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SOLUTIONS

CLEANUP OF THE HOUSATONIC "REST OF RIVER"

SOCIOECONOMIC IMPACT STUDY

September 2012

Skeo Solutions
www.skeo.com

EXECUTIVE SUMMARY

This study examines the socioeconomic impacts that could result from several cleanup and disposal options for the Housatonic Rest of River project. The study does not include impacts that are due to the river's contamination. The study focuses on the six Rest of River municipalities in Massachusetts: Pittsfield, Lenox, Lee, Stockbridge, Great Barrington and Sheffield.

Four cleanup options are included in this study: no removal, minimal removal (a five-year project), moderate removal (a 14-year project) and extensive removal (a 52-year project). For the latter three cleanup options, this study evaluates both on-site disposal and off-site disposal (via truck or rail).

The study's findings are summarized below:

Traffic

The annual traffic-related costs (due to pavement damage, congestion, crashes and noise) are estimated to range from $3,000 to $14,000, depending on the cleanup and disposal options selected. For each cleanup option, the lowest traffic costs are associated with off-site disposal via rail or on-site disposal at the Woods Pond location. The average number of truck trips per day would be highest under the moderate removal option (about 70 per day, for 14 years), followed by the extensive removal option (about 50 per day, for 52 years) and the minimal removal option (about 30 per day, for five years). The average number of truck trips per day would be roughly the same under either on-site or off-site disposal. For most road locations, the increase in total traffic would be small (less than 10 percent); however, some locations would experience large increases. The increase in truck traffic would be most severe for on-site disposal at the proposed Forest Street landfill location, followed by off-site disposal via the Massachusetts Turnpike. Off-site disposal via the Turnpike is expected to cause significantly more injuries and fatalities than on-site disposal, due to the large number of vehicle miles required.

Native American Sites

Based on the area's Native American history and the lack of a systematic evaluation of Native American historical and archaeological resources in Rest of River conducted to date, a cultural resources assessment in these areas prior to cleanup could help mitigate any potential impacts. Undiscovered Native American sites could exist within the large areas to be disturbed by the extensive removal and moderate removal cleanup options. Aside from the no removal option, the minimal removal option would have the smallest impact on Native American sites.

Tourism

The Rest of River cleanup will directly impact the recreational use of the Housatonic River, which in turn could impact the area's recreation-related tourism resources. The cleanup's visual presence in the area more broadly could also detract from the area's tourism appeal. The Rest of River cleanup could benefit local tourism in two ways, through environmental education opportunities and enhanced river-based recreation areas following cleanup.

Outdoor Recreation

The Rest of River cleanup will directly impact recreational uses along sections of the Housatonic River. The most significant area of cleanup (from Pittsfield to Woods Pond) is also the most heavily used section of the river. Options that could help to mitigate these impacts include:

- Within each area of cleanup, cleanup plans could specify when particular sub-areas could be available for recreational use, reducing the duration of recreational use restrictions.

- Educational materials could guide recreational users downstream to hunt, fish and boat on other sections of the river during initial phases of the cleanup. As cleanup activities move downstream, recreational users could move back upstream to cleaned-up portions of the river.

Aesthetics

There is limited information available to assess potential aesthetic impacts of the Rest of River cleanup on specific sections of the Housatonic River. A viewshed analysis could better determine any potential visual impacts.

Employment

Assuming off-site disposal, the moderate removal option is expected to create about 50 cleanup jobs for 14 years; the minimal removal and extensive removal options are expected to create about 40 cleanup jobs, for five and 52 years, respectively. *If on-site disposal is selected*, about 90 cleanup jobs would be created under the minimal removal and moderate removal options; the extensive removal option would create about 60 cleanup jobs. Slightly more than half of these jobs are expected to be filled by local residents. Including indirect employment created by the cleanup project, about 70–100 new jobs are estimated assuming off-site disposal, and about 120–170 new jobs assuming on-site disposal. Local contractors and vendors are expected to receive $11 to $113 million in new spending from the cleanup project. Non-local cleanup workers are expected to contribute $16,000–42,000 per year in local room occupancy and meals taxes.

Property Values

The Rest of River cleanup is estimated to have a long-term positive effect of $0–795 million on property values in the study area, with nearly all of the effect coming from residential properties. The positive effect on property tax revenues could range from $0 to $11 million annually, based on current tax rates. Conversely, on-site disposal could have a negative effect on property values near the potential landfill locations of about $20–40 million per landfill. It is possible that property values may decline temporarily during the cleanup project; this potential temporary decline is estimated to range from $0 to $397 million, which would lead to a decline of $0 to $5.6 million in annual property tax revenues during the cleanup operation.

Table 1. Summary of findings.

	No removal	Minimal removal	Moderate removal	Extensive removal
Duration of project (years)	0	5	14	52
Removal volume (cubic yards)	0	267,700	1,098,000	2,902,000
Miles of riverbank affected	0	1.6	14	14
Acres impacted				
remediation	0	76	444	728
access roads/staging areas	0	36	80	97
Traffic Impacts				
Daily truck trips				
off-site disposal	0	32	68	51
on-site disposal	0	34	69	51
Annual costs (pavement damage, congestion, crashes, noise)				
off-site disposal via Turnpike	$0	$4,800	$10,000	$7,600
off-site disposal via a possible rail loading site	$0	$3,200	$7,900	$5,900
Woods Pond landfill	$0	$3,400	$8,000	$7,200[1]
Forest Street landfill	$0	$5,000	$11,000	
Rising Pond landfill	$0	$7,500	$14,000	$10,000
Non-fatal injuries				
off-site disposal via Turnpike	0	7.3	31	78
on-site disposal or off-site disposal via rail	0	1.1	5.5	11
Fatalities				
off-site disposal via Turnpike	0	0.34	1.4	3.7
on-site disposal or off-site disposal via rail	0	0.05	0.26	0.52
Outdoor Recreation Impacts				
Cost of reduction in guided boating trips (annual)	$0	← $18,000–51,000 →		
Employment Impacts				
Cleanup jobs created				
off-site disposal	0	36	53	40
on-site disposal	0	92	93	64
Indirect jobs created				
off-site disposal	0	31	46	34
on-site disposal	0	79	81	55
Spending on local contractors and vendors	$600,000	$11,500,000	$48,400,000	$112,700,000
Annual room occupancy and meals tax revenues				
off-site disposal	$0	$16,000	$24,000	$18,000
on-site disposal	$0	$42,000	$42,000	$29,000

[1] If the extensive removal and on-site disposal options are chosen, then either the Rising Pond landfill or ***both*** of the other two landfills would have to be used, to accommodate the volume of material excavated under the extensive removal option.

	No removal	Minimal removal	Moderate removal	Extensive removal
Property Value Impacts				
Long-term effect near river				
residential property value	slightly negative	← $0–724 million increase →		
commercial, industrial and agricultural property value	slightly negative	← $0–71 million increase →		
annual property tax revenue	slightly negative	← $0–11 million increase →		
Temporary **negative** effect due to cleanup				
residential property value	N/A	← $0–362 million decrease →		
commercial, industrial and agricultural property value	N/A	← $0–36 million decrease →		
annual property tax revenue	N/A	← $0–5.6 million decrease →		
Long-term **negative** effect on property values near potential landfill locations				
Woods Pond	$0	← $43 million decrease →		
Forest Street	$0	← $23 million decrease →		
Rising Pond	$0	← $29 million decrease →		

Comments from the Communities

After reviewing this report, the six Rest of River municipalities submitted comments about the report to EPA; the comments are presented below.

August 31, 2012

Mr. Curt Spalding, Regional Administrator
Environmental Protection Agency, Region 1
5 Post Office Square - Suite 100
Boston, MA 02109-3912

Re: Cleanup of the Housatonic "Rest of River" Socioeconomic Impact Study

Dear Mr. Spalding

The communities of Pittsfield, Lenox, Lee, Stockbridge, Great Barrington and Sheffield are working jointly to understand and begin to quantify the potential socioeconomic impacts of remediating PCBs in the Housatonic Rest of River. We first and foremost want to thank the U.S. EPA and Skeo Solutions for their assistance in this effort by providing us with the *Cleanup of the Housatonic "Rest of River" Socioeconomic Impact Study* (June 2012). This has been an absolutely critical first step for our communities as we prepare to evaluate the cleanup options that will be proposed by the EPA and General Electric (GE). The Study presents a good framework upon which the six communities may expand and hold conversations with residents, the business community, GE and the regulatory agencies.

While the Rest of River communities view this Study as a good foundation upon which to build, we feel the need to clearly state that, in our opinions, the data and calculations presented in this Study underestimate the socioeconomic impacts that can be expected to be experienced by our communities during cleanup activities.

Specifically we believe:

- Traffic impacts and road damages are underestimated;
- Critical data gaps persist in the areas of tourism and outdoor recreation impacts;
- Multiplier effects have not been calculated for the economic impacts to outdoor recreation and the loss of Lane Construction Corporation (in the event that the site becomes an on-site disposal area); and
- Assumptions that serve as illustrative examples should be based on previous research.

We are concerned that underestimations and gaps in data could lead some readers of this Study, and possibly interested parties, to invalid conclusions. To ensure this Study is seen for its true value – a starting point and foundation upon which to continue to research and build – ***the Rest of River communities respectfully request that this letter and its attached comments be permanently inserted into the Study immediately after the Executive Summary so that readers are easily aware of the comments and next steps being proposed by the Rest of River communities.*** This location within the document will help inform those readers who focus their attentions largely on summaries and tables.

The Study was an ambitious undertaking. Despite its shortcomings due to data gaps, the general conclusion that the Rest of River communities will experience negative economic impacts during cleanup activities remains valid. Although not yet complete, the impacts that have been identified so far are quite significant, and they will need to be addressed.

We believe the attached comments and recommendations will help provide the next steps in shaping future research and developing a more accurate portrayal of socioeconomic impacts and costs associated with the cleanup. The comments and recommendations were developed by a working group representing the six communities, supported by the Berkshire Regional Planning Commission. We welcome the opportunity to work with local and regional stakeholders, the EPA and its consultants to bridge data gaps, where possible, in an effort to quantify the impacts that cleanup activities will have on our communities. This will provide vital information to better inform the decision-making process regarding the appropriate level of clean-up and will provide us with the framework for a well-reasoned community compensatory component of the clean up. The socioeconomic impacts to our communities and the region due to clean-up activities are substantial, and the communities cannot afford to absorb them without compensation.

Sincerely,

Mayor Daniel Bianchi, City of Pittsfield

Lenox Select Board Chair

Lee Select Board Chair

Stockbridge Select Board Chair

Great Barrington Select Board Chair

Sheffield Select Board Chair

CC: Hon. John Kerry, US Senator
Hon. Scott Brown, US Senator
Hon. John Olver, US Representative
Hon. Deval Patrick, Mass. Governor
Hon. Benjamin Downing, State Senator
Hon. Smitty Pignatelli, State Representative
Hon. Trisha Farley-Bouvier, State Representative
Sec. Richard Sullivan, Jr., Mass. Exec. Office of Energy and Environmental Affairs
Jim Murphy, EPA Team Leader, Government & Community Relations
Dean Tagliaferro, EPA Project Manager for GE-Pittsfield/Housatonic River Site
Michael Hancox, Skeo Solutions
Hagai Nassau, Skeo Solutions

ATTACHMENT

Rest of River Comments and Recommendations
On the Cleanup of the Housatonic "Rest of River" Socioeconomic Impact Study

August 31, 2012

The Rest of River communities believe the following comments and recommendations will help shape further research and establish a foundation for a more accurate portrayal of potential socioeconomic impacts associated with the cleanup. We welcome the opportunity to work with local and regional stakeholders, the EPA and its consultants to bridge data gaps, where possible, in an effort to quantify to the greatest feasible degree the potential impacts that cleanup activities will have on our communities.

Mitigation recommendations

Comment: We appreciate the potential mitigation strategies and opportunities that were presented in the traffic and tourism sections of the study. The Rest of River communities are interested in identifying mitigation strategies that could lessen the effects of negative impacts, while also identifying key opportunities that could turn negative impacts into community benefits. For example, a mitigation recommendation for tourism-related impacts may include conducting a robust tourist marketing campaign to draw additional people to the area to offset those who might avoid the area during construction. Another example of creating a community benefit might be to locate construction access roads and staging areas in a way that they could later serve as bicycle paths and park amenities.

Recommendation: The Rest of River communities, partnering with the EPA, continue to identify and create a more comprehensive list of mitigation strategies and opportunities for community benefits and develop cost estimates for their implementation. For example, if annual tourism spending is expected to be reduced for years during cleanup activities, an evaluation should be done to determine what can be done and what the associated cost would be to draw additional people to the area to offset forecasted spending losses.

Traffic Impacts

Comment: We strongly believe that the Study underestimates traffic impacts.

1. We note that the costs associated with heavy truck traffic were calculated using "rural interstate" or "rural highway" as a road category, which is not the appropriate category for any of the local roads being considered in the CMS, as shown in Figure 1 of the Study. Rural interstate highways, expecting greater heavy truck traffic, are designed and constructed to withstand the weight and wear of heavy trucks, while local roads are not constructed to

these standards, but are constructed to withstand lesser impacts. As such, we believe the local road systems will experience much greater damages than presented in the Study. We also believe congestion and noise impacts are underestimated by using the rural interstate/highway category in this analysis.

2. The Study excluded traffic-related air pollution costs, claiming that health effects were outside the scope of the socioeconomic study. We disagree with this approach. While we agree that health impacts from existing PCBs are considered outside the scope of the Study, we believe the health impacts from increased truck traffic are very much within the scope of the Study. There are numerous studies quantifying the cost of traffic-generated air pollution, and these can be used to determine costs for each of the removal and disposal alternatives.

Recommendation: The Berkshire Regional Planning Commission will work with the EPA to recalculate potential traffic-related costs. To more accurately predict road damages and noise impacts, costs imposed by 20-ton trucks should be calculated using local, collector and arterial road classifications. Include traffic-related health impact costs in the recalculations.

Tourism

Comment: We believe that there are unaccounted for economic losses associated with the projected decline in tourism. According to a Berkshire Visitor Bureau visitor survey, Scenic Beauty was the number one reason cited for "....playing a role in the selection of the Berkshires as a destination..." The region's scenic beauty is largely composed of New England towns and villages surrounded by a landscape of natural idyllic beauty. It is therefore important that the region's brand of possessing remarkable scenic beauty be preserved. This includes not only the existing scenery beauty but the *perception* that the region possesses scenic beauty. Whether the cleanup will affect visitors' perception of the Berkshires is still unexplored and undetermined.

We also believe that the potential nexus between cleanup-generated traffic and tourism (increased heavy trucks, noise and dust on truck routes) has not been sufficiently investigated. The increased impacts to traffic congestion in or near main visitor sites (e.g. Tanglewood, Lenox and Stockbridge centers) *during the height of the tourist season* have not been addressed.

Recommendation: Engage the services of a tourism consultant to investigate if and how cleanup activities could potentially impact the region's brand. This consultant should be versed in traveler psychology and marketing, and in a position to validate or refine the illustrative assumption of 2% and 10% reductions in tourism that Skeo Solutions cites as potential impacts. If a marketing or media campaign is deemed necessary to maintain the brand, develop cost estimates and strategies to implement such a campaign.

Skeo Solutions was not able to locate empirical studies that quantified the effects of a comparable cleanup project on the area's tourism. As such, we recommend putting aside the contamination aspect of the project and focusing on the construction aspect of the project. Perhaps studies have quantified the socioeconomic impacts of a large and prolonged construction project on an area's tourism. Many of the truck traffic impacts predicted for Rest of River communities may be comparable to building a large new highway or other large construction site and, if so, could begin to bridge the data gaps which continue to persist on this topic.

Outdoor Recreation

Comment: We do not believe all the potential outdoor recreation losses due to cleanup activities in the Rest of River corridor have been quantified. The Study used a value of $57.20 per boat trip when calculating potential losses to guides and outfitters in the area, instead of using actual fees these guides and outfitters charge. For example, The Arcadian Shop in Lenox charges $100 for delivery of two kayaks (without guide) to the Decker Boat launch on New Lenox Road. Also, the Study does not attempt to capture the economic losses that would be suffered by other businesses that cater to outdoor recreationists. At a minimum quantifying equipment and trip-related (food, lodging, transportation, sundries) expenditures of recreationists should have been attempted and should be included as this data is readily available.

The Berkshire Visitor Bureau estimates 2.6 million tourists visit the region each year. The Bureau's survey indicates that 42% of visitors to the region engaged in outdoor recreation while they were here. Of these, 25% hiked and 3% canoed. While we do not know how many of these visitors hiked or paddled in the Rest of River corridor, we do know that this section of the Housatonic River is the most popular stretch of river for both visitors and local residents alike.

Recommendation: Collect data on the outdoor recreationists that utilize the Rest of River corridor, including the numbers and places of residence of hikers, paddlers, and hunters. We view the lack of this information on the numbers of people who recreate in this stretch of river as a serious data gap. Outdoor recreation organizations and outfitters, along with the Rest of River communities and other stakeholder groups, could work cooperatively with the EPA and its consultants to gather the information. Students from local colleges could be enlisted to tabulate the data for analysis.

Property Values

Comment: The Rest of River communities seek to reduce the range of variability offered in the Study in the prediction of potential property value declines during cleanup activities. The Study estimates the decline in property values on residential properties within a three-mile range of the river could range from $0 to $362 million for residential properties and $0 to $36 million in commercial/industrial properties during the life of the cleanup. Because the decline in property values are inexorably tied to declines in municipal tax revenues and would in many other ways reverberate throughout the regional economy, this is an area that should be investigated more thoroughly.

Recommendation: Continue to search for data that narrow the variability offered in the Study. Cleanup activities have occurred over the course of several years in the first 2.5 miles of the river in the City of Pittsfield. Pre-and post-cleanup property values for these properties, taken from existing assessor and realtor records, could be utilized to gain a better understanding of the magnitude of impact that properties downstream may experience. Since property values vary greatly along the Rest of the River cleanup area, we recommend efforts concentrate on the percentage, rather than dollar, differences for pre-and post-cleanup property values.

Loss of Lane Construction Corporation

Comment: The employment impact section does not quantify the direct and indirect economic losses resulting from the closing of Lane Construction Corporation in Lee (in the event that this site becomes an on-site landfill). This company is an important community asset, not only because it provides jobs, pays taxes and contributes to the local economy, but also because it is a producer of sand, gravel and asphalt for the entire Berkshire region. Unless Lane Construction was able to relocate in Lee or a neighboring community, which should not be an automatic assumption either way, the loss of this corporation may have repercussions throughout the county's construction industry. As an example, the reduction in competition for supplying sand, gravel and asphalt would presumably have an impact on the costs for such materials.

Recommendation: Conduct an analysis to quantify the direct and multiplier effect costs associated with the loss of Lane Construction Corporation, as well as the likelihood of relocation options. Compare these figures to the net economic impacts of an on-site landfill for PCB contaminated materials.

Aesthetic Impacts

Comment: The Study concluded the information available to assess potential aesthetic impacts of a river cleanup is limited, but we believe this subject warrants more investigation.

Recommendation: The Study recommends in its findings that a viewshed analysis could better determine visual impacts, and we agree. Therefore, we would like to work with the EPA to undertake a viewshed analysis that would assess aesthetic impacts both during construction and post-construction. This analysis should include photographic simulations of the river corridor as post-construction vegetative cover returns over several decades. Sites selected for analyses should include popular recreational sites (e.g. Decker canoe launch, Woods Pond pedestrian bridge, Post Farm and others) and selected residential properties directly affected by cleanup activities.

Residential Quality of Life

Comment: Hundreds of residences along the Rest of the River will have their quality of life impacted during the remediation process and for several years after restoration work is completed. While some of these impacts have been identified under Aesthetic Impacts, more thought needs to be given to the type, magnitude, and duration of disruption and identification of potential mitigation strategies.

Recommendation: Engage the services of a land use consultant experienced with site plan development and review of large-scale projects to assist the communities in evaluating these impacts and identifying potential mitigation strategies.

INTRODUCTION

General Electric (GE) is in the process of cleaning up the Housatonic River in western Massachusetts and Connecticut, pursuant to a 1998 consent decree. The part of the site called Rest of River extends from the confluence of the East and West Branches in Pittsfield, downstream to the Long Island Sound. GE submitted a *Revised Corrective Measures Study Report* (the *Revised CMS*) for the Rest of River in October 2010. The next step in the Rest of River cleanup process will be the U.S. Environmental Protection Agency's (EPA's) proposal of its preferred cleanup plan, based on the *Revised CMS* and other information. EPA will then accept comments on the proposed plan during a formal public comment period.

Some community members are concerned about potential socioeconomic impacts that may be caused by the Rest of River cleanup. These concerns include impacts on traffic, tourism, outdoor recreation and property values. This report summarizes potential socioeconomic impacts of several cleanup options, so that members of the public will be better informed as they consider, and comment on, EPA's proposed plan.

