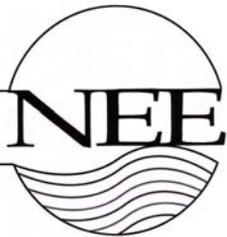

SUPPORTING DOCUMENTATION





1.0 INTRODUCTION

New England Environmental, Inc. (NEE) has prepared this Notice of Intent (NOI) on behalf of FirstLight Power Resources, LLC (FirstLight) for proposed bank stabilization/restoration along a section of the Connecticut River in Gill, MA. Woody debris design plans were prepared by the engineering firm of Doucet and Associates. A 401 Water Quality Certification application for this work is being filed simultaneously with this NOI filing. Work is proposed over **five** years in the vicinity of the Split River Farm. The proposed project consists of the stabilization of approximately **6,300** linear feet of Bank. The project will also include two temporary stream crossings to access the stabilization sites.

This is Phase III of bank stabilization work within the Turners Falls Pool of the Connecticut River. The initial period, Phase I (1996 to 2000), consisted of 5 sites located in Gill and Northfield, MA. Phase II (2001 to 2007) included an additional 9 sites in Gill, Northfield and Montague. None of the previously stabilized sites have experienced any failures. Since the initial designs in 1996, the designs have been modified in response to concerns about archaeological artifacts located within the banks and rare wildlife access to, and use of, the river and banks. These proposed projects use Coarse Woody Debris (CWD) as a means of bank stabilization and sediment capture and use no stone at the toe of slope.

This third phase includes **six** adjacent lots in Gill, or approximately **6,300** linear feet of bank. The current proposal is designed to stabilize and rebuild only the toe of the slope. This is a demonstration project using coarse woody debris structures and native plantings to stabilize and restore the bank. This design will leave trees at the top of the embankment in place, with the exception of a few access points. This will leave roosting trees in place for bald eagles. Bank swallow and kingfisher nesting holes will be undisturbed. The stone toe used in previous designs has been eliminated, replaced with engineered structures of large woody debris placed at intervals along the eroding bank. These designs are the direct result of comments and suggestions from the Connecticut River Streambank Erosion Committee. The woody debris structures will provide improved habitat for many species including rare dragonfly species accessing the riverbanks for emergence of nymphs from the river. The large woody debris will also provide fish habitat, including habitat for the Bridled Shiner which prefers submerged woody debris. It is expected that the woody debris will result in the accretion of sediment from the river on the eroded banks, allowing the banks to rebuild.

Copies of this NOI were submitted to the Gill Conservation Commission and the Massachusetts Department of Environmental Protection (DEP) in Springfield, MA. Pursuant to Massachusetts General Law, Chapter 131, Section 40, NEE has also notified all abutters located within 100 feet of the property lines of the availability to review a copy of the subject NOI. Notification provided information on how abutters may obtain information regarding the public hearing that will be held by the Gill Conservation Commission. The affidavit, the letter sent to the abutters, and the list of the abutters is presented in Appendix A.



The total filing fee for this project is calculated as \$110.00. The filing fee was calculated for a Limited Project under 310 CMR 10.53(4) for improving the natural capacity of resource areas. The check for the Town of Gill Conservation Commission (\$67.50) was filed with the Town's copy of this Notice of Intent. The check for the state (\$42.50) was mailed with a copy of the transmittal form to the DEP Lock Box in Boston. Copies of the transmittal form and checks submitted to the Town of Gill and the DEP are presented in Appendix B.

2.0 SITE DESCRIPTION

The site is located along the Connecticut River bank extending from the northern tip of property owned by FirstLight (assessor's map 228, parcel 9), immediately south of Split River Farm to the northern property line of the Wallace/Watson parcel (assessor's map 220, parcel 9). The bank varies in height from approximately 4 feet at the southern end to approximately 18 feet near the northern end. Throughout the entire length, the bank is eroding with the exception of a section that was rip-rapped in the 1970s during the construction of Northfield Mountain Pump Storage Project. Figure 1, the USGS Locus, illustrates the locations of the proposed work and Figure 2 is an orthophoto illustrating the location of the sites. Photographs of existing site conditions are presented in Appendix C.

Split River Farm is maintained as agricultural land planted with a variety of crops. The fields on the Bathory/Gallagher and Wallace/Watson parcels are planted in a cover crop, as required by their conservation plan with the Natural Resources Conservation Service.

The top of the embankment between the Connecticut River and the fields is dominated by mature trees consisting of silver maple, *Acer saccharinum* (FACW), black birch, *Betula lenta* (FACU), northern red oak, *Quercus rubra* (FACU-), black locust, *Robinia pseudoacacia* (FACU-) and eastern cottonwood, *Populus deltoides* (FAC). Species within the shrub layer include box elder, *Acer negundo* (FAC), common raspberry, *Rubus idaeus* (FAC-), black raspberry, *Rubus occidentalis* (UPL), multiflora rose, *Rosa multiflora* (FACU), and honeysuckle, *Lonicera sp.* The dominant herbaceous species include scouring rush, *Equisetum hyemale* (FACW), goldenrods, *Solidago canadensis* (FACU), *S. rugosa* (FAC), ostrich fern, *Matteuccia struthiopteris* (FACW), Asian bittersweet, *Celastrus orbiculatus* (UPL) and Virginia creeper, *Parthenocissus quinquefolia* (FACU).

The entire length of the bank is actively eroding. In some locations, the entire tree and root system have slid down the embankment to form a shelf partway between the river and the top of the embankment. In other locations, the trees have fallen towards the river, their roots ripped from the ground leaving large open eroding areas where the trees once stood.

The soils at the site consist of Hadley very fine sandy loam, overflow, 0 to 3% slopes (HcA) and Suncook loamy sand (Sv). Hadley very fine sandy loam, overflow, is a level soil subject to frequent flooding. It is a deep, well-drained soil formed in alluvial sediments mainly derived of schist, gneiss, granite, slate and phyllite. Suncook soils are excessively drained loamy sand and formed in



recently deposited materials. This soil has a coarser texture than the Hadley very fine sandy loam. Both of these soils dry early in the spring and have low moisture holding capacities.

3.0 PROJECT DESCRIPTION

The proposed project is to stabilize approximately 6,300 linear feet of Connecticut River bank in Gill, MA. This will be a multi-year project, with 1,000 to 1,800 linear feet under stabilization construction each year. The initial section proposed for work is the southern section of the Split River Farm, which is 1,725 linear feet (map 227, lot 10). Approximately 170 linear feet of this work will occur on the parcel to south (map 228, lot 9), which is owned by FirstLight. Work is proposed on lower Split River Farm during the fall of 2009, with additional plantings likely in spring 2010.

Upper Split River Farm will be the second section to be stabilized. The total length of this site is 2,360 linear feet. It is expected that stabilization will be completed on this stretch over two years, starting fall 2010. The **third** section scheduled for stabilization is the Bathory/Gallagher parcel. This section is approximately 1,200 linear feet and is proposed for stabilization in fall, 2012, and planted in the spring of 2013. **The final section will be the Wallace/Watson parcel (approximately 1,000 linear feet), which is scheduled for stabilization in fall, 2013, and plantings in the spring of 2014.** An Order of Conditions spanning a five year period is required to complete this work.

The techniques proposed for this work include placement of large woody debris structures on the “beach,” bio-engineering, and re-creating an aquatic vegetated bench. Due to the high number of archaeological finds, the majority of the work will occur at the toe of the slope to protect the artifacts buried. **An archaeological assessment of the Wallace/Watson parcel has yet to be completed, however, the majority of the work will occur at the toe of the slope as it does for the previous projects. The primary consideration resulting from an archaeological assessment of their field will be the location of the staging area(s) and access roads.** In addition, two temporary stream crossing are required to access the work areas. These are described in more detail below. The work is proposed to start in the fall of 2009 and culminate in the spring of 2014.

Woody Debris Structures

Large woody debris can perform critical stabilizing functions within rivers through the dissipation of flow energy, stabilization of river bed forms and channel banks, sediment entrapment, and formation of pools. Large woody debris has been shown to either force the accretion of sediment by physically blocking sediment transport or by forcing local flow divergence and subsequent sediment deposition due to backwater flows. In some riverine systems, sediment storage associated with woody debris exceeds the annual sediment yield ten-fold (Abbe et.al. 2003). The large woody debris structures also provide cover and shading for aquatic organisms. Many fish have been known to use the CWD structures for habitat. As a result, it is proposed to use the current large woody debris structures as a demonstration project for bank stabilization on the first section of bank, the lower Split River Farm. If this technique is successful, it will be used for the remaining sections of riverbank proposed for stabilization during Phase III. **It is possible that the final designs for the Upper Split River,**



Bathory/Gallagher, and Wallace/Watson sites may be revised based on the initial results of the Lower Split River work.

The CWD bank stabilization will consist of key members, logs with their root wads still attached, which will be driven into the bank at a slight angle upstream (see Plan Sheets BT-2 and BT-3). These will be located approximately every fifteen feet. Smaller logs (8 inch diameter) will be placed between these larger key members, also at a slight angle (20°). Woody debris structures will be constructed approximately every 120 feet along the bank. These have been located near scour hollows in an attempt to create sediment accretion specifically in these areas. The woody debris structures will consist of three key members driven into the bank, with three raked members lying on one key member, and the upper portions of their trunks driven under a downstream key member with their root wads upstream (see Plan Sheet BT-3). All logs will be anchored with cables and duck bill anchors driven deep in the sandy beach to keep the material from moving during high water events.

