5. In areas where visual observations indicated a significant amount of erosion (e.g., ruts, gullies, washouts, or sloughing) within the cleared or restored areas or rip-rap bank protection, GE implemented and completed measures to replace/restore the eroded soil or rip-rap to the original restoration design conditions.

3.2 Monitoring Activities

The restored banks were monitored during a spring 2002 monitoring event and the results were presented in a trip report included in this Monitoring Report as Attachment A. In addition, observations were made at various times throughout the year during implementation of the Upper ½-Mile Reach Removal Action. Results of additional monitoring and maintenance activities performed as a result of observations made during the Removal Action were presented in various monthly reports on activities at the GE-Pittsfield/Housatonic River Site. Response actions associated with these monitoring and maintenance activities are summarized below, and the locations where such activities were performed are identified on Figure 2-1.

3.3 Response Actions

3.3.1 Area 1 (Adjacent to Cell A)

During the spring 2002 bank inspection, a small area was observed to have eroded from a non-removal bank area near Cell A adjacent to the Newell Street Bridge (north side). To address this observation and reduce potential for future erosion in this area, the toe of the bank was restored by placing and consolidating 9- to 12-inch diameter stone (rip rap) in the erosion area and blending the rip rap to the existing upstream concrete bridge apron and the existing rip rap protection at the downstream direction.

3.3.2 Area 2 (Adjacent to Cell I-1)

During the spring 2002 bank inspection, a small amount (less than ½ cubic yard) was observed to have eroded into the river from a swale near the downstream portion of Cell I1 (south side). To address this observation, the sand was removed form the river and properly disposed off-site. To reduce possible future erosion in this area, stone dust was place over the swale to fill the voids between the rip rap to reduce the flow of water within the void and below the geotextile swale liner.

3.3.3 Area 3 (Adjacent to Cell C/D)

During the spring 2002 bank inspection, approximately 40 linear feet of exposed Waterloo barrier sheetpiling were observed along the bank near the 64 X oil/water separator (north bank). To address this observation, additional rip rap was placed over the tops of the exposed sheetpiles and spread to the ground on the bank side and to existing rip rap protection on the river side.

3.3.4 Area 4 (Adjacent to Cell F-3)

During the spring 2002 bank inspection, three small areas (approximately 1 square yard) were observed to have settled near the top of the bank in Cell F-3 (south bank). In response to these areas, the depressions were filled with topsoil, and grass seed and erosion mats were installed over each area.

3.3.5 Area 5 (Adjacent to Cells J1/J2)

During the spring 2002 bank inspection, exposed soil was observed at the top of the north bank near a former crane pad. To address this observation, topsoil was spread over the area of exposed soil, followed by the placement of grass seed and erosion control mats. A portion of the exposed soil lay in a utility right-of-way and this area was addressed by spreading wood chips over the exposed soil (similar to restoration of the existing right-of-way).

4. Sediment Cap Isolation Layer Monitoring

4.1 General

Periodic sampling of the sediment cap isolation layer is required to monitor its long-term effectiveness in controlling polychlorinated biphenyl (PCB) migration from the underlying sediment. During 2002, monitoring of the isolation layer was performed by sampling at four of six locations specified in the Upper ½-Mile Reach Removal Action Work Plan and at one additional location selected by EPA. The locations of the isolation layer sample points are shown on Figure 4-1. The following sections present the results of the monitoring activities and the response actions to be completed for the sediment cap isolation layer.

4.2 Monitoring Program

The isolation layer monitoring program consists of periodic sampling of the isolation layer at select locations along the Upper ½-Mile Reach. The objective of the monitoring program is to generate data for each location during different time periods to be compiled into a database for long-term evaluation.

4.2.1 Sampling Activities

As part of the monitoring program, sampling activities include:

- Collecting one residual sediment sample from beneath the isolation layer monitoring location immediately following excavation activities (prior to restoration);
- Collecting baseline samples of the isolation sand layer shortly after cap placement;
- Collecting samples of the isolation sand layer one year after cap placement; and
- Collecting samples of the isolation sand layer at the end of the initial five-year period after cap placement.

During 2002, the post-excavation and baseline sampling events were conducted at three locations (Cap-Mon-6 through 8), and the 1-year monitoring event was conducted at two locations (locations 4 and 5) at which the post-excavation and baseline sampling had been conducted in 2001.

Monitoring activities for the sediment cap isolation layer began with post-excavation sampling of the existing river sediments prior to cap placement to confirm that detectable PCBs were present in the remaining sediments, and to provide data for use in subsequent evaluations. For this sampling, a sample of the post-excavation, pre-restoration surface sediment (0- to 2-inch increment) was obtained and analyzed for PCBs.

After the post-excavation sediment samples were collected, restoration activities for the cell were initiated, with placement of the isolation sand layer. Following placement of the isolation sand layer, samples of the sand were collected to provide baseline data for long-term monitoring. Consistent with the requirements of the Work Plan, the core segment intervals that measured 2 to 4, 4 to 6, and 6 to 8 inches above the bottom geotextile layer were analyzed for PCBs and total organic carbon (TOC). In addition, based on discussions with EPA, full-depth cores of isolation material were collected and analyzed for TOC to provide additional baseline data.

After 1 year, additional samples must be collected at the same locations to provide 1-year data for inclusion in the database and future evaluation. At each of the 1-year sampling events conducted in 2002, the overlying

armor stone and newly deposited sediment in the armor stone were first removed by hand to the extent practicable and the geogrid and geotextile were temporarily cut back to allow access to the underlying isolation layer. Following this step, an undisturbed core of the sediment isolation layer was collected at each sampling location. At the time of sample collection, each core was sectioned into 2-inch increments. Consistent with the requirements of the Work Plan, the core segment intervals that measured 2 to 4, 4 to 6, and 6 to 8 inches above the bottom geotextile layer were analyzed for PCBs and TOC. In addition, based on discussions with EPA, full depth cores of isolation material were collected and analyzed for TOC to provide additional 1-year data.

4.2.2 Sampling Results

The isolation layer monitoring sampling results are summarized in Table 4-1. Although the post-excavation and baseline sampling events for the first three monitoring locations were conducted in 2000, the results of that sampling are included in this Monitoring Report for completeness. The sampling summary in Table 4-1 includes the cell sample location, sample ID, sample date, depth interval for each sample, and sample results for PCB and TOC analysis. The post-excavation residual sediment sampling at the three monitoring locations indicated PCB concentrations ranging from 88.8 to 1,000 parts per million (ppm).

The baseline isolation layer monitoring performed at the three monitoring locations shortly following isolation layer placement showed the following results:

- PCBs were not detected in any of the three baseline samples; and
- TOC levels in the baseline depth-interval samples ranged from 0.6 to 1.2% with an average of 0.86%. For the baseline full-depth isolation cores, TOC sample results ranged from 0.77% to 3.0% with an average of 1.4%.

The 1-year isolation layer monitoring sampling that was performed at two locations showed the following results for the isolation layer material:

- PCBs were not detected in either sample; and
- TOC results for the depth-interval samples ranged from 0.36% to 0.63% with an average of 0.47%. The full-depth isolation cores produced TOC sample results ranging from 0.26% to 0.51% with an average of 0.41%.

4.3 Response Actions

Near the completion of the project, EPA expressed concerns regarding the levels of TOC contained in some of the isolation layer material that was used for restoration in the Upper ½-Mile Reach. In response to the TOC sample data, EPA requested additional sampling of the isolation layer material that was placed from the beginning of the project through October 2001 in a letter dated August 26, 2002. In response, GE developed a proposed plan for TOC sampling of the isolation layers and performance of a seepage meter study. The proposed plan was submitted to EPA in a letter dated September 9, 2002. The portion of the plan related to TOC sampling was conditionally approved by EPA in a letter dated September 25, 2002. This supplemental sampling program is currently being performed and will be reported in a separate report. The scope of the seepage meter study has not yet been finalized.

5. Aquatic Habitat Structures and Armor Stone Layer Monitoring

5.1 General

Periodic monitoring of the aquatic habitat enhancement structures is required to evaluate the structural stability of the habitat enhancement structures, the effects of these structures on aquatic habitat, and the potential for increased bank-side erosion. Such monitoring is required following the first high-flow event and following the first prolonged low-flow condition on an annual basis for 5 years. An attempt was made to monitor the aquatic habitat structures and armor stone layer following high-flow conditions in May 2002. However, it was determined in consultation with EPA and EOEA that it would not be possible to perform these activities under high-water conditions and it was decided that future monitoring activities would only be performed for the prolonged low-flow condition. The aquatic habitat enhancement structures were observed during an August 2002 monitoring event following an extended low-flow period. In addition, observations were made at various times throughout the year during implementation of the Removal Action.

The armoring layer of stone placed over the isolation layer within the river bed must also be monitored periodically to ensure that it is effectively preventing erosion of the underlying sediment cap isolation layer. The monitoring program must consist of visual inspections of the Upper ½-Mile Reach following the first ice-out and high-water condition (i.e., a flow of 440 cfs or greater reported at the Coltsville gauging station), and once per year for 5 years during low-flow conditions. Observations should determine if significant movement of the armor stone, or reduction in the armor stone thickness, has occurred.

During 2002, monitoring activities for the armor stone layer were performed in conjunction with the monitoring event for the aquatic habitat structures, as well as through observations made during the course of the Removal Action, including during low-flow conditions. The combined monitoring event was performed in August 2002 (during low-flow conditions) and the results of this inspection were presented in a trip report included in this Monitoring Report as Attachment A.

5.2 Monitoring Activities

5.2.1 Aquatic Habitat Structures

The aquatic habitat enhancement structures that were monitored during 2002 along the Upper ½-Mile Reach include:

- Wing deflectors;
- Habitat enhancement boulders;
- W-weir; and
- Vortex weirs.

The approximate location of each habitat enhancement structure is presented on Figure 4-1. As presented in the August 2002 trip report (included as Attachment A to this Monitoring Report), the aquatic habitat structures that were monitored appeared to be stable with no evidence of bank side erosion. It should be noted that the areas of

deposition and scouring observed (adjacent to boulder clusters) was occurring in the recently deposited sediment on top of the armor stone. No scouring of the armor stone was observed (see below). More specifically, each structure, along with corresponding observations, is presented below.

At the beginning of 2002, the northern half of a vortex weir was placed in Cell J1 to complete the weir construction started in Cell I1 during 2001. The vortex weir was constructed with 2- to 3-foot-diameter boulders at the apex and near the banks, and 1-foot-diameter cobbles along the legs of the weir. During 2002, observations indicated the vortex weir was structurally stable with no changes in location. In addition, no bank erosion was noted on the north and south banks adjacent to the vortex weir following high-flow events. With regards to effects of the structure on aquatic habitat, the vortex weir appeared to be functioning as anticipated in the Work Plan.

A vortex rock weir and single wing deflector were placed in Cell J3 (the last cell to complete the Upper ½-Mile Reach) at the end of the project. The vortex rock weir design was modified based on discussions and input from EOEA. The head apex of the weir is located in Cell J3 forming a short leg to the north bank and a long leg to the south bank. Similar to the previous weir, construction included placing 2- to 3-foot-diameter boulders at the apex and near the banks, and 1-foot-diameter cobbles along the legs of the weir. No bank erosion was noted along the banks adjacent to the weir following installation.

A single-wing deflector was placed in Cell I3 on the south side of the river, upstream of the vortex weir. Field observations indicated the deflector to be structurally stable with no apparent change in the location of the boulders. The wing deflector perimeter is composed of 2-foot-diameter cobbles, and the interior is filled with 12-inch-diameter stones to form a triangular shaped deflector with the base along the south bank and the apex directed toward the middle of the river. No bank erosion was noted along the bank adjacent to the deflector following installation of the structure. With respect to effects of this structure on aquatic habitat, the deflector appeared to be functioning as anticipated in the Work Plan.

A total of 58 habitat enhancement boulders have been placed in the Upper ½-Mile Reach through the end of the project. Boulder clusters placed in the Upper ½-Mile Reach during 2002 include Cells JI, J2, and J3. At the request of the EPA and EOEA, several of the boulders were placed in different locations from those identified in the Work Plan. Figure 3-1 presents the "as-built" locations of the habitat boulders along the Upper ½-Mile Reach. During the August 2002 inspection, as well as various other times during the year, the observations of these boulders provided no indication that the boulders were structurally unstable or had changed in location. In addition, no erosion was noted along the banks near any of the boulders. With respect to effects of these boulders on aquatic habitat, the boulders appeared to be functioning as anticipated in the Work Plan.

5.2.2 Armor Stone Layer

Monitoring activities for the armor stone layer were performed in conjunction with a monitoring event for aquatic habitat structures during August 2002, as well as through other observations during the course of the Removal Action, including during low-flow conditions. As presented in the August 2002 trip report (included as Attachment A to this Monitoring Report), the armor stone layer appeared to be stable with no significant reduction in the thickness of the cap. There were no areas that were observed to have a reduction in the armor stone layer thickness. The rip rap along the toe of the bank of each cell was observed to be stable without significant movement of stones. In general, the armor stone layer appears to be functioning as anticipated in the Work Plan.

6. Summary and Future Activities

6.1 Vegetation Monitoring

During 2002, vegetation monitoring was performed in the spring and fall. The spring 2002 monitoring event indicated some losses in both understory and canopy plantings. In response to the canopy survival rate, tree guards and locks were installed to aid in their growth. The presence of invasive species was significantly reduced from observations made during 2001. The fall 2002 monitoring event revealed relatively light canopy losses and some understory losses in primary understory cells. The reason for the plant losses in those areas may be poor soil condition and lack of water. In general, summer 2002 was dry with very little rainfall and an ongoing drought. Areas that were noted to have insufficient herbaceous cover were addressed by placing topsoil, spreading grass seed, installing erosion control mats, and watering on a regular basis.

For 2003, vegetation monitoring will be performed once during the spring and once during the late summer/fall for all of the planting areas. Monitoring will continue through 2009. For 2003, planting areas 1, 2, 3, 4A, and 5 will be in monitoring year 3, planting areas 4B, 6, 7, 8, 8A, 9, 9A, 10, 11, and 11A will be in monitoring year 2 and planting areas 12, 13, 14, 15, 16, and 17 will be in monitoring year 1. However, the frequency will vary depending on the actual planting date for specific areas (e.g., two times per year for years 1, 2, and 3, and one time per year for years 5 and 7). The monitoring protocol will be similar to previous events including performing planting inventory, observations of invasive species, and herbaceous cover for the entire Upper ½-Mile Reach. Results of each monitoring event will be summarized and submitted to EPA in trip reports and the *2003 Annual Monitoring Report*.