Skeo Solutions conducted this study to identify, and where possible quantify, the socioeconomic impacts that could potentially result from several cleanup options for the Housatonic Rest of River project. The study also evaluates the socioeconomic impacts of potential waste disposal methods, including disposal at an off-site landfill and disposal at an on-site upland landfill. This study does not include potential health effects that may occur due to the cleanup, nor does it include impacts due to the contamination of the river. The study focuses on the six Rest of River municipalities in Massachusetts: Pittsfield, Lenox, Lee, Stockbridge, Great Barrington and Sheffield. Although EPA funded this study, EPA did not direct the research or its conclusions. Much of this study relies on estimates and data from the *Revised CMS*.

Cleanup Options

This study evaluates the predicted socioeconomic impacts that could occur under the following excavation options:

1. **No removal option**: no river channel, riverbank or floodplain sediment and soil removal (the SED 2/FP 1 remedial alternative in the *Revised CMS*).

2. **Minimal removal option**: minimally extensive river channel, riverbank and floodplain sediment and soil removal (the SED 10/FP 9 remedial alternative in the *Revised CMS*). Construction would take five years and affect 76 acres.

3. **Moderate removal option**: moderately extensive river channel, riverbank and floodplain sediment and soil removal (the SED 9/FP 8 remedial alternative in the *Revised CMS*). Construction would take 14 years and affect 444 acres.

4. **Extensive removal option**: extensive river channel, riverbank and floodplain sediment and soil removal (the SED 8/FP 7 remedial alternative in the *Revised CMS*). Construction would take 52 years and affect 728 acres.

The *Revised CMS* contains maps that are useful for comparing the relative intensity of these excavation options (Figures 8-7, 8-9 and 8-11). For the reader's convenience, these maps are included at the end of this report.

Disposal Options

For the three excavation options above that entail soil and sediment removal (#2, #3 and #4), this study evaluates the predicted socioeconomic impacts that would occur under the following disposal options:

1. **Off-site landfill disposal** (the TD 1 disposal alternative in the *Revised CMS*). Both rail and truck transportation are considered.

2. **On-site landfill disposal** in an upland disposal facility near the Housatonic River (the TD 3 disposal alternative in the *Revised CMS*).

Socioeconomic Impacts Evaluated

The subsequent sections of this report describe the following categories of potential socioeconomic impacts:

- Traffic
- Native American sites
- Tourism
- Recreation
- Aesthetics
- Employment
- Property values

TRAFFIC IMPACTS

Community members are concerned about the potential impacts of cleanup-related truck traffic on mobility of non-cleanup traffic (motorized vehicles and bicycles), road safety, road and bridge conditions, air quality and property values along truck routes. As stated in the *Revised CMS*:

> Due to the need to deliver equipment to the work areas, remove excavated materials, and deliver capping, backfill, and bank stabilization materials to the site, truck traffic would increase substantially over current conditions. This additional traffic would increase the likelihood of accidents, noise levels, emissions of vehicle/equipment exhaust, and nuisance dust to the air, and would persist over the duration of remedial activities. (p. 8-64)

Reports have identified limited capacity, indirect routes, steep grades and a lack of limited access freeways as significant limitations of the road transportation network in the Rest of River area. As described in the 2011 *Berkshire Comprehensive Economic Development Strategy*:

> The Massachusetts Turnpike runs east-west across the region, with a full interchange in Lee and a half interchange in West Stockbridge. Other east-west and the north-south routes across the region are winding roads with significant grade changes and flow interruptions … There are occasional three (3) and four (4) lane sections of road on the region's arterials that allow for passing. The lack of limited access freeways and land use conflicts contribute to congestion. This is a significant transportation limitation to economic development and regional competitiveness. (p. 48)[2]

All of the cleanup options except for the no removal option would involve truck traffic for various purposes: hauling excavated materials from the river and floodplain to staging areas; hauling excavated materials from staging areas to disposal facilities; and delivering equipment and capping, backfill and bank stabilization materials. The bulk of the excavation would take place between the confluence and Woods Pond Dam (Reaches 5 and 6; see Figure 1), so this traffic analysis focuses on trucks hauling supplies to those reaches, and trucks hauling excavated materials from those reaches to an off-site disposal area via the Massachusetts Turnpike, to a rail loading site, or to the three proposed local disposal areas.

Table 2 below presents the estimated number of daily truck trips for each of the four cleanup options considered in this study, under both off- and on-site disposal options. These estimates assume 198 working days per year (*Revised CMS*, p. 3-20). Note that these daily truck trips would last for various numbers of years, depending on the duration of the cleanup option. For instance, the moderate removal cleanup option, assuming off-site disposal, would produce an estimated 68 daily truck trips for 14 years. Also, although the moderate removal option would create the greatest number of truck trips per day, this cleanup option would last fewer years than the extensive removal option (14 vs. 52 years), so the moderate removal option would create far fewer total truck trips over the duration of the cleanup project than the extensive removal option.

[2] Berkshire Regional Planning Commission. 2011. *Berkshire Comprehensive Economic Development Strategy.* http://www.berkshireplanning.org/economic/2011_berkshire_ceds.html.

Table 2 does not include truck trips to transport excavated materials from the river and floodplain to the staging areas, because those trips would mainly occur on access roads rather than public roads. See the *Revised CMS* figures provided at the end of this report for the proposed locations of access roads and staging areas.

Table 2. Estimate of average daily truck trips.[3]

	No removal	Minimal removal	Moderate removal	Extensive removal
Duration of project (years)	N/A	5	14	52
Transporting excavated materials from the staging areas to the off- or on-site disposal facilities or the rail loading site[4]	0	22	33	24
Delivering capping, backfill and bank stabilization materials to the remediation areas[5]	0	10	35	27
Daily truck trips under *off-site disposal* option	**0**	**32**	**68**	**51**
Transporting materials for construction and closure of on-site landfill(s)	0	2.1[6]	1.2[7]	0.5[8]
Daily truck trips under *on-site disposal* option	**0**	**34**	**69**	**51**

The *Revised CMS* proposes the following truck routes:

> The Woods Pond Site is approximately 0.3 miles south of the PSA [primary study area], which is the area where most of the sediment and soil removal activities would occur. If

[3] For all tables in this report, numbers are rounded, so they may appear to sum incorrectly.
[4] *Revised CMS*, Table 8-30, p. 8-65. Converted to daily estimates using assumption of 198 working days per year (*Revised CMS*, p. 3-20).
[5] See footnote above.
[6] 2.1 truck trips per day = 2,034 truck trips ÷ 5 year project duration ÷ 198 working days per year (*Revised CMS*, p. 3-20).
2,034 truck trips = 267,700 cubic yards excavated (*Revised CMS*, p. ES-12) ÷ 132 cubic yards landfilled per truck trip. 132 cubic yards landfilled per truck trip = 191,000 cubic yards excavated under SED 3/FP 2 (*Revised CMS*, Tables ES-2 and ES-4) ÷ 1,451 truck trips to transport materials for construction and closure of the Woods Pond landfill (*Revised CMS*, Table 9-2, p. 9-66). This calculation was carried out using data available in the *Revised CMS* that are most comparable to the minimal removal cleanup scenario: the SED 3/FP 2 excavation volume, disposed of at the Woods Pond site.
[7] 1.2 truck trips per day = 3,276 truck trips ÷ 14-year project duration ÷ 198 working days per year (*Revised CMS*, p. 3-20).
3,276 truck trips = 1,098,000 cubic yards excavated (*Revised CMS*, p. ES-12) ÷ average of 132 and 539 cubic yards landfilled per truck trip. See footnote above for calculation of 132 cubic yards landfilled per truck trip.
539 cubic yards landfilled per truck trip = 2,902,000 cubic yards excavated under SED 8/FP 7 (*Revised CMS*, Table ES-5) ÷ 5,387 truck trips to transport materials for construction and closure of the Rising Pond landfill (*Revised CMS*, Table 9-2, p. 9-66). Because the moderate removal scenario would entail an excavation volume midway between the lower-bound (SED 3/FP 2) and upper-bound (SED 8/FP 7) estimates presented in the *Revised CMS* (Table 9-2, p. 9-66), this calculation used the average of 132 and 539 cubic yards landfilled per truck trip.
[8] 0.5 truck trips per day = 5,387 truck trips (*Revised CMS*, Table 9-2, p. 9-66) ÷ 52-year project duration ÷ 198 working days per year (*Revised CMS*, p. 3-20). This calculation used the *Revised CMS*'s estimate of truck trips to import supplies to the Rising Pond landfill (5,387 truck trips) because the Rising Pond landfill is the only proposed on-site landfill large enough to contain the excavation volume under the extensive removal cleanup scenario.

> TD 3 were implemented at the Woods Pond Site, truck traffic from the PSA would primarily be routed along Woodland Road and East Street.[9]
>
> The Forest Street Site is approximately 3.9 miles away from the PSA. Although the Forest Street Site is located in Lee, trucks would bypass the downtown area to the extent practicable. Truck traffic from the PSA to the Forest Street Site would be expected to travel predominantly on Woodland Road, East Street, and Mill Street.
>
> The Rising Pond Site is approximately 14 miles by road south of the PSA. Truck traffic from the PSA to the Rising Pond Site would likely travel through Lenox and Stockbridge. (p. 9-65)

This study assumes that, for the off-site disposal via truck option, trucks would be routed to the Turnpike's interchange in Lee by way of Mill Street to East Street to Maple Street to Chapel Street to Water Street. Figure 1 below shows representative road locations that may be affected by one or more disposal options. Table 3 below presents estimates of the potential increases in total traffic and truck traffic for these selected road locations.

As shown in Table 3, the estimated increase in total traffic ranges from 0 percent under the no removal option to 17 percent under the moderate removal option with disposal at the Forest Street location. Looking at truck traffic only, the estimated increases range from 0 percent to 267 percent for the moderate removal option with disposal at the Forest Street location. Once again, it is important to note that the increased traffic will persist for different numbers of years, depending on the duration of the cleanup option (0, 5, 14 or 52 years).

The *Revised CMS* states that off-site disposal via rail is technically feasible (see *Revised CMS* Appendix B). Trucks would haul excavated materials from the river and floodplain to temporary staging areas near the river (see Figures 8-7, 8-9 and 8-11), and then from the staging areas to a single rail loading site. The *Revised CMS* does not identify a proposed location for the rail loading site. Assuming that the rail loading site would be near Reach 5 (where most of the excavation would occur), the truck traffic impacts from the rail option would be approximated by Table 3's "All Disposal Options" rows. Depending on the location chosen for the rail loading site, the rail option could avoid the large increases in truck traffic on East Street in Lee that would be imposed by trucks traveling to the Turnpike.

[9] The *Revised CMS* defines the primary study area as the portion of the Rest of River site between the confluence and Woods Pond Dam.

Figure 1. Traffic points (numbered green circles correspond to the map labels given on Table 3).

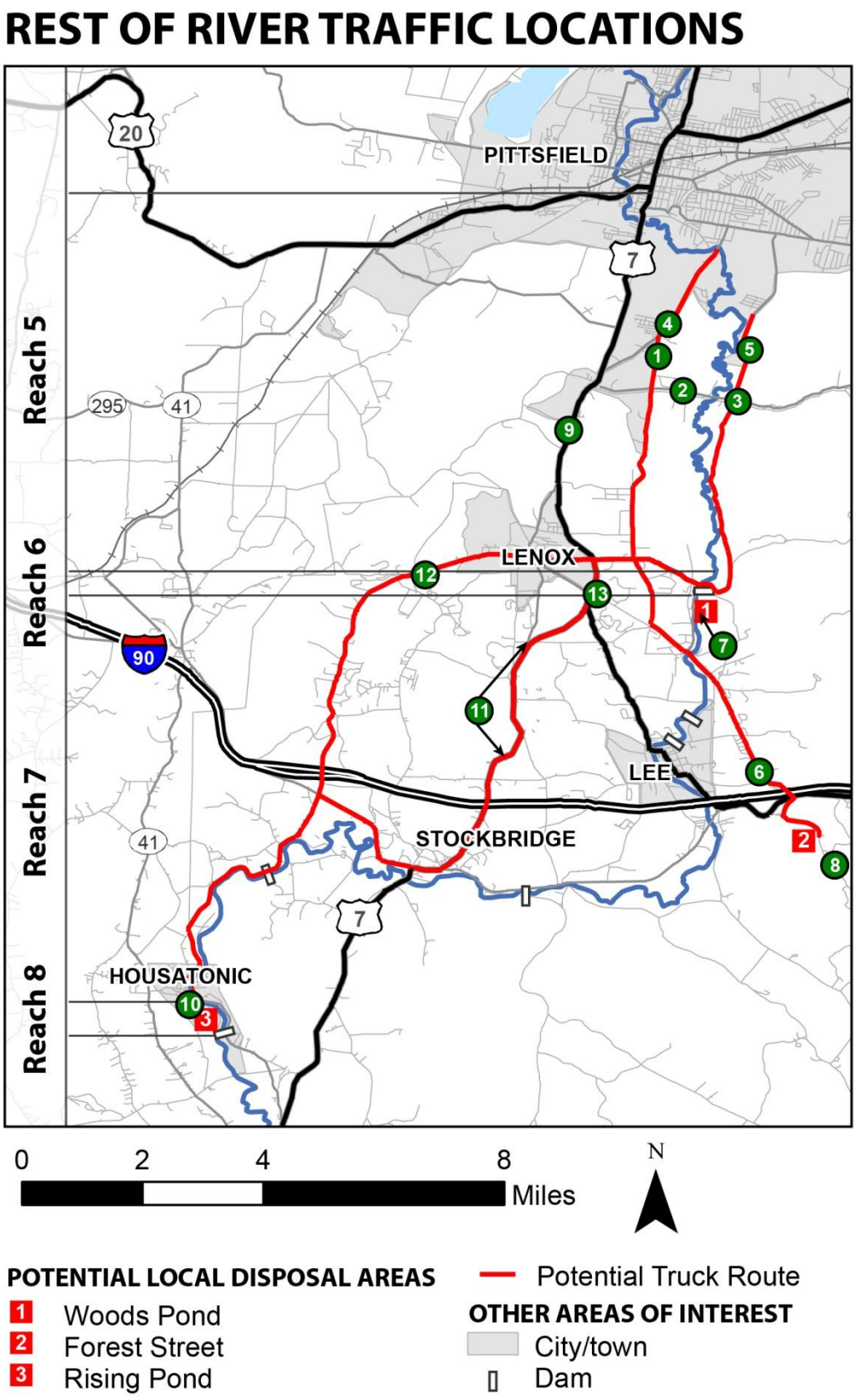


Table 3. Estimate of potential increases in traffic.

Map label	Location	Current traffic		Potential increase in traffic							
				No removal		Minimal removal		Moderate removal		Extensive removal	
		total daily traffic[10]	% trucks[11]	total traffic	truck traffic	total traffic	truck traffic	total traffic	truck traffic	total traffic	truck traffic
All disposal options (road locations near Reach 5), including off-site disposal via rail[12]											
1	East Street at Lenox/Pittsfield line	5,839	2%	0%	0%	1%	29%	1%	59%	1%	44%
2	New Lenox Road, west of river	1,800	N/A	0%	0%	2%	N/A	4%	N/A	3%	N/A
3	New Lenox Road, east of river	888	N/A	0%	0%	4%	N/A	8%	N/A	6%	N/A
4	Holmes Road in Pittsfield, between Plumb Street and Chapman Road	10,000	2%	0%	0%	0%	17%	1%	35%	1%	26%
5	East New Lenox Road in Pittsfield, near Lenox line	1,300	N/A	0%	0%	3%	N/A	5%	N/A	4%	N/A
Off-site disposal via Turnpike											
6	East Street in Lee, north of Maple Street	1,300	2%	0%	0%	2%	122%	5%	262%	4%	194%
Woods Pond landfill											
7	Valley Street in Lenox	730	N/A	0%	0%	5%	N/A	10%	N/A	7%	N/A
Forest Street landfill											
6	East Street in Lee, north of Maple Street	1,300	2%	0%	0%	3%	130%	5%	267%	4%	196%
8	Goose Pond Road in Tyringham, north of Lakeside Drive	420[13]	N/A	0%	0%	8%	N/A	17%	N/A	12%	N/A
Rising Pond landfill											
9	Route 7/20 in Lenox, north of Route 7A junction	31,782	N/A	0%	0%	0%	N/A	0%	N/A	0%	N/A
10	Van Deusenville Road in Great Barrington	1,900	N/A	0%	0%	2%	N/A	4%	N/A	3%	N/A
route via downtown Stockbridge											
11	Route 7, north of Summer Street; and Route 7, north of Devon Road	8,939	3.5%	0%	0%	0%	11%	1%	22%	1%	16%
route via downtown Lenox											
12	Route 183 (West Street) in Lenox, east and west of Under Mountain Road	3,772	3%	0%	0%	1%	30%	2%	61%	1%	45%
13	Walker Street in Lenox, south of Route 7	3,100	N/A	0%	0%	1%	N/A	2%	N/A	2%	N/A

[10] Unless otherwise noted, total daily traffic counts were obtained from the Massachusetts Department of Transportation's (MassDOT's) Transportation Data Management System. Accessed at: http://mhd.ms2soft.com/tcds/tsearch.asp?loc=Mhd&mod via http://www.mhd.state.ma.us/default.asp?pgid=content/traffic01&sid=about on March 5, 2012.
[11] MassDOT. 2009. Truck Peak Hour & Average Day History for 2002–2009. Accessed at: http://www.mhd.state.ma.us/downloads/trafficCounts/TRUCKHIST2009.ZIP (via http://www.mhd.state.ma.us/default.asp?pgid=content/traffic01&sid=about) on February 21, 2012. "N/A" indicates truck traffic data was not available for that location.
[12] The *Revised CMS* does not identify a rail loading site. This study assumes that a rail loading site can be identified within five miles from the center of the primary cleanup area.
[13] Berkshire Regional Planning Commission Local Traffic Counts 1977–2011. Accessed at: http://www.berkshireplanning.org/data/local_traffic_counts.html on February 21, 2012.

Traffic-Related Costs

Table 4 below presents the cost per mile for a 20-ton truck on a rural interstate, from the most recent federal Highway Cost Allocation Study. These include costs due to pavement damage, congestion, crashes and noise:

> Pavement costs represent the contribution of a mile of travel by different vehicles to pavement deterioration and the costs of repairing the damage. Congestion costs reflect the value of added travel time due to additional small increments of traffic. Crash costs include medical costs, property damage, lost productivity, pain and suffering, and other costs associated with highway crashes… Noise costs reflect changes in the value of adjacent properties caused by motor vehicle-related noise.[14]

The Highway Cost Allocation Study presents costs per mile for trucks of various weights. This study uses the figures for a 40 kip (20-ton) 4-axle single unit truck on a rural interstate because these most closely approximate the 16- and 20-ton trucks described in the *Revised CMS*. The Highway Cost Allocation Study also includes an air pollution cost of 3.85 cents per mile for "premature death, illness, and other effects of various highway-related emissions." This study excludes the air pollution costs because health effects are outside the scope of this study.

Table 4. Costs imposed by a 20-ton truck on a rural highway.[15]

	Cents per Mile
Pavement	1.0
Congestion	2.45
Crash	0.47
Noise	0.09
Total	**4.01**

Table 5 below presents estimates of the average annual miles that would be traveled by trucks under the various cleanup and disposal options. The mileage estimates in Table 5 include only the miles traveled within the study area (defined as the city of Pittsfield and the towns of Lenox, Lee, Stockbridge, Great Barrington and Sheffield, not including travel on the Turnpike).

[14] "Addendum to the 1997 Federal Highway Cost Allocation Study Final Report," U.S. Department of Transportation, Federal Highway Administration, May 2000. http://www.fhwa.dot.gov/policy/hcas/addendum.htm.
[15] "Addendum to the 1997 Federal Highway Cost Allocation Study Final Report," Table 13.

Table 5. Estimated annual truck miles within the study area.