In a section of Lower Split River Farm, which is highlighted in purple on Plan Sheet BT-1, and within the heavy dashed line on Plan Sheet BT-2, an additional bank reconstruction technique is proposed. In this section, trees, shrubs and herbaceous vegetation have slid down the bank while remaining upright. This has resulted in a scalloped edge at the water line, interspersed with benches of trees and shrubs. To protect these benches of vegetation, we are proposing to stabilize the eroded inlets between vegetated benches by laying short sections of trunks with root-wads horizontally within the scallops; the roots towards the river (see Detail 2 on Sheet BT-9).

Bio-engineering

Bio-engineering has been used previously to stabilize the banks on the Connecticut River. This technique includes the planting of native species of shrubs (willows and dogwoods), installation of coir fascines to aid in stabilizing eroding soil, and erosion control blankets which are seeded with native grasses and herbaceous species. All of these techniques use native plant material to hold the soil in place with their roots, with minimal temporary structure provided by coir, a coconut fiber product. The large woody debris structures will be keyed into the bioengineering design to ensure stability of the structures as well as managing backwater flows and diminishing side channel formation from eddies.

Vegetated Aquatic Bench

Vegetated aquatic benches have been installed at sites previously stabilized with bio-engineered techniques, including the Flagg site in Gill, and the Country Road and Durkee Point sites in Northfield. The purpose of installing these vegetated benches is to slow water down as it flows over shallower areas and through vegetation, to serve as a wave-break, and to capture sediments. The aquatic benches constructed at the Flagg and Country Road sites have been successfully accreting sediments and building the bank, and adding to the stability of the banks.



Vegetated aquatic benches are created by the placement of material suitable to support aquatic plants on the bank at the toe of the slope. These areas are planted with native species known to occur within this section of the river, including rice cut grass, Joe Pye weed, wood reedgrass, soft rush, woolgrass, and cardinal flower in areas of shallow water, and water plantain, duck potato, burreed, pickerel weed, soft stem bulrush, and three way sedge in areas with deeper water and wild celery and pondweed in the areas with permanent water.

Temporary Access Roads

Construction equipment must be able to access the bench area at the toe of the embankment to construct and place the large woody debris structures. There currently are no roads to the toe of the slope on any of the properties. We propose to construct two access-ways for construction equipment to drive onto the beach for each stretch of bank stabilization, for a total of six access points. The potential access ways have been located in eroded areas which do not contain any artifacts, and have few, if any trees which will need to be cut. These access roads will be steep, 20% grades, to be used only by the construction vehicles. This construction technique has been proven to be very effective in limiting the area of disturbance and in facilitating rapid construction.

The bank at these access roads will be reconstructed at the completion of bank stabilization activities that they are needed for, and will match grades on either side of them. This bank mitigation will be completed through the use of geo-lifts, native plantings and seed. Specifically, geo-lifts are made with 2 layers of 700 GSM fabric (woven coir fabric) backfilled with soil, with live willow stakes layered in between the lifts. At the top, shrubs will be planted. These bank reconstruction techniques are illustrated in Detail 3 on Plan Sheet BT-9.

We are proposing to re-use access ways located between bank stabilization sections in the second to fourth year, minimizing the number of cuts in the bank that will be necessary for construction equipment (i.e., two access roads will be located for Upper Split River Farm 1, the southern one will be a continuation of Pisgah Mountain Road, while the northern one will be located at the northern extent of the work, between the two Upper Split River Farm sites). After the southern section of Upper Split River Farm 1 bank stabilization has been completed in 2010, the bank at Pisgah Mountain Road will be restored to existing conditions and the access way between the northern and southern reaches of Upper Split River Farm will be left open in a stable condition until the construction on the northern section of Upper Split River Farm is completed in 2011, at which time the access road between the two will be restored to grades similar to those on either side. Similarly, the access road at the northern end of Upper Split River will be reused during 2012 for construction access to the Bathory/Gallagher site. Use of the same access roads will minimize the cutting of mature trees at the top of the slope, and the potential loss of artifacts.

Temporary Crossings

There are currently farm roads throughout the sites used by farm equipment to access the various fields. Two of these roads, which lead to areas of the proposed bank stabilization, currently have at-



grade stream crossings. These two stream crossings need to be temporarily upgraded for construction equipment access to areas of bank stabilization. The crossings will be restored to existing conditions after construction. Both of these streams are located at the Split River Farm, and neither has a culvert.

Bordering Vegetated Wetlands (BVW) associated with these streams have been delineated by NEE and the flag locations have been surveyed. These wetland flag locations are illustrated on Figure 2A (for the southern crossing) and Figure 2B (for the northern crossing). These wetland lines are also illustrated on the Site Plans. No BVW is located within the crossings (there is no hydric vegetation within the roadway – the extent of work), but it is located adjacent to them. Wetland impacts at the crossings consist of Bank as the streams flow across the roads.

The southern stream is illustrated on the USGS Millers Falls Quadrangle topographical map as an unnamed perennial stream flowing off Stacy Mountain. This proposed crossing will provide access to Lower Split River Farm site during its construction in the fall of 2009. At the suggestion of DEP, we are proposing swamp mats be placed on geotextile fabric across the stream bed. The swamp mats will consist of logs or 8X8 timbers. Water will flow between the timbers and mats; the geotextile fabric will prevent soils at the crossing from eroding, and keep silt and sediment from being washed downstream.

The northern-most stream is illustrated on the USGS topographical map as an intermittent stream. This stream has been impacted by beaver (*Castor canadensis*) activity both downstream and upstream of the crossing. The area of the proposed crossing completely dries during the summer. This crossing is needed for access to the upper Split River Farm sites and the Bathory/Gallagher site.

Both of these crossing improvements are proposed to be temporary. Currently, both of these are existing at-grade crossings for farm machinery to gain access to the fields. These temporary crossings will remain in place only while active construction is occurring at the site, and will be removed from the crossing once the work is completed.

Wetland mitigation is required whenever work occurs within wetland resources. In the case of the two temporary crossings, the “replacement” wetlands will be *in situ*. Once work is completed, the swamp mats and geotextile fabric will be removed and any work to restore the crossings will be completed. As there is currently no vegetation within these farm crossings, the reconstruction will consist solely of smoothing ruts out of the farm roads, if needed. The contractor will be responsible for maintaining the farm roads in useable condition, and is not allowed off of farm roads into arable land, except as explicitly indicated in the site plans.



4.0 WETLAND RESOURCES

The wetland types located on the parcels consist of the following:

- Bordering Vegetated Wetlands (BVW)
- Bank
- Land Subject to Flooding
- Riverfront Area
- Land Under Waterway

There is no Isolated Land Subject to Flooding within the proposed work area. The wetland resources are described in detail in the following sections.

Bordering Vegetated Wetland

NEE delineated the wetland areas on the site adjacent to work using consecutively numbered orange and black striped flagging tape in areas where work will occur within 100 feet of the wetland boundary. The edge of the Bordering Vegetated Wetlands (BVW) was delineated using a multiple parameter methodology to identify the upland/wetland boundary. This approach emphasizes the use of hydrophytic vegetation in accordance to the U.S. Fish and Wildlife Service's *National List of Plant Species that Occur in Wetlands* (1988, and draft revisions, 1997), and the 50% wetland vegetation criterion as outlined in 310 CMR 10.55(2)(c). The delineation also included the examination of soils, and the methodology from the DEP handbook entitled *Delineating Bordering Vegetated Wetlands* (1995). In accordance with this handbook, the flagged boundary was located to include all areas which contained a majority of wetland plants and hydric soils, with consideration given to other indicators of wetland hydrology when present. The delineation was completed by Karro Frost, Professional Wetland Scientist # 1771.

Plants are used in the delineation of wetlands as different plants species have been applied various categories to describe their preferred site hydrologic regime. Plants are categorized as nearly always occurring in a wetland, usually occurring in a wetland, commonly found in wetlands and uplands, usually occurring in an upland, nearly always occurring in an upland or they are not categorized by this method due to a lack of information regarding the plant species. Based on these categories, the 50% wetland plant criterion is used to delineate the BVW. The specific categories are presented below.

<u>Category</u>	<u>Symbol</u>	<u>Definition</u>
Obligate Hydrophyte	OBL	Nearly always occurs in wetlands (>99%)
Facultative Wetland Species	FACW	Usually occurs in wetlands (67% to 99%)
Facultative Species	FAC	Commonly occurs in both wetlands and uplands (34% to 66% in wetlands)



Facultative Upland Species	FACU	Usually occurs in uplands, but may occasionally occur in wetlands (1% to 33%)
Obligate Upland Species	UPL	Nearly always occurs in uplands (<1% in wetlands)
Not Indicator	NI	Not sufficient information to classify this plant

A positive (+) sign behind the Facultative Indicator categories indicates a frequency toward the higher end of the category (more frequently found in wetlands), while a negative (-) sign indicates a frequency toward the lower end of the category (less frequently found in wetlands). For the purpose of wetland delineation, species with a rating of FAC or wetter are considered to be wetland indicator species.