6.2 Sediment Cap Isolation Layer Monitoring

During 2002, sediment cap isolation layer monitoring was performed at five locations (four work plan locations and one EPA-selected location). Post-excavation sediment samples and baseline isolation layer monitoring samples were collected at locations 6, 7 and 8, and 1-year isolation layer monitoring samples were collected at locations 4 and 5. Results of the sampling activities are summarized in Section 3 and presented in Table 3-1.

For 2003, 1-year isolation layer monitoring samples will be obtained at locations 6, 7, and 8. The results will be provided in the monthly report and presented in the *2003 Annual Monitoring Report*.

6.3 Restored Bank Areas

Monitoring of the restored bank area for erosion was performed during spring 2002 following first ice-out and a high-flow event, and at various times during implementation of the Removal Action. The spring 2002 inspection of the restored bank areas identified two areas with evidence of measurable erosion and three other impacted areas requiring further action due to settlement or exposed sheeting. These areas were addressed by removing sediment from the River (e.g., areas with measurable erosion) and by placing additional rip rap over areas where the tops of barrier wall sheetpiles were exposed.

The restored banks will be monitored for potential erosion/settlement on a semi-annual basis in 2003 and annually for 2004 through 2007. Results of each monitoring event will be summarized and submitted to EPA in trip reports and the *2003 Annual Monitoring Report*.

6.4 Aquatic Habitat Structures and Armor Stone Layer Monitoring

Monitoring of the aquatic habitat structures and armor stone layer was performed during August 2002 following a period of low-flow, and at various times during implementation of the Removal Action. The August 2002 monitoring event indicated the habitat structures to be structurally stable with no displacement of boulders and structures. There were no observations of increased bank side erosion or scouring of the underlying armor cap. In addition, aquatic wildlife was observed near the majority of habitat structures. Finally, observations of the armor stone layer indicated no areas of reduced armor stone layer thickness.

For 2003, the aquatic habitat structures and armor stone layer will be monitored in the summer during a period of low-flow conditions. The results of this monitoring event will be presented in a trip report and summarized in the *2003 Annual Monitoring Report*.

6.5 Water Column Monitoring

For 2003, the post-removal water column monitoring program will be performed. This post-removal monitoring program consists of water column sampling performed three times annually (high flow, storm flow, and low flow) for the first 5 years at the Newell and Lyman Street sampling locations, following completion of restoration activities. Samples will be analyzed for total/dissolved PCBs and total suspended solids (TSS), and during each sampling event measurements will be made of turbidity. The results will be reported in the monthly report and presented in the *2003 Annual Monitoring Report*.

6.6 Biota Monitoring

For 2003, the biota monitoring program (i.e., caged mussel study) will be performed during the late summer/fall. The biota monitoring program was postponed until 2003, with EPA concurrence, due to removal activities being performed by EPA in the upstream portion of the 1½ Mile Reach. Completing the caged mussel study during the same time of year under similar conditions (to the extent practical) potentially reduces seasonal and temperature-related effects. Sample locations for the caged mussel study will include the sample locations used previously, in the mussel study performed during construction. Specimens will be collected from the cages following an appropriate exposure period and will consist of one approximately 10-mussel composite sample from each mussel cage array. The results from the mussel samples will be reported in the monthly report and presented in the *2003 Annual Monitoring Report*.

6.7 Restored Sediments Monitoring

Three rounds of periodic sampling of the restored sediments (i.e., sediment on top of the armor layer) in the Upper **2**-Mile Reach will be performed at 5-year intervals, beginning 5 years after completion of construction on the sediment removal/replacement activities. Therefore, for 2003, the restored sediment monitoring program will not be performed. Restored sediment monitoring will begin in 2007.

References

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

Weatherbee, Pamela B., 1996. *Flora of Berkshire County.* The Studley Press; Dalton, Massachusetts.

Tables

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Table 2-1
Planting Summary

2002 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*	SubTotal	Red-Osier Dogwood *Cornus sericea*	Total	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	110	82	**192**	79	79	26	26	**210**
1	Oct-00	A,C	--	--	0	36	0	0	0	36	0	**36**	0	0	0	0	**0**
1	Jun-01	A,C	--	--	22	0	1	1	0	2	0	**2**	0	0	0	0	**0**
1	Oct-01	A,C	--	--	0	10*	10	9	10	29	8	**37**	10	10	24	21	**65**
1	Oct-02	A,C	--	--	0	6	5	6	6	23	6	**29**	0	0	0	0	**0**
2	May-00	D	0.17	NA	0	0	0	0	0	0	0	**0**	44	44	15	15	**118**
2	Oct-01	D	--	--	0	0	0	0	0	0	0	**0**	9	9	14	8	**40**
3	May-00	E	0.05	45	0	0	18	18	19	55	11	**66**	13	13	4	4	**34**
3	Oct-00	E	--	--	0	18	0	0	0	18	0	**18**	0	0	0	0	**0**
3	Jun-01	E	--	--	0	0	0	0	1	1	0	**1**	1	1	0	0	**2**
3	Oct-01	E	--	--	0	5*	4	4	4	12	0	**12**	5	5	4	4	**18**
3	Oct-02	E	--	--	0	6	0	6	0	12	8	**20**	3	0	0	2	**5**
Subtotal			**0.52**	**373**	**22**	**66**	**75**	**81**	**76**	**298**	**115**	**413**	**155**	**155**	**83**	**74**	**492**
4A	Oct-00	G1,G2	0.16	395	0	19	18	18	18	73	74	**147**	64	63	5	10	**142**
4A	Oct-01	G1,G2	--	--	0	12*	6	6	6	18	12	**30**	3	4	10	5	**22**
4A	Oct-02	G1,G2	--	--	0	8*	4	4	10	18	8	**26**	30	10	0	0	**40**
4B	Jun-01	G2,G3	0.40	416	22	54	56	56	0	166	134	**300**	95	95	33	33	**256**
4B	Oct-01	G2,G3	--	--	0	0	0	0	53	53	0	**53**	0	0	0	0	**0**
	Oct-02	G2,G3	--	--	0	8*	4	6	2	12	8	**20**	10	0	10	10	**30**
5	Oct-00	F1,F2	0.10	NA	0	19	18	18	18	73	0	**73**	25	25	8	8	**66**
6	Jun-01	F3	0.07	226	0	0	0	0	0	0	57	**57**	21	21	7	7	**56**
6A	Jun-01	F3	0.05	NA	0	0	0	0	0	0	0	**0**	8	8	3	3	**22**
7	Jun-01	F3	0.01	NA	0	0	0	0	0	0	0	**0**	3	3	1	1	**8**
Subtotal			**0.79**	**1037**	**22**	**92**	**106**	**108**	**107**	**413**	**293**	**706**	**259**	**229**	**77**	**77**	**642**
8	Oct-01	H1	0.02	32	0	0	0	0	0	0	6	**6**	6	4	2	2	**14**
8	Oct-02	H1	--	--	0	0	0	0	0	0	2	**2**	0	0	0	0	**0**
8A	Oct-01	H1	0.05	104	0	0	0	0	0	0	29	**29**	12	7	4	4	**27**
9	Oct-01	H1	0.01	NA	0	0	0	0	0	0	0	**0**	3	2	1	1	**7**
9A	Oct-01	H1,H2	0.06	187	0	0	0	0	0	0	31	**31**	12	7	4	4	**27**
9A	Oct-02	H1	--	--	0	0	0	0	0	0	2	**2**	0	0	0	0	**0**
10	Oct-01	B68	0.18	NA	0	36*	36	37	37	110	0	**110**	47	47	16	16	**126**
11	Oct-01	H2	0.04	88	0	0	0	0	0	0	20	**20**	8	6	3	3	**20**
11	Oct-02	H2	--	--	0	0	0	0	0	0	2	**2**	0	0	0	0	**0**
11A	Oct-01	H2	0.06	83	0	0	0	0	0	0	28	**28**	12	7	4	4	**27**
11A	Oct-02	H2	--	--	0	0	0	0	0	0	2	**2**	0	0	0	0	**0**
12	May-02	J1	0.19	269	0	18*	0	19	18	37	67	**104**	50	50	0	17	**117**
12	Oct-02	J1	--	--	22	0	18	0	0	18	0	**18**	0	0	17	0	**17**
13	May-02	I1	0.10	234	0	18	0	18	19	55	41	**96**	26	26	0	9	**61**
13	Oct-02	I1	--	--	0	0	18	0	0	18	18	**36**	0	0	9	0	**9**
14	Oct-02	J3	0.21	192	22	37*	37	36	36	109	48	**157**	56	56	19	19	**150**
15	May-02	I2	0.00	40	0	0	0	0	0	0	10	**10**	0	0	0	0	**0**
16	Oct-02	I2	0.01	72	0	0	0	0	0	0	18	**18**	3	3	1	1	**8**
17	Oct-02	I3	0.04	108	0	0	0	0	0	0	27	**27**	10	10	3	3	**26**
Subtotal			**0.96**	**1409**	**44**	**18**	**109**	**110**	**110**	**347**	**351**	**698**	**245**	**225**	**83**	**83**	**636**
Total			***2.27***	***2819***	***88***	***310***	***290***	***299***	***293***	***1058***	***759***	***1817***	***659***	***609***	***243***	***234***	***1770***

Notes:

- 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.
- 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.
- Canopy planted in varying densities, clumps, or if necessary, sinuous lines.
- Dogwood band planted on 4' centers in a single row along the toe of the bank.

* Chokecherry *prunus serotina*

Table 4-1
Isolation Layer Sampling Summary

2002 Annual Monitoring Report
Upper 1/2-Mile Reach of the Housatonic River
General Electric Company - Pittsfield, Massachusetts

Cell	Sample ID	Post Excavation Sediment Results				Depth Interval	Isolation Layer Baseline Results				Isolation Layer 1-Year Results			
		Date	Depth Interval	Total PCBs	TOC		Sample Date	Total PCBs	TOC (DI)	TOC (FD)	Sample Date	Total PCBs	TOC (DI)	TOC (FD)
G1	CAP-MON -1	6/23/00	Surface	20	4,500	2" - 4"	11/9/00	0.027J	Rejected	NA	11/5/01	ND(0.0551)	1,040	703
						4" - 6"	11/9/00	ND(0.038)	Rejected	NA	11/5/01	0.0790	1,450	1,850
						6" - 8"	11/9/00	ND(0.040)	Rejected	NA	11/5/01	ND(0.0576)	1,350	1,190
G1	CAP-MON -2	8/17/00	Surface	19.0	ND(5970)	2" - 4"	11/9/00	ND(0.039)	Rejected	NA	11/5/01	0.0845[0.074]	1490[1010]	788
						4" - 6"	11/9/00	ND(0.040)	Rejected	NA	11/5/01	ND(0.0581)	897	1120 [910]
						6" - 8"	11/9/00	ND(0.039)	Rejected	NA	11/5/01	ND(0.0588)	844	798
G2	CAP-MON -3	8/17/00	Surface	1.72	ND(1230)	2" - 4"	11/9/00	ND(0.039)	Rejected	NA	11/5/01	ND(0.0570)	699	1,060
						4" - 6"	11/9/00	0.030J	Rejected	NA	11/5/01	ND(0.0552)	946	1,270
						6" - 8"	11/9/00	ND(0.039)	Rejected	NA	11/5/01	ND(0.0575)	1,090	1,180
G3	CAP-MON -4	2/22/01	Surface	519	NS	2" - 4"	2/27/01	ND(0.0636)	15,240[10,972]	NA	2/27/02	ND(0.0570)	4630	5040
						4" - 6"	2/27/01	ND(0.0580)	1,591	NA	2/27/02	ND(0.0569)	3640	3530
						6" - 8"	2/27/01	ND(0.0558)	27,624	NA	2/27/02	ND(0.0553)	3610 [3450]	3240
F3	CAP-MON -5	5/4/01	Surface	8.46	NS	2" - 4"	5/10/01	ND(0.0582)	ND(100)	NA	7/3/02	ND(0.0588)	6320 [5040]	4980
						4" - 6"	5/10/01	ND(0.0559)	ND(100)	NA	7/3/2002	ND(0.0589)	4560	5130
						6" - 8"	5/10/01	ND(0.0583)	6,697	NA	7/3/2002	ND(0.0591)	5140	2630
J1	CAP-MON -6	1/15/02	Surface	1,000	NS	2" - 4"	1/30/02	ND(0.061) [ND(0.0586)	8680 [9120]	7,670	NA	NA	NA	NA
						4" - 6"	1/30/02	ND(0.061) [ND(0.0586)	12,200	10,000	NA	NA	NA	NA
						6" - 8"	1/30/02	ND(0.061) [ND(0.0586)	6,030	11,000	NA	NA	NA	NA
J3	CAP-MON -7	8/2/02	Surface	88.8	NS	2" - 4"	8/16/02	ND(0.054) [ND(0.053)]	10,000 [8900]	14,000	NA	NA	NA	NA
						4" - 6"	8/16/02	ND(0.055)	11,000	13,000	NA	NA	NA	NA
						6" - 8"	8/16/02	ND(0.058)	6,700	12,000	NA	NA	NA	NA
J3	CAP-MON -8	8/2/02	Surface	216	NS	2" - 4"	8/16/02	ND(0.057)	9,100	30,000	NA	NA	NA	NA
						4" - 6"	8/16/02	ND(0.052)	6,200	15,000	NA	NA	NA	NA
						6" - 8"	8/16/02	ND(0.054)	7,300	16,000	NA	NA	NA	NA

Notes: 1. TOC = Total Organic Carbon
DI = depth interval
FD = full depth
NA = Not Applicable
ND - Analyte was not detected. The value in parentheses is the associated detection limit.
J - Indicates an estimated value less than the practical quantitation limit (PQL).
2. Duplicate sample results presented in brackets.
3. PCB and TOC results presented in ppm.