	No removal	Minimal removal	Moderate removal	Extensive removal
Transporting excavated materials from the staging areas to the off- or on-site disposal facilities				
average annual truck trips[16]	0	4,400	6,500	4,700
annual round trip miles *within the study area* for these various disposal options:[17]				
off-site via Turnpike (19 miles per round trip)[18]	0	83,600	123,500	89,300
off-site via a possible rail loading site (10 miles per round trip)[19]	0	44,000	65,000	47,000
Woods Pond landfill (10 miles per round trip)	0	44,000	65,000	62,667[20]
Forest Street landfill (20 miles per round trip)	0	88,000	130,000	
Rising Pond landfill (32 miles per round trip)	0	140,800	208,000	150,400
Delivering capping/backfill and bank stabilization materials to the remediation areas				
average annual truck trips[21]	0	1,900	7,000	5,300
annual round trip miles *within the study area* (19 miles per round trip)[22]	0	36,100	133,000	100,700
Transporting materials for construction and closure of the on-site landfill				
average annual truck trips	0	407	234	varies[23]
annual round trip miles *within the study area* for these various disposal options:[24]				
Woods Pond landfill (10 miles per round trip)	0	4,067	2,340	15,420[25]
Forest Street landfill (4 miles per round trip)	0	1,627	936	
Rising Pond landfill (24 miles per round trip)	0	9,762	5,616	2,486
Total annual round trip miles *within the study area* for these various disposal options:				
off-site disposal via Turnpike	0	119,700	256,500	190,000
off-site disposal via a possible rail loading site	0	80,100	198,000	147,700
Woods Pond landfill	0	84,167	200,340	178,787[26]
Forest Street landfill	0	125,727	263,936	
Rising Pond landfill	0	186,662	346,616	253,586

[16] *Revised CMS*, Table 8-30 (p. 8-65).
[17] Mileages estimated from center of primary cleanup area (New Lenox Road).
[18] Mileage between center of primary cleanup area and the Lee interchange.
[19] The *Revised CMS* does not identify a rail loading site. This study assumes that a rail loading site can be identified within five miles from the center of the primary cleanup area.
[20] If extensive removal and on-site disposal are chosen, then either the Rising Pond landfill or ***both*** of the other two landfills would have to be used, to accommodate the volume of material excavated under the extensive removal option. Assumes 2/3 of trips go to Woods Pond location and 1/3 of trips go to Forest Street location.
[21] *Revised CMS*, Table 8-30 (p. 8-65).
[22] Assumes that materials would be trucked in from the Turnpike's Lee interchange.
[23] Average annual trips: 110 for Woods Pond location, 3,580 for Forest Street location (*Revised CMS*, Table 9-2 (p. 9-66)).
[24] Assumes that materials would be trucked in from the Turnpike's Lee interchange.
[25] See footnote 20.
[26] See footnote 20.

Table 6 below combines the mileage estimates from Table 5 and the cost per mile from Table 4 to calculate the annual cost of cleanup-related truck traffic under the various cleanup and disposal options. As shown in Table 6, the annual traffic-related costs range from $3,000 to $14,000, depending on the cleanup and disposal options selected. For all three cleanup options, the lowest traffic costs would be imposed by off-site disposal via rail. *This assumes that a rail loading location can be identified within five miles of the primary cleanup area.* Under the minimal and moderate cleanup options, on-site disposal at the Woods Pond landfill location is a very close second. The highest traffic costs would be imposed by the Rising Pond landfill location, due to its distance from the cleanup area.

Table 6. Estimated annual traffic cost due to pavement damage, congestion, crashes and noise *within the study area* for various disposal options.

	No removal	Minimal removal	Moderate removal	Extensive removal
Off-site disposal via Turnpike	$0	$4,800	$10,286	$7,619
Off-site disposal via a possible rail loading site	$0	$3,212	$7,940	$5,923
Woods Pond landfill	$0	$3,375	$8,034	$7,169[27]
Forest Street landfill	$0	$5,042	$10,584	
Rising Pond landfill	$0	$7,485	$13,899	$10,169

Road and Bridge Damage

Community members are concerned that cleanup-related truck traffic will damage local roads and bridges. Research has shown that a heavy truck causes far more pavement damage than a passenger car. The *2012 Berkshire Regional Transportation Plan* indicates that many roads in the cleanup area are already in fair or poor condition (p. III-5).[28] Cleanup traffic could heavily impact East Street in Lenox, which is in poor condition between New Lenox Road and Walker Street, as well as Walker Street in Lenox, stretches of which are in poor and very poor condition.

Based on the costs per mile presented in Table 4, one quarter of the total traffic costs presented in Table 6 are due to pavement damage. Therefore, the annual cost due to pavement damage would range from $1,000 to $3,000, depending on the cleanup and disposal options selected.

According to the Lee town administrator, the bridge on Mill Street over Washington Mountain Brook, just south of Washington Mountain Road, has failed. This is important because, in order to get to the potential Forest Street landfill or to the Turnpike, trucks would need to travel this route to avoid downtown Lee. The Lee public works superintendent estimates that repairs could cost $100,000.[29] The *Regional Transportation Plan* indicates that one other bridge in the cleanup area is structurally deficient (p. III-8). This bridge, in downtown Lee, does not appear to be on a route likely to be traveled by cleanup traffic. Other bridges in the area are classified as "functionally obsolete," which means they have no serious defects but have "outdated or sub-standard geometric features (lane or shoulder width, etc.)" (p. III-7).

[27] If the extensive removal and on-site disposal options are chosen, then either the Rising Pond landfill or ***both*** of the other two landfills would have to be used, to accommodate the volume of material excavated under the extensive removal option.
[28] http://www.berkshireplanning.org/transportation/documents/RTPIII-ExistingConditions8-31-11.pdf.
[29] "Bridge needs $100K repair." *The Berkshire Eagle*. February 7, 2012.

Property Values along Truck Routes

Some community members are concerned that increased truck traffic will decrease property values along truck routes. Empirical studies have shown that traffic volumes and traffic noise tend to decrease property values. This report's property value section monetizes the property value effects of the cleanup options and the potential creation of landfills. Since both of these actions (cleanup and filling of a landfill) include truck traffic, this study assumes that any decrease in property values along truck routes would be included within the property value effect estimated in the property value section.

Two percent of the traffic costs presented in Table 6 are attributable to the change in property values due to truck traffic noise. The total property value losses due to noise amount to $72 to $312.

Safety

The increased truck traffic during cleanup would increase the risk of traffic accidents. Table 7 below presents estimates of the number of injuries and fatalities that would occur due to traffic accidents under each of the cleanup options. These injuries and fatalities are calculated using the total number of miles traveled, not only the miles in the Rest of River area.

Table 7. Estimate of injuries and fatalities due to traffic accidents.[30]

	No removal	Minimal removal	Moderate removal	Extensive removal
On-site disposal or off-site disposal via rail				
Non-fatal injuries	0	1.1[31]	5.5[32]	11[33]
Fatalities	0	0.05[34]	0.26[35]	0.52[36]
Off-site disposal via Turnpike[37]				
Non-fatal injuries	0	7.3	31	78
Fatalities	0	0.34	1.4	3.7

[30] *Revised CMS*, Table 8-31, p. 8-66.
[31] 1.1 injuries = 1.09 injuries from SED 10/FP 9 (*Revised CMS*, Table 8-31, p. 8-66) + 0.04 injuries from TD 3.
0.04 injuries from TD 3 = 267,700 cubic yards excavated ÷ 6,366,667 cubic yards excavated per injury for TD 3 under SED 3/FP 2.
6,366,667 cubic yards excavated per injury for TD 3 under SED 3/FP 2 = 191,000 cubic yards excavated under SED 3/FP 2 ÷ 0.03 injuries for TD-3 at Woods Pond under SED 3/FP 2 (*Revised CMS*, Appendix N, Table N-21).
[32] 5.5 injuries = 5.43 injuries from SED 9/FP 8 (*Revised CMS*, Table 8-31, p. 8-66) + 0.08 injuries from TD 3.
0.08 injuries from TD 3 = 1,098,000 cubic yards excavated ÷ 14,344,872 cubic yards excavated per injury.
14,344,872 cubic yards excavated per injury (for moderate removal and on-site disposal) = average of 6,366,667 cubic yards excavated per injury for TD 3 under SED 3/FP 2 (see calculation in footnote above) and 22,323,077 cubic yards excavated per injury for TD 3 under SED 8/FP 7. Because the moderate removal scenario would entail an excavation volume midway between the minimum (SED 3/FP 2) and maximum (SED 8/FP 7) estimates presented in the *Revised CMS* (Appendix N, Table N-21), this calculation used an average value for cubic yards excavated per injury.
22,323,077 cubic yards excavated per injury (for extensive removal and on-site or rail disposal) = 2,902,000 cubic yards excavated under SED 8/FP 7 ÷ 0.13 injuries for TD-3 at Rising Pond under SED 8/FP 7 (*Revised CMS*, Appendix N, Table N-21).
[33] 11 injuries = 11 injuries from SED 8/FP 7 (*Revised CMS*, Table 8-31, p. 8-66) + 0.13 injuries from TD 3 at Rising Pond landfill (*Revised CMS*, Appendix N, Table N-21).
[34] 0.05 fatalities = 0.05 fatalities from SED 10/FP 9 (*Revised CMS*, Table 8-31, p. 8-66) + 0.003 fatalities from TD 3.
0.003 fatalities from TD 3 = 267,700 cubic yards excavated ÷ 95,500,000 cubic yards excavated per fatality for TD 3 under SED 3/FP 2.
95,500,000 cubic yards excavated per fatality for TD 3 under SED 3/FP 2 = 191,000 cubic yards excavated under SED 3/FP 2 ÷ 0.002 fatalities for TD-3 at Woods Pond under SED 3/FP 2 (*Revised CMS*, Appendix N, Table N-21).
[35] 0.26 fatalities = 0.25 fatalities from SED 9/FP 8 (*Revised CMS*, Table 8-31, p. 8-66) + 0.006 fatalities from TD 3.
0.006 fatalities from TD 3 = 1,098,000 cubic yards excavated ÷ 192,850,000 cubic yards excavated per fatality.
192,850,000 cubic yards excavated per fatality (for moderate removal and on-site or rail disposal) = average of 95,500,000 cubic yards excavated per fatality for TD 3 under SED 3/FP 2 (see calculation in footnote above) and 290,200,000 cubic yards excavated per fatality for TD 3 under SED 8/FP 7. Because the moderate removal scenario would entail an excavation volume midway between the minimum (SED 3/FP 2) and maximum (SED 8/FP 7) estimates presented in the *Revised CMS* (Appendix N, Table N-21), this calculation used an average value for cubic yards excavated per fatality.
290,200,000 cubic yards excavated per fatality (for extensive removal and on-site disposal) = 2,902,000 cubic yards excavated under SED 8/FP 7 ÷ 0.01 fatalities for TD-3 at Rising Pond under SED 8/FP 7 (*Revised CMS*, Appendix N, Table N-21).
[36] 0.52 fatalities = 0.51 fatalities from SED 8/FP 7 (*Revised CMS*, Table 8-31, p. 8-66) + 0.01 fatalities from TD 3 at Rising Pond landfill (*Revised CMS*, Appendix N, Table N-21).
[37] The calculations for off-site disposal via the Turnpike are analogous to the calculations presented for on-site disposal.

Mitigation

The following are several approaches that could be pursued to mitigate the impacts from truck traffic:

- Minimize the number of trips by reducing the volume of material to be excavated.
- Minimize the truck miles by either:
    - using the Housatonic Railroad to transport materials for disposal, provided that a suitable rail loading site can be located within several miles of the main cleanup area, or
    - disposing of materials at the nearest on-site landfill (the Woods Pond location).
- Coordinate among EPA, GE and the communities to select preferable truck routes and minimize truck traffic during major events.

Findings

The annual traffic-related costs are estimated to range from $3,000 to $14,000, depending on the cleanup and disposal options selected. For each cleanup option, the lowest traffic costs are associated with off-site disposal via rail or on-site disposal at the Woods Pond location. The average number of truck trips per day would be highest under the moderate removal option (about 70 per day, for 14 years), followed by the extensive removal option (about 50 per day, for 52 years) and the minimal removal option (about 30 per day, for five years). The average number of truck trips per day would be roughly the same under either on-site or off-site disposal. For most road locations, the increase in total traffic would be small (less than 10 percent); however, some locations would experience large increases. The increase in truck traffic would be most severe for on-site disposal at the Forest Street location, followed by off-site disposal via the Turnpike. Off-site disposal via the Turnpike is expected to cause significantly more injuries and fatalities than disposal via rail or on-site disposal, due to the large number of vehicle miles required.

IMPACTS ON NATIVE AMERICAN SITES

Overview

The Native American presence in Berkshire County stretches back several centuries, predating the arrival of European settlers in the eighteenth century. The Mohican family of the Algonkin Indians, who came from New York east over the Taconic mountains, first visited the valley for seasonal hunting and fishing and later were the first valley settlers. The Indians named the river "usi-a-di-en-uk" or Housatonnuck, which meant "beyond the mountain place."[38]

Within the Rest of River area, many Mohicans eventually settled in the Stockbridge area, established as a mission in 1734, chartered as Indian Town in 1737 and officially incorporated in 1739. Figures 2 and 3 document the community's establishment "for the Housatonic Indians" in 1736 and the significant number of Mohican property owners in Stockbridge in 1750. This area includes parts of modern-day West Stockbridge and Lenox as well as Stockbridge. While many Mohicans lived in Stockbridge, others continued to reside throughout the Rest of River area, including in and around present-day Great Barrington and Sheffield.

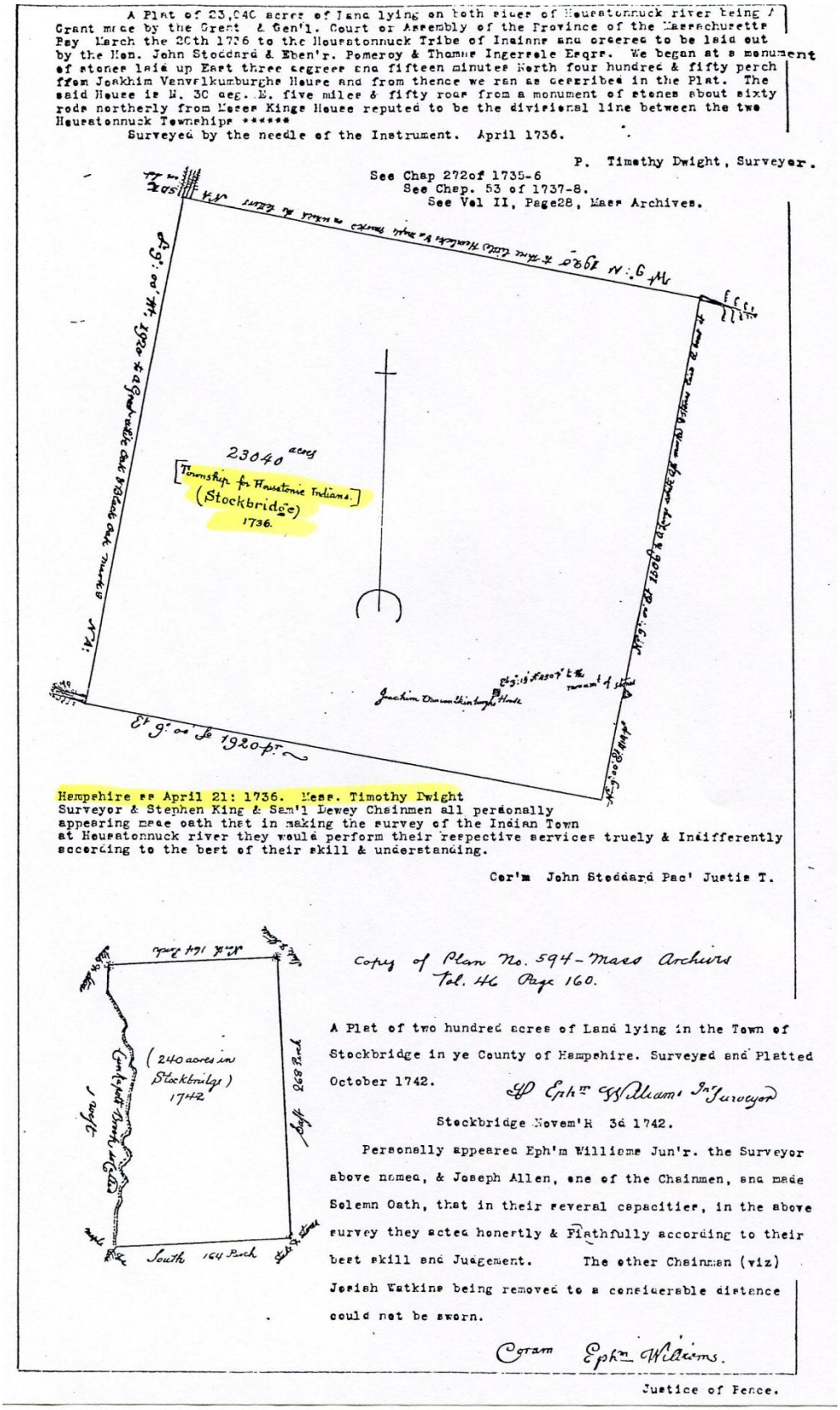
Some Mohicans migrated west to the community of New Stockbridge in western New York in the 1780s; most were forced by the federal government to relocate west to reservations in Wisconsin in the 1820s and 1830s with the Munsee. The two tribes formed the Stockbridge-Munsee Band of Mohican Indians, and today are federally recognized as the Stockbridge-Munsee Community. Their reservation is located in the towns of Bartelme and Red Springs in northern Wisconsin.

Rest of River Cleanup Impacts on Native American Sites

This analysis focuses on potential impacts of the Rest of River cleanup on Native American historical and archeological sites in the area. Parties interviewed indicated that, to the best of their knowledge, there has not been a systematic evaluation of Native American historical and archaeological resources along the Housatonic River between the confluence and the state border with Connecticut. Parties interviewed expressed concern that the Rest of River cleanup could impact undocumented Native American sites and artifacts located along the Housatonic River's banks and in its floodplain. Parties expressed particular concern regarding the protection of Native American sites and artifacts in the Stockbridge area.

[38] Findings in this section of this report are based on materials provided by Stockbridge police chief and local historian Rick Wilcox and Sherry White, tribal historic preservation officer for the Stockbridge-Munsee Tribe.

Figure 2. 1736 survey of Stockbridge Township.



A Plat of 23,040 acres of Land lying on both sides of Housatonnuck river being / Grant made by the Great & Gen'l. Court or Assembly of the Province of the Massachusetts Bay March the 20th 1736 to the Housatonnuck Tribe of Indians and ordered to be laid out by the Hon. John Stoddard & Eben'r. Pomeroy & Thomas Ingersole Esqrs. We began at a monument of stones laid up East three degrees and fifteen minutes North four hundred & fifty perch from Joakhim Vanvalkumburghs House and from thence we ran as described in the Plat. The said House is N. 30 deg. E. five miles & fifty rods from a monument of stones about sixty rods northerly from Moses Kings House reputed to be the divisional line between the two Housatonnuck Townships ******

Surveyed by the needle of the Instrument. April 1736.

P. Timothy Dwight, Surveyor.

See Chap 272of 1735-6
See Chap. 53 of 1737-8.
See Vol II, Page28, Mass Archives.

23040 acres
[Township for Housatonic Indians.]
(Stockbridge)
1736.

Hampshire ss April 21: 1736. Mess. Timothy Dwight Surveyor & Stephen King & Sam'l Dewey Chainmen all personally appearing made oath that in making the survey of the Indian Town at Housatonnuck river they would perform their respective services truely & Indifferently according to the best of their skill & understanding.

Cor'm John Stoddard Pac' Justis T.

Copy of Plan No. 594 - Mass Archives
Vol. 46 Page 160.

(240 acres in Stockbridge)
1742

A Plat of two hundred acres of Land lying in the Town of Stockbridge in ye County of Hampshire. Surveyed and Platted October 1742.

Eph'm Williams Jn'r Surveyor

Stockbridge Novem'R 3d 1742.

Personally appeared Eph'm Williams Jun'r. the Surveyor above named, & Joseph Allen, one of the Chainmen, and made Solemn Oath, that in their several capacities, in the above survey they acted honestly & Faithfully according to their best skill and Judgement. The other Chainman (viz) Josiah Watkins being removed to a considerable distance could not be sworn.

Coram Ephm Williams.

Justice of Peace.

Figure 3. 1750 Stockbridge property owner map.