BVW is found in association with the unnamed perennial stream and an unnamed intermittent stream. BVW was flagged adjacent to the proposed crossing of the unnamed perennial stream and near the proposed staging area near the unnamed perennial stream for lower Split River Farm bank stabilization as A-1 through A-6, B-1 through B-6 and E-1 through E-16 (see Figure 2A); and adjacent to the proposed crossing at the intermittent stream as C-1 through C-6 and D-1 through D-7 (see Figure 2B). DEP data sheets are located in Appendix D.

For the BVW near the proposed crossing of the perennial stream, the canopy is dominated by silver maple, *Acer saccharinum* (FACW) with scattered eastern cottonwoods, *Populus deltoides* (FAC). Multiflora rose, *Rosa multiflora* (FACU), common red raspberry, *Rubus idaeus* (FAC-), silky dogwood, *Cornus amomum* (FACW), and common elderberry, *Sambucus nigra ssp. canadensis* (FACW-) are the shrubs within this wetland area. Herbaceous species consisted of sensitive fern, *Onoclea sensibilis* (FACW), late goldenrod, *Solidago gigantea* (FACW), woolgrass, *Scirpus cyperinus* (FACW+), Joe Pye weed, *Eupatorium maculatus* (FACW), purple-leaved willowherb, *Epilobium coloratum* (OBL), Avens, *Geum sp.*, and an undetermined grass. Asian bittersweet, *Celastrus orbiculatus* (UPL) was observed near the edges of the wetland.

BVW near the proposed crossing of the intermittent stream was dominated by silky dogwood, multiflora rose, and Morrow's honeysuckle, *Lonicera morrowii* (NI). Trees are scattered within this wetland and include silver maple, elm, *Ulmus sp.*, and white ash, *Fraxinus americana* (FACU). Herbaceous species were observed throughout this wetland and included: late goldenrod, fringed sedge, *Carex crinita* (OBL), curly dock, *Rumex crispus* (FACU), ostrich fern, *Matteuccia struthiopteris*, (FACW), climbing nightshade, *Solanum dulcamara* (FAC-), purple-leaved willowherb, sensitive fern, blue skullcap, *Scutellaria lateriflora* (FACW+), asters, *Symphotrichum spp.*, skunk cabbage, *Symplocarpus foetidus* (OBL) and yellow rocket, *Rorippa sp.*

Bank



Bank resource is located along the Connecticut River and the two small streams: one intermittent and the unnamed perennial stream. Bank was not delineated separately in the field. The proposed bank stabilization and habitat improvement will occur within this wetland resource associated with the Connecticut River. The upgraded farm road stream crossings will temporarily impact Bank within the streams, and mitigation of impacts to Bank in the streams will be *in situ* restoration. These are existing at-grade farm road crossings of the streams, which will be temporarily upgraded to accommodate construction equipment.

Land Subject to Flooding

The Flood Insurance Rate Map for Gill, Community-Panel Number 250117 0006 B (1980), illustrates that the site is located within the 100-year floodplain (FIRM, 1980). Figure 3A illustrates the extent of the 100 year floodplain at Bathory/Gallagher and Upper Split River Farm and Figure 3B illustrates the floodplain at Lower Split River Farm. The elevation of the floodplain in this stretch of the Connecticut River is 205 at the northern end of the Bathory/Gallagher property (the upstream end of the project), 204 south of the unnamed perennial stream on lower Split River Farm, and 203 at the downstream end of the project. The fields at Split River Farm and on the Bathory/Gallagher parcels are inundated during the 100 year flood event.

Riverfront Area

Riverfront Area extends horizontally 200 feet from mean annual high water of the Connecticut River and the perennial stream flowing through Split River Farm. The extent of Riverfront Area is illustrated on the Site Plan. Total Riverfront Area on the Bathory/Gallagher parcel is approximately 5.75 acres; Riverfront Area on Split River Farm is approximately 44.2 acres; **Riverfront Area on Wallace/Watson is approximately 4.6 acres.** Riverfront Area on the parcel owned by the Town of Gill at the end of Pisgah Mountain Road is estimated to be 0.6 acres. The parcel at the southern end of the project owned by FirstLight has approximately 14.8 acres of Riverfront Area. Total Riverfront Area on all parcels is **70.1** acres.

The primary work within Riverfront Area will be the staging areas. The use of existing farm roads has not been included in the total riverfront impacts as these are existing roads and the farmer has requested that trucks not drive on the agricultural fields to avoid compaction of the arable soil. Each of the access roads to the toe of slope bench is also located within Riverfront Area. Each of these access roads is approximately 1,800 square feet within Riverfront Area. Total impacts to Riverfront Area are therefore approximately **62,600 square feet (<1.5 acre)** from **five** staging areas, each 10,000 square feet (two are only partially located within the Riverfront Area) and **seven** access roads at 1,800 square feet each. All impacts within Riverfront Area are temporary and will be restored *in situ* after construction is completed on each related section.



Other Applicable Standards and Requirements

In preparation of this NOI, NEE reviewed the Massachusetts Geographic Information System (MassGIS) to determine if the property was located within or had areas designated as priority habitat of rare species or estimated habitats of rare wildlife, certified vernal pools or potential vernal pools. These designations are made by the Massachusetts Natural Heritage and Endangered Species Program (NHESP). The data layers, prepared using information provided by NHESP, illustrate areas of priority habitat of rare species, estimated habitat of rare wildlife, the locations of certified vernal pools, and potential vernal pools.

The entire area of proposed work lies within both Estimated Habitat of Rare Wildlife and Priority Habitat of Rare Species according to the Massachusetts Natural Heritage Atlas, 13th Edition (2008) Millers Falls Quad. Figure 4 illustrates the areas designated by NHESP. NEE and FirstLight have been in communication with NHESP regarding the rare species at the site and a MESA checklist has been submitted. A copy of this Notice of Intent has been sent to NHESP via certified mail. A copy of the mailing receipt is included in Appendix E.

NEE also reviewed the MassGIS system to determine if the site was located within Outstanding Resource Waters (ORW) or Areas of Critical Environmental Concern (ACEC). ORW are watershed areas that have been classified as such under the Massachusetts Surface Water Quality Standards. These watersheds constitute an outstanding resource as determined by their important socioeconomic, recreational, ecological and/or aesthetic values. These areas have been identified so that they may be protected and maintained (MassGIS, 2002). There are no ORW located in the immediate vicinity of the project. An ACEC is also an area designated in Massachusetts that receives special recognition because of the quality, uniqueness and significance of its natural and cultural resources (MassGIS, 2007). There are no ACEC located within the immediate vicinity of the property.

5.0 PERFORMANCE STANDARDS

The proposed work consists of stabilization of Connecticut River Bank at the Split River Farm, the Bathory – Gallagher, **and the Wallace/Watson** parcels in Gill, MA. Wetland resources impacted by this project will include bank, land under water, land subject to flooding, and riverfront area as outlined in this NOI. All of these wetland resources have performance standards which must be met, pursuant to the Massachusetts Wetland Regulations 310 CMR 10.00.

Additionally, pursuant to 310 CMR 10.55(4)(d), the regulations state:

Notwithstanding the provisions of 310 CMR 10.55(4)(a),(b) and (c), no project may be permitted which will have any adverse effect on specified habitat sites of rare vertebrate or invertebrate species, as identified by procedures established under 310 CMR 10.59.



FirstLight and NEE have been working with NHESP to develop bank stabilization plans that have no adverse impacts of the habitat of rare vertebrate or invertebrate species. The use of CWD for bank stabilization was welcomed by NHESP staff and Massachusetts fisheries biologists who visited the site during the fall of 2008. In addition, based on NEE knowledge of the rare species near the work area, no rare species will be impacted by the temporary stream crossings. NHESP is reviewing this NOI and their comments should be included by the Commission in the Order of Conditions for the project.

Bank

Bank stabilization activities and the two stream crossings will occur within the wetland resource Bank. The stream crossings are both temporary and will only temporarily impact bank while there is active construction in the fall. Both of these crossings will be restored to existing conditions after the bank stabilization activities have been completed each fall. (The swamp mats may be temporary re-installed during the spring to access the sites for additional plantings).

Pursuant to 310 CMR 10.54(4), the general performance standards for Bank are stated below in *italics*. The means by which this project will meet the performance standards are presented in plain text.

(a) Where the presumption set forth in 310 CMR 10.54(3) is not overcome, any proposed work on a Bank shall not impair the following:

- 1. the physical stability of the Bank;*

The existing physical stability of the Connecticut River Bank is impaired. This NOI is for work that will correct this through the proposed bank stabilization and restoration activities.

The temporary stream crossings will protect bank through the placement of geotextile fabric under swamp mats to prevent bank material from eroding and being moved downstream. Swamp mats will spread out the weight of construction equipment so that the crossings do not become rutted. The timbers within the crossings will be placed with the flow of water so that the stream can flow between the timbers and mats with no disturbance.

- 2. the water carrying capacity of the existing channel within the Bank.*

The water carrying capacity of the Connecticut River will not be impeded. The temporary stream crossings will be placed so that the water carrying capacity of these streams is not interrupted. The swamp mats will be placed to allow water to flow between the timbers, and in high water, over the timbers. The use of swamp mats will ensure that the long term carrying capacity of the existing channels at these crossings will not be altered.



3. ground water and surface water quality.

The purpose of this project is to rebuild eroding Connecticut River banks and as such, the water will be slowed as it flows through the coarse woody debris structures, depositing sediment between and on the logs. The quality of the surface water will improve slightly as sediment will be removed from the surface water in the Connecticut River and deposited on the existing "beach area." Ground water quality will be neither improved nor impaired. The proposed stream crossings will neither improve nor impair the ground water or surface water quality.