Table 6-1
Post-Removal Monitoring Activities Summary

2002 Annual Monitoring Report
Upper 1/2-Mile Reach of the Housatonic River
General Electric Company - Pittsfield, Massachusetts

Category	Media	Frequency	Parameter	Requirements
Restored Bank Vegetation	Planting inventory	2x/year for years 1 - 3	Planting quantity	Survival of >80% of planting quantity
	Invasive species	1x/year for years 5 and 7	Invasive type	Presence of <5% of surface area
	Herbaceous groundcover	(see note 2)	% groundcover	Presence of 100% in area outside foliar area
Isolation Layer	Sediment	1 and 5 years after placement.	PCBs, TOC	Compare to Work Plan predictions re PCB migration through isolation layer
Restored Bank Soil	Soil	2x/year for first year 1x/year for years 2 - 5	Erosion	Repair significant erosion of bank soils
Habitat Enhancement Structures	Boulders	1x/year for 5 years	Stablility	Address unstable conditions
			Effects on aquatic habitat	Document observations in report.
			Potential for bank-side erosion	Repair increased bank erosion, if any.
Armor Stone Layer	Rip rap stone	1x/year for 5 years	Armor stone thickness	Repair significant movement or reduction in armor stone thickness
Water column	Water	3x/year for 5 years	PCBs, TSS	Compare to baseline data.
Biota	Caged mussels	1 event	PCBs, % Lipids	Compare to baseline data.
Sediments on armor stone	Sediment	3 rounds (5, 10, and 15 years after completion).	PCBs	If PCBs found, evaluate data to determine source.

Notes:
1. Information presented in table obtained from *Upper 1/2-Mile Reach Removal Action Work Plan* (BBL, 1999).
2. Bank vegetation inspection activities to be performed in phases dependent upon actual planting date for specific planting area.

Figures

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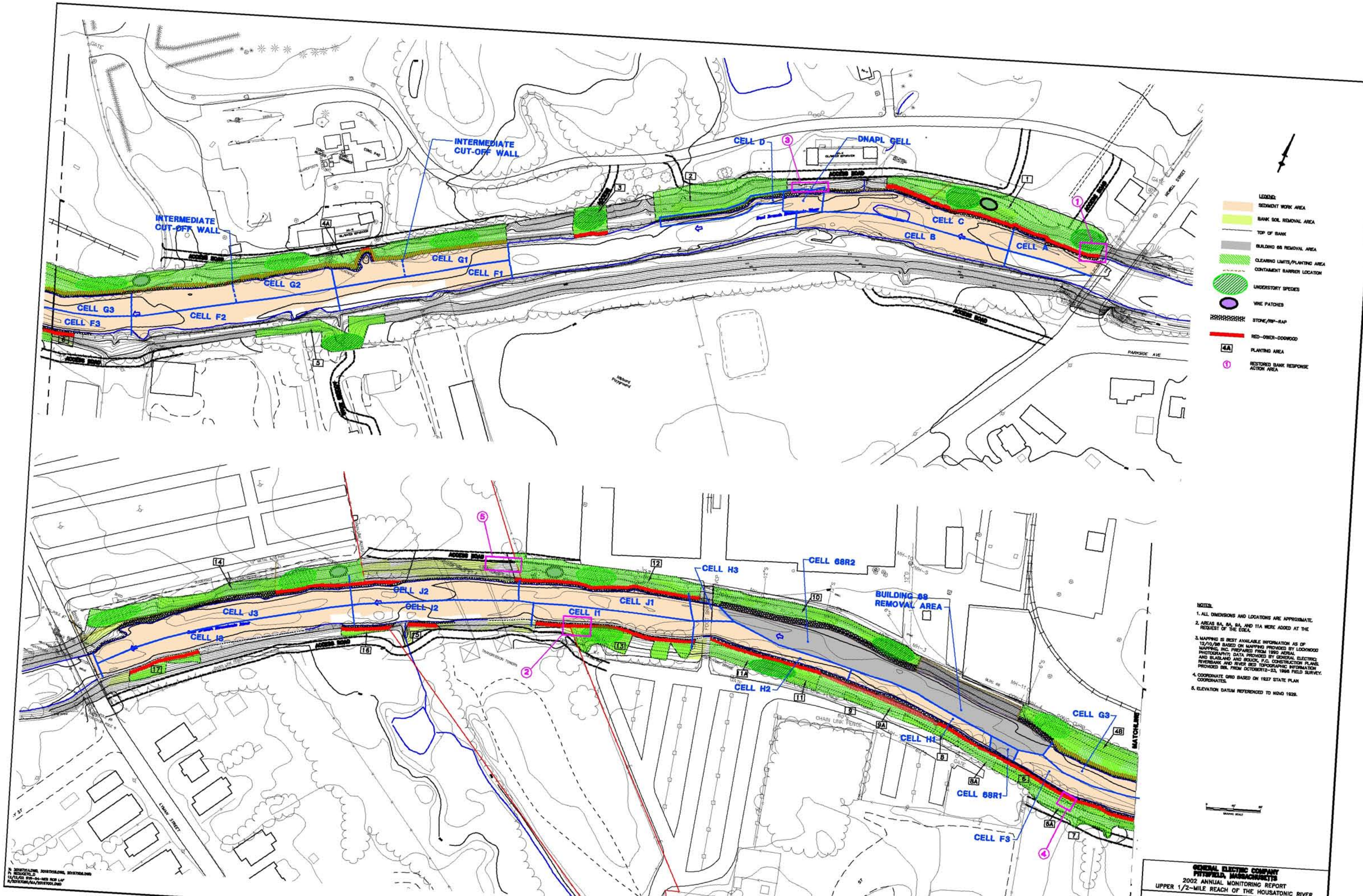

NOTES:

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 BBL FROM OCTOBER12-23, 1998 FIELD SURVEY.
4. COORDINATE GRID BASED ON 1927 STATE PLAN COORDINATES.
5. ELEVATION DATUM REFERENCED TO NGVD 1929.

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
2002 ANNUAL MONITORING REPORT
UPPER 1/2-MILE REACH OF THE HOUSATONIC RIVER

RESTORED BANK PLANTING AREAS AND RESPONSE ACTION AREAS

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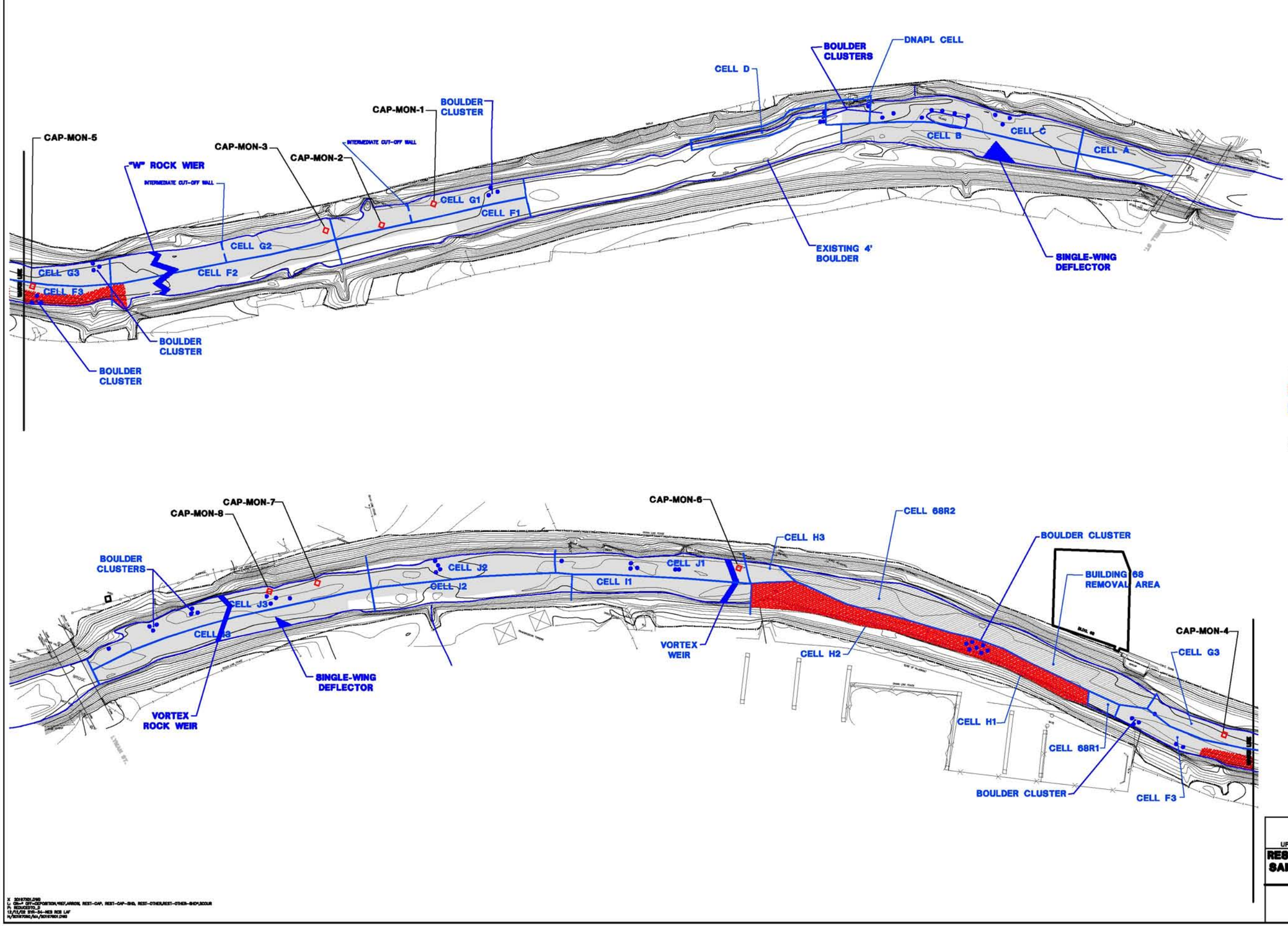
FIGURE 2-1



LEGEND:

- CAP AND ARMOR AREAS (ARMOR STONE D100, 9")
- CAP AND ARMOR AREAS (ARMOR STONE D100, 12")
- AQUATIC ENHANCEMENT STRUCTURES
- HABITAT ENHANCEMENT BOULDERS
- BUILDING 68 REMOVAL AREA
- SEDIMENT CAP ISOLATION LAYER MONITORING LOCATION

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.
4. ISOLATION LAYER SAMPLE LOCATIONS IN ACCORDANCE WITH WORK PLAN. EPA SELECTED SAMPLE LOCATIONS CAP-MON-2 AND CAP-MON-7.

0 80' 160'

GRAPHIC SCALE

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS
2002 ANNUAL MONITORING REPORT
UPPER 1/2-MILE REACH OF THE HOUSATONIC RIVER

RESTORED RIVER ISOLATION LAYER SAMPLE LOCATIONS AND HABITAT STRUCTURE LOCATIONS

BBL BLASLAND, BOUCK & LEE, INC. engineers & scientists

FIGURE 4-1

Attachments

BBL®
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

Attachment A

Trip Reports

BBL®
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

July 25, 2002

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

Re: Trip Report - May 2002 Vegetation Monitoring (GECD800)

Dear Mr. Tagliaferro:

Enclosed please find a memorandum representing the trip report for the May 2002 vegetation monitoring visit for the restored banks of the Upper ½ Mile Reach of the Housatonic River.

Please call me with any questions.

Yours truly,

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

ATS/dmn
Attachment
cc: T. Angus. MDEP
R. Bell, MDEP
J. Bieke, Esquire, Shea & Gardner
M. Carroll, GE
T. Conway, EPA
C. Fredette, CDEP
R. Goff, ACE
M. Gravelding, BBL
Mayor Hathaway, City of Pittsfield
H. Inglis, EPA
D. Jamros, Weston
J. H. Maxymillian, Maxymillian Technologies
S. Messur, BBL
K. C. Mitkevicius, USACE
T. O'Brien, MA EOEA
B. Olson, EPA
S. Steenstrup, MDEP
A. Weinberg, DEP
Public Information Repositories

MEMORANDUM

TO: Andrew Silfer, P.E.
General Electric

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

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

SUBJ: Trip Report;
May 2002 Monitoring Visit
First ½ Mile Restoration Project, Housatonic River
Pittsfield, Massachusetts

DATE: June 21, 2002
Revised July 25, 2002

As outlined in Section 9.2 of the *Removal Action Work Plan – Upper ½ Mile Reach of Housatonic River* (BB&L, 1999), habitat restoration activities were implemented in those areas where bank soils were excavated as part of the removal action and in areas that were cleared to allow access for the removal activities. The ecorestoration techniques outlined in the work plan are intended to restore the vegetative community in those disturbed riparian areas to a functional value that exceeds that of the riparian habitat prior to the removal action.

As part of the habitat restoration process and specified in Section 11.6.2 of the *Removal Action Work Plan – Upper ½ Mile Reach of Housatonic River* (BB&L, 1999), GE agreed to monitor those areas that were restored to ensure the success and biological integrity of the intended vegetative community. The monitoring program consists of two visits during each of the first three years after planting, and an annual visit to be conducted during the fifth year and seventh year after planting. In each of the first three years after planting, visits are conducted in the late spring after the first leaf flush (May/June) and in the summer (July/August) to assess plant survival. The single visit in the fifth year and seventh year after planting will be conducted in the summer (July/August). In the event of a significant loss of plantings (greater than 1/4 acre), the timing for monitoring will be restarted following actions to replant the lost trees or shrubs (except in the case where a third party is responsible for growth failure).

An annual summary monitoring report is required to prepared documenting the results of that year's monitoring visits and the conditions of the restored areas within the Upper ½-Mile Reach. That report is to be submitted to the U.S. Environmental Protection Agency by December 15 of that year. Additionally, a trip report summarizing the findings of each monitoring visit is to be submitted following the completion of each monitoring visit. This trip report is filed for the monitoring visit that was conducted on May 20 and 21, 2002. The results of the visit are detailed

in the attached tables and the areas that were monitored are presented on Figure 1 from the planting plan.

1. Charles Harman of AMEC and Brian McKinsey of BB&L conducted the monitoring visit for GE and Bill Stack of Woodlot Alternatives was present for the Trustees. Chris Frank of C. L. Frank & Associates accompanied the monitoring party as the certified arborist.

2. Planting areas 1, 2, 3, 4A, 4B, 5, and 10 were inspected individually. Planting areas 6, 6A, 7, 8A were inspected as one contiguous unit, as were planting areas 8, 9, 9A, 11, 11A. (Note: Future trip reports will include reference to the monitoring year for each planting area.)