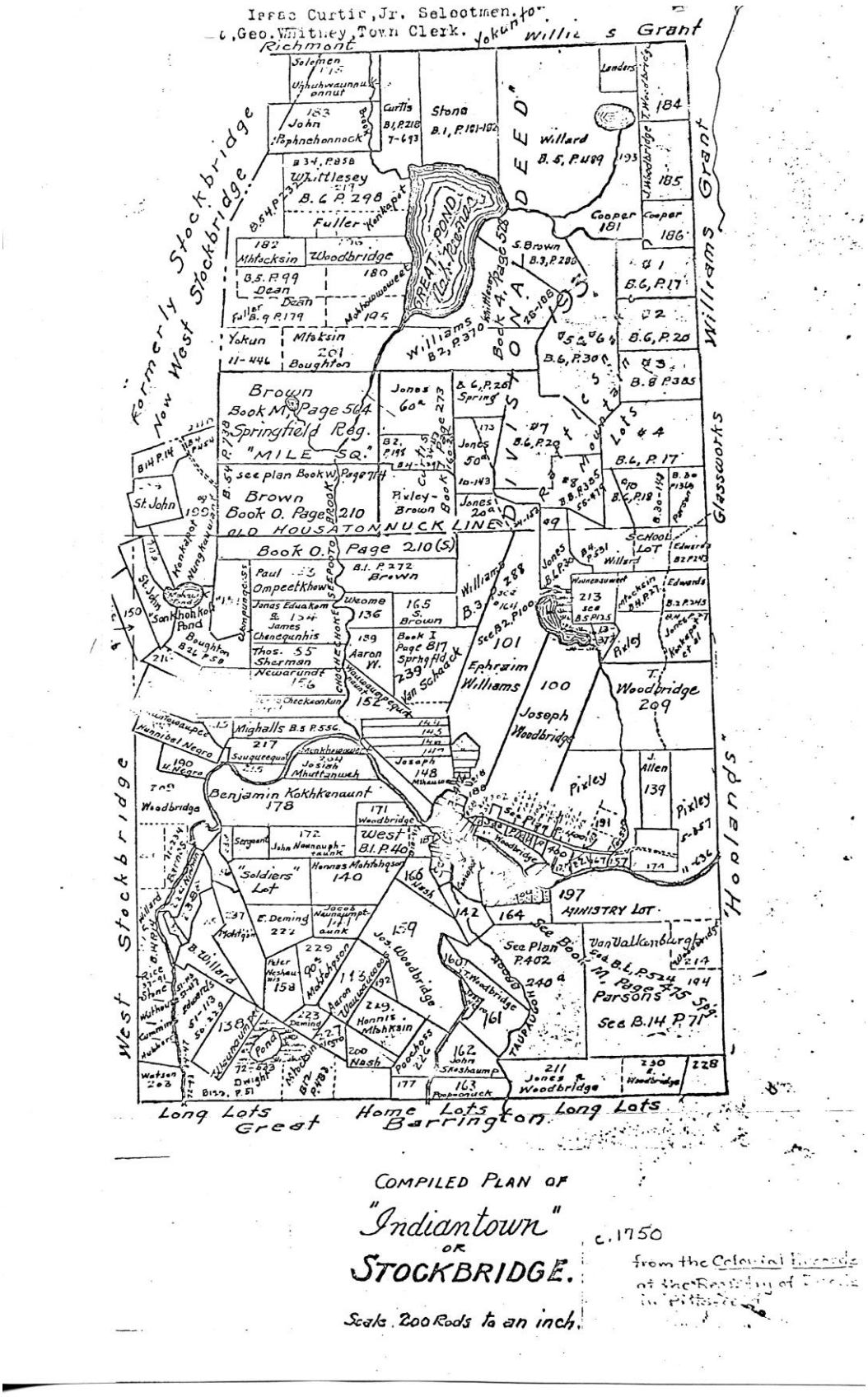
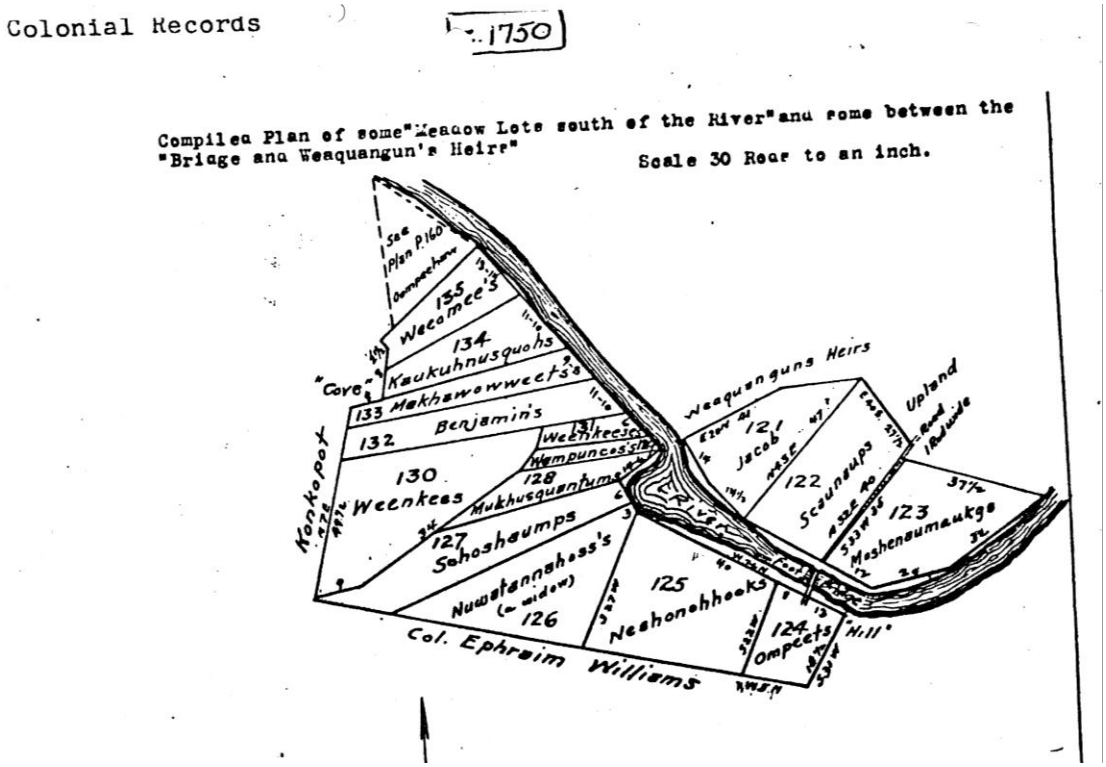


Figure 4. 1750 Stockbridge property owner map, detail of river.



Major documented sites in Stockbridge include the Mission House and the Indian Burial Ground, both located on Main Street. These sites are not located next to the river or in its floodplain and would not be affected by cleanup activities. However, Figures 3 and 4 illustrate that Stockbridge property lots owned and occupied by Mohicans extended to the river's edge in the eighteenth century. Artifacts such as pottery, arrowheads and tools have also been recovered throughout the Rest of River area; some of these artifacts are displayed in the Native American museum in the Well Courtyard behind the Mission House.

Other sites have been located by accident, during construction and other activities. Figure 5 maps the locations of these sites.

- In 1783, construction of a church foundation, at the present location of the Field Arboretum, located a Native American burial ground with 13 sets of remains.

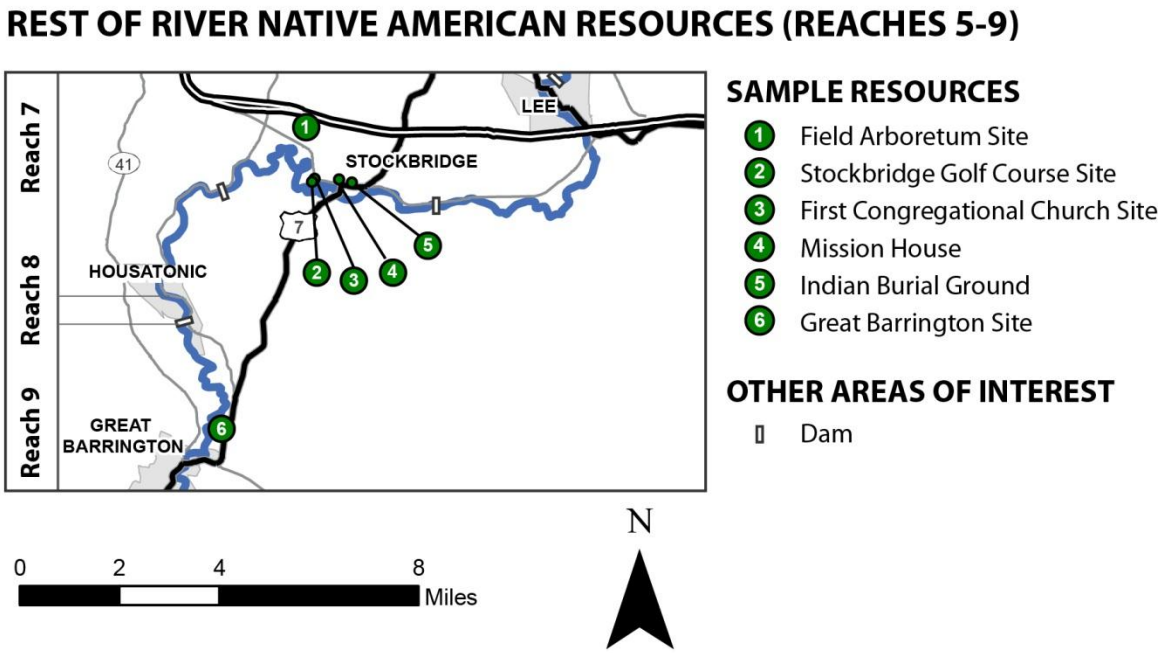
- In the 1930s, remains were uncovered during the digging out of a sand trap on the outside edge of the second green of the Stockbridge Golf Course.

- In 1988, a woman's remains dating to the mid-1700s were discovered in a washout on the edge of an embankment behind the First Congregational Church, located at 4 Main Street in Stockbridge. The remains were located in the southwest corner of the property, in an area overlooking the Stockbridge Golf Course.

- In 2011, Native American remains were uncovered next to the Housatonic River in Great Barrington.

Several of these sites are located near the Indian Burial Ground in Stockbridge, suggesting that its original area was perhaps larger than the one-third of an acre transferred for caretaking and stewardship. The other two sites illustrate the potentially broader geographic range of Native American sites in Rest of River and surrounding areas.

Figure 5. Identified Native American heritage sites near the Rest of River.



Findings

Based on the area's Native American history and the lack of a systematic evaluation of Native American historical and archaeological resources in Rest of River conducted to date, a cultural resources assessment in these areas prior to cleanup could help mitigate any potential impacts. Cleanup actions performed under the Superfund law (CERCLA, the Comprehensive Environmental Response, Compensation and Liability Act) are subject to the regulations set forth in the National Historic Preservation Act (NHPA) of 1966, as amended (regulations at 36 CFR Part 800 – Protection of Historic Properties). Under Section 106 of the NHPA, CERCLA remedial actions are required to take into account the effects of the remedial activities on any historic properties listed in, or eligible for, listing in the National Register. The Rest of River cleanup will be conducted as a CERCLA remedial action, so all cleanup actions must comply with the substantive portions of state and federal regulations, such as the NHPA.

In the moderate removal and extensive removal options, any potential riverbank impacts would be located north of Woods Pond Dam in Reaches 5A and 5B, where bank removal and stabilization activities would take place along approximately 14 linear miles (7 miles on both banks). These options would also include floodplain soil removals throughout Reaches 5 and 6. Some floodplain soils near Stockbridge would also be removed in the extensive removal option.

Aside from the no removal option, the minimal removal option would have the smallest impact on the river's banks and floodplains. In the minimal removal option, riverbank removal and stabilization would take place only in select areas rather than along the full 14 linear miles of Reaches 5A and 5B (as would be the case in the moderate removal and extensive removal options), resulting in reduced bank soil removal volume (6,700 cubic yards instead of 35,000 cubic yards). Floodplain soil removal would also be significantly reduced (26,000 cubic yards removed instead of 177,000 and 615,000 cubic yards removed in the other two options, respectively) and would affect far fewer acres.

TOURISM IMPACTS

Overview

The vitality and importance of tourism in Berkshire County is well documented. The 2011 *Berkshire Comprehensive Economic Development Strategy* provides the following summary:

> Berkshire County's location … coupled with its outstanding beauty has made the region famous as a vacation destination. A large seasonal population of urbanites has second homes or stays in resorts and motels, camp at the numerous state parks, visit friends, or simply drive through the area. Pastoral amenities are complemented by major cultural facilities … and the many well-regarded theater venues. (p. 11)[39]

Tourism is also a major part of region's economy. The 2006 *Rural Clusters of Innovation: Berkshires Strategy Project* report, for example, notes that "the Hospitality and Tourism cluster plays a central role in the economy of Berkshire County, and is a prominent aspect of the County's overall identity" (p. 35).[40] Between 2001 and 2006, the report also found that "the main driver of the region's economic recovery has been growth in the Hospitality & Tourism cluster, based principally on the region's rich set of cultural attractions set amidst its natural beauty" (p. 11).

Approximately 2.6 million people visit Berkshire County annually, spending $327.25 million. In 2010, the county's tourism sector supported 3,450 jobs, 5.6 percent of all jobs in the county. Tourism provided $84.95 million in annual wages (2.8 percent of the county's total employee compensation) and generated $25.73 million in state and local tax receipts.[41] The total economic impact of Berkshire County's tourism sector in 2010 was $523.6 million, representing 10 percent of the county's total economy.[42] Economic challenges associated with tourism include the seasonality of employment and relatively low average pay of tourism jobs. The 2006 *Rural Clusters of Innovation: Berkshires Strategy Project* report, for example, noted that "average Hospitality & Tourism wages in the county remain modest at just under $21,000" (p. 36).

Tourism in Rest of River

Tourism in the Rest of River area encompasses diverse cultural, historical and recreational resources, as illustrated by Figure 6 below. Resources include theaters, spas and resorts, museums, historic homes and gardens, craft fairs, music festivals, recreation areas, boating and Native American heritage areas. The Housatonic River laces through the communities in Rest of River, extending from Pittsfield south and west through Lenox, Lee, Stockbridge, Housatonic, Great Barrington and Sheffield before reaching the state line.

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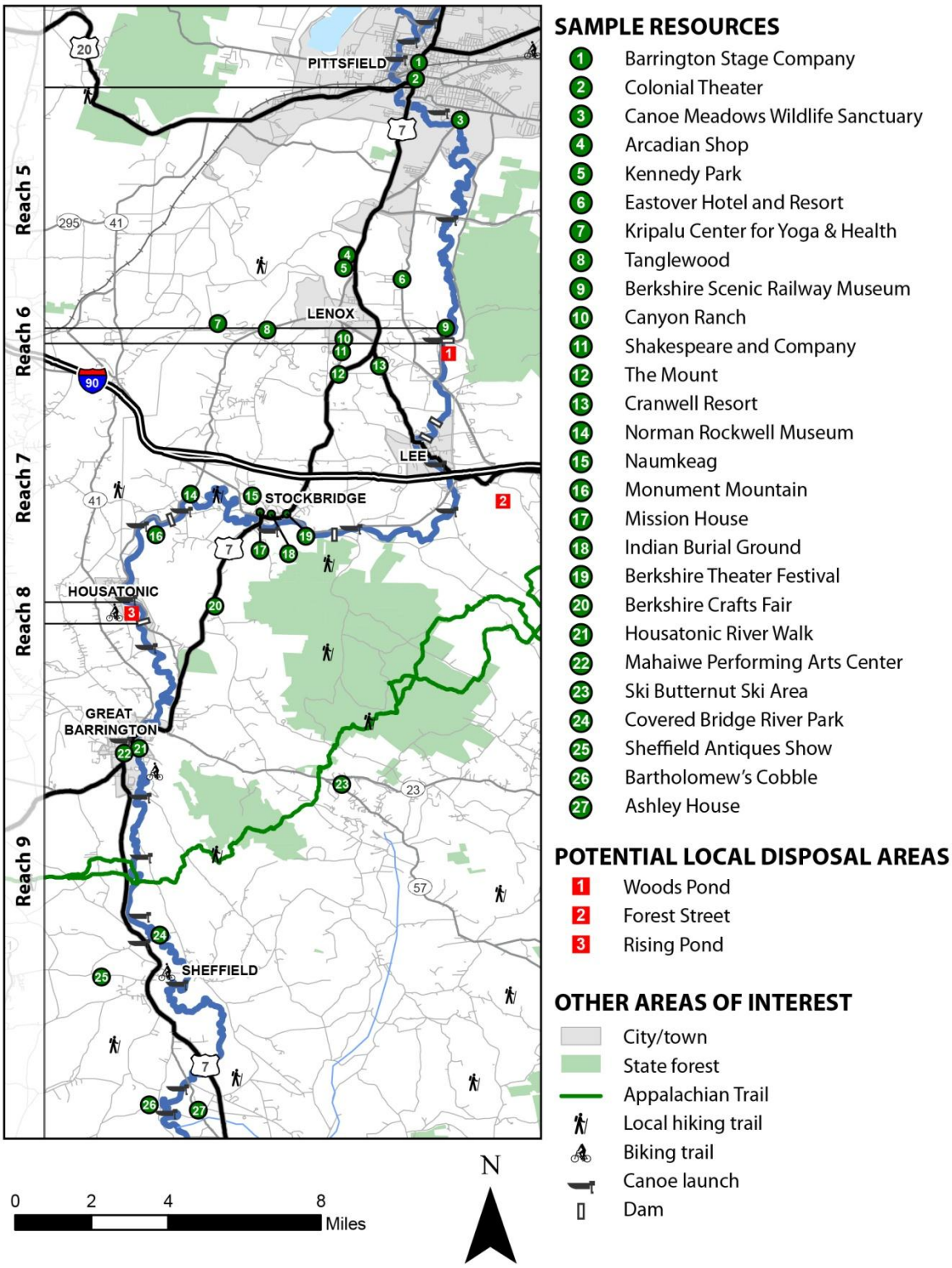
[39] Berkshire Regional Planning Commission. 2011. *Berkshire Comprehensive Economic Development Strategy*.
[40] Berkshire Economic Development Corporation. 2006. *Rural Clusters of Innovation: Berkshires Strategy Report*. http://www.isc.hbs.edu/pdf/Berkshires_Rural_Strategy_Project_2006.pdf.
[41] Wage data from the Bureau of Economic Analysis, Table CA06N, http://www.bea.gov/itable/iTable.cfm?ReqID=70&step=1.
[42] Tourism statistics provided by the Berkshire Visitors Bureau. Berkshire County's 2010 GDP obtained from the Bureau of Economic Analysis: http://www.bea.gov/newsreleases/regional/gdp_metro/2011b/pdf/gdp_metro0211b.pdf.

Figure 6.

REST OF RIVER TOURISM RESOURCES (REACHES 5-9)



Measuring Tourism Impacts

Methods ranging from basic surveys to complex mathematical models are used to estimate tourism impacts.[43] Impacts can be positive (e.g., increased revenues and local jobs) or negative (e.g., tourism can be seasonal and provide lower-wage jobs). Local governments commonly use economic impact analyses to identify how tourism contributes to the local economy.

Tourism has a variety of economic impacts. Tourists contribute to sales, profits, jobs, tax revenues and income in an area. The most direct effects occur within the primary tourism sectors – lodging, restaurants, transportation, amusements and retail trade. Through secondary effects, tourism affects most sectors of the economy. An economic impact analysis of tourism activity normally focuses on changes in sales, income and employment in a region resulting from tourism activity. See the sidebar for examples of other methods commonly used to measure tourism impacts.

This study attempted to identify empirical studies that quantified the actual effects of a comparable cleanup project on an area's tourism. However, no such studies were located, so it is not possible to use a benefits transfer approach to predict the potential reductions in tourism revenue due to the Rest of River cleanup. Local organizations contacted were also not aware of any tourism impact studies conducted during earlier stages of the Housatonic's cleanup that could be applied to the Rest of River cleanup.[44] Finally, any such research would face significant challenges. The impact of the Rest of River contamination on current tourism activity, for example, is unknown.

Other Tourism Impact Measurement Approaches

Fiscal impact analyses determine changes in demand for government utilities and services resulting from tourism-related activity.

Demand analyses predict how changes in a tourism marketplace may result in different numbers or types of visitors in the future.

Benefit/cost analyses identify tourism approaches that may yield the greatest net benefits and their associated costs.

Other tools, such as *financial analyses*, *feasibility studies* and *environmental impact assessments*, have a narrower focus, looking at whether a particular tourism project, policy or business activity will meet a particular goal, such as profitability or increased visitor traffic.

Some community members are concerned that the cleanup project could tarnish the region's brand and thereby harm tourism. Accordingly, this analysis provides a qualitative discussion of potential impacts of the Rest of River cleanup on tourism in the area. The analysis cannot speculate on the larger question of how the public will respond to the cleanup – in other words, appreciation of the cleanup versus potential stigma concerns.

Impacts on Tourism at Other Cleanup Sites

The analysis did not identify any academic studies or other reports documenting the impacts on tourism of cleanup projects in other communities. However, it is known that several sites have

[43] Information in this section excerpted from *Economic Impacts of Tourism* by Daniel J. Stynes.
[44] Parties contacted include the Berkshire Visitors Bureau and the Massachusetts Office of Travel and Tourism.

become tourist attractions and served as environmental education resources during and after cleanup.