4. the capacity of the Bank to provide breeding habitat, escape cover and food for fisheries;

The use of woody debris on the beach area was encouraged by the Massachusetts Fisheries and Wildlife fisheries biologists, who visited the site in October, 2008. Water fluctuations will partially cover the installed large woody debris, and when these structures are partially covered by water, they will increase escape cover, provide additional surfaces for food species (insects on the woody debris), and eventually, breeding habitat. Portions of the root wads are likely to be under water most of the time, except in low water.

Neither stream crossing site currently provides breeding habitat, escape cover, or food for fisheries. Nor have fish been observed by NEE scientists in either stream. However, when the temporary crossings are in place, any fish within these streams will be able to swim upstream or downstream between the swamp mats. When the temporary crossings have been removed, the streams will be restored to existing conditions if necessary. It is unlikely that there are any fish moving in the intermittent stream due to the beaver dams in that area, as fish would have to cross these dams first.

5. the capacity of the Bank to provide important wildlife habitat functions.

This is discussed in detail in Section 6.0, Wildlife Habitat Evaluation. Four areas on the bank currently provide nesting habitat for bank swallows and kingfishers. These sections will be left undisturbed by the construction activities. In addition, bank stabilization activities will occur during the fall after these birds have migrated south, and thus nesting activities will not be disturbed by construction.

Land Under Waterways

There is no work within Land Under Waterway associated with the actual bank stabilization of the Connecticut River banks; all proposed work is located between mean annual high water and mean annual low water.

The perennial stream crossing to access Lower Split River will temporarily impact 60 square feet of Land Under Waterways. The area of impact was calculated by determining the stream width as 4 feet and the width of the crossing as 15. Pursuant to 310 CMR 10.56(4)(a), the general performance



standards for Land Under Waterways are stated below in *italics*. The means by which this project will meet the performance standards are presented in plain text.

1. *The water carrying capacity within the defined channel, which is provided by said land in conjunction with the banks;*

To protect the water carrying capacity within the defined channel of the unnamed perennial stream, swamp mats will be placed so that water can flow between the timbers. The placement of swamp mats will also protect the stream channel from becoming rutted from heavy equipment accessing the site. At the completion of construction, the swamp mats will be removed and any damage to the existing conditions of the channel at the crossing will be repaired.

2. *Ground and surface water quality;*

Ground water quality will not be impacted by the proposed work at the perennial stream crossing, nor within the Connecticut River.

Good erosion and sediment control practices will be taken at each site. To protect the surface water quality at the crossing, stone construction pads are proposed on either side of the crossing to knock dirt off the equipment tires before they cross the stream on the swamp mats. A geo-textile fabric is proposed under the swamp mats within the stream bed to assist in preventing erosion of the bed, and minimize disturbance on the stream bed from equipment crossing the streams on the swamp mats. To protect the surface water quality of the Connecticut River, a turbidity curtain will be installed along the length of the proposed yearly work area prior to any other work. In addition, silt fence will be installed along the edge of farm roads that lie within 100 feet of wetland resources, with the exception of the Connecticut River. Silt fence is not needed at the top of the bank of the Connecticut River as the top of the embankment on the Bank is higher in elevation than the abutting farm roads and fields.

3. *The capacity of said land to provide breeding habitat, escape cover and food for fisheries;*

There is no permanent work within any Land Under Waterway. The work is proposed when fish are not breeding, so there will be no impact to breeding habitat. The proposed work on Bank, the placement of the woody debris structures, will increase escape cover and food for fisheries when these are covered by water. Currently there is no breeding habitat, escape cover or food for fisheries within the temporary crossing of the perennial stream, so this capacity will not be impacted.

4. *The capacity of said land to provide important wildlife habitat functions. A project or projects on a single lot, for which Notice(s) of intent is filed on or after November 1, 1987, that (cumulatively) alter(s) up to 10% or 5,000 square feet (which ever is less) of land in this resource area found to be significant to the protection of wildlife habitat, shall not be deemed to impair its capacity to provide important wildlife habitat functions. Additional*



alterations beyond the above threshold may be permitted if they will have no adverse effects on wildlife habitat, as determined by procedures established under 310 CMR 10.60.

The proposed project will impact only 60 square feet of Land Under Water and thus will impact less than 5,000 square feet and less than 10% of Land Under Water; therefore this project will not impair Land Under Waterways capacity to provide important wildlife habitat functions.

Land Subject to Flooding

Pursuant to 310 CMR 10.57(4)(a), the general performance standards for Bordering Land Subject to Flooding are stated below in *italics*. The means by which this project will meet the performance standards are presented in plain text.

1. *Compensatory storage shall be provided for all flood storage volume that will be lost as the result of a proposed project within Bordering Land Subject to Flooding, when in the judgment of the issuing authority said loss will cause an increase or will contribute incrementally to an increase in the horizontal extent and level of flood waters during peak flows.*

Compensatory storage shall mean a volume not previously used for flood storage and shall be incrementally equal to the theoretical volume of flood water at each elevation, up to and including the 100-year flood elevation, which would be displaced by the proposed project. Such compensatory volume shall have an unrestricted hydraulic connection to the same waterway or water body. Further, with respect to waterways, such compensatory volume shall be provided within the same reach of the river, stream or creek.

Land Subject to Flooding is considered to begin at the top of the Bank or at the upland boundary of Bordering Vegetated Wetlands, whichever extends further into the uplands. As such, there is no proposed alteration of any elevations within Land Subject to Flooding.

This project is not proposing any compensatory storage. The riprap placed on the Bank across from the Northfield Mountain Pump Storage Facility extends approximately 30 feet into the river beyond the unprotected bank on either end of the riprap (lower Split River Farm and upper Split River Farm). This indicates that since 1970, the river has eroded approximately 30 horizontal feet off the banks in the vicinity of the proposed work. We are proposing to replace a fraction of that bank material previously found at the site, which eroded and washed downstream. We are requesting that any requirement to provide flood compensatory storage for this project be waived as this is filed as a limited project filed under 310 CMR 10.53(4), to improve the natural capacity of a resource area.

2. *Work within Bordering Land Subject to Flooding, including that work required to provide the above-specified compensatory storage, shall not restrict flows so as to cause an increase in flood stage or velocity.*



The proposed work will not restrict the flows within the Connecticut River. This bank stabilization work will not increase the flood stage or velocity of the river. This proposed work will slow water flowing along the bank of the river within the woody debris and vegetation, encouraging it to deposit sediment from the water column.

3. *Work in those portions of bordering land subject to flooding found to be significant to the protection of wildlife habitat shall not impair its capacity to provide important wildlife habitat functions. Except for work which would adversely affect vernal pool habitat, a project or projects on a single lot, for which Notice(s) of Intent is filed on or after November 1, 1987, that (cumulatively) alter(s) up to 10% or 5,000 square feet (whichever is less) of land in this resource area found to be significant to the protection of wildlife habitat, shall not be deemed to impair its capacity to provide important wildlife habitat functions. Additional alterations beyond the above threshold, or altering vernal pool habitat, may be permitted if they will have no adverse effects on wildlife habitat, as determined by procedures contained in 310 CMR 10.60.*

The proposed work has been designed to improve wildlife habitat through the use of coarse woody debris with root wads attached. This will improve the fisheries habitat within the river when the root wads are under water. It will provide surfaces which can be used by emerging dragonflies. Birds and small mammals are likely to use the coarse woody debris piles while searching for food. The trees at the top of the bank are proposed to remain, except for the proposed six access ways to the toe of the slope (2 for lower Split River Farm, 3 for Upper Split River's two sections, and 1 additional one on the Bathory/Gallagher parcel). The proposed plantings on the created bench will provide habitat for all species.

Riverfront Area

Pursuant to 310 CMR 10.58(4), the general performance standards for Riverfront Area is stated below in *italics*. The means by which this project will meet the performance standards are presented in plain text.

(a) Protection of other resource areas. The work shall meet the performance standards for all other resource areas within the riverfront area, as identified in 310 CMR ... 10.55 (Bordering Vegetated Wetland), and 10.57 (Land Subject to Flooding). When work in the riverfront area is also within the buffer zone to another resource area, the performance standards for the riverfront area shall contribute to the protection of the interests of M.G.L. c. 131§ 40 in lieu of any additional requirements that might otherwise be imposed on work in the buffer zone within the riverfront area.

Work within the 200 foot Riverfront Area includes the staging areas and the use of access roads throughout the farm (already created). The staging areas for lower Split River Farm are proposed within the 100 foot buffer zone to BVW (see Plan Sheet BT-1). The staging areas for upper Split River Farm and the Bathory/Gallagher site are illustrated on Plan Sheets BT-5 and BT-7. **The**



staging area for Wallace Watson is illustrated on BT-11. These staging areas are temporary. Due to the proximity of the staging area and roads to BVW and Bank, silt fence will be installed to prevent sedimentation of the BVW and the streams. No long-term change in the current use of the buffer zone as agricultural land is proposed.

Staging areas are proposed to be located within the Riverfront Area. To the extent possible, these areas have been located outside of the arable land; **nor are any trees are proposed to be cut for the staging areas.** At the completion of construction, any staging areas located within arable land will be deep plowed to loosen compacted soil, **or top soil will be temporarily removed during construction** and area will be seeded with specified seed mix (see Site Plan Sheet BT-10).