3. The specific results of the monitoring visit are presented in the attached tables.

4. In general, canopy losses were relatively light, except in planting areas 4A and 4B. Losses in understory species were observed in all plantings areas with understory cells, with planting area 4A having the greatest loss GE will review the results of the monitoring event that is planned for August 2002 and will implement any planting in the fall 2002 that is needed to bring the area to the performance standards.

5. Protective screens were placed around the canopy specimens in the fall of 2001. This action appeared to have lessened the impact of herbivory on the plants. However, excess rubbing on the protective screen by the plants due to wind movement had resulted in a number of specimens showing distinct scaring and damage to the outer bark. Some plants had even broken at the wear point. A remedial action to correct the problem by installing tree locks between the plantings and the protective screens was implemented by C. L. Frank & Associates in June 2002.

6. Winterberry hollies, in general, appeared to have leaved out at the beginning of the growing season, but then were damaged by a subsequent cold snap. Freeze damage was observed in almost every specimen. GE will monitor the condition of the winterberry hollies during the August monitoring event and if any further corrective action is needed, it will be conducted in the fall.

7. During the 2001 monitoring visits, it was noted that serviceberries did not appear to be surviving well. Subsequent plantings and replantings were, in fact, made with chokecherry. During the May 2002 visit, it appears that those serviceberries that had survived, were fully leafed out and thriving.

8. Red-osier dogwoods were thin in some spots and appeared to have been impacted by herbivorous actions. GE will monitor the condition of the red-osier dogwoods in August 2002 and determine if any additional corrective actions are needed. Red-osier dogwoods will grow prolifically and the August event should indicate whether

the plants have recovered from both the effects of winter and the effects of herbivory. If additional plantings are required to meet the performance standards, they will be performed in the fall.

9. Grapevines showed very poor survival. It is suggested that further consideration be given to the methods used for growth and propagation of grapevine, as they do not appear to be hardy enough to survive through the winter. To address this issue, future River Grape planting stock will be larger with more root growth than previous plantings and improved maintenance (watering and mulching) will be implemented. As a note, GE has identified natural growth of grape vines in some of the planting areas. The extent to which this natural growth can be counted towards achievement of the performance standard will be evaluated in the August 2002 monitoring visit.

10. Herbaceous cover was less than the required performance standard in all areas. However, in some of the older planting areas such as area 1, the lack of coverage could be the result of the time of year. Observations of the cover composition indicated that grasses dominated it. The August monitoring visit should provide an indication of the growth herbaceous wildflowers that generally lag behind the grasses in seasonal growth. It is believed inappropriate to plant herbaceous cover during July/August, and as a result, GE will monitor the condition of the herbaceous cover during the August monitoring event and if any further corrective action is needed, it will be conducted in September. In addition, GE will identify specific areas subject to clearing and revegetation where existing woody debris or poor soil quality exist and will perform removal of the debris and/or top dressing with topsoil in theses areas in order to establish herbaceous cover.

11. Composite planting area 8, 9, 9A, 11, 11A showed poor herbaceous cover. The cause of the poor herbasceous cover is primarily existing woody debris. As a result, this material will be cleared to facilitate revegetation.

12. The presence of invasive species has been significantly reduced from last year. Locations of invasive species were identified and noted by C. L. Frank & Associates for further action. Invasive control activities are on going and being performed along the banks of the entire First ½ Mile Reach.

The next monitoring visit is tentatively scheduled for August 12-14, 2002.

TABLE 1

RESULTS OF CANOPY MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens			Dead	Variance	Notes
					Non-stressed	Stressed	Total			
5/31/2001	1	May 00	210	168	139	12	151		**- 18**	a, b, c
	2	May 00	118	94	79	3	82		**- 9**	d, e
	3	May 00	34	27	8	1	9		**- 18**	f
	4, Cell G1	Oct 00	142	114	117	12	129		+ 3	g, h
	5	Oct 00	66	53	55	4	59		+ 2	
8/23/2001[i]	1	May 00	210	168	71	52	123	1	**- 45**	j, h
	2	May 00	118	94	45	22	67		**- 27**	k
	3	May 00	34	27	11	2	13		**- 14**	l
	4, Cell G1	Oct 00	142	114	51	55	106	41	**- 8**	j, m
	5	Oct 00	66	53	44	16	60	3	+ 7	j
5/20/2002[i]	1	May 00	210	168	139	27	166	5	**-2**	n
	2	May 00	118	94	69	20	89		**-5**	o
	3	May 00	34	27	22	7	29		+2	
	4A	Oct 00	142	114	53	23	76	3	**-38**	o
	4B	June 01	256	205	139	58	197	7	**-8**	
	10	Oct 01	126	101	120	4	124	1	+23	
	5	June 01	66	53	46	8	54		+1	
	6, 6A, 7, 8A	June/Oct 01	113	90	60	26	86	3	**-4**	o
	8, 9, 9A, 11, 11A	Oct 01	95	76	108	5	113	2	+37	p
	1	May 00	210	168						
	2	May 00	118	94						
	3	May 00	34	27						
	4A	Oct 00	142	114						
	4B	June 01	256	205						
	10	Oct 01	126	101						
	5	June 01	66	53						
	6, 6A, 7, 8A	June/Oct 01	113	90						
	8, 9, 9A, 11, 11A	Oct 01	88	70						

TABLE 1

RESULTS OF CANOPY MONITORING SURVEYS

Notes on Canopy Surveys:

a. The stressed specimens were boxelder (5) and cottonwood (2).
b. Black willow and silver maple were significantly underrepresented in the count. Only 2 black willows and 7 silver maples were identified.
c. Resprouted species that were cut during remedial activities included eastern cottonwood, boxelder, black cherry (*Prunus serotina*), American elm (*Ulmus americana*), black willow, and red oak (*Quercus rubra*).
d. Black willow and silver maple were significantly underrepresented in the count. Only 1 black willow and 10 silver maples were identified.
e. Resprouted species that were cut during remedial activities included eastern cottonwood, boxelder, red oak and black cherry.
f. No black willow or silver maples were noted. Herbivory is probably the result of the loss.
g. Black willow and silver maple were significantly underrepresented in the count. Only 5 black willow and 10 silver maples were identified.
h. Resprouted species that were cut during remedial activities included eastern cottonwood, boxelder, black cherry, American elm, black willow, red oak, and shagbark hickory (*Carya ovata*).
i. Joint GE/Trustee monitoring event.
j. Cottonwood and boxelder are the dominant species surviving in this area.
k. Resprout species include black cherry, American elm, red oak, green ash (*Fraxinus pennsylvanica*), speckled alder (*Alnus rugosa*), bigtooth aspen (*Populus grandidentata*).
l. Resprout species in this area include American elm, green ash, red oak, white willow (*Salix alba*).
m. Resprout species in this are include red oak and American elm.
n. Resprout observed species include black cherry and American elm.
o. Only other resprout species was black cherry.
p. Only other resprout species was American elm.

TABLE 2

RESULTS OF UNDERSTORY MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens			Dead	Variance	Notes
					Non-stressed	Stressed	Total			
5/31/2001	1	May 00	146	117	93	4	97		**- 20**	
	2	May 00	--	--	--	--	--	--	--	a
	3	May 00	73	58	56	1	57		**- 1**	b
	4, Cell G1	Oct 00	73	58	54	8	62		+ 4	
	5	Oct 00	73	58	68	4	72		+ 14	
8/23/2001[e]	1	May 00	146	117	59	34	93		**- 24**	c, d
	2	May 00	--	--	--	--	--			
	3	May 00	73	58	47	2	49	2	**- 9**	d
	4, Cell G1	Oct 00	73	58	19	17	36	33	**- 22**	d
	5	Oct 00	73	58	44	19	63	7	+ 5	d
5/20/2002[e]	1	May 00	146	117	83	34	117	10	0	f
	2	May 00	--	--	--	--	--	--	--	
	3	May 00	73	58	26	26	52		**-6**	f
	4A	Oct 00	73	58	24	19	43	4	**-15**	f
	4B	June 01	219	175	99	74	173		**-2**	f
	10	Oct 01	73	58	54	20	74		+16	f, g
	5	June 01	73	58	33	26	59	1	+1	f
	6, 6A, 7, 8A	June/Oct 01	--	--	--	--	--	--	--	
	8, 9, 9A, 11, 11A	Oct 01	73	58	46	22	68	--	+10	g
	1	May 00	146	117						
	2	May 00	--	--						
	3	May 00	73	58						
	4A	Oct 00	73	58						
	4B	June 01	219	175						
	10	Oct 01	146	117						
	5	June 01	73	58						
	6, 6A, 7, 8A	June/Oct 01	--	--	--	--	--	--	--	
	8, 9, 9A, 11, 11A	Oct 01	--	--	--	--	--	--	--	

TABLE 2

RESULTS OF UNDERSTORY MONITORING SURVEYS

Notes on the Understory Surveys:

a. No understory specimens were planted in this area.
b. 54 understory specimens were originally planted in May 2000. An additional 18 were planted in October 2000.
c. Overall survival of the understory species is skewed towards the plot located in the western end of Area 1. There is very good survival in that plot and very poor survival in the plot located in the eastern end of Area 1.
d. In general, serviceberry had the poorest survival and tended to be that species with the greatest demonstrated stress.
e. Joint GE/Trustee monitoring event.
f. In general, winterberry hollies appeared to have begun sprouting and putting on leaves when they were hit with frost. Stress appeared to be cold induced. Also, serviceberries that were stressed in 2001 appeared to be a very good condition.
g. One shrub clump was moved from Area 10 to Area 11 at the request of the trustees

TABLE 3

RESULTS OF RED-OSIER DOGWOOD MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count[a]		Comments	Notes
					> 4 foot on center	< 4 foot on center		
5/31/2001	1	May 00	82	66	101 (by count)			
	2	May 00	--	--	--			b
	3	May 00	11	9	13 (by count)			
	4, Cell G1	Oct 00	74	59	74 (by count)			
	5	Oct 00	--	--	--			b
8/23/2001[c]	1	May 00	82	66	First 100' - Partial Second 100' – Partial Third 100' – 100%	First 100' – 10 foot section Second 100' – 20 foot section Third 100'		
	2	May 00	--	--	--	--		b
	3	May 00	11	9	100%			
	4, Cell G1	Oct 00	74	59	Partial	Sparse western 50', with no specimens left last 20'		
	5	Oct 00	--	--	--	--		b
5/20/2002[c]	1	May 00	82	66	First 100' – Partial Second 100' – Partial Third 100' – Partial Fourth 100' – 100%	First 100' – 50 foot section Second 100' – 20 foot section Third 100' – 20 foot section		
	2	May 00	--	--	--	--		b
	3	May 00	11	9	Partial	50% of First 50 feet is sparse		
	4A	Oct 00	74	59		First 100' - 100% Second 100' – 100% Third 100' – 100%	Thin for entire section, water stress in some sections	

TABLE 3

RESULTS OF RED-OSIER DOGWOOD MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count[a]		Comments	Notes
					> 4 foot on center	< 4 foot on center		
	4B	June 01	134	107	First 100' - Partial Second 100' – Partial Third 100' – Partial Fourth 100' – 100%	First 100' – 20 foot section Second 100' – 20 foot section Third 100' – 20 foot section		
	10	Oct 01	--	--	--	--		b
	5	June 01	--	--	--	--		b
	6, 6A, 7, 8A	June/Oct 01	89	71	First 100' - Partial Second 100' – 100%	First 100' – missing first 30 foot section		d
	8, 9, 9A, 11, 11A	Oct 01	82	66	First 100' - Partial Second 100' – Partial Third 100' – Partial Fourth 100' – Partial Fifth 100' – Partial		18 dead red-osier dogwoods identified over the length of this stretch	e

Notes on Red-Osier Dogwood Surveys:

a. Based on discussions with the Trustees during the 8/23/2001 monitoring event, it was agreed that individual counts of red-osier dogwood would not be made. Instead, based on visual observation, it would be identified which parts of the bank did not meet the original planting scheme of one plant every 4 feet. If that measure were not met, then remedial plantings would be utilized to establish the red-osier dogwood to that required density.
b. No red-osier dogwood were planted in this area.
c. Joint GE/Trustee monitoring event.
d. In this sequence of areas, 57 red-osier dogwoods were planted in Area 6 and 32 red-osier dogwood were planted in Area 8A, none were planted in Areas 6A and 8A.

e. In this sequence of areas, 6 red-osier dogwoods were planted in Area 8, 32 red-osier dogwood were planted in Area 9A, 14 red-osier dogwoods were planted in Area 11, and 30 red-osier dogwoods were planted in Area 11A.

TABLE 4

RESULTS OF GRAPE VINE MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens		Dead	Variance	Notes
					Non-stressed	Stressed			
5/31/2001	1	May 00	22	18	22			+ 4	
8/23/2001[a]	1	May 00	22	18	8	8	6	- 2	
5/20/2002[a]	1	May 00	22	18		6		-12	
	4B	June 01	22	18		5		-13	
	9A								b

Notes on Grape Vine Surveys:

a. Joint GE/Trustee monitoring event
b. Due to limitations in stock, this area has not been planted with grape vine as scheduled.

TABLE 5

RESULTS OF HERBACEOUS GROUNDCOVER MONITORING SURVEYS

Date	Area	Date Planted	Target Performance Standard (Cover)	General Monitoring Results (Total Percent Herbaceous Coverage)	% Coverage of Area by Significant Amounts of Open/Bare Soil	Comments
8/23/ 2001[a]	1	May 00	100%	First 100' – 50% coverage Second 100' – 80% coverage Third 100' – 85% coverage Final 60' – 50% coverage		
	2	May 00	100%	75% coverage		
	3	May 00	100%	85% coverage		
	4, Cell G1	Oct 00	100%	First 100' – 45% coverage Second 100' – 75% coverage Third 100' – 85% coverage		
	5	Oct 00	100%	70% coverage		
5/20/ 2002[a]	1	May 00	100%	First 100' – 85% coverage Second 100' – 90% coverage Third 100' – 90% coverage Final 60' – 80% coverage		
	2	May 00	100%	85% coverage		
	3	May 00	100%	85% coverage		
	4A	Oct 00	100%	First 100' – 50% coverage Second 100' – 65% coverage Third 100' – 80% coverage		
	4B	June 01	100%	First 100' – 85% coverage Second 100' – 85% coverage Third 100' – 85% coverage Fourth 100' – 75% coverage Fifth 100' – 75% coverage		
	10	Oct 01	100%	First 100' – 85% coverage Second 100' – 85% coverage		
	5	June 01	100%	75% coverage		
	6, 6A, 7, 8A	June/ Oct 01	100%	70%		

TABLE 5

RESULTS OF HERBACEOUS GROUNDCOVER MONITORING SURVEYS

Date	Area	Date Planted	Target Performance Standard (Cover)	General Monitoring Results (Total Percent Herbaceous Coverage)	% Coverage of Area by Significant Amounts of Open/Bare Soil	Comments
	8, 9, 9A, 11, 11A	Oct 01	100%	First 100' – 70% coverage Second 100' – 50% coverage Third 100' – 75% coverage Fourth 100' – 30% coverage		

Notes on Herbaceous Coverage Surveys:

a. Joint GE/Trustee monitoring event.