- *Milltown Reservoir Sediments, Silver Bow Creek/Butte Area Superfund site, Montana:* This project is one of the nation's largest river cleanup and restoration efforts. A viewing area on a bluff overlooking the confluence of the Clark Fork and Blackfoot Rivers enables citizens to watch cleanup and restoration activities.[45]

- *Berkeley Pit, Silver Bow Creek/Butte Area Superfund site, Montana:* School groups visit the site's viewing platform and ground water treatment facility to learn about one of the world's largest open pit mines and cleanups. Thousands of tourists visit the site each year via sightseeing trolley tours operated by the Butte Chamber of Commerce.[46]

- *Woolfolk Chemical Works Superfund site, Georgia:* This site is located along one of the major gateways to the City of Fort Valley. During the site's cleanup, the community located its new tourism welcome center in Troutman House, a historic building located on a cleaned-up portion of the site.[47]

- *Wyckoff-Eagle Harbor site, Washington State:* The community established the Bainbridge Island Japanese American Memorial on the site in honor of the Nikkei, Japanese-Americans, who in 1942 were ordered from their homes and resettled in internment camps for the duration of World War II. The Memorial opened with a dedication ceremony in August 2011 with close to 600 people in attendance.[48]

Other research documents the benefits of site reuse in communities *following cleanup*, including tourism-related benefits.[49]

Rest of River Cleanup Impacts on Tourism

Potential impacts of the Rest of River cleanup on tourism in the area are a function of the intensity, extent, timing and duration of the excavation alternative selected, the disposal option selected, and the proximity of each individual resource to the Rest of River cleanup. It is important to note that, to a significant degree, the decisions of individuals to visit the area will be guided by outside perceptions of the cleanup rather than local conditions. How the cleanup is portrayed in the media and through public relations efforts may be as important if not more important than the actual choice of remedy.

Direct Impacts

Most of the area's tourism resources are not river-based and are not located adjacent to the river (see Figure 6). For example, most tourism resources in and around Lenox – Tanglewood,

[45] For more information: http://www.epa.gov/superfund/programs/recycle/pdf/milltown-casestudy.pdf.
[46] For more information: http://www.pitwatch.org/2009.htm#2009learning and http://www.buttecvb.com/listing/butte-trolley.
[47] For more information: http://www.fortvalleymainstreet.org/troutman.cfm.
[48] For more information: http://www.bijac.org.
[49] For more information: http://www.epa.gov/superfund/accomp/pdfs/SFBenefits-031011-Ver1.pdf and http:/www.epa.gov/superfund/programs/recycle.

Canyon Ranch, Shakespeare and Company, The Mount and Cranwell Resort – are at least one mile from the river and so would not face significant direct impacts from cleanup activities.

However, river-based resources (recreation areas, trails, boat launches), activities (boating, fishing, hunting, swimming), and related businesses such as outfitters would face significant direct impacts – full or partial closure of the river during cleanup activities, particularly in Reaches 5 and 6 (from the confluence to Woods Pond Dam). This area is also the part of the river used most heavily for recreational activities. Closure times could range from several years to more than a decade.[50] Resources located near the three candidate disposal areas could also face significant impacts. Here is how the *Revised CMS* describes the situation:

> During the period of active construction, restrictions on recreational uses of the River and floodplain would be imposed in the areas where remediation-related activities are taking place. Due to safety considerations, boaters, anglers, hikers, hunters, and other recreational users would not be able to use the River, floodplain, or riverbank in the construction and support areas. Aesthetically, the presence of heavy construction equipment and cleared or disturbed areas would detract from the visually undisturbed nature of the area. (p. 8-64)

There is evidence that the area's recreational resources are an increasingly important part of the tourism economy in Berkshire County. For example, the 2006 *Rural Clusters of Innovation: Berkshires Strategy Project* report found that while attendance at top cultural attractions or local ski areas remained largely unchanged between 2001 and 2005, total travel and tourism expenditures in Berkshire County continued to grow at rates exceeding national and state rates (3.6 percent versus 2.3 percent and 1.0 percent, respectively). The report's conclusion states:

> There is reason to believe, therefore, that activities that have traditionally been peripheral to tourism promotion efforts – such as outdoor recreation – have been significant drivers of recent growth and represent opportunities for continued expansion in the future. (p. 38)

The Outdoor Recreation Impacts section of the report provides more information on the potential impacts of the Rest of River cleanup on the area's recreational resources.

South of Woods Pond Dam, the analysis identified two potential cleanup impacts on tourism resources. First, recreation restrictions could be put in place near dams during cleanup activities. Second, if the Rising Pond location is selected as a disposal area, this could lead to increased truck traffic, either through Stockbridge on Route 7 or through Housatonic on Route 183. Other than this potential truck traffic, the analysis found cleanup activities would not significantly impact tourism resources in the area south of Woods Pond Dam.

Secondary Impacts – Truck Traffic

Truck traffic associated with the cleanup could affect tourism resources in and around Lenox, especially resources located closer to the river, such as Eastover Resort and the Berkshire Scenic Railway Museum. This impact could be both location-specific – busier roads deterring visitors from visiting particular facilities – and more generalized. Over time, regular truck traffic from

[50] *Revised CMS*, Figures 8-8a to 8-12.

the site on local roads could serve as a visual reminder of the site's cleanup, stigmatizing the area as a work in progress rather than a vibrant tourist destination. Under the projected 52-year duration of cleanup under the extensive removal option, it is also possible that tourists could come to assume that the area's truck traffic is a permanent condition.

The Berkshire Regional Planning Commission's *Tourist Routing Study* illustrates why increased truck traffic could pose a challenge for tourism in the Rest of River area:

> The "traveler experience" plays an important role in the overall tourism economy of the Berkshires. More than 90 percent of all visitors to the Central and Northern Berkshires come by car, and seldom leave the car to view the scenery, except for a few special features, and so the roads become the keys to tourist appreciation of the region.[51]

As the report's traffic analysis makes clear, truck traffic in certain locations – particularly along East Street, Routes 7 and 20, and Route 183 – could increase significantly during the Rest of River cleanup. This increase in truck traffic could impact tourism resources located near these roadways, including Canoe Meadows Wildlife Sanctuary, Eastover Resort, Tanglewood, the Berkshire Scenic Railway Museum, the Norman Rockwell Museum and Monument Mountain (see Figure 6).

The Berkshire Regional Planning Commission's *2012 Regional Transportation Plan* also makes clear that increased truck traffic could have a larger impact on tourism resources during "high season" summer months and special events linked to tourism resources like Tanglewood. As the report states, "the Berkshires experience traffic congestion within a set of specific circumstances instead of capacity problems." The report identifies "seasonal variation in traffic volumes" and "special event traffic generators" among the reasons for regional traffic bottlenecks:

> Summer traffic volumes are generally 10 percent higher than annual average daily traffic (AADT), and in some cases are 50 percent higher in areas of significant seasonal activity (Great Barrington or Lenox) … Summer weekends in Great Barrington, concerts at Tanglewood, and street fairs in Pittsfield are examples of special events that contribute to traffic congestion. Our communities and entertainment venues use various approaches to manage special event traffic, but it is frequent enough regional concern. (p. III-6)

Secondary Impacts – Seasonal Home Sales and Rentals

Berkshire County's housing stock includes many seasonal homes – six communities in the county have greater than 50 percent of their housing stocks identified as seasonal homes – that are valued partly for the access they provide to the area's tourism resources.[52] It is possible that sales and rentals of residential properties adjacent to river and floodplain cleanup areas, access roads or staging areas could be impacted during the Rest of River cleanup (see the Property Value Impacts section).

[51] Berkshire Regional Planning Commission. 1999. *Tourist Routing Study for the Central and Northern Berkshires.*
[52] Berkshire Regional Planning Commission. 2011. *Berkshire Comprehensive Economic Development Strategy.* p. 46.

Secondary Impacts – Hotel Rooms

With Rest of River cleanup anticipated to generate between 20 and 52 new local jobs and requiring the relocation of between 16 and 41 workers to the area (as discussed in the report's employment section), workers and tourists may compete for a limited supply of rooms. Available data indicates that this should not be a significant issue. According to STR Global, there are 4,450 hotel rooms in Berkshire County. In 2011, average room occupancy rates in Berkshire County ranged from 32.7 percent in low-season months such as January to 63.0 percent in high-season months such as July and August.[53] Actual occupancy rates may differ from these estimates because this data does not take inns and bed and breakfasts into account. However, this data indicates that there is sufficient room availability for cleanup workers seeking rooms in area hotels. Room occupancy data from 2007 to 2011 show that room occupancy rates in Berkshire County are steadily returning to the levels prior to the economic downturn. In 2007, high-season room occupancy rates in July and August were 64.9 and 71.1 percent, respectively.[54]

Secondary Impacts – Multiple-Resource Visitors

The site's cleanup could impact a particular category of visitor – people visiting the area for multiple tourism resources (cultural venues and historic downtown districts, for example) *as well as* river-based recreation. The full or partial closure of sections of the river, particularly in Reaches 5A and 5B, during the Rest of River cleanup could deter some of these visitors. There is no data available with which to measure this potential impact.

Duration Considerations

Estimated timeframes are also a factor in considering potential cleanup impacts on the area's tourism resources. Specifically, any impact from the cleanup's visual presence on the "traveller's experience" – thereby detracting from the area's tourism appeal – depends partly on how long the cleanup takes.

The extensive removal option would include a significant cleanup presence on the most heavily visited parts of the river, from the confluence to Woods Pond, for approximately 39 years, with trucks on some area roadways for 52 years in total. The moderate removal option would include a significant cleanup presence in this area for up to 11 years, with trucks on some area roadways for 14 years in total. For the minimal removal option, the estimated timeframe is five years in total.[55] The *Revised CMS* also estimates that, following cleanup, an additional five years will be required for restoration monitoring and maintenance (p. 3-60).

It is also important to remember that the Rest of River cleanup will take place sequentially, moving downriver. Therefore, potential visual impacts and recreation restrictions may not be in place for these entire periods of time. For example, under the extensive removal option, Reach 5A's cleanup will take approximately 12 years. During the cleanup of Reach 5B, from years 12 to 18, it may be possible for people to access Reach 5A for recreation.

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[53] STR Global data provided by the Berkshire Visitors Bureau. Bureau director Lauri Klefos cautioned that the room occupancy rate data, while the best available, is based on a small sample size (25 properties, with 1,707 rooms).
[54] Additional 2007–2011 room occupancy rate data provided by the Massachusetts Office of Travel and Tourism, March 5, 2012.
[55] *Revised CMS*, Figures 8-8a to 8-12.

Potential Opportunities

In addition to potential impacts, the analysis identified two potential tourism-related opportunities associated with the Rest of River cleanup.

- Cleanup of Rest of River could provide opportunities for environmental education and recognition of the region's industrial history and heritage, bolstering Berkshire County's tourism resources.

- The cleanup design could include consideration of future tourism and recreation-related uses along impacted sections of the Housatonic River. For example, access roads could be designed to be reduced in size following cleanup to serve as potential trails. Riverbank restoration features could be designed for double duty, to also serve as wildlife viewing areas.

Findings

The Rest of River cleanup will directly impact the recreational use of the Housatonic River, which in turn could impact the area's recreation-related tourism resources. The largest cleanup area (Reaches 5 and 6) is also the most heavily used section of the river. The cleanup's visual presence in the area more broadly could also detract from the area's tourism appeal.

While it is not possible to precisely quantify the degree to which the Rest of River cleanup options will impact tourism, it is likely that the extensive removal and the moderate removal cleanup options would have some impact on at least those visitors attracted by outdoor recreation. For illustrative purposes, take the $327.25 million of tourism spending in Berkshire County in 2010. Assuming that the extensive removal and the moderate removal cleanup options would dissuade 10 percent of visitors, this would result in a reduction in annual tourism spending of $32.7 million. Even a 2 percent reduction in visitors would result in a reduction in annual tourism spending of $6.5 million.[56]

Several options could help to mitigate these impacts.

- Within each area of cleanup, cleanup plans could specify when particular sub-areas (e.g., Reach 5A within Reach 5) could be available for recreational use, reducing the duration of recreational use restrictions.

- Educational materials could guide recreational users downstream to hunt, fish and boat on other sections of the river during initial phases of the cleanup. As cleanup activities move downstream, recreational users could move back upstream to cleaned-up portions of the river.

- To reduce the cleanup's visual presence in the area, cleanup schedules – and particularly trucking schedules – could be coordinated with communities' special events, such as concerts at Tanglewood. This would also reduce traffic on area roadways during these busy times.

[56] The 2 and 10 percent reductions in visitor numbers are sample assumptions for illustrative purposes only.

Finally, the Rest of River cleanup could benefit local tourism in two ways, through environmental education opportunities and enhanced river-based recreation areas following cleanup.

OUTDOOR RECREATION IMPACTS

Overview

The Rest of River is located within a broader area – the Housatonic Valley – noted for the diversity and abundance of its recreational resources. As stated in the Upper Housatonic Valley National Heritage Area's 2011 *Environmental Assessment: Proposed Management Action Plan*:

> The Housatonic Valley is a land rich with recreational opportunities. Over 100,000 acres of public land within the Housatonic River watershed offer hiking, camping, winter sports, hunting, fishing and other water-based activities (HVA [Housatonic Valley Association] [2010]). There are 57 state recreational and land conservation properties in the heritage area, including: 42 parks, reservations, wildlife management areas, forests, natural heritage areas, and a sanctuary in Massachusetts … A national treasure, the Appalachian Trail runs north-south through the heritage area and offers incredible views of the Housatonic River. (p. 107)[57]

Recreation in the Rest of River

Figure 7 illustrates the diversity and extent of recreational resources in the Rest of River area, including state parks, several wildlife management areas, millponds, 20 boat launches, and trails and river walks. These resources enable hiking, wildlife watching, hunting, fishing, trapping, boating and other recreational activities. The Housatonic River links most of the area's recreational resources together.

As noted earlier, the Rest of River's recreational resources are also part of the area's tourism appeal, contributing to the overall "traveler's experience" as well as directly attracting visitors to the area. The recreational resources also have a local economic impact, directly sustaining businesses such as outfitters and indirectly contributing to economic development more generally.

History indicates that, until recently, the Housatonic River has not been a major recreational resource:

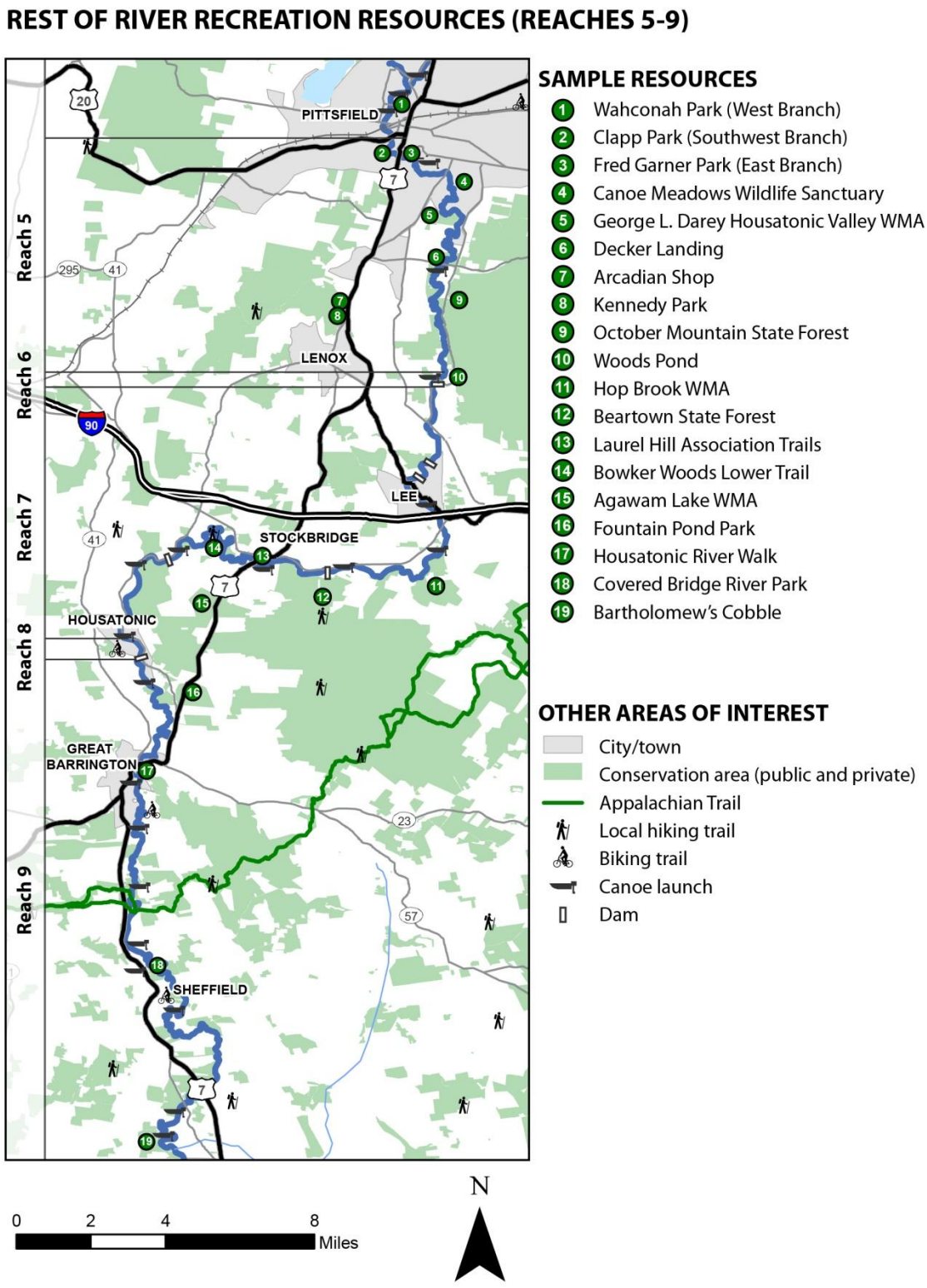
> Eighteenth and nineteenth century Americans saw rivers and streams as navigational lines or as supplies for water for drinking, irrigating fields, powering machinery, and providing fish for food. Increasingly in the nineteenth century, they were also seen as sinks to dispose of wastes. (p. 151)[58]

In many New England communities, including those in the Rest of River area, the use of rivers as waste disposal areas led to a significant change in the physical landscape: as communities "turned their backs" on rivers like the Housatonic, many structures were built set back from the

[57] Upper Housatonic Valley National Heritage Area, Inc. 2011. *Upper Housatonic Natural Heritage Area Environmental Assessment: Proposed Management Action Plan*. p. 107.
[58] John Tumbler. 2001. *Reasonable Use: The People, the Environment and the State, New England 1790–1930*. p. 151.

river, away from the eyesore. A century later, this partly explains why the Housatonic River corridor is visually such a pristine natural resource and laced with diverse recreation resources.

Figure 7.



Interviews with local organizations indicate that local and visitor interest in the recreational use of the Housatonic River and adjacent areas in the Rest of River has been growing, particularly over the last few years. Evidence includes:[59]

- Four new river access locations were installed in the Rest of River area in 2010–2011, in Pittsfield, Lenox, Lee and Sheffield.
- The City of Pittsfield is acquiring vacant properties for back taxes and creating riverside pocket parks, expanding greenway trails, and recently installed a downtown wetlands observation deck for environmental education.
- Lee residents worked with Yale School of Forestry students in 2011 on a plan for a greenway to enhance connections between the downtown district and the river as well as area trails.
- Great Barrington and Stockbridge continue to explore opportunities to expand existing trails such as the Housatonic River Walk and the Mary Flynn Trail along and near the river.
- A boating portage route and boating put-in/take-out areas are scheduled for installation above and below Glendale Dam in 2012.
- Sheffield opened its new riverside park in 2011 and established a River Park Task Force to explore additional opportunities to enhance connections between the community and the river.

These efforts demonstrate an expanding interest in the recreational use of the Housatonic River throughout the Rest of River.

Measuring Rest of River Recreation Impacts

Interviews conducted with local organizations provide a partial estimate of the number of people potentially impacted by recreational use restrictions in the Rest of River during the cleanup.[60] With regard to boating, environmental organizations, resorts and an outfitter take between 1,230 to 1,780 people out on the river each year (see Table 8). It was not possible to estimate the number of self-guided boaters in the Rest of River each year; staff at the Massachusetts Division of Fisheries and Wildlife indicated that boating surveys or user population counts have not been conducted on the Housatonic River.[61]

The 1997 *Natural Resource Damage Assessment* (NRDA) for the Housatonic River estimates a value of $40 for each lost boating trip on the Massachusetts Housatonic (p. 3-9). Using an

[59] Information from February 8, 2012 interview with Housatonic Valley Association Berkshire program manager, Dennis Regan.
[60] Organizations contacted include the Housatonic Valley Association, the Massachusetts Audubon Society, the Arcadian Shop (outfitter), the Berkshire County League of Sportsmen, and the Massachusetts Division of Fisheries and Wildlife.
[61] February 21, 2012 interview with the Massachusetts Division of Fisheries and Wildlife's western district and information and educational liaison Marion Larsen.

updated value of $57.20 (year 2011 dollars) per lost boating trip, it is possible to monetize the potential reduction in *guided* recreational boating uses during the Rest of River cleanup. As shown in Table 9, the annual cost of this reduction ranges from $17,589 to $25,454, assuming a 50 percent reduction in the number of guided boat trips, to $35,178 to $50,908, assuming a 100 percent reduction in the number of guided boat trips.