(b) Protection of rare species. No project may be permitted within the riverfront area which will have any adverse effect on specified habitat sites of rare wetland or upland, vertebrate or invertebrate species, as identified by the procedures established under 310 CMR 10.59 ... or which will have any adverse effect on vernal pool habitat certified prior to the filing of the Notice of Intent.

The project is located within Estimated Habitat of Rare Wildlife and Priority Habitat of Rare Species. A copy of this Notice of Intent has been submitted to NHESP for their review. In addition, NEE and FirstLight have been working with NHESP for the past three years to minimize impacts to rare wildlife known to occur within this section of the river. Research has been conducted to determine which species of rare dragonflies are using this section of the river and the impact of past bank stabilization projects on these populations. Research has also been conducted to determine the main causes of mortality of emerging dragonfly nymphs.

(c) Practicable and Substantially Equivalent Economic Alternatives. There must be no practicable and substantially equivalent economic alternative to the proposed project with less adverse effects on the interests identified in M.G.L. c. 131 § 40.

There is no alternative to the proposed bank stabilization. This work is mandated by the FERC; however, as this is the third round of bank stabilization projects proposed for this section of the Connecticut River, modifications have been made in the design. Bank stabilization is required by FirstLight's FERC license, and this area has been identified as an area requiring bank stabilization.

(d) No Significant Adverse Impact. The work, including proposed mitigation measures, must have no significant adverse impact on the riverfront area to protect the interests identified in M.G.L. c. 131 § 40.

The work as proposed is expected to have no significant adverse impacts. Bank stabilization will reduce areas of eroding bank, which is the preferred habitat for nesting bank swallows and kingfishers. However, existing nests of these animals will not be disturbed during construction activities. It is expected that over the long term, that sediment will accumulate, slowly rebuilding and stabilizing the banks.



Alternatives Analysis

The proposed work has been through a multi-year design process. After a full river reconnaissance, eroding sites were selected for stabilization. The use of coarse woody debris as a stabilization technique was suggested by Dr. John Field, a fluvial geomorphologist who reviewed the bank erosion in the Connecticut River. This technique has been widely used in Washington and Oregon states to restore rivers in regions which have been significantly altered through logging, specifically as a method to restore salmon to the rivers. More recently the use of coarse woody debris has been successfully used by the U.S. Forest Service in New York and Vermont. Massachusetts fisheries biologists and NHESP staff encouraged NEE and FirstLight to use coarse woody debris for bank stabilization on the Connecticut River.

In order to stabilize this section of bank, work must occur in this location. The slope cannot be cut back as it has been at other sites due to the extensive archaeological artifacts in this location. In order to protect as many trees on the top of the slope as possible, equipment cannot work on the top and reach over the slope either. The current design has taken in account the rare species in the area and will provide or improve habitat for their use (including rare dragonfly and minnow species), and will not alter existing habitat for other rare species (bald eagles will be able to continue using mature trees at the top of the embankment as perching sites). There is no stone toe proposed at this site due to the difficulties it can cause some dragonfly species during their emergence. The proposed plan is the most viable alternative at this time.

The placement of sandy gravel on the bank may be considered as “discharge of ... fill material” in 314 CMR 9.06 (401 Water Quality Certification regulations). This material is required for equipment to access the site. It will be placed on non-woven geotextile and edged by a coir fascine to minimize the amount of material that will be required. Without the geotextile fabric and fill, equipment would not be able to operate on the beach. After the placement of large woody debris structures and logs, the area between these will be planted with wetland species which tolerate the fluctuating water levels that occur within this area. The designers expect that sediment will accrete on the sandy gravel bench after planting between the woody debris structures. Monitoring of sediments will be completed after construction.

6.0 WILDLIFE HABITAT EVALUATIONS

Alterations to resource areas are proposed as part of this restoration project and therefore a Wildlife Habitat Evaluation is required (310 CMR 10.60) for anticipated impacts to Bank, Land Under Waterways (LUW) and Riverfront areas. Therefore, NEE was contracted to conduct a wildlife habitat evaluation and identify any significant habitat features present within the restoration, staging and access areas. The assessment was conducted on August 5, 7, 28, and December 18, 2008 by NEE’s Wildlife Biologist, Christin McDonough, MS, who is qualified as determined at 10.60 (1)(b).

This wildlife habitat evaluation has been divided into three sections, based on property owners: The Lower Split River Farm property at the southern-most limit; the Upper Split River Farm property;



and the Bathory/Gallagher property is the northern-most area. The three Assessment Areas are further subdivided by resource area and corresponding data forms are attached in Appendix E; photographs are included in Appendix C. Areas where work is proposed that exceeds thresholds includes Bank (5,300 lf of Bank on the Connecticut River at the 3 properties combined), Bank (45 lf at the 2 temporary stream crossings), and Riverfront (40,800 sf temporary disturbance for staging areas and access roads). Impacts to Land Under Waterways (LUW) at the perennial stream crossing at the Lower Split River property are estimated to be approximately 60 sf, and are therefore under threshold limits. Other LUW characteristics associated with the toe of the slope along the Bank of the CT River at the 3 sites are described in this section. The characteristics that were identified to be important at the site, and their location, are presented in the following paragraphs.

The Connecticut River is classified as a lower perennial river (Cowardin et al. 1979). The River winds from north to south through three states beginning in New Hampshire and flowing south/southeast through Massachusetts, and empties into Long Island Sound in Connecticut. The portion of the River where bank restoration work is proposed in Gill, Massachusetts is surrounded primarily by agricultural land. Water levels may vary four to five feet throughout a given day and are further influenced by rainfall, bank was often exposed during the beginning of the assessment and submerged at the end of a given assessment. Some wildlife features which may be considered important (potential turtle basking logs, for example), change on a daily basis. Photographs of the overall site and assessment areas are presented in Appendix C.

Upland/Wetland Food Plants (hard mast and fruit/berry producers)

Due to the highly unstable nature of the existing eroding Bank, there is little vegetation growing on the actual Bank resource area, particularly at the Bathory/Gallagher and Upper Split River Farm Sites. In some cases, vegetation growing along the top of the Bank (Riverfront Area) is described in order to better understand potential wildlife use of Bank.

Lower Split River Farm Site: The dominant trees along the top of the bank (Riverfront area) at the Lower Split River Farm include silver maple and slippery elm (*Ulmus rubra*). Maple seeds are consumed by raccoons (*Procyon lotor*), squirrels (*Sciurid carolinensis*), chipmunks (*Tamias striatus*), small mammals (ex. *Peromyscus* or *Microtus*), rabbits (*Sylvilagus floridanus*), porcupines (*Erethizon dorsatum*), and nuthatch (*Sitta spp.*). Twigs and foliage are somewhat important for white-tailed deer (*Odocoileus virginianus*; Martin et al. 1951). Several shrubs present within this area provide fruit, including barberry, dogwood, buckthorn, and juniper. However, the only shrubs that can be considered important to wildlife are dogwoods. Dogwoods provide fruit for numerous wildlife species including several songbirds, bear (*Ursus americanus*), rabbits, deer, skunks (*Mephitis mephitis*), fox (ex. *Vulpes vulpes*), squirrels, chipmunks, raccoon, and small mammals, such as mice (Martin et al. 1951). This vegetative community will not change after work has been completed, and the temporary loss of maples is not expected to impact wildlife species given the low number of trees proposed to be removed.



The dominant plant in the shrub and vine layers are invasive plants (Japanese barberry and Asian bittersweet, respectively), and invasive plants are common throughout all vegetative layers (ex., black locust, Japanese barberry, honeysuckle, glossy buckthorn, Japanese knotweed, Asian bittersweet, purple loosestrife, and reed canary grass). These plants have limited wildlife value.

Horsetails are dominant in the herbaceous layer and may provide very limited value to muskrats (*Ondatra zibethicus*; Martin et al. 1951).

No aquatic vegetation was noted at the Lower Split River property; however, some coarse woody debris is present at the toe of the slope. Coarse woody debris may be important cover habitat for turtles and fish, and may provide important sunning spots or perches for waterbirds and turtles.

The proposed access road for the Lower Split River Farm will impact a perennial stream (Bank) and LUW (see Site Plans Sheet BT-1). The access road is unvegetated; however, shade from silver maple and cottonwood trees cover a portion of the assessment area. No trees or other vegetation will be removed from this crossing.

Upper Split River Farm Sites: The dominant trees along the top of the Bank (Riverfront Area) at the Upper Split River Farm Site include silver maple, black birch, northern red oak, black locust, and eastern cottonwood. Maple seeds, birch seeds and oak acorns are consumed by raccoons, squirrels, chipmunks, small mammals (ex. *Peromyscus* or *Microtus*), rabbits, porcupines, and nuthatch, for example. Twigs and foliage are somewhat important for white-tailed deer (Martin et al. 1951). Cottonwood bark has been shown to be favored by beavers (*Castor canadensis*) and porcupines (Martin et al. 1951).