TABLE 6

RESULTS OF INVASIVE SPECIES MONITORING SURVEYS

Date	Area	Date Planted	Target Performance Standard (Invasives)	Monitoring Results (Percent Invasives)	Primary Observed Invasive Species	Notes
8/23/ 2001[a]	1	May 00	< 5%		bittersweet, purple loosestrife, common mullein, bittersweet nightshade, buckthorn	
	2	May 00	< 5%		bittersweet, buckthorn, Norway maple, winged euonymus	
	3	May 00	< 5%		bittersweet, Morrow's honeysuckle, purple loosestrife	
	4, Cell G1	Oct 00	< 5%		bittersweet, Japanese barberry, Morrow's honeysuckle, bittersweet nightshade, Norway maple, buckthorn	
	5	Oct 00	< 5%		Japanese knotweed, bittersweet, Japanese barberry, purple loosestrife	
5/20/ 2002[a]	1	May 00	< 5%	First 100' – <5% Second 100' – <5% Third 100' – <5% Final 60' – <5%	buckthorn, bittersweet, Japanese barberry, garlic mustard	
	2	May 00	< 5%	Approximately 5%	bittersweet, buckthorn, Morrow's honeysuckle, Norway Maple, cypress spurge	
	3	May 00	< 5%	Approximately 10%	bittersweet, buckthorn, Morrow's honeysuckle, cypress spurge	
	4A	Oct 00	< 5%	First 100' – 15% Second 100' – 10% Third 100' – <5%	burning bush, multiflora rose, Norway maple, Morrow's honeysuckle, buckthorn	
	4B	June 01	< 5%	First 100' – <10% Second 100' – <10% Third 100' – <10% Fourth 100' – 0% Fifth 100' – 0%	Norway maple, bittersweet and garlic mustard	
	10	Oct 01	< 5%	<5%	None noted	
	5	June 01	< 5%	>5%	Japanese knotweed, Morrow's honeysuckle, buckthorn, bittersweet, multiflora rose	
	6, 6A, 7, 8A	June/ Oct 01	< 5%	<5%	burning bush, garlic mustard, buckthorn	

TABLE 6

RESULTS OF INVASIVE SPECIES MONITORING SURVEYS

Date	Area	Date Planted	Target Performance Standard (Invasives)	Monitoring Results (Percent Invasives)	Primary Observed Invasive Species	Notes
	8, 9, 9A, 11, 11A	Oct 01	< 5%	First 100' – <5% Second 100' – <5% Third 100' – <5% Fourth 100' – <5% Fifth 100' – <5%	None noted	

September 11, 2002

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

Re: Trip Reports - August 2002 Vegetation Monitoring and Armor Cap and Habitat Structure Monitoring (GECD800)

Dear Mr. Tagliaferro:

Enclosed please find two attachments representing the trip reports for the August 2002 vegetation monitoring visit for the restored banks of the Upper ½ Mile Reach of the Housatonic River (Attachment A) and the August 2002 armor cap and habitat structure monitoring for the river bottom (Attachment B).

Please call me with any questions.

Yours truly,

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

ATS/dmn
Attachments
cc: T. Angus. MDEP
R. Bell, MDEP
J. Bieke, Esquire, Shea & Gardner
M. Carroll, GE
T. Conway, EPA
C. Fredette, CDEP
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D. Jamros, Weston
J. H. Maxymillian, Maxymillian Technologies
B. McKinsey, BBL
S. Messur, BBL
K. C. Mitkevicius, USACE
T. O'Brien, MA EOEA
B. Olson, EPA
S. Steenstrup, MDEP
A. Weinberg, DEP
Public Information Repositories

ATTACHMENT A

MEMORANDUM

TO: Andrew Silfer, P.E.
General Electric

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

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

SUBJ: Trip Report;
August 2002 Monitoring Visit
Upper ½ Mile Restoration Project, Housatonic River
Pittsfield, Massachusetts

DATE: September 11, 2002

As outlined in Section 9.2 of the *Removal Action Work Plan – Upper ½ Mile Reach of Housatonic River* (BB&L, 1999), habitat restoration activities were implemented in those areas where bank soils were excavated as part of the removal action and in areas that were cleared to allow access for the removal activities. The ecorestoration techniques outlined in the work plan are intended to restore the vegetative community in those disturbed riparian areas to a functional value that exceeds that of the riparian habitat prior to the removal action.

As part of the habitat restoration process and specified in Section 11.6.2 of the *Removal Action Work Plan – Upper ½ Mile Reach of Housatonic River* (BB&L, 1999), GE agreed to monitor those areas that were restored to ensure the success and biological integrity of the intended vegetative community. The monitoring program consists of two visits during each of the first three years after planting, and an annual visit to be conducted during the fifth year and seventh year after planting. In each of the first three years after planting, visits are conducted in the late spring after the first leaf flush (May/June) and in the summer (July/August) to assess plant survival. The single visit in the fifth year and seventh year after planting will be conducted in the summer (July/August). In the event of a significant loss of plantings (greater than 1/4 acre), the timing for monitoring will be restarted following actions to replant the lost trees or shrubs (except in the case where a third party is responsible for growth failure).

An annual summary monitoring report is required to prepared documenting the results of that year's monitoring visits and the conditions of the restored areas within the Upper ½-Mile Reach. That report is to be submitted to the U.S. Environmental Protection Agency by December 15 of that year. Additionally, a trip report summarizing the findings of each monitoring visit is to be submitted following the completion of each monitoring visit.

This trip report is filed for the monitoring visit that was conducted on August 12 and 13, 2002. The results of the visit are detailed in the attached tables (A-1 through A-6) and the areas that were monitored are presented on the attached Figure A-1.

1. Charles Harman of AMEC and Brian McKinsey of BBL conducted the monitoring visit for GE and Bill Stack of Woodlot Alternatives was present for the Trustees. Chris Frank of C. L. Frank & Associates accompanied the monitoring party as the certified arborist. Tom O'Brien for the Trustees was present on the morning of August 12.

2. Planting areas 1, 2, 3, 4A, 4B, 5, and 10 were inspected individually. Planting areas 6, 6A, 7, 8A were inspected as one contiguous unit, as were planting areas 8, 9, 9A, 11, 11A.

3. The specific results of the monitoring visit are presented in the attached tables.

4. In general, canopy losses were relatively light, except in planting area 4A. Several planting areas demonstrated significant increases in the canopy specimens due to a large number of box elder resprouts. This was particularly noted in planting area 4B and planting area 8, 9, 9A, 11, 11A.

5. Losses in understory species were observed in most plantings areas that had understory cells, with planting area 4A having the greatest loss. It is believed that the reason for the plant losses in those areas is poor soil conditions and lack of water. The basis for the conclusion regarding poor soil conditions is the patchy nature of the understory plant loss. Some understory cells were extremely thin, while others in the same planting area were thriving.

6. In general, red-osier dogwood species appeared to be growing in accordance with the performance standards. Planted grape vine appears to be establishing itself. However, wild grape specimens have dramatically increased across the planting areas. It is very likely that within a few years, this presently desirable species will become a nuisance.

7. Protective screens were placed around the canopy specimens in the fall of 2001. This action continues to have a positive impact on plant herbivory, significantly reducing impacts from wildlife. A remedial action to prevent wind damage to stems and trunks appears to have been successful, as very little new damage was noted.

8. Winterberry hollies appeared to have recovered from the frost damage suffered at the beginning of the growing season. However, all understory specimens, including the winterberry hollies appeared to suffer from the ongoing drought.

9. Herbaceous cover was less than the required performance standard in most planting areas. However, the inability to meet the standard was usually due to thin stands of vegetation or small spots that where bare. Both dry weather and poor soil conditions appear to be partly responsible for the lack of total coverage. As a result, response actions to address planting area segments that can be effectively corrected and whose improvement would result in a significant increase in habitat value have been proposed and were implemented in September 2002 (Table A-7 and Figure A-1).

10. Composite planting area 8, 9, 9A, 11, 11A showed poor herbaceous cover. The cause of the poor herbaceous cover is primarily woody debris. As a result, this material will be cleared to facilitate revegetation.

11. The presence of invasive species has been significantly reduced from 2001. Locations of invasive species were identified and noted by C. L. Frank & Associates for further action. Invasive control activities are on going and being performed along the banks of the entire Upper ½ Mile Reach.

12. Response actions to address the loss of canopy and understory specimens will begin in September 2002. The Fall Planting Schedule is provided in Table A-8.

The next monitoring visit is tentatively scheduled for May 2003. The Annual Monitoring Report is due to the Trustees by December 15, 2003.

TABLE A-1

RESULTS OF CANOPY MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens			Dead	Variance	Notes
					Non-stressed	Stressed	Total			
5/31/2001	1	May 00	210	168	139	12	151		**- 18**	a, b, c
	2	May 00	118	94	79	3	82		**- 9**	d, e
	3	May 00	34	27	8	1	9		**- 18**	f
	4, Cell G1	Oct 00	142	114	117	12	129		+ 3	g, h
	5	Oct 00	66	53	55	4	59		+ 2	
8/23/2001[i]	1	May 00	210	168	71	52	123	1	**- 45**	j, h
	2	May 00	118	94	45	22	67		**- 27**	k
	3	May 00	34	27	11	2	13		**- 14**	l
	4, Cell G1	Oct 00	142	114	51	55	106	41	**- 8**	j, m
	5	Oct 00	66	53	44	16	60	3	+ 7	j
5/20/2002[i]	1	May 00	210	168	139	27	166	5	**-2**	n
	2	May 00	118	94	69	20	89		**-5**	o
	3	May 00	34	27	22	7	29		+2	
	4A	Oct 00	142	114	53	23	76	3	**-38**	o
	4B	June 01	219	175	139	58	197	7	**-8**	
	10	Oct 01	126	101	120	4	124	1	+23	
	5	June 01	66	53	46	8	54		+1	
	6, 6A, 7, 8A	June/Oct 01	113	90	60	26	86	3	**-4**	o
	8, 9, 9A, 11, 11A	Oct 01	95	76	108	5	113	2	+37	p
8/13/2002[i]	1	May 00	210	168	175	3	178		+10	m, n
	2	May 00	118	94	90	5	95		+1	
	3	May 00	34	27	25	1	26		**-1**	
	4A	Oct 00	142	114	86	2	88		**-26**	
	4B	June 01	256	205	201	1	202		**-3**	
	10	Oct 01	126	101	141	1	142		+41	
	5	June 01	66	53	61	3	64		+11	
	6, 6A, 7, 8A	June/Oct 01	113	90	102	3	105		+15	
	8, 9, 9A, 11, 11A	Oct 01	95	76	159	1	160		+83	

TABLE A-1

RESULTS OF CANOPY MONITORING SURVEYS

Notes on Canopy Surveys:

a. The stressed specimens were boxelder (5) and cottonwood (2).
b. Black willow and silver maple were significantly underrepresented in the count. Only 2 black willows and 7 silver maples were identified.
c. Resprouted species that were cut during remedial activities included eastern cottonwood, boxelder, black cherry (*Prunus serotina*), American elm (*Ulmus americana*), black willow, and red oak (*Quercus rubra*).
d. Black willow and silver maple were significantly underrepresented in the count. Only 1 black willow and 10 silver maples were identified.
e. Resprouted species that were cut during remedial activities included eastern cottonwood, boxelder, red oak and black cherry.
f. No black willow or silver maples were noted. Herbivory is probably the result of the loss.
g. Black willow and silver maple were significantly underrepresented in the count. Only 5 black willow and 10 silver maples were identified.
h. Resprouted species that were cut during remedial activities included eastern cottonwood, boxelder, black cherry, American elm, black willow, red oak, and shagbark hickory (*Carya ovata*).
i. Joint GE/Trustee monitoring event.
j. Cottonwood and boxelder are the dominant species surviving in this area.
k. Resprout species include black cherry, American elm, red oak, green ash (*Fraxinus pennsylvanica*), speckled alder (*Alnus rugosa*), bigtooth aspen (*Populus grandidentata*).
l. Resprout species in this area include American elm, green ash, red oak, white willow (*Salix alba*).
m. Resprout species in this are include red oak and American elm.
n. Resprout observed species include black cherry and American elm.
o. Only other resprout species was black cherry.
p. Only other resprout species was American elm.