Table 8. Guided boat trips on the Rest of River.

Organization	Annual number of boaters (estimated)	Location	Additional information
Arcadian Shop (outfitter)[a]	200–250	Decker's Landing to Woods Pond (Reaches 5 and 6)	Includes kayak rentals and guided kayak trips. No canoe rentals.
Canyon Ranch[b]	180	Decker's Landing to Woods Pond (Reaches 5 and 6)	
Housatonic Valley Association[c]	100	Decker's Landing to Woods Pond (Reaches 5 and 6)	
Mass Audubon[d]	650–1,050	Decker's Landing to Woods Pond (Reaches 5 and 6)	Includes approximately 50 people on six monthly canoe trips, plus 600–1,000 students, teachers and adult chaperones on educational trips. Number varies based on availability of resources.
The Trustees of Reservations[e]	100–200	Bartholomew's Cobble (Sheffield) (Reach 9)	This reach would not be affected by any of the cleanup options.
Total:	1,230–1,780		

Estimate Sources (information gathered in February 2012)
[a] Store manager Chris Calvert
[b] Outdoor activity manager Michael Duffy
[c] Housatonic Valley Association Berkshire program manager Dennis Regan
[d] Berkshire Wildlife Sanctuaries director René Laubach
[e] Bartholomew's Cobble conservation ranger Rene Wendell
Note: The Kripalu Center was contacted but did not respond to information requests.

Table 9. Monetized cost of reduction in recreational boating trips during cleanup.

Number of annual boat trips[a]	50% reduction in # of boat trips during cleanup	75% reduction in # of boat trips during cleanup	100% reduction in # of boat trips during cleanup
615[b]	$17,589	$26,384	$35,178
890[c]	$25,454	$38,181	$50,908

Estimate Sources
[a] Assumes two people per boat.
[b] 1,230 ÷ 2.
[c] 1,780 ÷ 2.
Note: Monetized cost based on updated boating trip value from 1997 NRDA, not on information provided by sources listed in Table 8.

Limited data was available to inform an estimate of the number of hikers, hunters and fishermen visiting the Rest of River each year. The Berkshire County League of Sportsmen provided a 2007 spreadsheet documenting 2,164 licensed sportsmen who self-identified as hunting and

fishing along the Housatonic River in Massachusetts. Of this total, 95.2 percent live in Massachusetts and 65.9 percent live in Rest of River communities. League President Mark Jester also stated that the primary hunting and fishing areas in Rest of River include the George L. Darey Wildlife Management Area, October Mountain State Forest and farmland adjacent to the river.[62] In particular, the potential loss of access to the George L. Darey Wildlife Management Area during the cleanup of Reach 5 could impact local hunting and fishing revenues (e.g., license fees, trip-related expenses, equipment).[63]

It is also possible to partially characterize the Rest of River cleanup's positive impact on outdoor recreation *following* cleanup. Specifically, the cleanup may make possible the removal of fish consumption advisories that are currently in place for the Housatonic River in Connecticut.[64] PCB (polychlorinated biphenyl) concentrations in fish and other aquatic organisms would decline by various amounts in the decades following cleanup. According to the predictive models used in the *Revised CMS*, these reductions would not be sufficient to remove the fish consumption advisory currently in place in Massachusetts. Removing the fish consumption advisories in Connecticut, however, would be a significant cleanup benefit for outdoor recreation.

Rest of River Cleanup Impacts on Recreation

River-based recreation resources (recreation areas, trails, boat launches), activities (boating, fishing, hunting, swimming), and businesses (outfitters) would face significant direct impacts – full or partial closure of the river during cleanup activities, particularly in Reaches 5 and 6. This area is also the part of the river used most heavily for recreational activities. Closure times could range from several years to more than a decade.[65] Resources located near the three candidate disposal areas could also face traffic and aesthetic impacts. The Williams River Rail Trail in Housatonic, for example, is located in close proximity to the potential Rising Pond disposal area. Here is how the *Revised CMS* describes the situation:

> During the period of active construction, restrictions on recreational uses of the River and floodplain would be imposed in the areas where remediation-related activities are taking place. Due to safety considerations, boaters, anglers, hikers, hunters, and other recreational users would not be able to use the River, floodplain, or riverbank in the construction and support areas. Aesthetically, the presence of heavy construction equipment and cleared or disturbed areas would detract from the visually undisturbed nature of the area. (p. 8-64)

Below, the report discusses the potential impacts of the cleanup options on recreational resources in the Rest of River in more detail.

Extensive removal option

This remedial alternative includes extensive river channel, riverbank and floodplain sediment and soil removal. Construction would take 52 years and impact 728 acres, including 49 staging

[62] February 22, 2012 email correspondence.
[63] Information provided by Berkshire Regional Planning Commission.
[64] *Revised CMS*, Executive Summary, p. 16.
[65] *Revised CMS*, Figures 8-8a to 8-12.

areas occupying 61 acres and 15 miles of access roads covering 36 additional acres between the confluence and Rising Pond Dam (*Revised* CMS, p. 8-6).

- *Reaches 5 and 6:* The use of dry excavation techniques to clean up all parts of the river in Reaches 5A and 5B and bank removal and stabilization along approximately 14 linear miles (7 miles on both banks) would completely restrict the recreational use of the Housatonic River and its riverbanks while cleanup activities are underway in these areas.

  Hydraulic dredging in Reach 5C, the Reach 5 Backwaters and Reach 6 would limit the recreational use of the river as far south as Wood Ponds Dam, although the riverbanks would not be subject to stabilization. Recreation resources potentially affected include 20 boat launches, Clapp and Fred Garner Parks, Canoe Meadows Wildlife Sanctuary, the George L. Darey Wildlife Management Area and October Mountain State Forest.

- *Reach 7:* There are significant stretches of the river in Reach 7 where Monitored Natural Recovery (MNR) is the cleanup alternative in all options. Hydraulic dredging techniques used to clean up the Reach 7 Impoundments, including Columbia Mill Dam, Former Eagle Mill Dam, Willow Mill Dam and Glendale Dam would limit river-based uses in the immediate vicinity of these areas.

- *Reach 8:* Cleanup of this reach focuses on the Rising Pond Dam. Hydraulic dredging techniques used to clean up the dam would limit river-based uses in the immediate vicinity of these areas. No other significant recreation-related impacts were identified.

Moderate removal option

This remedial alternative includes moderately extensive river channel, riverbank and floodplain sediment and soil removal. Construction would take 14 years and impact 441 acres, including 30 staging areas occupying 47 acres and 14 miles of access roads covering 34 additional acres between the confluence and Rising Pond Dam (*Revised CMS,* p. 8-8).

- In terms of recreation-related impacts, the shorter duration of cleanup activities is one major difference between this option and the extensive removal option. This option also includes a much smaller-scale removal of floodplain sediments (177,000 cubic yards versus 615,000 cubic yards).

- The changes in cleanup approach would not significantly alter the recreation-related impacts discussed above. For example, the performance of all sediment removal and capping work performed in the "wet" by equipment operating in the river would restrict recreational uses along the same stretches of the Housatonic River. Similarly, bank removal and stabilization along approximately 14 linear miles (7 miles on both banks) of Reaches 5A and 5B would still completely restrict the recreational use of the riverbanks while cleanup activities are underway in these areas.

- Recreation-related impacts of the cleanup south of Woods Pond Dam would also remain largely unchanged – restrictions on river-based uses in the immediate vicinity of the dams.

Minimal removal option

This remedial alternative includes minimally extensive river channel, riverbank and floodplain sediment and soil removal. Construction would take five years and impact 76 acres, including 14 staging areas occupying 18 acres and eight miles of access roads covering 18 additional acres mainly between the confluence and Woods Pond Dam (*Revised CMS*, p. 8-9).

- Aside from the no removal option, this option would take the shortest amount of time and have the smallest recreation-related impacts, with MNR selected for Reach 5C, Reach 5 backwaters, and Reaches 7 through 16.

- *Reach 5:* River use restrictions would likely apply to a 20-acre portion of Reach 5A where dry excavation techniques would be used to clean up the river. MNR would be selected for Reach 5C and the Reach 5 backwaters. Riverbank removal and stabilization would also take place in select areas – the Reach 5A/5B banks – estimated at approximately 1.6 linear miles in the *Revised CMS*, rather than along the full 14 linear miles, resulting in reduced bank soil removal volume compared to the moderate removal and extensive removal options (6,700 cubic yards instead of 35,000 cubic yards) and reducing impacts on riverside trails, boat launches and other river-based recreation resources.

- *Reach 6:* Recreational use of the river near Woods Pond Dam would likely remain restricted in this option – cleanup would focus on a 42-acre area rather than the 60-acre area cleaned up under the extensive removal and moderate removal options.

- *Reaches 7–16*: With MNR selected as the cleanup approach for these reaches and extremely limited areas of floodplain soil removal (26,000 cubic yards), the only recreation-related impact anticipated downstream of Woods Pond Dam under this option would be possible restrictions on river-based uses above Glendale Dam during floodplain soil removal.

Duration Considerations

Estimated timeframes are also a factor in considering potential cleanup impacts on the area's recreation resources. The extensive removal option would include a significant cleanup presence on the most heavily visited parts of the river, from the confluence to Woods Pond, for approximately 39 years, with trucks on some area roadways for 52 years in total. The moderate removal option would include a significant cleanup presence in this area for up to 11 years, with trucks on some area roadways for 14 years in total. For the minimal removal option, the estimated timeframe is six years in total.[66] The *Revised CMS* also estimates that, following cleanup, an additional five years will be required for restoration monitoring and maintenance (p. 3-60).

It is important to remember that the Rest of River cleanup will take place sequentially, moving downriver. Therefore, potential recreation restrictions may not be in place for these entire periods of time. For example, under the extensive removal option, Reach 5A's cleanup will take

[66] *Revised CMS*, Figures 8-8a to 8-12.

approximately 12 years. During the cleanup of Reach 5B, from years 12 through 18, it may be possible for people to access Reach 5A for recreation.

Finally, the potential removal of fish consumption advisories currently in place for the Housatonic River in Connecticut following cleanup indicates that the Rest of River cleanup has the potential to provide longer-term positive outdoor recreation impacts as well as shorter-term restrictions on recreation opportunities.

Findings

The Rest of River cleanup will directly impact recreational uses along sections of the Housatonic River. The most significant area of cleanup (Reaches 5 and 6) is also the most heavily used section of the river. Options that could help to mitigate these impacts include:

- Within each area of cleanup, cleanup plans could specify when particular sub-areas (e.g., Reach 5A within Reach 5) could be available for recreational use, reducing the duration of recreational use restrictions.

- Educational materials could guide recreational users downstream to hunt, fish and boat on other sections of the river during initial phases of the cleanup. As cleanup activities move downstream, recreational users could move back upstream to cleaned-up portions of the river.

AESTHETIC IMPACTS

The Rest of River's aesthetic features – the qualities of the area that as a whole give pleasure to the senses – include the beauty of the river's natural environment and surrounding landscapes. Berkshire County's natural beauty is an integral part of the area's tourism and recreational appeal.

Measuring Aesthetic Impacts

Aesthetic impacts – primarily visual impacts, as well as related issues such as noise, dust and night lighting – are measured across a range of settings, such as highway construction and energy development projects, where construction will likely result in significant changes to the physical environment. Methods typically focus on determining a project's visibility from various key vantage points, either by visiting these points in person or conducting GIS spatial analysis. These methods are often called viewshed analyses.

This analysis did not identify any comparable studies to use for benefits transfer to monetize potential aesthetic impacts due to the Rest of River cleanup.

The *Revised CMS* states that the minimal, moderate and extensive removal options would each create significant aesthetic impacts. Here is the report's description for the extensive removal option (SED 8/FP 7):

> SED 8 would have long-term impacts on the aesthetic features of the natural environment. The removal activities (followed by backfilling) in 351 acres of Reaches 5 through 8, as well as bank stabilization along approximately 14 linear miles (7 miles on both banks) Reaches 5A and 5B, would significantly alter the appearance of the River over the course of those activities and for a period thereafter. Since the bank stabilization efforts would result in the permanent loss of mature overhanging trees on the banks, they would permanently change the vegetative community on those banks to a more open, exposed community, and thus the natural appearance of the banks would never resemble the banks' appearance prior to remediation.
>
> The construction of network of access roads and staging areas on both sides of the River to support implementation of SED 8 would also cause long-term impacts on the aesthetics of the floodplain. As discussed for prior alternatives, the placement of roadways and staging areas would remove trees and vegetation, including in numerous forested areas. The length of time that the appearance of the floodplain in these in these areas would be changed depends on the length of time that the roads and staging areas remain, along with additional time for these areas to return to a natural appearance.
>
> Since SED 8 would take the longest time to complete of all the sediment alternatives, its implementation would result in the longest length of time that roads would be in place. As discussed previously, where mature trees are cut down, it would take at least 50 to 100 years for a replanted forest community to develop an appearance comparable to their current appearance. The presence of these cleared areas would detract from the natural

> pre-remediation of those areas until such time as the restoration plantings have matured. (p. 6-272 to 6-273)

The greatest aesthetic impacts would be concentrated in Reaches 5 and 6, the areas of heaviest cleanup. Aesthetic impacts below Woods Pond Dam would be smaller and localized, immediately adjacent to areas of cleanup, access roads, staging areas, truck routes, and the three proposed local disposal areas.

Aesthetic impacts will partly be determined by the materials selected to stabilize riverbanks and restore Rest of River's natural appearance. Under the extensive removal and moderate removal options, all 14 miles of riverbank in Reaches 5A and 5B would be stabilized. Under the minimal removal option, only 1.6 miles of riverbank would be stabilized. Appendix G of the *Revised CMS* provides a detailed discussion of riverbank stabilization techniques. Bioengineering techniques include the use of natural materials such as coir fabric and riparian vegetation and would be the most "natural" option, minimizing aesthetic impacts. However, the *Revised CMS* also points out that:

> In areas that are subject to greater instability, such as where shear stress and channel velocities are particularly severe, bioengineering techniques are unlikely to succeed (at least by themselves), and thus traditional hardening methods (e.g., use of concrete, riprap, and gabion baskets) are necessary to prevent bank soil erosion. Bioengineering techniques and traditional hardening methods are not exclusive of each other, however. In areas where shear stress and channel velocities are relatively severe, bioengineering can be used in conjunction with traditional hardening methods to provide the most effective strategy for bank stability. (p. G-6)

Appendix G of the *Revised CMS* provides a detailed discussion of where traditional hardening methods with greater aesthetic impacts would be needed in Reaches 5A and 5B. These methods would apply across all three cleanup options. Locations include:

- The outside of tight meander bends with banks over 4 feet in height, which occur at many locations in the five miles of Reach 5A.
- The outside of tight meander bends with banks greater than 4 feet in height and deep pools, which are found in several locations below New Lenox Road in the lower portion of Reach 5B.
- Straight reaches with banks less than 4 feet in height and under moderate shear stress. The lower portion of Reach 5B is influenced by the backwater effects of Woods Pond Dam.

Bioengineering techniques would be appropriate for other areas, such as straight stretches of the river and depositional banks. For more information, see pages G-17 to G-24 in Appendix G of the *Revised CMS*.

While the *Revised CMS* focuses primarily on visual impacts, the report also indicates that cleanup activities will lead to increased noise and dust levels. The summary for all three cleanup options states:

> The increased traffic would increase noise levels and emissions of vehicle/equipment exhaust and nuisance dust to the air. Noise in and near the construction zone could affect those residents and businesses located along the River. (pp. 6-281, 6-324 and 6-365)

The *Revised CMS* does not specifically address the use of night lighting as part of the site's cleanup. However, the *Revised CMS* assumes an eight-hour workday, which would likely mean that all cleanup activities would take place during daylight hours (p. 3-20).

With regard to situating access roads and staging areas, the *Revised CMS* notes that "GE has also made efforts, in the siting of those facilities, to avoid or minimize travel through densely populated areas and impacts to residential neighborhoods where doing so would be practical" (p. 5-8). Review of *Revised CMS* maps that depict access roads and staging areas (Figures 8-7, 8-9 and 8-11) confirms that this is the case. However, these facilities would still be located near some homes, businesses and other land uses. These areas could experience significant aesthetic impacts – changes in the visual appearance of the surrounding environment, as well as related issues such as noise and dust.

It is also possible that aesthetic impacts will be greater *following* cleanup rather than *during* cleanup. As discussed earlier in this report, cleanup in Reaches 5 and 6 may entail river access restrictions during cleanup. Aesthetic impacts during cleanup would accordingly be reduced because fewer people would come in contact with the river. Following cleanup, however, as people return to the river, the 50–100 year timeframe estimate for riverside areas to "develop an appearance comparable to their current appearance" means that aesthetic impacts will be at their greatest immediately following cleanup and then decrease over the long term.

Determining potential aesthetic impacts on particular stretches of the river with any greater specificity is not possible without a systematic survey or GIS spatial analysis.

Findings

There is limited information available to assess potential aesthetic impacts of the Rest of River cleanup on specific sections of the Housatonic River. A viewshed analysis could better determine any potential visual impacts.

EMPLOYMENT IMPACTS

This section of the report estimates the number of jobs that would be created by the four cleanup options. These include jobs directly related to the cleanup project (for example, cleanup contractors, truck drivers), as well as the increase in indirect employment in the area due to increased demand. Please note that these jobs would last different numbers of years, depending on the duration of the cleanup project (for example, 5, 14 or 52 years).

Direct Employment

The types of jobs that would be directly created by the cleanup project include construction managers, field technicians, foremen, laborers, mechanics, operators, superintendents, survey technicians, industrial truck drivers and wastewater treatment system technicians. Annual wages for these jobs range from $31,500 for industrial truck drivers to $62,260 for construction managers and foremen.[67] Table 10 below presents an estimate of the number of cleanup jobs that would be created **assuming off-site disposal**. These are based on the estimated labor hours provided in the *Revised CMS* (Appendix N, Table N-3), annualized using the project duration (5, 14 or 52 years), and converted to number of jobs by dividing by 1,584 working hours per year (9 working months per year, 22 days per month, 8 hours per day; see *Revised CMS*, p. 3-20). The number of local hires was estimated using the percentage of local hires used during cleanup of the 1 ½ Mile Reach (56 percent, or 19 local hires out of 34 total full-time jobs).[68] Table 10 shows that the number of cleanup jobs created, assuming off-site disposal, ranges from 36 to 53 (excluding the no removal option). The extensive removal option would require the most total labor hours; however, because these labor hours are spread out over a very long duration (52 years), the number of jobs created is less than for the moderate removal option.

Table 10. Estimate of cleanup jobs created, with off-site disposal (based on labor hours provided in the *Revised CMS*).

	No removal	Minimal removal	Moderate removal	Extensive removal
Duration of project (years)	0	5	14	52
Local hires	0	20	30	22
Non-local hires	0	16	23	18
Jobs Created:	**0**	**36**	**53**	**40**

Table 11 below presents an estimate of the number of cleanup jobs that would be created **assuming on-site disposal**. These are based on the estimates presented in Table 10 above, plus the jobs that would be associated with on-site disposal. These additional jobs would include construction managers, field technicians, foremen, laborers, mechanics, operators, superintendents, survey technicians, industrial truck drivers, gate attendants, and health and safety officers. The on-site disposal labor hours were calculated using the removal volume of each cleanup option (*Revised CMS*, Executive Summary, p. 12), multiplied by a labor hours-per-

[67] May 2010 National Occupational Employment and Wage Estimates. http://www.bls.gov/oes/current/oes_nat.htm.
[68] Local economic impacts of the 1 ½ Mile Reach cleanup were provided by Dean Tagliaferro, EPA project manager for the GE/Housatonic site.

cubic-yard ratio derived from data presented in the *Revised CMS* (Appendix N, Table N-4).[69,70] Then, as described above, the labor hours were annualized using the project duration (5, 14 or 52 years), the annual hours were converted to number of jobs by dividing by 1,584 working hours per year, and the number of local hires was estimated using the percentage of local hires used during cleanup of the 1 ½ Mile Reach (56 percent). Table 11 shows that the number of cleanup jobs created, assuming on-site disposal, ranges from 64 to 93 (excluding the no removal option).

Table 11. Estimate of cleanup jobs created, with on-site disposal (based on labor hours provided in the *Revised CMS*).

	No removal	Minimal removal	Moderate removal	Extensive removal
Duration of project (years)	0	5	14	52
Local hires	0	52	52	36
Non-local hires	0	41	41	28
Jobs Created:	**0**	**92**	**93**	**64**

To verify the results from Table 10, an additional method was used to estimate the number of cleanup jobs that would be created assuming off-site disposal. The results are presented in Table 12. These estimates were calculated using the estimated cost for each cleanup option without treatment and disposal (*Revised CMS*, p. 8-70), and annualized using the project duration. These annual costs were then divided by the annual-project-cost-per-job ratio calculated using data from the 1 ½ Mile Reach cleanup.[71] The resulting estimates (36–58 jobs created) correspond closely to the estimates presented in Table 10 (36–53 jobs created).