Other plants which may provide important food items for wildlife at the Upper Split River Farm Site include box elder and raspberry. Raspberry fruit provide significant contribution to the diet of many wildlife species, including catbirds (*Dumetella carolinensis*), cardinals (*Cardinalis cardinalis*), robins (*Turdus migratorius*), and white tailed deer (Martin et al. 1951). Other animals will consume raspberry fruit, but do not rely heavily on them, such as squirrels, chipmunks, fox, skunks, and raccoons. Grape provides significant food contributions to ruffed grouse (*Bonasa umbellus*), wild turkey (*Meleagris gallopavo*), cardinals, mockingbirds (*Mimus polyglottos*), robins, cedar waxwings (*Bombycilla cedrorum*), woodpeckers (ex., *Melanerpes carolinus*), skunks and raccoons (Martin et al. 1951).

This vegetative community will not change after work has been completed, and the temporary loss of maples is not expected to impact wildlife species given the low number of trees proposed to be removed. The dominant plant in the shrub and vine layers are invasive plants (Japanese barberry and Asian bittersweet, respectively), and invasive plants are common throughout all vegetative layers (ex., black locust, Japanese barberry, honeysuckle, glossy buckthorn, Japanese knotweed, Asian bittersweet, purple loosestrife, and reed canary grass). Invasive plants are generally believed to provide little wildlife value since they out-compete the native vegetation.



Aquatic vegetation found at the Upper Split River property includes wild celery (*Vallisneria spp.*) and a pondweed (*Potamogeton spp.*). These plants may provide cover for small fish and food for ducks or swans (*Cygnus olor*). There is also coarse woody debris found throughout the site, often from fallen trees, and these areas may be more important to fish, water birds and turtles than the sparse pockets of aquatic vegetation.

The proposed access roads for the Upper Split River Farm and Bathory/Gallagher Sites will impact an intermittent stream (Bank) (see Site Plan sheet BT-5). The access road is unvegetated and under an open canopy. The stream appears to be the outflow from a beaver impoundment located further upstream. There is clear evidence of historic beaver activity around the impoundment along with a possibly unoccupied beaver lodge (located approximately 250 feet upstream from the proposed crossing). Located approximately 100 feet downstream of the proposed crossing is a weak beaver-constructed dam.

Bathory/Gallagher Site: The dominant trees along the top of the Bank (Riverfront Area) at the Bathory/Gallagher Site include silver maple, black birch, northern red oak, black locust, and eastern cottonwood. Maple seeds are consumed by raccoons, squirrels, chipmunks, small mammals (ex. *Peromyscus* or *Microtus*), rabbits, porcupines, and nuthatch. Twigs and foliage are somewhat important for white-tailed deer (Martin et al. 1951).

Other plants which may provide important food items for wildlife at the Bathory/Gallagher Site include box elder, raspberry, and arguably, multiflora rose. Raspberry fruit provide significant contribution to the diet of many wildlife species, including catbirds, cardinals, robins, and white tailed deer (Martin et al. 1951). Other animals will consume raspberry fruit, but do not rely heavily on them, such as squirrels, chipmunks, fox, skunks, and raccoons. Grape provides significant food contributions to ruffed grouse, wild turkey, cardinals, mockingbirds, robins, cedar waxwings, woodpeckers, skunks and raccoons (Martin et al. 1951).

This vegetative community will not change after work has been completed, and the temporary loss of maples is not expected to impact wildlife species given the low number of trees proposed to be removed. The dominant plant in the shrub and vine layers are invasive plants (Japanese barberry and Asian bittersweet, respectively), and invasive plants are common throughout all vegetative layers (ex., black locust, Japanese barberry, honeysuckle, glossy buckthorn, Japanese knotweed, Asian bittersweet, purple loosestrife, and reed canary grass).

Aquatic vegetation found at the Bathory/Gallagher property includes wild celery and a pondweed. These plants may provide cover for small fish and food for ducks or swans. There is also coarse woody debris found throughout the site, often from fallen trees, and these areas may be more important to fish, water birds and turtles than the sparse pockets of aquatic vegetation.

Bank Swallow Colonies and Kingfisher Burrows



Bank swallows (*Riparia riparia*) often nest in colonies in excavated tunnels along vertical sandy banks. Belted kingfishers (*Megaceryle alcyon*) also nest in burrows in eroded sandy banks. Preferred nesting habitats include riverbanks, creeks, seashores, and lakes. Bank swallows forage heavily and communally on insects in nearby open meadows and fields. These habitat criteria are present within the Bank resource areas of Upper Split River Farm and Bathory/Gallagher sites, and in fact two significant areas were observed during our survey. The location of these areas was recorded with a sub-meter accuracy Trimble GPS unit and plotted on the attached plans. Points labeled "Habitat Point 1" and "Habitat Point 6" mark locations where a burrow approximately 3 inches in diameter and another burrow approximately 6 inches in diameter are located. In addition to the burrows present at "Habitat Point 1", a green heron (*Butorides virescens*) was observed preening on a fallen tree. "Habitat Point 4" contains an area of vertical Bank and approximately 15 holes which may have been utilized by a nesting colony of bank swallows (see Figure 5 Habitat GPS Points, Appendix C, Site Plan Sheets BT-5 and BT-7). The point labeled "Habitat 5" contained approximately 26 holes in the Bank.

Shrubs and Herbaceous Vegetation Suitable for Veery Nesting

Veery (*Catharus fuscescens*) nest in damp, but not flooded, deciduous or mixed forests and riparian habitats. They prefer disturbed or early succession forests with a dense understory. These habitat requirements are not consistent with the assessment areas.

Standing Dead Trees and Nest Cavities

Standing dead trees often provide hollow areas and cavities used by mammals and birds for nesting, roosting, foraging, and perching and are considered significant habitat features to wildlife if present. Perches such as these are often utilized by kingfishers (*Ceryle alcyon*) if they overlook open water, or dead snags can be used as foraging habitat for a number of woodpeckers. No snags were located within Bank; however several were located within Riverfront Area adjacent to Bank and may provide perch sites. Five dead trees may need to be removed from the Lower Split River Farm area; 13 dead trees may need to be removed from the bank at Upper Split River Farm; 12 dead trees may need to be removed from the Bathory/Gallagher Site. A wren hole was observed at the Lower Split River Farm; 6 cavities were observed at the Bathory/Gallagher Site. Final determinations on trees that will be removed will be made immediately before construction. Any trees removed will be used as coarse woody debris for bank stabilization on the site.

Mammal Burrows

Burrows are often made by voles (i.e. *Microtus spp.*) and mice (i.e. *Peromyscus spp.*) but are utilized by a number of other species including snakes and sometimes overwintering amphibians (ex. *Ambystomidae* and *Rana sylvatica*). The presence of burrows can also imply that the prey base may be abundant and available for predators such as red tail hawk (*Buteo jamaicensis*) and fox. Small mammal burrows were present throughout portions of the Riverfront Area included in the Bathory/Gallagher, Upper Split River Farm and Lower Split River Farm areas. A raccoon burrow



was observed at the Lower Split River Farm Site. Mammal burrows were not present within the proposed access routes at the Upper and Lower Split River Farm Sites. The location marked “Habitat Point 3” along the Bank of the Upper Split River property is the location of an otter (*Lutra canadensis*) or beaver slide.

Standing Water Present for at Least Part of the Growing Season

Standing water can be an important habitat feature as it can provide rehydration, foraging and breeding habitat for amphibians, reptiles, wading birds and waterfowl. Flowing water is present in the Connecticut River, the intermittent stream crossing at the Upper Split River Farm where access to the Site is proposed, and at the perennial stream crossing on Lower Split River Farm, where access to the Site is proposed.

Wildlife Cover

Areas which may provide cover habitat for wildlife may include submerged woody tangles (cover for fish and turtles), overhanging roots along steeply cut riverbanks (wood turtles, meso-mammals), coarse woody debris (amphibians, snakes, small mammals, and birds), and dense herbaceous cover (birds, snakes and small mammals). Dense herbaceous cover can be found throughout the assessment areas. The majority of the Riverfront area assessed at the Lower Split River Farm property contained a dense stand of horsetail, which may be suitable cover habitat for birds (Appendix C), amphibians and small. Portions of Bank within the Bathory/Gallagher and Upper Split River Farm Sites contain overhanging roots and vegetation suitable for small mammals, waterfowl, and turtles to find refuge and forage. Coarse woody debris is located throughout all of the forested areas located within the Riverfront. Rotten tree stumps and large woody debris are common at the Upper Split River Farm Site, and may provide cover for meso mammals such as raccoons and otters. Steeply undercut sandy banks with overhanging roots are present at the Upper Split River Farm Site and at the Bathory/Gallagher Site.

Habitat Degradation

Significant invasive plant colonization was observed throughout the assessment areas. Japanese barberry, oriental bittersweet, multiflora rose, common reed, and purple loosestrife are some examples of non-native plants that are common throughout the Riverfront Area and Bank assessment areas. A culvert has been washed downstream at the proposed access road to the Lower Split River Farm property.

Landscape Context

This portion of the Connecticut River is surrounded by agriculture; primarily corn fields. In addition, the surrounding landscape includes open fields, small streams, deciduous forested



wetlands, floodplain forest and forested uplands. The open fields provide habitat for deer, dragonflies and other invertebrates, birds of prey (ex. red-tailed hawk), and numerous small and meso mammals. Located across the River from the Lower Split River Farm Site is the Northfield Pump Storage Facility intake and outlet.

The following paragraphs discuss the impact areas as they pertain to the overall property and landscape of the site area.