TABLE A-2

RESULTS OF UNDERSTORY MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens			Dead	Variance	Notes
					Non-stressed	Stressed	Total			
5/31/2001	1	May 00	146	117	93	4	97		**- 20**	
	2	May 00	--	--	--	--	--	--	--	a
	3	May 00	73	58	56	1	57		**- 1**	b
	4, Cell G1	Oct 00	73	58	54	8	62		+ 4	
	5	Oct 00	73	58	68	4	72		+ 14	
8/23/2001[e]	1	May 00	146	117	59	34	93		**- 24**	c, d
	2	May 00	--	--	--	--	--			
	3	May 00	73	58	47	2	49	2	**- 9**	d
	4, Cell G1	Oct 00	73	58	19	17	36	33	**- 22**	d
	5	Oct 00	73	58	44	19	63	7	+ 5	d
5/20/2002[e]	1	May 00	146	117	83	34	117	10	0	f
	2	May 00	--	--	--	--	--	--	--	
	3	May 00	73	58	26	26	52		**-6**	f
	4A	Oct 00	73	58	24	19	43	4	**-15**	f
	4B	June 01	219	175	99	74	173		**-2**	f
	10	Oct 01	73	58	54	20	74		+16	f, g
	5	June 01	73	58	33	26	59	1	+1	f
	6, 6A, 7, 8A	June/Oct 01	--	--	--	--	--	--	--	
	8, 9, 9A, 11, 11A	Oct 01	73	58	46	22	68	--	+10	g
8/13/2002	1	May 00	146	117	92	16	108		**-9**	c, e
	2	May 00	--	--	--	--	--	--	--	
	3	May 00	73	58	52	2	54		**-4**	
	4A	Oct 00	73	58	37	3	40		**-18**	
	4B	June 01	219	175	167	4	171		**-4**	
	10	Oct 01	73	58	72	4	76		+18	
	5	June 01	73	58	62	2	64		+6	
	6, 6A, 7, 8A	June/Oct 01	--	--	--	--	--	--	--	
	8, 9, 9A, 11, 11A	Oct 01	73	58	69	1	70		+12	

TABLE A-2

RESULTS OF UNDERSTORY MONITORING SURVEYS

Notes on the Understory Surveys:

a. No understory specimens were planted in this area.
b. 54 understory specimens were originally planted in May 2000. An additional 18 were planted in October 2000.
c. Overall survival of the understory species is skewed towards the plot located in the western end of Area 1. There is very good survival in that plot and very poor survival in the plot located in the eastern end of Area 1.
d. In general, serviceberry had the poorest survival and tended to be that species with the greatest demonstrated stress.
e. Joint GE/Trustee monitoring event.
f. In general, winterberry hollies appeared to have begun sprouting and putting on leaves when they were hit with frost. Stress appeared to be cold induced. Also, serviceberries that were stressed in 2001 appeared to be a very good condition.
g. One shrub clump was moved from Area 10 to Area 11 at the request of the trustees

TABLE A-3

RESULTS OF RED-OSIER DOGWOOD MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count[a]		Comments	Notes
					> 4 foot on center	Meets target performance standard, < 4 foot on center,		
5/31/2001	1	May 00	82	66	101 (by count)			
	2	May 00	--	--	--			b
	3	May 00	11	9	13 (by count)			
	4, Cell G1	Oct 00	74	59	74 (by count)			
	5	Oct 00	--	--	--			b
8/23/2001[c]	1	May 00	82	66	First 100' - Partial Second 100' – Partial Third 100' – 100%	First 100' – 10 foot section Second 100' – 20 foot section Third 100'		
	2	May 00	--	--	--	--		b
	3	May 00	11	9	100%			
	4, Cell G1	Oct 00	74	59	Partial	Sparse western 50', with no specimens left last 20'		
	5	Oct 00	--	--	--	--		b
5/20/2002[c]	1	May 00	82	66	First 100' – Partial Second 100' – Partial Third 100' – Partial Fourth 100' – 100%	First 100' – 50 foot section Second 100' – 20 foot section Third 100' – 20 foot section		
	2	May 00	--	--	--	--		b
	3	May 00	11	9	Partial	50% of First 50 feet is sparse		
	4A	Oct 00	74	59		First 100' - 100% Second 100' – 100% Third 100' – 100%	Thin for entire section, water stress in some sections	
	4B	June 01	134	107	First 100' - Partial Second 100' – Partial Third 100' – Partial Fourth 100' – 100%	First 100' – 20 foot section Second 100' – 20 foot section Third 100' – 20 foot section		
	10	Oct 01	--	--	--	--		b
	5	June 01	--	--	--	--		b

TABLE A-3

RESULTS OF RED-OSIER DOGWOOD MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count[a]		Comments	Notes
					> 4 foot on center	Meets target performance standard, < 4 foot on center,		
	6, 6A, 7, 8A	June/Oct 01	89	71	First 100' - Partial Second 100' – 100%	First 100' – missing first 30 foot section		d
	8, 9, 9A, 11, 11A	Oct 01	82	66	First 100' - Partial Second 100' – Partial Third 100' – Partial Fourth 100' – Partial Fifth 100' – Partial		18 dead red-osier dogwoods identified over the length of this stretch	e
8/13/2002	1	May 00	82	66	First 100' – gaps at 17 – 23 foot interval, 33 – 38 foot interval, and 61-69 foot interval Second 100' – gaps at 7 – 10 foot interval Third 100' – Gap at 60 foot point	Fourth 100'		
	2	May 00	--	--	--	--	--	b
	3	May 00	11	9	Gap in the red-osier dogwood band at the 70' to 100' interval	--		
	4A	Oct 00	74	59	First 100' – gap at the 0 – 20' interval and the 89' – 100' interval	Second 100' Third 100'	Water stress in some sections	
	4B	June 01	134	107	First 100' - Thin at 70 – 100' interval Fourth 100' – Thin at 90' point	Second 100' Third 100'		
	10	Oct 01	--	--	--	--		b
	5	June 01	--	--	--	--		b
	6, 6A, 7, 8A	June/Oct 01	89	71	--	First 100' Second 100'		d

TABLE A-3

RESULTS OF RED-OSIER DOGWOOD MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count[a]		Comments	Notes
					> 4 foot on center	Meets target performance standard, < 4 foot on center,		
	8, 9, 9A, 11, 11A	Oct 01	82	66	Second 100' – Missing 2 plants Fourth 100' – Missing 1 plant	First 100' Third 100' – Partial	18 dead red-osier dogwoods identified over the length of this stretch	e

Notes on Red-Osier Dogwood Surveys:

a. Based on discussions with the Trustees during the 8/23/2001 monitoring event, it was agreed that individual counts of red-osier dogwood would not be made. Instead, based on visual observation, it would be identified which parts of the bank did not meet the original planting scheme of one plant every 4 feet. If that measure were not met, then remedial plantings would be utilized to establish the red-osier dogwood to that required density.
b. No red-osier dogwoods were planted in this area.
c. Joint GE/Trustee monitoring event.
d. In this sequence of areas, 57 red-osier dogwoods were planted in Area 6 and 32 red-osier dogwood were planted in Area 8A, none were planted in Areas 6A and 8A.
e. In this sequence of areas, 6 red-osier dogwoods were planted in Area 8, 32 red-osier dogwood were planted in Area 9A, 14 red-osier dogwoods were planted in Area 11, and 30 red-osier dogwoods were planted in Area 11A.

TABLE A-4

RESULTS OF GRAPE VINE MONITORING SURVEYS

Date	Area	Date Planted	Quantity Required	Target Performance Standard	Monitoring Count - Live Specimens		Dead	Number of Wild Grape	Variance	Notes
					Non-stressed	Stressed				
5/31/2001	1	May 00	22	18	22				+ 4	
8/23/2001[a]	1	May 00	22	18	8	8	6		- 2	
5/20/2002[a]	1	May 00	22	18		6			-12	
	4B	June 01	22	18		5			-13	
	9A									b
8/13/2002	1	May 00	22	18	10			17	19	
	4B	June 01	22	18		13		6	+ 1	
	9A							>>18		b

Notes on Grape Vine Surveys:

a. Joint GE/Trustee monitoring event
b. Due to limitations in stock, this area has not been planted with grape vine as scheduled.

TABLE A-5

RESULTS OF HERBACEOUS GROUNDCOVER MONITORING SURVEYS

Date	Area	Date Planted	Target Performance Standard (Cover)	General Monitoring Results (Total Percent Herbaceous Coverage)	Comments
8/23/ 2001[a]	1	May 00	100%	First 100' – 50% coverage Second 100' – 80% coverage Third 100' – 85% coverage Final 60' – 50% coverage	
	2	May 00	100%	75% coverage	
	3	May 00	100%	85% coverage	
	4, Cell G1	Oct 00	100%	First 100' – 45% coverage Second 100' – 75% coverage Third 100' – 85% coverage	
	5	Oct 00	100%	70% coverage	
5/20/ 2002[a]	1	May 00	100%	First 100' – 85% coverage Second 100' – 90% coverage Third 100' – 90% coverage Final 60' – 80% coverage	
	2	May 00	100%	85% coverage	
	3	May 00	100%	85% coverage	
	4A	Oct 00	100%	First 100' – 50% coverage Second 100' – 65% coverage Third 100' – 80% coverage	
	4B	June 01	100%	First 100' – 85% coverage Second 100' – 85% coverage Third 100' – 85% coverage Fourth 100' – 75% coverage Fifth 100' – 75% coverage	
	10	Oct 01	100%	First 100' – 85% coverage Second 100' – 85% coverage	
	5	June 01	100%	75% coverage	
	6, 6A, 7, 8A	June/ Oct 01	100%	70%	

TABLE A-5

RESULTS OF HERBACEOUS GROUNDCOVER MONITORING SURVEYS

Date	Area	Date Planted	Target Performance Standard (Cover)	General Monitoring Results (Total Percent Herbaceous Coverage)	Comments
	8, 9, 9A, 11, 11A	Oct 01	100%	First 100' – 70% coverage Second 100' – 50% coverage Third 100' – 75% coverage Fourth 100' – 30% coverage	
8/13/ 2002[a]	1	May 00	100%	Overall 90% First 100' Upper bank: 0 – 33 foot interval ~50%; upper 67 foot ~95%; Lower bank: 0 – 35 foot interval ~80%; 35 – 65 foot interval ~95%; 80 foot interval ~95%; Second 100' 0 – 15 foot interval ~85%; 75 foot ~95%; Third 100' – 100% coverage Final 60' – 100% coverage	For some areas of herbaceous cover that are less than 100%, reason for lack of coverage appears to be related to dry weather and lack of rain, some areas had small patches (less than one square foot) that might be bare as a result of poor soil, only one location in the First 100 foot interval that will be handled through a response action to correct site conditions.
	2	May 00	100%	90% coverage	Herbaceous cover in this area tends to be thinner towards the top of the slope; some of the lack of coverage appears to be because of lack of rain and poor soil. One area within this planting area should be addressed through a response action to correct the poor coverage.
	3	May 00	100%	Approximately 80% at top of slope, 95% coverage at bottom of slope	Response actions are proposed for one segment of this planting area.
	4A	Oct 00	100%	First 100' – 75% coverage Second 100' – 75% coverage Third 100' – 75% coverage	Response actions are proposed for 4 segments of this planting area.
	4B	June 01	100%	First 100' – 85% coverage Second 100' – 93% coverage Third 100' – 100% coverage Fourth 170' – 95% coverage	Response actions are proposed for one segment of this planting area
	10	Oct 01	100%	First 100' – 95% coverage Second 100' – 90% coverage Third 100' – 65% coverage	Response actions are proposed for 2 segments of this planting area.

TABLE A-5

RESULTS OF HERBACEOUS GROUNDCOVER MONITORING SURVEYS

Date	Area	Date Planted	Target Performance Standard (Cover)	General Monitoring Results (Total Percent Herbaceous Coverage)	Comments
	5	June 01	100%	90% coverage overall; 95% in eastern section, 85% in the middle segment, with the western slope being thin with a lot of debris	Response actions are proposed for one segment of this planting area.
	6, 6A, 7, 8A	June/ Oct 01	100%	First 100' - 85% with the top of slope being thin Second 100' – 85%	Response actions are proposed for one segment of this planting area.
	8, 9, 9A, 11, 11A	Oct 01	100%	First 100' – 90% coverage Second 100' – 65% coverage Third 100' – 90% coverage Fourth 100' – 80% coverage	Response actions are proposed for 2 segments of this planting area.

Notes on Herbaceous Coverage Surveys:

a. Joint GE/Trustee monitoring event.

TABLE A-6

RESULTS OF INVASIVE SPECIES MONITORING SURVEYS

Date	Area	Date Planted	Target Performance Standard (Invasives)	Monitoring Results (Percent Invasives)	Primary Observed Invasive Species	Notes
8/23/ 2001[a]	1	May 00	< 5%		bittersweet, purple loosestrife, common mullein, bittersweet nightshade, buckthorn	
	2	May 00	< 5%		bittersweet, buckthorn, Norway maple, winged euonymus	
	3	May 00	< 5%		bittersweet, Morrow's honeysuckle, purple loosestrife	
	4, Cell G1	Oct 00	< 5%		bittersweet, Japanese barberry, Morrow's honeysuckle, bittersweet nightshade, Norway maple, buckthorn	
	5	Oct 00	< 5%		Japanese knotweed, bittersweet, Japanese barberry, purple loosestrife	
5/20/ 2002[a]	1	May 00	< 5%	First 100' – <5% Second 100' – <5% Third 100' – <5% Final 60' – <5%	buckthorn, bittersweet, Japanese barberry, garlic mustard	
	2	May 00	< 5%	Approximately 5%	bittersweet, buckthorn, Morrow's honeysuckle, Norway Maple, cypress spurge	
	3	May 00	< 5%	Approximately 10%	bittersweet, buckthorn, Morrow's honeysuckle, cypress spurge	
	4A	Oct 00	< 5%	First 100' – 15% Second 100' – 10% Third 100' – <5%	burning bush, multiflora rose, Norway maple, Morrow's honeysuckle, buckthorn	
	4B	June 01	< 5%	First 100' – <10% Second 100' – <10% Third 100' – <10% Fourth 100' – 0% Fifth 100' – 0%	Norway maple, bittersweet and garlic mustard	
	10	Oct 01	< 5%	<5%	None noted	
	5	June 01	< 5%	>5%	Japanese knotweed, Morrow's honeysuckle, buckthorn, bittersweet, multiflora rose	
	6, 6A, 7, 8A	June/ Oct 01	< 5%	<5%	burning bush, garlic mustard, buckthorn	