Table 12. Alternative estimate of cleanup jobs created, with off-site disposal (based on costs provided in *Revised CMS*, and cost-per-job ratio during cleanup of the 1 ½ Mile Reach).

	No removal	Minimal removal	Moderate removal	Extensive removal
Duration of project (years)	0	5	14	52
Local hires	0	22	32	20
Non-local hires	0	17	26	16
Jobs Created:	**0**	**39**	**58**	**36**

Indirect Employment

This section estimates the number of jobs that would be indirectly created as a result of the cleanup project. These include people that will need to be hired to satisfy the increased demand

[69] The labor hours presented in Appendix N of the *Revised CMS* were taken from the cost estimate (App. N, p. 3). Dividing the cost estimates by the corresponding labor hour estimates yields dollar-per-hour ratios ranging from $104 to $174 per labor hour. Note that the cost estimates include labor, materials, equipment and contingency allowances.

[70] For the minimal removal cleanup option, the study used 1.7 labor hours per cubic yard. This is the ratio derived for SED 3/FP 2, which is closest in volume to the minimal removal option. For the moderate removal option (removal volume = 1,098,000 cubic yards), the study used the labor hour per cubic yard ratio for filling up the Forest Street landfill (capacity = 1 million cubic yards). For the extensive removal option, the study used 0.7 labor hours per cubic yard, which is the ratio derived for SED 8/FP 7 (the study's extensive removal option).

[71] The 1 ½ Mile Reach project's cost without treatment and disposal was $65.9 million, or $16.5 million per year for the four-year project. Given that 34 cleanup jobs were created, the annual-cost-per-job ratio was $484,559.

in the region for goods and services, as well as the people that will need to be hired as a result of purchases made by cleanup workers. Indirect employment was estimated using the Regional Input-Output Modeling System (RIMS II) developed by the U.S. Department of Commerce's Bureau of Economic Analysis. The RIMS II multipliers "attempt to estimate how much a one-time or sustained increase in economic activity in a particular region will be supplied by industries located in the region."[72] Empirical studies have found that RIMS II multipliers are "not substantially different in magnitude from those … based on relatively expensive surveys."[73] As a result, "RIMS II is widely used in both the public and private sector."[74]

Table 13 presents an estimate of the number of jobs that will be created (directly and indirectly) as a result of the four cleanup options. The estimates of direct jobs were obtained from Tables 10 and 11 above. The estimates of indirect jobs were calculated using the RIMS II direct-effect employment multiplier for Berkshire County, which estimates that adding one job in the "waste management and remediation services" industry will create 1.8618 total jobs (including the one initial job).[75] As shown in Table 13, the total employment created by the cleanup options is estimated at 67–99 jobs under the off-site disposal option, and 119–174 jobs under the on-site disposal option (ignoring the no removal option).

Table 13. Estimate of direct, indirect and total jobs created.

	No removal	Minimal removal	Moderate removal	Extensive removal
Duration of project (years)	0	5	14	52
Off-site disposal				
Direct jobs	0	36	53	40
Indirect jobs	0	31	46	34
Total Jobs:	**0**	**67**	**99**	**74**
On-site disposal				
Direct jobs	0	92	93	64
Indirect jobs	0	79	81	55
***Total Jobs*:**	**0**	**172**	**174**	**119**

Once again, it is important to note that these employment effects would last for different numbers of years, depending on the duration of the cleanup project. The estimates of indirect employment were calculated with the assumption that all of the people employed in direct jobs will reside in Berkshire County. To the extent that cleanup workers live part of the year outside Berkshire County (for example, on weekends or during the winter off-season), the number of indirect jobs would be reduced.

It is important to note that the estimates presented in Table 13 do not include the potential loss of existing jobs due to the cleanup project. If the cleanup project reduces tourism or outdoor recreation, then it is likely that some job losses in those sectors would occur. As noted in the tourism section, in 2010, Berkshire County's tourism sector supported 3,450 jobs (5.6 percent of

[72] https://www.bea.gov/regional/rims/index.cfm.
[73] https://www.bea.gov/regional/rims/brfdesc.cfm.
[74] Ibid.
[75] The most recent RIMS II multipliers for Berkshire County were purchased from the Bureau of Economic Analysis on February 22, 2012. These multipliers are based on year 2008 data.

all jobs in the county) and provided $84.95 million in annual wages (2.8 percent of the county's total employee compensation). Although it is not possible to predict how many jobs might be lost, even a small drop in tourism could mean the loss of several dozen jobs in the tourism sector. However, it is likely that the cleanup project will result in a net gain in jobs and wages for the county.

Another way to predict the local economic impacts of the cleanup options is to estimate how much of the cleanup's cost would be spent on local contractors and vendors. This study estimates that the Rest of River cleanup could result in $11.5 to $112.7 million in spending on local contractors and vendors, as shown in Table 14 below.

Table 14. Estimate of spending on local contractors and vendors.

	No removal	Minimal removal	Moderate removal	Extensive removal
Cost (without transportation and disposal)[76]	$5,000,000	$93,500,000	$394,000,000	$917,000,000
Percentage spent on local contractors and vendors[77]	12%	12%	12%	12%
Estimated spending on local contractors and vendors:	**$600,000**	**$11,500,000**	**$48,400,000**	**$112,700,000**

Local Tax Revenues

Cleanup workers who patronize local hotels and restaurants will create increased local tax revenues, due to the local option meals and room occupancy excises. This study assumes that half of the non-local hires (see Tables 10 and 11) will stay at hotels and eat at restaurants, with the other half staying in apartments and preparing their own meals. The study assumes that these workers will use hotels and restaurants in Pittsfield, Lenox and Lee, due to these municipalities' proximity to the main cleanup area. All three of these municipalities have adopted a local meals tax of 0.75 percent and a local room occupancy tax of 6 percent. The *Revised CMS* assumes that the construction season will last nine months per year. Assuming a hotel rate of $120 per night and $40 per day spent at restaurants, each worker will create $1,971 per year in room occupancy taxes and $82 per year in meals taxes. As shown in Table 15 below, the annual local tax revenues are estimated to be $16,000–41,000 from room occupancy taxes and $700–$1,700 from meals taxes.

[76] *Revised CMS*, p. 8-70.
[77] This is the percentage that was spent on local contractors and vendors during the 1 ½ Mile Reach cleanup, excluding spending on transportation and disposal. Provided by Dean Tagliaferro, EPA project manager for the GE/Housatonic River site.

Table 15. Estimate of annual local tax revenues from cleanup jobs.

	No removal	Minimal removal	Moderate removal	Extensive removal
Duration of project (years)	0	5	14	52
Off-site disposal				
Workers staying in hotels	0	8	12	9
Annual local room occupancy tax revenue	$0	$15,651	$23,129	$17,323
Annual local meals tax revenue	$0	$652	$964	$722
On-site disposal				
Workers staying in hotels	0	20	21	14
Annual local room occupancy tax revenue	$0	$40,084	$40,613	$27,761
Annual local meals tax revenue	$0	$1,670	$1,692	$1,157

Findings

Assuming off-site disposal, the moderate removal option is expected to create about 50 cleanup jobs for 14 years; the minimal removal and extensive removal options are expected to create about 40 cleanup jobs, for five and 52 years, respectively. If on-site disposal is selected, about 90 cleanup jobs would be created under the minimal removal and moderate removal options; the extensive removal option would create about 60 cleanup jobs. Slightly more than half of these jobs are expected to be filled by local residents. Including indirect employment created by the cleanup project, about 70–100 new jobs are estimated assuming off-site disposal, and about 120–170 new jobs assuming on-site disposal. Local contractors and vendors are expected to receive $11 to $113 million in spending from the cleanup project. Non-local cleanup workers are expected to contribute $16,000–42,000 per year in local room occupancy and meals taxes.

PROPERTY VALUE IMPACTS

Some community members in the Rest of River area are concerned that cleanup actions, as well as the possible construction of one or more landfills in the area, would drive down the value of local real estate. This section of the report attempts to monetize these potential effects on property values. A Web-based literature search was conducted to identify recent articles and reports that address the effects of contaminated sites, and their cleanup, on nearby property values. The literature search also attempted to locate research on the effects of landfills on nearby property values. Peer-reviewed academic articles and reports issued by EPA were included. Articles and reports that synthesized results from multiple researchers were especially sought out.

The following sections draw on the findings of the literature search to answer these questions:

- *Do contaminated sites affect residential property values?*
- *Would residential property values in the Rest of River increase after cleanup?*
- *What would be the cleanup's effects on commercial and industrial property values?*
- *What might be the long-term property value impacts after the Rest of River cleanup?*
- *What might be the property value impacts during the Rest of River cleanup?*
- *How would the potential on-site landfills affect property values?*

Do contaminated sites affect residential property values?

A 2009 EPA report surveyed the literature on the property value effects of the Superfund program. The authors found that "little is known with certainty about these property value impacts" (p. 12).[78] In general, "contamination may tend to decrease the value of nearby residential properties. However, in some cases site and community characteristics may result in an increase in the value of nearby properties. Overall, the magnitude and direction of the price effect on surrounding home prices appears to vary significantly with individual sites" (p. 22).

Another recent EPA report stated that while many studies have found National Priorities List (NPL) sites "to affect residential property values, the magnitude and direction of the impact varies, information on timing of effects is unclear, and studies have rarely focused on timeline as an issue of interest" (p. 53).[79]

A 2011 academic article presented a meta-analysis of 46 studies that investigated the connection between waste sites and property values.[80] The meta-analysis found that "all classes of waste sites affect real estate prices, but sites classified as hazardous, especially aquatic hazardous sites, are associated with the greatest discounts" (p. 175). The authors state that, with a few exceptions,

[78] U.S. Environmental Protection Agency. Office of Superfund Remediation and Technology Innovation. January 2009. *Challenges in Applying Property Value Studies to Assess the Benefits of the Superfund Program*. http://www.epa.gov/superfund/programs/recycle/pdf/PropertyStudy.pdf.
[79] U.S. Environmental Protection Agency. Office of Policy and Office of Solid Waste and Emergency Response. October 2011. *Handbook on the Benefits, Costs and Impacts of Land Cleanup and Reuse*. EPA-240-R-11-001. http://yosemite.epa.gov/ee/epa/eerm.nsf/vwAN/EE-0569-02.pdf/$file/EE-0569-02.pdf.
[80] Braden, JB, Feng X, Won DH. 2011. *Waste Sites and Property Values: A Meta-Analysis*. Environmental and Resource Economics 50:175-201.

"virtually all studies have found that NPL status significantly influences nearby housing values" (p. 180). After excluding outliers, the mean price effect of a waste site was a decrease of 4.5 percent; for aquatic hazardous waste sites, the price effect was a decrease of 16 percent.[81] When non-hazardous sites were excluded from the analysis, the mean price effect was a decrease of 8.3 percent (p. 185).

Interestingly, Braden et al.'s meta-analysis found that sites on the NPL have a less negative impact on property values than do non-NPL hazardous waste sites; however, the meta-analysis is not able to monetize the difference in property value impacts between NPL and non-NPL sites. The authors speculate that "this finding might reflect market expectations that sites on the NPL are or will be remediated with greater certainty than non-NPL sites. In other words, since property values embody both current use values and future economic prospects, the fact that NPL sites are given priority for cleanup may more than offset the fact that these sites are among the most hazardous at the time they are placed on the list" (p. 198).

Would residential property values in the Rest of River increase after cleanup?

The 2009 EPA review, which surveyed the literature on the property value effects of the Superfund program, found that "in cases where price declines are seen, remedial actions may reverse this decline at some sites. If the cleanup of a site is delayed for a long period, a more permanent decrease in value may occur" (p. 22). The authors of the 2009 review surveyed the literature for evidence of a rebound in home values after cleanup; they concluded that "some homes near NPL sites begin to experience a reversal of the decline in price associated with site proximity after the site is listed and before the remedial action is complete, with the possible exception of sites with … complex, highly visible or contentious remedies, or time-consuming remedial actions" (pp. 10, 21).

The 2011 EPA report quoted a 2006 review, which found "no consistent results as to when or whether housing prices dropped and then rebounded" (p. 53).

Braden et al.'s 2011 review found that "the literature varies on whether cleanup reverses negative price effects" (p. 180). Their meta-analysis concluded that:

> There is little evidence that a change in the status of a site, from discovery through remediation, produces significant and predictable effects on property values. This may imply either inertia in real estate markets or differences in the processes by which prices rise or fall in response to an intervention. Whatever the underlying cause, it is a sobering discovery for those who would like to believe that removal of the disamenity will reliably lead real estate prices to recover. Many hedonic property value studies have been used by advocates of remediation to imply such a recovery, but the literature taken as a whole does not support it. (pp. 198-199)

[81] Braden et al. define "waste site" to include hazardous sites as well as non-hazardous sites such as sanitary landfills and recycling centers.

A 2003 article focused on environmental stigma, and whether its effect on property values is temporary or long-term.[82] According to the authors' interpretation of their model results, "both temporary stigma and long-term stigma are possible equilibrium outcomes after the discovery and cleanup of a hazardous waste site" (p. 276). They hypothesize that long-term stigma occurs when environmental contamination causes an area's characteristics to change in such a way that lower property values persist even after the site has been cleaned up. For instance,

> When the public perceives that a neighborhood is no longer fashionable, the value of the intangible component falls. By making the neighborhood less desirable, a hazardous waste site decreases the value of the neighborhood's property, making it more affordable to lower-income families and less attractive to higher-income families. Over time, higher-income residents may relocate. As a result, the by-products of high-income residents, such as social status, good schools, low crime rates, quick police response, and well-maintained, owner-occupied homes, may disappear. Therefore, although the environmental problems are temporary, they affect the character of a neighborhood, creating long-term stigma. (p. 276)

Messer et al. (2006) focused on the effect of stigma on nearby home values in three communities with high-profile Superfund sites.[83] They conclude that most of the value of a cleanup is lost when the cleanup is delayed for many years. They argue that lengthy cleanups give rise to more media attention and "perceptual cues" (for example, high truck traffic, warning signs, workers wearing protective clothing) that can cause the area to become stigmatized, "resulting in quasi-permanent economic damages" (p. 322).

What would be the cleanup's effects on commercial and industrial property values?

The effects of contaminated sites on the values of commercial and industrial properties are even less well studied and understood than the effects of contaminated sites on residential property values (EPA 2009, p. 7); however, the impacts on commercial property values seem to be lower than impacts on residential property values (Braden et al. 2011, p. 177).

What might be the long-term property value impacts *after* the Rest of River cleanup?

The literature search has shown that there is a high degree of uncertainty regarding the effects of contaminated sites and their cleanup on nearby property values. Property values near contaminated sites do not follow a predictable course over time as the sites are discovered and then cleaned up. It is plausible that property values would decrease after a contaminated site is discovered. However, after discovery, a variety of actions and perceptions can occur, some of which could increase property values and others of which could decrease property values. Actions and perceptions that could increase property values include: the expectation that cleanup will occur in the future, the actual cleanup and a cleaner river. Actions and perceptions that could

[82] McCluskey JJ, Rausser GC. 2003. *Stigmatized Asset Value: Is It Temporary or Long-term?* The Review of Economics and Statistics 85:276-285.
[83] Messer KD, Schulze WD, Hackett KF, Cameron T, McClelland G. 2006. *Can Stigma Explain Large Property Value Losses? The Psychology and Economics of Superfund*. Environmental and Resource Economics 33:299-344.

decrease property values include: the expectation that cleanup will be delayed, environmental stigma (for example, concern that PCBs will migrate downstream during dredging), disamenities during the cleanup (for example, truck traffic, limited access to the river, construction noise), the creation of on-site landfills and a landscape scarred by construction activity. Research has shown that it is not possible to predict whether the negative or positive effects on property values will dominate at a specific site. Therefore, this study presents a range of potential property value scenarios that may occur.

Table 16 presents the property value scenarios assumed in this study. Scenarios #1–4 assume that the temporary property value loss is 5.5 percent for residential and agricultural properties; this is equal to the mean decline found by Braden et al. (2011) for terrestrial and aquatic hazardous waste sites.[84] To provide an upper estimate, scenarios #5–8 assume that the temporary property value loss is 16 percent for residential and agricultural properties, which is equal to the decline found by Braden et al. for aquatic hazardous waste sites. The effect on commercial and industrial properties is assumed to be half of the effect on residential properties, based on the finding that the property value effects on commercial properties are smaller than the effects on residential properties (Braden et al. 2011, p. 177). Given that the property value effects caused by NPL sites tend to be smaller than the property value effects caused by other hazardous waste sites, our assumed property value losses may be overestimates, because the GE/Housatonic River site, although not listed on the NPL, is similar in many ways to an NPL site.

Table 16. Property value scenarios.

Scenario #	Temporary property value decline (residential, commercial)	How much of this decline has already occurred?	How much will property values rebound after cleanup?	Predicted long term change in property values (residential, commercial)
1	5.5%, 2.75%	All	Completely	+5.5%, +2.75%
2	5.5%, 2.75%	Half	Completely	+2.75%, +1.375%
3	5.5%, 2.75%	All	Halfway	+2.75%, +1.375%
4	5.5%, 2.75%	Half	Halfway	0%, 0%
5	16%, 8%	All	Completely	+16%, +8%
6	16%, 8%	Half	Completely	+8%, +4%
7	16%, 8%	All	Halfway	+8%, +4%
8	16%, 8%	Half	Halfway	0%, 0%

The distance from the river over which these price effects apply is assumed to be 3 miles, which is the mean distance at which an effect is detected in the studies analyzed by EPA (2009, p. 13). Property values are assumed to be affected along both sides of the Housatonic River from the confluence of the east and west branches of the Housatonic River in Pittsfield, to Rising Pond Dam near the village of Housatonic; this assumption was made to strike a balance between the stretch of river where property values may be affected by cleanup construction, and the longer stretch of river where property values may be affected by perceived contamination, stigma and other factors.

The literature search does not enable this study to determine how much of the property value decline is due to the river's contamination and how much will be due to the cleanup construction

[84] Weighted average of the price effects of terrestrial and aquatic hazardous waste sites (Braden et al. 2011, Table 2, p. 188). 5.5% = [(76 × 3.546%) + (14 × 15.937%)] ÷ 90.

phase. In other words, it is not known how much of the 5.5 percent decline has already occurred, and how much will occur in the future. Therefore, some of the property value scenarios in Table 16 assume that all of the property value decline has already occurred, and the other scenarios assume that half of the decline has occurred and that the other half will occur in the future (perhaps as a result of construction-related disamenities). Conducting site-specific property value research to more precisely determine the property value effects is beyond the scope of this study, and would be subject to the many difficulties, uncertainties and confounding effects that plague such studies. Furthermore, collecting historical data would not necessarily shed light on the property value changes that may occur in the future due to cleanup, which is the focus of this study.

As stated in the previous paragraph, previous research has not been able to conclude how much of the property value decline is due to environmental contamination, and how much is due to construction-related disamenities. Another consequence of this uncertainty is that the study is not able to calculate separate property value estimates for each of the cleanup options. This is because the perception of environmental contamination (and its corresponding property value effect) is likely to be affecting a long stretch of Rest of River, whereas the cleanup effort (and its corresponding construction-related property value effect) would focus on a shorter stretch of the river. For this reason, it seems likely that a cleanup option that affects a smaller area would result in higher property values, provided that environmental concerns are addressed.

Tables 17 and 18 present the estimated property value impacts under each of the eight property value scenarios. This analysis does not include properties in localities other than Pittsfield and the five Rest of River towns. These estimates find that the Rest of River cleanup can be expected to have a positive effect on residential property values ranging from $0 to $724 million, compared to their current level. The effect on commercial, industrial and agricultural properties is estimated to be $0 to $71 million, which is about a tenth of the residential effect. Please note that these estimates of the effect of cleanup on property values are not predictions of future property values, because many other factors (aside from cleanup) will also affect property values. Also note that Tables 17 and 18 estimate the effect that will exist *after cleanup has been completed*; as assumed in property value scenarios #2, #4, #6 and #8 (see Table 16 above), property values could be negatively affected during the cleanup project, and could then rebound once the cleanup has been completed.

Table 17. Estimated *post-cleanup* effect on residential property values within 3 miles of river, relative to current property values ($ millions).

	Current residential property value within 3 miles[85]	Estimated effect on property values *after cleanup*				
		Scenario 1	Scenarios 2 and 3	Scenarios 4 and 8	Scenario 5	Scenarios 6 and 7
		+5.5%	+2.75%	0%	+16%	+8%
Pittsfield	$2,013	$111	$55	$0	$322	$161
Lenox	$754	$41	$21	$0	$121	$60
Lee	$549	$30	$15	$0	$88	$44
Stockbridge	$677	$37	$19	$0	$108	$54
Great Barrington	$531	$29	$15	$0	$85	$43
Sheffield	$0	$0	$0	$0	$0	$0
Total:	**$4,524**	**+$249**	**+$124**	**$0**	**+$724**	**+$362**

Table 18. Estimated *post-cleanup* effect on commercial, industrial and agricultural property values within 3 miles of river, relative to current property values ($ millions).