Rare Wildlife and Priority Habitat of Rare Species

This property is currently mapped as Priority Habitat and Estimated Habitat on maps provided by the NHESP (Figure 4). FirstLight has filed a Massachusetts Endangered Species Act (MESA) Project Review checklist with the NHESP and is in consultation with them regarding rare species protection measures.

Habitat Continuity

Habitat continuity is an important factor when determining impacts and overall habitat quality, particularly for ground dwelling animals. This site is located on and around portions of the Connecticut River, part of a wide ranging wetland system that spans the length of four states, as mentioned above. Large wetland systems provide contiguous habitat for a number of wildlife including turtles, frogs, waterfowl and some mammals. The proposed project does not propose to fragment this wetland system.

As part of this assessment, NEE utilized MassGIS to evaluate NHESP's BioMaps of Core Habitat and Supporting Natural Landscape (Figure 6), and Maps of Living Waters and Supporting Landscape (Figure 7) and the DEP's Habitat of Potential Regional or Statewide Importance (Figure 8).

All 3 of the Sites are located within Core BioMap Habitat (Figure 5). Areas identified in the NHESP Core BioMap Habitat are areas most in need of protection in order to protect the native biodiversity of the Commonwealth. These areas contain natural biodiversity, natural communities and often rare species. The area identified on the map as Core Habitat was also identified as Priority Habitat for rare species; however no rare plants were found and the rare wildlife species identified will likely benefit from the proposed project given their biological requirements.

The Connecticut River, along with 2 streams that run through the Bathory/Gallagher and Upper Split River Farm Sites are mapped as Core Living Waters Habitat and the remainder of the Sites are located within Living Waters Critical Supporting Watershed Habitat (Figure 7). NHESP developed the Living Waters conservation plan to identify critical areas of freshwater biodiversity in the Commonwealth. These sites, also referred to as Core Habitats, represent the rivers, streams, lakes, and ponds where conservation activities should focus in order to protect freshwater habitats. This is significant because these areas are sensitive to changes in water flow and degradations in water



quality and often provide habitat for rare aquatic or semi-aquatic species. The semi-aquatic and aquatic wildlife species known to occur in the vicinity of the project area will likely benefit from the proposed project since it will control the sedimentation of the River.

Portions of all three sites are mapped as Potential Habitat of Regional or Statewide Importance, including a small area of Bank at the Upper Split River Farm Site (Figure 8). Areas classified as Potential Habitat of Regional or Statewide Importance represent potentially valuable wildlife habitat.

Potential Impacts

The proposed access routes will require the temporary placement of swamp mats over geo-textile fabric within the streams, in order to reduce sediment movement downstream. However, it appears that the existing substrate at both crossing sites is sand with gravel fill mixed in. No vegetation is proposed to be removed from either stream crossing locations.

Staging areas for machinery will be located within Riverfront area. No trees are proposed to be removed for staging.

Impacts to the Bank along the CT River will be temporary and will ultimately provide better quality habitat for wildlife. A constructed bench along the Bank will allow for machines to access the shoreline to place stabilizing structures such as log vanes, large woody debris structures and vegetated beaches. Impacts to the toe of the slope, such as sedimentation, may be avoided or reduced if work is conducted during low water and strong sedimentation controls are implemented. The inclusion of woody debris structures into the bank will improve wildlife habitat quality, particularly for species such as turtles, fish and numerous dragonfly/damselfly species.

7.0 ADDITIONAL PERMITS

NEE has filed or is in the process of filing additional permits for the proposed work including a Request for Jurisdictional Determination regarding Chapter 91, an Environmental Notification Form with MEPA, filings with the Army Corps of Engineers, a MESA checklist with Natural Heritage and Endangered Species Program, and with this NOI, the 401 Water Quality Certification.

Chapter 91

On behalf of FirstLight, NEE submitted a Request for Determination of Applicability pursuant to the Chapter 91 Waterways Regulations 310 CMR 9.06. We have received a Determination of Applicability, which is included as Appendix G. This states that the proposed work is located within an area subject to Chapter 91, but does not require a license for bank stabilization work with a final Order of Conditions permitting the work.

MEPA



An Environmental Notification Form (ENF) for this project was prepared and submitted on July 15, 2008. This document allows state agencies to simultaneously review the project and notify the Massachusetts Environmental Policy Act office if any problems with the project are foreseen. A Certificate from the Secretary of the Executive Office of Energy and Environmental Affairs was received in September, 2008 stating that an EIR is not required. **The Certificate for Lower Split River, Upper Split River and the Bathory Gallagher parcel is included in Appendix H. The MEPA office has notified NEE that a Notice of Project Change (NPC) must be filed for the proposed bank stabilization work on the Wallace Watson parcel. The NPC is currently being prepared.**

Army Corps of Engineers

NEE attended a pre-filing meeting with the Army Corps of Engineers on March 25, 2009 to review this project with them. Per their request, each stage of the project will be filed separately with the Army Corps prior to construction. They are particularly interested in post-construction monitoring. An outline of NEE's proposed post-construction monitoring is included in section 10.0 below. Information gathered from the first year of monitoring may lead to design improvements for the next section. Any changes in the plans for Upper Split River Farm and the Bathory Gallagher parcels will be submitted to the Gill Conservation Commission and DEP for approval prior to construction.

As part of the Army Corps permits, we must obtain approval for the project work from Massachusetts Historical Commission (we have obtained preliminary approval). As a result, archaeologists have done extensive work at the selected sites, and identified areas where potential access roads and staging areas could be located to avoid areas of cultural resource importance.

MESA

Since the filing of the Phase II projects, NEE has been in communication with NHESP regarding the rare species on the Connecticut River, in particular, the several species of rare dragonflies. Yearly surveys of these species have been conducted both pre- and post-construction for bank stabilization. Through this process we have learned that many endangered Clubtail dragonflies have difficulty negotiating the rock used for stone toes when emerging from the river as nymphs. In the past, NHESP has placed emphasis on maintaining trees along the top of the slope for eagle nesting. A new concern for a rare minnow in the River was voiced last fall during the NHESP site visit. The use of root wads and woody debris structures for bank stabilization was welcomed by the Massachusetts Fish and Wildlife fishery scientists and NHESP staff. NEE has submitted a MESA checklist with NHESP and a copy of **this revised** NOI has been sent to them for their review and comment.



401 Water Quality Certification

Although a Water Quality Certification has not been required for past bank stabilization projects, the language in the regulations has changed since NEE last submitted an NOI for bank stabilization. As a result, DEP has requested more detail regarding work on the banks, including square feet of work within bank area in addition to the linear feet of impact.

A 10 wide section of geo-textile fabric will be laid on the exposed beach and covered with sandy gravel prior to the placement of the woody debris to form a drivable surface for the construction equipment and a planting substrate between woody debris structures. Coir logs will be installed at the edge of the geo-textile fabric to keep the sandy gravel from washing into the River (See Detail 5 on Plan Sheet BT-9). The square footage of the fabric and sandy gravel for creating the aquatic bench for planting has been calculated for each of the sites and is included in Table 1 below. Woody debris structures will be placed on top of this bench. The square footage of large woody debris in the Table 1 includes both material resting on the ground and material driven into the substrate, but not material above the ground. This material will be laid on top of the created bench; therefore this square foot of impact is not in addition to the square feet of the created bench.

FirstLight and NEE submitted an ENF and received a MEPA certificate. A copy of the MEPA certificate is included as Appendix H. In addition, a legal notice for the 401 Water Quality Certification has been sent to The Recorder for publication.

Table 1. Impacts to Bank

	Lower Split River	Upper Split River 1	Upper Split River 2	Bathory/ Gallagher
Aquatic Bench	18,630 sq ft	14,688 sq ft	10,800 sq ft	13,500 sq ft
Large Woody Debris	6,260 sf on bench + 2,150 sf in coves Total= 8,410 sq ft	4,940 sf on bench + 610 sf in coves Total = 5,550 sq ft	3,630 sq ft on bench	4,540 sq ft on bench
Total Fill on Bank	6,590 cu ft	3,800 cu ft	2,070 cu ft	5,630 cu ft

	Wallace/ Watson
Aquatic Bench	10,800 sq ft
Large Woody Debris	3,630 sq ft on bench
Total Fill on Bank	2,070 cu ft

NEE and FirstLight respectfully request the Gill Conservation Commission and DEP to allow this project, which will restore the natural capacity of this Bank of the Connecticut River as described in 314 CMR 9.06 (8).



8.0 SEDIMENTATION AND EROSION CONTROL

Planning for sedimentation and erosion control is important for every construction site. Special consideration was given for areas that are occurring with wetland resources. The following shall be followed by the site contractor:

- Prior to any other work within or adjacent to the Connecticut River, silt fence shall be installed along farm roads as indicated on the plans for the current year and a turbidity curtain will be installed adjacent to the entire work area within the Connecticut River to prevent any disturbed soil or sediment from washing into the River.
- The site construction foreman shall be designated as the on-site individual who will be responsible for the daily maintenance of all sediment and erosion controls, and shall implement all measures necessary to control erosion and to prevent sediment from leaving the site. NEE will serve as an independent erosion control monitor on behalf of FirstLight.
- Prior to any site grading or site work, the contractor shall install all specified sediment and erosion controls, which will also serve as the limit of construction. The sediment controls will be a silt fence which has been entrenched into the ground.
- Silt fencing or snow fencing will be installed, as directed by the individual property owners to protect farmland from compaction during construction.
- Silt fencing, snow fencing and the turbidity curtain will be removed at the end of construction for the year after any accumulated sediment has been collected and removed.