TABLE A-6

RESULTS OF INVASIVE SPECIES MONITORING SURVEYS

Date	Area	Date Planted	Target Performance Standard (Invasives)	Monitoring Results (Percent Invasives)	Primary Observed Invasive Species	Notes
	8, 9, 9A, 11, 11A	Oct 01	< 5%	First 100' – <5% Second 100' – <5% Third 100' – <5% Fourth 100' – <5% Fifth 100' – <5%	None noted	
8/13/ 2002[a]	1	May 00	< 5%	First 100' ~5% Second 100' ~5% Third 100' ~5% Final 60' ~5%	buckthorn, bittersweet, garlic mustard, purple loosestrife	
	2	May 00	< 5%	Approximately 10%	cypress spurge was main invasive	
	3	May 00	< 5%	Approximately 5%	bittersweet, buckthorn, Morrow's honeysuckle, cypress spurge	
	4A	Oct 00	< 5%	First 100' ~5% Second 100' ~5% Third 100' ~5%	Morrow's honeysuckle, buckthorn, bittersweet, purple loosestrife, cypress spurge	
	4B	June 01	< 5%	First 100' ~5% Second 100' ~5% Third 100' ~5% Fourth 170' <5%	Norway maple, purple loosestrife, bittersweet and garlic mustard,	
	10	Oct 01	< 5%	~5%	Purple loosestrife	
	5	June 01	< 5%	~5%	Japanese knotweed, Morrow's honeysuckle, buckthorn, bittersweet,	
	6, 6A, 7, 8A	June/ Oct 01	< 5%	First 100' ~5% Second 100' <5%	garlic mustard, bittersweet	
	8, 9, 9A, 11, 11A	Oct 01	< 5%	First 100' <5% Second 100' <5% Third 100' ~5% Fourth 100' <5%	purple loosestrife, bittersweet, garlic mustard, cypress spurge	

Table A-7

General Electric Company
Upper Half Mile Reach
Pittsfield, Massachusetts

August 2002 Vegetation Monitoring
Herbaceous Cover Field Observations/Response Actions

Planting Area	Observations	Action Area (Size)	Response Action
1	Upper and lower bank area at the upstream end (near Newell Street Bridge) had some thin areas of herbaceous cover. Herbaceous cover (especially over thin areas) was generally dry and brown in color. Poor native soil contained stones, rocks, and slag near surface.	A (30' x 15') A2 (3' x 8')	Thin areas: Top-dress with topsoil, spread grass seed, mulch, and water.
2	Area at top of bank near fence showed thin herbaceous cover. Poor native substrate showed stones and rocks in dry surface soil. Herbaceous cover was generally dry and brown in color.	B (15' x 10')	Thin areas: Top-dress with topsoil, spread grass seed, mulch, and water.
3	Bank slope steep near swales with thin cover. Herbaceous cover was generally dry and brown in color.	C (30' x 30')	Top-dress with topsoil, spread grass seed, place erosion control mat/mulch, and water.
4A - Area 1	Area at top of bank near fence showed thin herbaceous cover over steep slope section of bank. Poor native substrate showed stones and rocks in dry surface soil. Herbaceous cover was generally dry and brown in color.	D (20' x 20')	Top-dress with topsoil, spread grass seed, place erosion control mat/mulch, and water.
4A - Area 2	Area at top of bank near fence showed thin herbaceous cover over steep slope section of bank. Poor native substrate showed stones and rocks in dry surface soil. Herbaceous cover was generally dry and brown in color.	E (15' x 30')	Top-dress with topsoil, spread grass seed, place erosion control mat/mulch, and water.
4A - Area 3	Dead herbaceous material on ground. Very steep upper bank slope near swales with no ground cover. Apparent erosion below fence. Herbaceous cover was generally dry and brown in color.	F (20' x 20')	Backfill steep swale area with rock at top of swale. Place topsoil, spread grass seed, place erosion control mat/mulch, and water.
4A - Area 4	Dead herbaceous material on ground. Steep bank slope with no ground cover. Herbaceous cover was generally dry and brown in color.	G (30' x 15')	Place topsoil, spread grass seed, place erosion control mat/mulch, and water.
4B	Some bare areas. Herbaceous cover was generally dry and brown in color	H (20' x 10')	Place topsoil, spread grass seed, mulch, and water.
5	Woody debris and dead herbaceous material on ground at top of bank along fence near downstream end. Herbaceous cover was generally dry and brown in color.	I (45' x 15')	Remove debris and dead material at top of bank near fence. Work existing substrate, spread grass seed, mulch, and water.

Table A-7

General Electric Company
Upper Half Mile Reach
Pittsfield, Massachusetts

August 2002 Vegetation Monitoring
Herbaceous Cover Field Observations/Response Actions

Planting Area	Observations	Action Area (Size)	Response Action
6, 6A, 7, 8A	Few eroded areas located mid-bank near mid-cell.	J (2' x 2')	Fill eroded areas, place topsoil, spread grass seed, mulch, and water.
8, 9, 9A, 11, 11A	Woody debris and dead herbaceous material on ground at mid-bank at two locations. Herbaceous cover was generally dry and brown in color.	K (15' X 30') L (15' X 30')	Remove debris and dead material from two areas near mid-bank. Work existing substrate, spread grass seed, mulch, and water.
10	Woody debris and dead herbaceous material on ground at two locations mid-bank near downstream end. Herbaceous cover was generally dry and brown in color.	M (50' x 20') N (35' x 15')	Grape vines to remain in place. Remove debris and dead material from two areas near mid-bank. Work existing substrate, spread grass seed, mulch, and water.
14	Upper bank area at upstream end of utility property showed generally dry, brown vegetation.	O (80' x 15')	Work existing substrate as needed. Spread grass seed, mulch and water.
15	Lower bank area showed generally dry, brown vegetation.	P (20' x 5')	Work existing substrate as needed. Spread grass seed, mulch, and water.
16	Lower bank area showed generally dry, brown vegetation.	Q (10' x 10')	Work existing substrate as needed. Spread grass seed, mulch, and water.

Notes

1. Vegetation monitoring event was performed for planting areas on the banks of the Upper Half Mile Reach on August 12 and 13, 2002. Representatives from EOEA, Woodlot Alternatives, AMEC Environmental, CLFrank, and BBL were in attendance.
2. This table presents observations regarding herbaceous cover only.
3. Dry/brown herbaceous cover was apparently due to little rainfall and elevated summer temperatures.
4. Each area size is approximate.
5. Watering of newly seeded areas will be performed on an as needed basis depending on rainfall. A rotating schedule will be set up such that, until the herbaceous cover is established, the seeded areas will be watered a minimum of once every 2-3 days. Normal water schedules will resume following establishment of herbaceous cover.

Table A-8

General Electric Company
Pittsfield, Massachusetts

Removal Action Upper 1/2-Mile Reach of Housatonic River

Fall 2002 Planting Schedule

					Vines	Understory				Dogwood Band		Canopy				
Area	Planting Date	Cell Area	Planting Area (ac)	Toe Planting Length (lf)	Woody Vines *Vitus riparia*	Chokecherry *Prunus virginiana*	Northern Arrowwood *Viburnum dentatum*	Silky Dogwood *Cornus amomum*	Winterberry Holly *Ilex verticillata*	Red-Osier Dogwood *Cornus sericea*	**Total**	Eastern Cottonwood *Populus deltoides*	Boxelder *Acer negundo*	Black Willow *Salix nigra*	Silver Maple *Acer saccharinum*	**Total**
1	Oct-02	A,C	0.30	328	0	6	5	6	6	6	**29**	0	0	0	0	**0**
3	Oct-02	E	0.05	45	0	6	0	6	0	8	**20**	3	0	0	2	**5**
Subtotal			**0.35**	**373**	**0**	**12**	**5**	**12**	**6**	**14**	**49**	**3**	**0**	**0**	**2**	**5**
4A	Oct-02	G1,G2	0.28	395	0	8	4	4	10	8	**34**	30	10	0	0	**40**
4B	Oct-02	G2,G3	0.28	416	0	8	4	6	2	8	**28**	10	0	10	10	**30**
Subtotal			**0.56**	**811**	**0**	**16**	**8**	**10**	**12**	**16**	**62**	**40**	**10**	**10**	**10**	**70**
8	Oct-02	H1	0.02	32	0	0	0	0	0	2	**2**	0	0	0	0	**0**
9A	Oct-02	H1	0.06	187	0	0	0	0	0	2	**2**	0	0	0	0	**0**
11	Oct-02	H2	0.04	88	0	0	0	0	0	2	**2**	0	0	0	0	**0**
11A	Oct-02	H2	0.06	83	0	0	0	0	0	2	**2**	0	0	0	0	**0**
12	Oct-02	J1	0.19	269	22	0	18	0	0	0	**18**	0	0	17	0	**17**
13	Oct-02	I1	0.10	234	0	0	18	0	0	18	**36**	0	0	9	0	**9**
14	Oct-02	J3	0.21	192	22	37	37	36	36	48	**194**	56	56	19	19	**150**
16	Oct-02	I2	0.01	72	0	0	0	0	0	18	**18**	3	3	1	1	**8**
17	Oct-02	I3	0.04	108	0	0	0	0	0	27	**27**	10	10	3	3	**26**
Subtotal			**0.73**	**1265**	**44**	**37**	**73**	**36**	**36**	**119**	**301**	**69**	**69**	**49**	**23**	**210**
Total			***1.64***	***2449***	***44***	***65***	***86***	***58***	***54***	***149***	***412***	***112***	***79***	***59***	***35***	***285***

Notes:
- Woody vines to be planted at an approximate density of 40 vines/acre on 4' centers in a 15'x30' patch with a minimum of 150' between patches.
- Understory to be 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.
- Canopy to be planted in varying densities (min. density of 700 trees/acre), clumps, or if necessary, sinuous lines.
- Dogwood band to be planted on 4' centers in a single row along the toe of the bank.
- Per EOEA letter to GE (dated 9/05/01): Chokecherry (Prunus virginiana) recommended as substitute for Serviceberry as part of understory plantings.
- Original planting Areas 12, 13, 14 and 15 coverage areas revised based on discussions with EPA and EOEA.
- Woody grape vines scheduled for planting area 9A are eliminated based on August 2002 inventory showing 18+ native/wild grape vine clumps.
- Toe planting length is revised for planting area 13 resulting an additional 18 red-osier dogwoods to be planted Fall 2002.

Stake-Out Color Key:

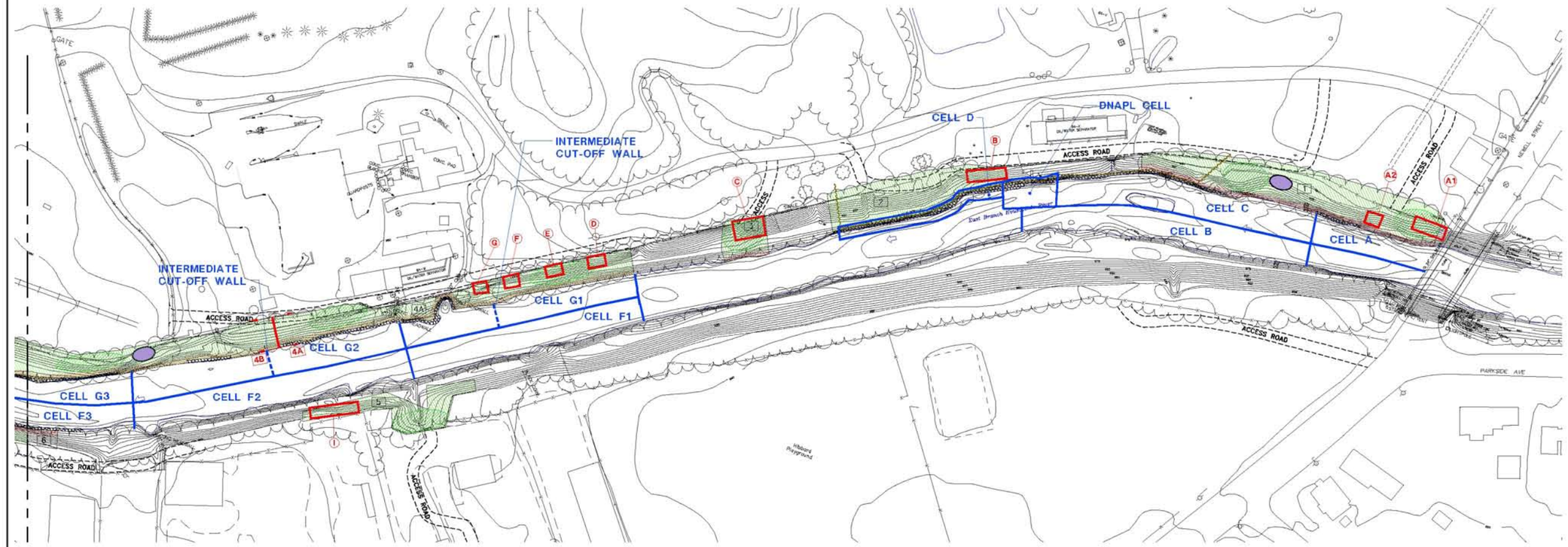
Understory - Natural Stake with Flagging

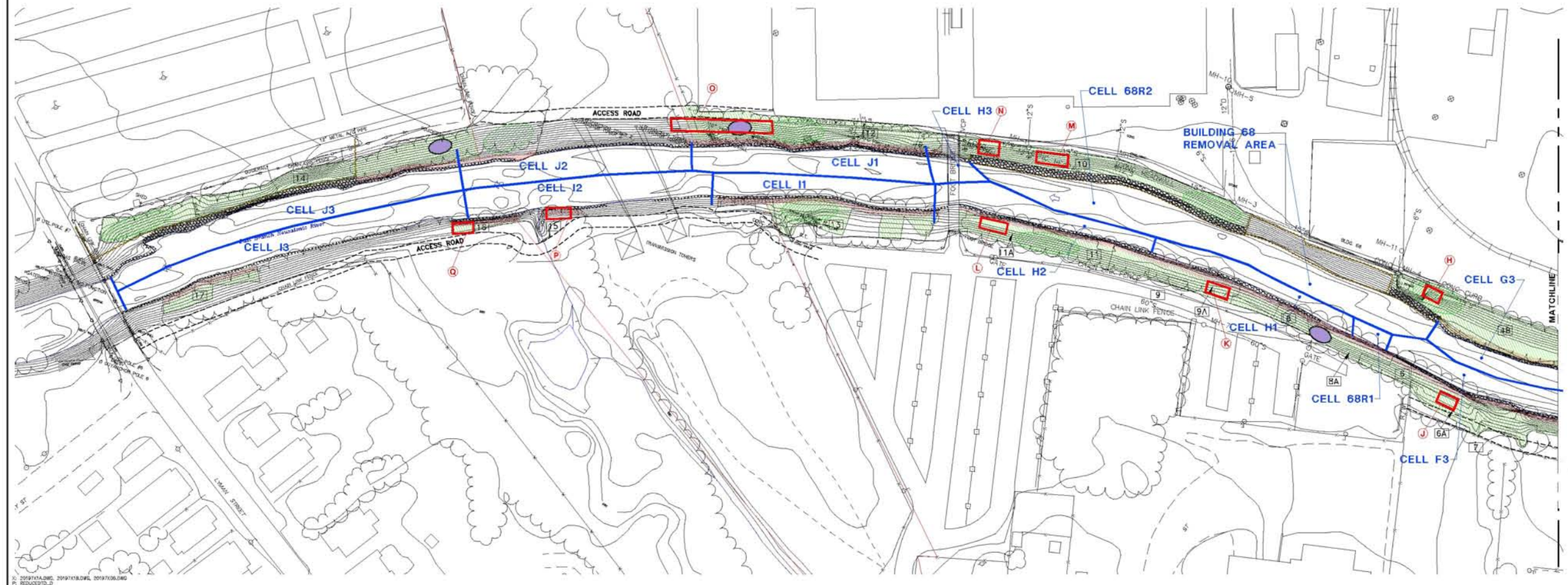
orange/white	Chokecherry/Serviceberry
orange/blue	Nothern Arrowwood
orange/yellow	Silky Dogwood
orange/orange	Winterberry Holly
blue/blue	Red-Osier Dogwood

Canopy - Green Stake with Flagging

blue	Eastern Cottonwood
white	Boxelder
yellow	Black Willow
orange	Silver Maple

Woody Vines - Yellow Stake





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 BBL FROM OCTOBER12-23, 1998 FIELD SURVEY.
4. COORDINATE GRID BASED ON 1927 STATE PLAN COORDINATES.
5. ELEVATION DATUM REFERENCED TO NGVD 1929.

GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS

UPPER 1/2-MILE REACH OF HOUSATONIC RIVER

VEGETATION MONITORING HERBACEOUS COVER AUGUST 2002

BLASLAND, BOUCK & LEE, INC. engineers & scientists

FIGURE A-1

ATTACHMENT B

General Electric Company
Pittsfield, Massachusetts

Upper ½ Mile Reach Removal Action
August 2002 Armor Cap and Habitat Structure Monitoring Trip Report

A combined habitat enhancement structure and armor cap inspection was performed on August 14, 2002 and included a visual review of the habitat structures and armor cap installed along the Upper ½ Mile Reach. Representatives from BBL (B. McKinsey), Army Corp of Engineers (C. Marney) and Woodlot Alternatives (B. Stack) performed the monitoring event. The armor stone layer was reviewed to observe whether a significant movement of armor stone or a reduction in armor stone thickness had occurred. The habitat enhancement structures were observed for structural stability, effects on aquatic habitat, and potential for increased bank side erosion.

The inspection started at the eastern end of the Upper ½ Mile Reach (near the Newell Street Bridge) at Cell A. The armor cap was observed in each cell and field notes were compiled to record observations (see attached Table B-1 and Figure B-1). Moving downstream (westerly), each habitat enhancement structure was inspected for the previous-listed parameters (see attached Table B-1 and Figure B-1). Photographs were taken at each structure and field notes were collected to record observations. This process was continued downstream to Cell J2 (the final area restored with an armor cap and habitat structures).

In general, the armor cap appeared to be stable with no significant reduction in the thickness of the cap. There were no areas that were observed to have a reduction in the armor cap thickness. The rip rap along the toe of the bank of each cell was observed to be stable with no significant movement of stones. In general, the habitat structures appeared to be stable with no evidence of bank side erosion. Areas of deposition and scouring were also noted upstream and downstream of each structure. Aquatic wildlife was observed near the majority of the structures and included small fish, tall river grass, mayflies, caddis flies, and crayfish. Based on the above, response actions are not required.

General Electric Company
Upper 1/2 Mile Reach
Pittsfield, Massachusetts

Date: August 14, 2002
Persons: C. Marney, B. Stack, & B. McKinsey
Sunny, 95°

Table B-1
Monitoring Field Acitivities
Armor Cap and Habitat Structures

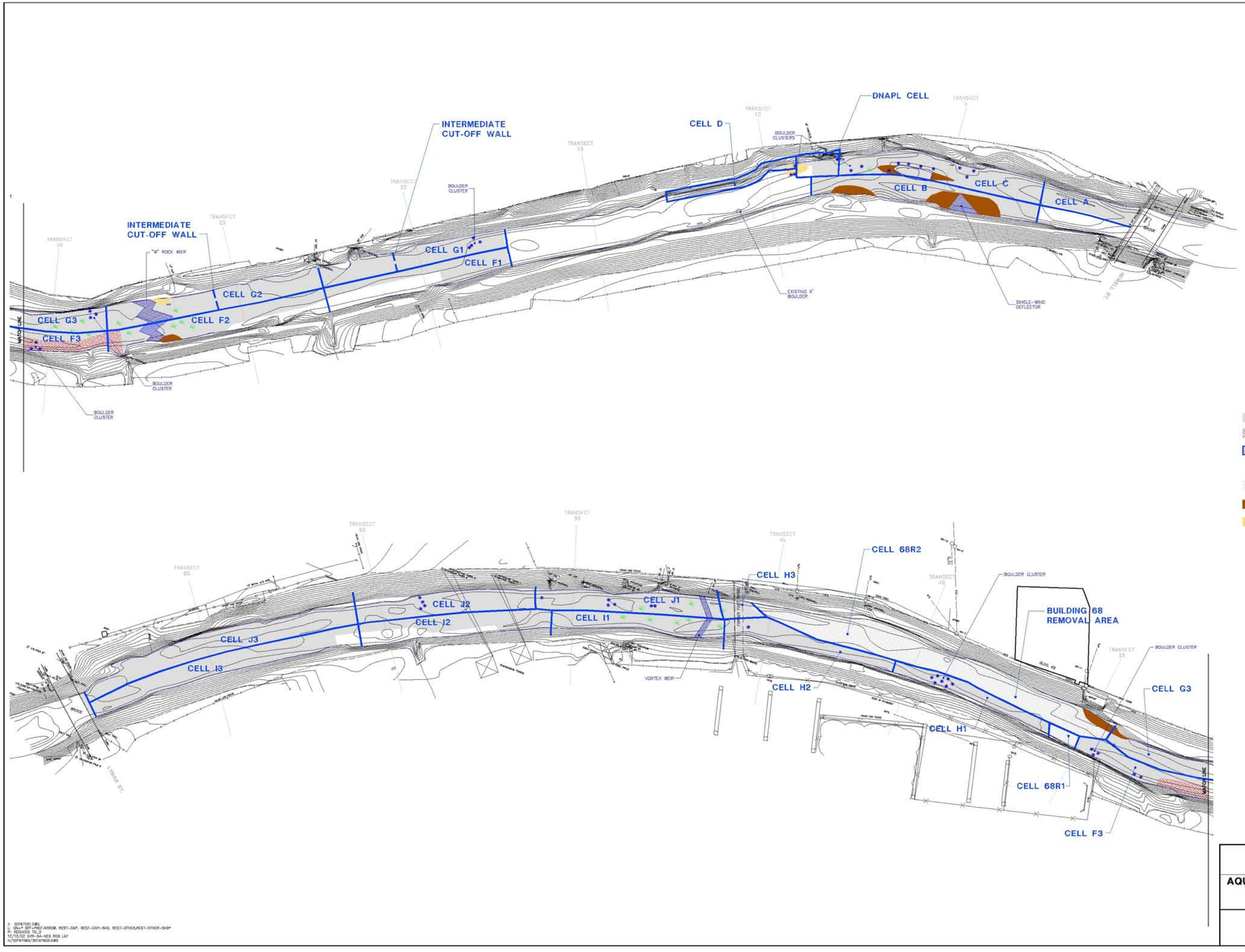
Cell	Armor Cap Layer	Habitat Enahancement Structures
B	Movement: None apparent Thickness: No apparent thin areas Rip rap at toe: Stable, consistent elevation Notes: Algae growth and sediment on top of armor cap, Mayflys	Type: Wing deflector Location: South back Stability: No apparent movement Aquatic habitat: Mayflys, small fish Bank side erosion: None observed Notes: Structure is visible and above water. Sediment deposition at upstream and downstream ends of deflector.
C	Movement: None apparent Thickness: ~6" sediment on top of armor layer. No apparent thin areas. Rip rap at toe: Stable, no erosion Notes: Scour/deposition around boulders	Type: Existing island and adjacent boulders Location: Middle of river Stability: No apparent movement Aquatic habitat: Crayfish, few fish, caddisflys Bank side erosion: None observed Notes: Plants and vegetative growth on island. Type: Boulder clusters (3 groups) Location: North bank Stabliity: Apparent movement of 1 boulder, others appear to be stable. Aquatic habitat: Crayfish, frogs Bank side erosion: None observed Notes: River grass Areas of deposition and scour upstream and downstream of boulder cluster
G1	Movement: None apparent Thickness: No apparent thin areas Rip rap at toe: Stable, no erosion Notes: River grass, small fish	Type: 3 boulder cluster Location: North bank, upstream end of cell Stability: No apparent movement Aquatic habitat: Mayfly, caddisfly, small fish Bank side erosion: None observed Notes: Wood debris entangled in cluster, boulders providing cover, tops exposed
G2	Movement: None apparent Thickness: No apparent thin areas Rip rap at toe: Stable, no erosion Notes: River grass, birds taking fish from river	Type: 3 boulder cluster Location: North bank Stability: No apparent movement Aquatic habitat: river grass, small fish Bank side erosion: None observed Notes: Structure providing cover, boulders submerged, no scour - mostly deposition

Table B-1
Monitoring Field Acitivities
Armor Cap and Habitat Structures

Cell	Armor Cap Layer	Habitat Enahancement Structures
F2/G2	Movement: None apparent Thickness: No apparent thin areas Rip rap at toe: Stable, no erosion, small amount of vegetative growth in rip rap Notes:	Type: W-weir Location: Across river Stability: No apparent movement Aquatic habitat: Mayflies, crayfish, fish, river grass Bank side erosion: None observed Notes: Variable depth (1.3' to 2.5') along weir, sediment on top of 1' stones/legs, pool/run area of riverbed, structure providing cover North bank-scour /South bank-deposition
F3	Movement: None apparent Thickness: No apparent thin areas Rip rap at toe: Stable, no erosion Notes: Deep channel near south bank	Type: 3 boulder cluster Location: South bank (upstream) Stability: No apparent movement Aquatic habitat: Many small fish, river grass Bank side erosion: None observed Notes: Structure providing cover, scour observed, some deposition, mayflies, wood debris in cluster Type: 2 boulder cluster Location: South bank (midcell) Stability: No apparent movement Aquatic habitat: Mayflies, caddisfly, fish Bank side erosion: None observed Notes: Scour, some deposition, stucture was submerged (in deep channel) Type: 3 boulder cluster Location: South bank (downstream) Stability: No apparent movement Aquatic habitat: Unable to observe (submerged) Bank side erosion: None observed Notes: Fully submerged (depth ~5'), not visible, structure in deep channel
G3	Movement: None apparent Thickness: No apparent thin areas Rip rap at toe: No erosion, stable Notes: Flat near north side	Type: Single boulder Location: Mid river Stability: No apparent movement Aquatic habitat: Small fish Bank side erosion: None observed Notes: Flat area/deposition

Table B-1
Monitoring Field Acitivities
Armor Cap and Habitat Structures

Cell	Armor Cap Layer	Habitat Enahancement Structures
H1	Movement: None apparent Thickness: No apparent thin areas Rip rap at toe: Stable, no erosion Notes	Type: 7 boulder cluster Location: South bank Stability: No apparent movement Aquatic habitat: Mayflies Bank side erosion: None observed Notes: Algae cover on armor cap, mostly submerged, good cover, shelf area
H2	Movement: None apparent Thickness: No apparent thin areas Rip rap at toe: Stable, no erosion Notes	Type: Single boulder Location: Downstream end (near foot bridge) Stability: No apparent movement Aquatic habitat: River grass Bank side erosion: None observed Notes: Little scour/deposition near structure
J1	Movement: None apparent Thickness: No apparent thin areas Rip rap at toe: Stable, no erosion Notes	Type: V Weir (soft head) Location: Bank to bank across river Stability: No apparent movement Aquatic habitat: Fish, 2 Mayflys, river grass Bank side erosion: None observed Notes: End boulders visible others submerged, algae growth, scour and deposition near structure, good cover Type: 2 boulder cluster Location: Mid cell Stability: No apparent movement Aquatic habitat: River grass, fish Bank side erosion: None observed Notes: Little deposition, some scour Type: 3 boulder cluster Location: Downstream portion of cell Stability: No apparent movement Aquatic habitat: Caddisfly, Mayfly, river grass Bank side erosion: None observed Notes: Submerged, algae on top of armor cap
J2	Movement: None apparent Thickness: No apparent thin areas Rip rap at toe: Stable, no erosion	Type: 1 boulder Location: North bank Stability: No apparent movement Aquatic habitat: Algae growth on armor cap Bank side erosion: None observed Notes: Top of boulder visible, rest submerged Type: 4 boulder cluster Location: North bank, downstream end of cell Stability: No apparent movement Aquatic habitat: Few fish, frog, algae growth Bank side erosion: None observed Notes



GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS

AQUATIC HABITAT ENHANCEMENT STRUCTURES MONITORING AUGUST 2002

BBL BLASLAND, BOUCK & LEE, INC. engineers & scientists

FIGURE **B-1**

Attachment B

Photographic Log

BBL®
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

Ecological Streambank Restoration
2002 Annual Monitoring Report

Photo Log

Photograph 1 **May 20 & 21, 2002; Area 1 Plantings**

Photograph 2 **May 20 & 21, 2002; Area 2 Plantings**

Photo Log

Photograph 3 **May 20 & 21, 2002; Area 3 Plantings**

Photograph 4 **May 20 & 21, 2002; Area 4 Plantings**

Photo Log

Photograph 5 **May 20 & 21, 2002; Area 10 Plantings**

Photograph 6 **May 20 & 21, 2002; Area 5 Plantings**

Photo Log

Photograph 7 **August 12, 13, 14; Area 1 Plantings**

Photograph 8 **August 12, 13, 14; Area 2 Plantings**

Photo Log

Photograph 9 **August 12, 13, 14; Area 4 Plantings**

Photograph 10 **August 12, 13, 14; Area 4 Plantings**

Photo Log

Photograph 11 **August 12, 13, 14; Area 5 Plantings**

Photograph 12 **August 12, 13, 14; Area 11A Plantings**