9.0 GENERAL CONSTRUCTION SEQUENCE

Prior to conducting work associated with this project, the contractor shall be required to obtain all copies of permit applications and approvals that outline conditions governing the proposed work. The site contractor will conduct a pre-construction meeting with the site owner, a representative from FirstLight, project engineers, project wetland scientists, the Town of Gill Conservation Commission, and any other required government agencies. The contractor will then follow the general sequence of work as outlined below:

- Temporary entrances, construction fences and traffic control devices shall be placed prior to any construction. Geotextile fabric and swamp mats will be installed across the perennial stream to allow equipment access to lower Split River Farm. The swamp mat and geotextile fabric will be removed and the crossing restored to existing conditions at completion of construction.
- The proposed staging area shall be staked in the field and well-marked. No material storage will occur outside of this area to prevent damage to buried archaeological artifacts and to prevent soil compaction and thus damage to the agricultural value of the field.



- Silt fence will be installed on three sides of the staging area.
- The proposed staging area at the southern end of Lower Split River will be searched for a rare plant species prior to any work in this area.
- The top soil may be removed and stockpiled from the staging areas on Split River Farm to avoid compaction. Whether this occurs will be up to the landowner to determine.
- Silt fence and orange construction fencing will be installed along the property line on the southern property line abutting property owned by The Nature Conservancy. Under no circumstances shall any equipment operate on or other work occur on this abutting parcel of property.
- The contractor will place erosion and sedimentation control systems in accordance with the construction drawings, with additional controls as needed dictated by site conditions, in order to maintain the intent of the specifications and permits. This includes the installation of the turbidity curtain within the Connecticut River extending the length of the work area. Deficiencies or changes on the drawings shall be corrected or implemented as site conditions change. Changes during construction shall be noted on the drawings (Site Plan).
- The contractor shall maintain temporary erosion and sedimentation control systems as dictated by site conditions, indicated in the construction documents, or as directed by governing authorities or owner to control sediment until final stabilization.
- The contractor shall respond within 24 hours to any maintenance or additional work ordered by the property owner or FirstLight representative or Conservation Commission representative.
- The proposed access roads to the toe of the slope shall be cut. Any trees within this area that can be used for the woody debris structures will be carefully removed and stored for later use.
- The non-woven geotextile fabric will be laid on the beach. A coir log will be anchored along the river side of the fabric. This fabric will then be covered with sandy gravel, creating a bankfull bench, which will allow the construction equipment to operate on it.
- Logs with root wads attached will be driven into the bank, partially within the bench. These will be angled at a 20° towards upstream.
- Eroded coves will be stabilized with staked logs and root wads as illustrated on Site Plan Sheet BT-9.
- Large woody debris structures will be constructed at the stations specified on the plans.
- The bank at the temporary access roads will be reconstructed as illustrated on the Site Plans.
- At the completion of all structures, any sediment which has collected in the turbidity curtain will be removed and turbidity curtain will be removed.
- Silt fencing will be removed from the site.
- The staging areas will be restored to pre-existing conditions: deep-plowing of any arable land used and seeding of non-arable staging areas.
- The swamp mats and geotextile fabric will be removed from the stream crossing, and stored for the next year's construction.
- Willow stakes or tublings may be either in early winter at the completion of construction or in the spring after the spring freshet.



- Herbaceous plantings will be completed in the spring after the spring freshet.

10.0 MONITORING AND MAINTENANCE

The performance objective of this monitoring plan is to determine the effectiveness of coarse woody debris (CWD) structures as a bank stabilization technique in the Turners Falls pool of the Connecticut River. Monitoring is to determine not only the success of the CWD structures, but also to determine if any modifications in their design are needed. Monitoring is proposed for five years after the installation at the intensity described below, and FirstLight will continue to monitor the sites through cross-sectional surveys afterwards. FirstLight and NEE propose to monitor the success of this bank stabilization technique through the installation of permanent monitoring stations at the Lower Split River Farm site. Monitoring will occur as noted in the descriptions below. Each station will have:

- Cross-sectional surveys
- Scour chains
- Bank pins
- Stakes for measuring sediment
- Permanent photo stations
- Vegetation plots
- Structural inspections
- Year-end report

Cross-sectional surveys are completed by FirstLight following every bank stabilization project to determine its success. Cross-sectional surveys of the stabilized site are completed in several locations from the top of the embankment to the river's edge on an annual basis.

Scour chains will be installed immediately upstream of the root wads of the racked and keyed members of the CWD structures at stations 12+37, 20+26, and 24+34 (Treatment A) and stations 13+83, 15+82, and 17+34 (Treatment B). Three scour chains will be installed immediately upstream of each of the structures: one will be at the toe of the embankment, one will be installed in the middle of the aquatic bench and one will be installed at the edge of the aquatic bench. If scour occurs, it is most likely to occur under or immediately upstream of the root wads. In addition, six pairs of scour chains will be installed: one under or immediately downslope from six selected "intermediate logs" lying on the constructed aquatic bench (river edge) and the other part of the pair near the toe of slope of the embankment. During the first summer, these will be assessed on a monthly basis. Provided no severe erosion is occurring, these will then be assessed twice year, once after the spring freshet and once in the fall for years two and three. In years four and five, they will be monitored at least once a year. If scouring or other erosion is noted, a plan to remedy the situation on this site will be provided in the yearend report, and construction plans for the remaining sites will be modified.



Bank pins will be installed at each of proposed cross-sectional surveys [stations 12+37, 20+26, and 24+34 (Treatment A) and stations 13+83, 15+82, and 17+34 (Treatment B)]. These will be placed 1 foot above the change in slope on the embankment and then every 4 vertical feet up the face of the eroded embankment. Bank pins are constructed from 3 foot sections of rebar hammered horizontally into the bank. If the bank erodes, the bank pin becomes exposed and exposed length can be measured, indicated the depth of bank that has eroded. During the first summer, these will be assessed on a monthly basis. Provided no severe erosion is occurring, these will then be assessed twice year, once after the spring freshet and once in the fall for years two and three. In years four through eight, they will be monitored at least once a year. If erosion is noted, a plan to remedy the situation on this site will be provided in the yearend report, and construction plans for the remaining sites will be modified.

Stakes for measuring sediment accrual will be placed at each of the six structures selected for monitoring [stations 12+37, 20+26, and 24+34 (Treatment A) and stations 13+83, 15+82, and 17+34 (Treatment B)]. These will be wooden (or metal) stakes marked in five centimeter increments, and placed immediately upstream, within and immediately downstream of the CWD structure. During the first summer, these will be assessed on a monthly basis. Provided no severe erosion is occurring, these will then be assessed twice year, once after the spring freshet and once in the fall for years two and three. In years four and five, they will be monitored at least once a year until they disappear.

Two permanent photo stations will be established for each of the six CWD structures that are being monitored [stations 12+37, 20+26, and 24+34 (Treatment A) and stations 13+83, 15+82, and 17+34 (Treatment B)]. One will record the upstream side of the structure; the other will record the downstream side of the structure.

Vegetation Plots will be established in each of the four vegetation zones in three locations: 10 feet upstream, 10 feet downstream and 40 feet downstream of the monitored structures for a total of twelve vegetated plots per structure or a total of 72 plots to be monitored [stations 12+37, 20+26, and 24+34 (Treatment A) and stations 13+83, 15+82, and 17+34 (Treatment B)]. An additional vegetation assessment will be completed for Treatment B in the adjacent scour pockets to determine if any vegetation is becoming established in these areas. Each plot will be 1 square meter. Each vegetative plot will be assessed for total percent cover, a list of plant species and a determination of the dominant species, planted species survival, plant reproductive vigor and bird/wildlife use. These plots will be monitored once a year during August for 5 years.

CWD Structural inspections will be completed on each structure once a month the first year after the spring freshet until fall. Cables and anchors will be checked and tightened. Any trash that has lodged itself in the CWD structures will be removed and disposed of. If there has been little or no loosening of cables and anchors during the first year, these will be checked only during spring and fall in years 2 and 3 after construction. They will be checked at least once a year in years 4 through 8. If loosening has occurred, inspections will continue on a monthly basis.



A year-end report will be prepared from the data collected from the above monitoring and provided to the Conservation Commission (and DEP and the Army Corps) no later than November 30 of the monitoring year. This year-end report will provide the results from the monitoring and include recommended modifications in the design.

Similar monitoring protocols will be established at each of the five sites as they are stabilized. All information will be provided in a single year-end report.

11.0 SUMMARY

This Notice of Intent and application for a 401 Water Quality Certification is for the stabilization of **6,300 linear feet** of bank on the Connecticut River in Gill, MA in **five** separate phases. This project has been filed as a Limited Project under the Massachusetts Wetlands Protection Act to improve the natural capacity of Bank. This is a demonstration project of the use of large woody debris structures for bank stabilization in Massachusetts. This project is expected to improve the bank habitat for dragonflies and fish species, and have no negative impacts on other species.

The proposed work is located entirely on Bank. No BVW will be impacted and impacts to Land Under Waterway are minimal and temporary. Land Subject to Flooding will not be impacted by the construction. Work within Riverfront Area is also temporary and all disturbed areas will be restored to their existing conditions.

We request that the Gill Conservation Commission issue an Order of Conditions for five years to complete the proposed work.



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