	Current property value within 3 miles[86]			Estimated effect on future property values				
				Scenario 1	Scenarios 2 and 3	Scenarios 4 and 8	Scenario 5	Scenarios 6 and 7
	Comm.	Indust.	Agric.	+2.75%	+1.375%	0%	+8%	+4%
Pittsfield	$303	$97	$0.6	$11	$5.5	$0	$32	$16
Lenox	$149	$7.4	$0.1	$4.3	$2.1	$0	$12	$6.2
Lee	$150	$43	$0.5	$5.3	$2.7	$0	$15	$7.7
Stockbridge	$42.1	$3.4	$0.2	$1.3	$0.6	$0	$3.7	$1.8
Great Barrington	$80	$7.6	$5.3	$2.5	$1.3	$0	$7.4	$3.7
Sheffield	$0	$0	$0	$0	$0	$0	$0	$0
Total:	**$724**	**$158**	**$6.7**	**+$24**	**+$12**	**$0**	**+$71**	**+$36**

Selecting the no removal cleanup option can be expected to have a slightly negative effect on property values. This is based on the assumption that current property values are based, in part, on the expectation of a future cleanup, with a positive effect from expectations of a cleaner environment and a negative effect due to any apprehensions about negative impacts from the cleanup operation. Assuming that the positive effect outweighs the negative effect, selecting the no removal option would have a slightly negative effect on property values.

Given the finding that property values are less likely to rebound at sites with "complex, highly visible or contentious remedies, or time-consuming remedial actions" (EPA 2009; pp. 10, 21), it is likely that the more intensive cleanup options proposed for the site would result in actual property value impacts that are closer to the scenario 4/8 end of the range, given their high visibility and the length of time required for their completion. This assumption is supported by the stigma research of McCluskey and Rausser (2003) and Messer et al. (2006), which states that

[85] Provided by Mark Maloy of the Berkshire Regional Planning Commission, February 29, 2012. All values are for fiscal year 2012, except Stockbridge (fiscal year 2011). The current property values used in this study are equal to the real estate assessment values set by the municipalities; these assessed values are required by state law to reflect current market values.
[86] See previous footnote.

lower property values are more likely to persist if environmental contamination causes the area's character to change; this slow change is more likely to occur if the cleanup takes many years.

The value of certain specific parcels may be especially affected by the Rest of River cleanup. These include those parcels associated with dam impoundments. There are five major dams in Reaches 7 and 8 (Columbia Mill Dam, Eagle Mill Dam, Willow Mill Dam, Glendale Dam and Rising Pond Dam). The properties that include these dams and their impoundments are severely impacted by the contamination in the impoundments. In some cases, the perceived liability and uncertainty caused by the contamination can reduce the value of these parcels to almost zero. Cleaning up the dams and impoundments could greatly improve these properties' reuse potential, and increase their value. The Columbia Mill Dam property can be used to provide a rough estimate of the property value increase that could be created by removing the perceived liability. According to knowledgeable local sources, the property is currently not marketable due to the regulatory uncertainty caused by the PCB contamination in the impoundment. The property's current assessed value ($640,000 land, $597,500 building, $1,237,500 total)[87] provides a reasonable rough estimate of the potential property value increase once this uncertainty has been eliminated by EPA's selected cleanup.

The four cleanup options being considered in this study vary in their approach to the impoundments. The no removal and minimal removal options would use monitored natural remediation to address the impoundments. The moderate removal option would remove sediment to a depth of 1 to 1.5 feet, followed by capping. The extensive removal option would remove sediment to a greater depth (to achieve a PCB concentration of 1 mg/kg), followed by backfilling. Any cleanup alternative selected by EPA would remove the regulatory uncertainty that is depressing the values of the dam properties. However, if the less intensive impoundment cleanups would also require restrictions on the future allowed uses of those properties, then those restrictions could result in a smaller increase in value for the properties.

What might be the property value impacts *during* the Rest of River cleanup?

As previously discussed, Table 16 above summarizes this study's assumptions about the cleanup's effects on property values. The section above uses these assumptions to estimate how property values could be affected *after the cleanup is complete*. This section uses the assumptions to estimate how property values could be affected *during the cleanup project*. These estimates are presented in Tables 19 and 20 below. As discussed in the previous section, a variety of perceptions can occur during a cleanup project, some of which could increase property values (for example, the expectation of a cleaner river in the future) and others of which could decrease property values (for example, environmental stigma and construction-related disamenities). Construction-related disamenities include truck traffic, limited access to the river, construction noise and the replacement of a bucolic setting with a construction site. As can be seen in the figures at the end of this report, each of the cleanup options will require the creation of access roads and staging areas on both sides of the river. In some cases, access roads and staging areas may be constructed very close to, or on, residential properties. The values of those

[87] Parcel ID:150/013.0-0000-0001.0, 157 Columbia St., Land Area: 22.00 acres, Total Finished Area: 242,585 sqft, http://csc-ma.us/PROPAPP/display.do?linkId=1967103&town=LeePubAcc.

specific, highly-impacted properties may decline far more than the average declines assumed in Table 19 for residential properties at large.

Under scenarios 1, 3, 5 and 7, this study assumes that the entire property value decline associated with the GE/Housatonic River site has already occurred, so no further decline would occur during the cleanup. Under scenarios 2, 4, 6 and 8, this study assumes that half of the property value decline has already occurred, and half will occur during the cleanup. Therefore, for scenarios 2 and 4, the property value effect during cleanup is assumed to be 2.75 percent for residential properties and 1.38 percent for commercial, industrial and agricultural properties. For scenarios 6 and 8, the property value effect during cleanup is assumed to be 8 percent for residential properties and 4 percent for commercial, industrial and agricultural properties. This study estimates that the temporary property value decline in the study area during cleanup could range from $0 to $362 million for residential properties, and from $0 to $36 million for commercial, industrial and agricultural properties. The section above describes in detail how property values are expected to rebound after the cleanup is complete.

Table 19. Estimated effect on residential property values within 3 miles of river, *during cleanup*, relative to current property values ($ millions).

	Estimated effect on property values *during cleanup*		
	Scenarios 1, 3, 5 and 7	Scenarios 2 and 4	Scenarios 6 and 8
	0%	2.75%	8%
Pittsfield	$0	$55	$161
Lenox	$0	$21	$60
Lee	$0	$15	$44
Stockbridge	$0	$19	$54
Great Barrington	$0	$15	$43
Sheffield	$0	$0	$0
Total:	**$0**	**-$124**	**-$362**

Table 20. Estimated effect on commercial, industrial and agricultural property values within 3 miles of river, *during cleanup*, relative to current property values ($ millions).

	Estimated effect on property values *during cleanup*		
	Scenarios 1, 3, 5 and 7	Scenarios 2 and 4	Scenarios 6 and 8
	0%	1.38%	4%
Pittsfield	$0	$6	$16
Lenox	$0	$2	$6
Lee	$0	$3	$8
Stockbridge	$0	$1	$2
Great Barrington	$0	$1	$4
Sheffield	$0	$0	$0
Total:	**$0**	**-$12**	**-$36**

How would the potential on-site landfills affect property values?

The potential on-site landfills could affect nearby property values due to perceptions about health effects, truck traffic, visual aesthetics, noise and air quality concerns. The literature search

attempted to identify recent studies of the effects of landfills on nearby property values. The most recent and comprehensive meta-analysis identified was Braden et al. (2011), which compiled the results of 46 studies. For the "terrestrial hazardous waste site" category, which includes "hazardous waste landfills, inactive industrial sites where hazardous materials remain, and hazardous waste incinerators" (p. 180), the mean price effect was 3.5 percent (p. 188). For the "non-hazardous waste site" category, which includes "sanitary landfills and recycling centers" (p. 180), the mean price effect was 3.1 percent (p. 188). This study assumes that residential properties near a future PCB landfill could decline in value by 3.5 percent, and that commercial, industrial and agricultural properties could decline by 1.75 percent. Although the PCB landfills would not be "hazardous waste landfills" according to EPA's regulatory definition, the hazardous waste price effect is appropriate to use given likely public attitudes toward these disposal facilities. The distance from the potential landfill locations over which this effect would apply is assumed to be 3 miles, which is the mean distance at which an effect was detected in the studies analyzed by EPA (2009, p. 13).

Table 21 below presents estimates of the potential property value effect of constructing an on-site landfill. An estimate is presented for each of the potential landfill locations identified in the *Revised CMS*. These potential landfill locations are depicted on Figures 9-3 through 9-11 of the *Revised CMS*.[88] As shown in Table 21, the potential property value effects from an on-site landfill range from $23 million for the Forest Street location, to $43 million for the Woods Pond location.

[88] http://www.epa.gov/region1/ge/thesite/restofriver/reports/cms/472605_Section_9_Figures.pdf.

Table 21. Estimated change in property values within 3 miles of potential landfill locations ($ millions).

Potential landfill location		Current property value within 3 miles[89]		Estimated future change in property value		
		Residential	Commercial, industrial, agricultural	Residential 3.5%	Commercial, industrial, agricultural 1.75%	Total
Woods Pond	Pittsfield	$0	$0	$0	$0	$0
	Lenox	$617	$121	$22	$2.1	$24
	Lee	$404	$141	$14	$2.5	$17
	Stockbridge	$68	$6.1	$2.4	$0.1	$2.5
	Great Barrington	$0	$0	$0	$0	$0
	Sheffield	$0	$0	$0	$0	$0
	Total:	**$1,089**	**$268**	**-$38**	**-$4.7**	**-$43**
Forest Street	Pittsfield	$0	$0	$0	$0	$0
	Lenox	$23	$1.7	$0.8	$0.0	$0.8
	Lee	$541	$183	$19	$3.2	$22
	Stockbridge	$0	$0	$0	$0	$0
	Great Barrington	$0	$0	$0	$0	$0
	Sheffield	$0	$0	$0	$0	$0
	Total:	**$563**	**$184**	**-$20**	**-$3.2**	**-$23**
Rising Pond	Pittsfield	$0	$0	$0	$0	$0
	Lenox	$0	$0	$0	$0	$0
	Lee	$0	$0	$0	$0	$0
	Stockbridge	$135	$6.0	$4.7	$0.1	$4.8
	Great Barrington	$629	$107	$22	$1.9	$24
	Sheffield	$0	$0	$0	$0	$0
	Total:	**$765**	**$113**	**-$27**	**-$2.0**	**-$29**

Property Tax Revenues

This section of the report monetizes the potential effects that the cleanup options may have on property tax revenues in the Rest of River municipalities. This section builds on the property value estimates presented above, to estimate how property tax revenues would be affected by the changes in property values. Table 22 below presents estimates of the effects on annual property tax revenues *after cleanup has been completed*. Table 23 below presents estimates of the temporary effects on annual property tax revenues *during cleanup*. The estimates in both tables are based on the municipalities' current property tax rates. The property value scenarios (#1–8) are described above in Table 16. As shown in Table 22 below, the positive impact on annual property tax revenues could range from $0 to $11 million after cleanup is completed, based on current tax rates. During cleanup, a temporary negative impact of $0 to $6 million on annual property tax revenues is possible, as shown in Table 23.

[89] Provided by Mark Maloy of the Berkshire Regional Planning Commission, February 29, 2012. All values are for fiscal year 2012, except Stockbridge (fiscal year 2011).

Table 22. Estimated *post-cleanup* effect on annual property tax revenues, relative to current property tax revenues ($ millions).[90]

Municipality	Tax rate (per $1,000)	Estimated effect on annual property tax revenues: Scenario 1	Scenarios 2 and 3	Scenarios 4 and 8	Scenario 5	Scenarios 6 and 7
Pittsfield	$16.11 (residential)	$1.8	$0.9	$0	$5.2	$2.6
	$32.85 (commercial)[91]	$0.4	$0.2	$0	$1.1	$0.5
	Total:	$2.1	$1.1	$0	$6.2	$3.1
Lenox	$11.17 (residential)	$0.5	$0.2	$0	$1.3	$0.7
	$14.79 (commercial)[92]	$0.1	$0.0	$0	$0.2	$0.1
	Total:	$0.5	$0.3	$0	$1.5	$0.8
Lee	$13.67[93]	$0.5	$0.2	$0	$1.4	$0.7
Stockbridge	$7.48[94]	$0.3	$0.1	$0	$0.8	$0.4
Great Barrington	$13.12[95]	$0.4	$0.2	$0	$1.2	$0.6
Sheffield	N/A	$0	$0	$0	$0	$0
Total:		**+$3.9**	**+$1.9**	**$0**	**+$11.2**	**+$5.6**

Table 23. Estimated effect on annual property tax revenues, *during cleanup*, relative to current property tax revenues ($ millions).[96]

Municipality		Estimated effect on annual property tax revenues: Scenarios 1, 3, 5 and 7	Scenarios 2 and 4	Scenarios 6 and 8
Pittsfield	residential	$0	$0.9	$2.6
	commercial	$0	$0.2	$0.5
	Total:	$0	$1.1	$3.1
Lenox	residential	$0	$0.2	$0.7
	commercial	$0	$0.0	$0.1
	Total:	$0	$0.3	$0.8
Lee		$0	$0.2	$0.7
Stockbridge		$0	$0.1	$0.4
Great Barrington		$0	$0.2	$0.6
Sheffield		$0	$0	$0
Total:		**$0**	**-$1.9**	**-$5.6**

The potential effect of cleanup on certain parcels is of special concern to some community members. For example, some community members are concerned that the *Revised CMS* identifies the Lane Construction sand and gravel quarry, which is in operation, as a possible

[90] Does not include the effect of the potential on-site landfills on property tax revenues.
[91] FY 2011 tax rates from http://www.cityofpittsfield.org/city_departments/tax_collections/index.htm.
[92] FY 2012 tax rates from http://www.assessedvalues.com/index.zhtml?jurcode=152.
[93] FY 2012 tax rate from http://csc-ma.us/Lee.
[94] FY 2011 tax rate from Brandi Page of Stockbridge Assessor's Office.
[95] FY 2012 tax rate from http://csc-ma.us/GreatBarrington.
[96] Does not include the effect of the potential on-site landfills on property tax revenues.

landfill location (the potential Woods Pond landfill location). One of the effects of converting the quarry to a landfill would be reduced property tax revenues from that parcel. The Town of Lee's Board of Assessors stated that converting the property to a landfill would "likely result in a lower valuation but it is not feasible for us to predict what the new value would be until the changes actually happen".[97] The parcel is currently assessed at $1.18 million, with an annual tax of $16,188.[98] It is reasonable to assume that if the quarry were converted to a landfill, few structures would exist on the property, so the value of the improvements would decline to nearly zero. As a rough estimate, assuming an improvement value of zero, and an unchanged land value, the annual tax would be $9,495, a decline of $6,693.

Mitigation

Overall, this study finds that cleanup will have a long-term positive effect on property values. Research suggests that some cleanup attributes are more likely to minimize environmental stigma, and thereby lead to higher property values. These include:

- Conducting a cleanup that effectively addresses the environmental concerns, thereby removing concerns that the area is contaminated.
- Conducting a quick, non-controversial cleanup with minimal delay.
- Reducing negative media attention and "perceptual cues" (for example, high truck traffic, warning signs, and workers wearing protective clothing).

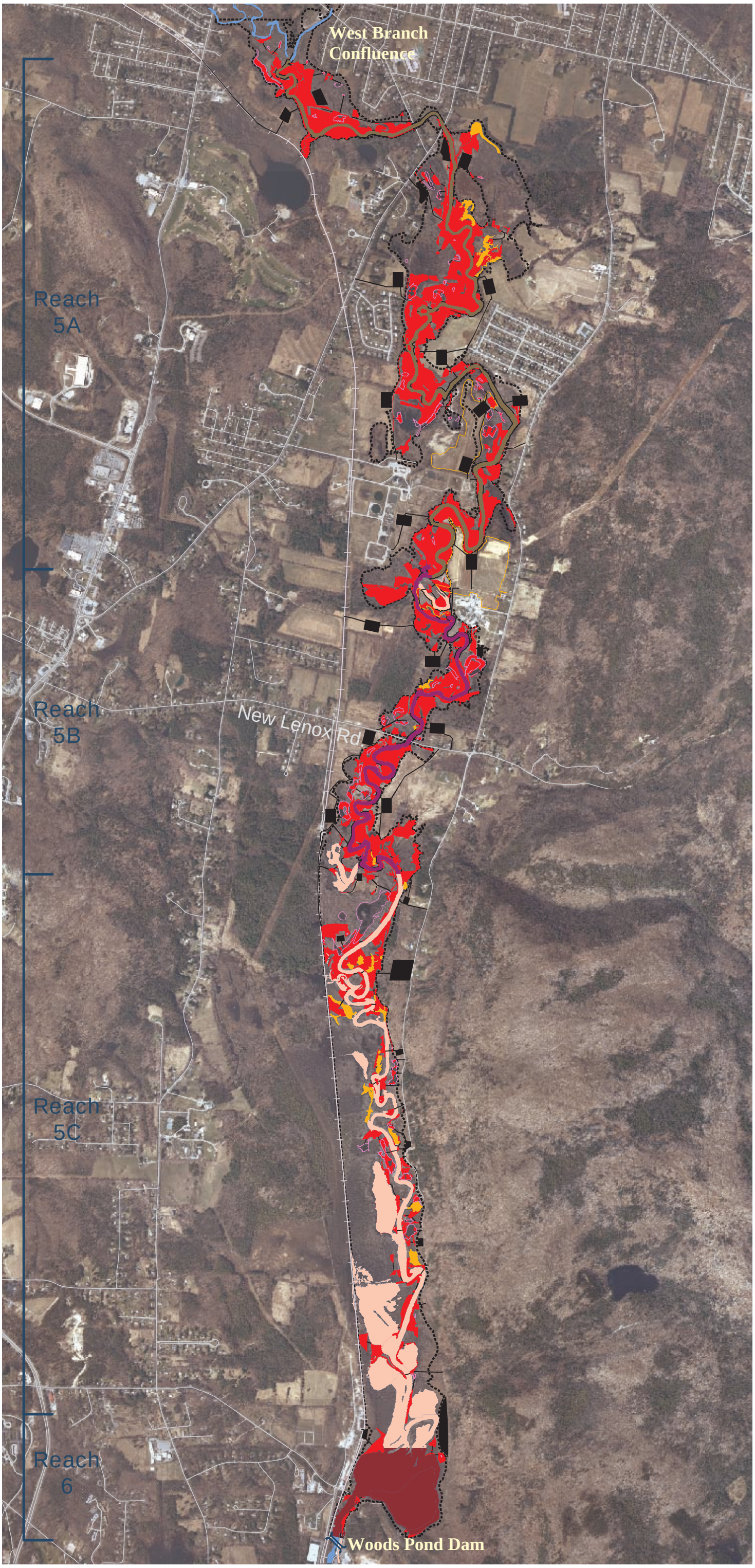
Specific actions that could maximize property values at the GE/Housatonic River site include:

- Minimizing construction-related disamenities during the cleanup (for example, truck traffic, limited access to the river, construction noise).
- Minimizing the area affected by cleanup construction.
- Building access roads and staging areas in low-visibility locations, and away from residential properties.
- Avoiding the creation of on-site landfills.
- Designing cleanup methods that prevent PCBs from migrating downstream during dredging, conducting sampling to confirm that PCBs are not migrating, and communicating that information to the public.
- Addressing the dam properties in a way that removes the regulatory uncertainty that is depressing their value, and also avoids placing restrictions on the future allowed uses of those properties.
- Using the cleanup project as an opportunity to add amenities such as trails, boat launches or viewing platforms.
- Conducting a public relations campaign to counter potential negative media attention.

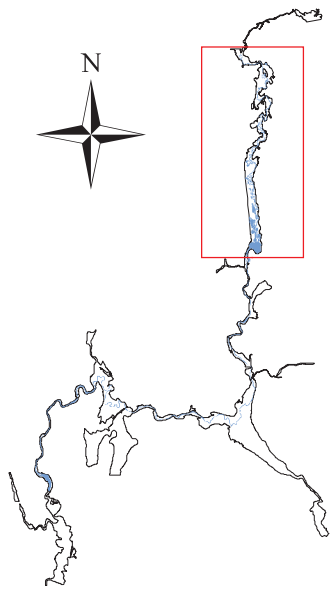
[97] March 6, 2012 letter from Dayton DeLorme, Chairman, Lee Board of Assessors.
[98] 60 Willow Hill Road (232.14 acres, Parcel ID 150/002.0-0000-0004.0) is assessed at $694,600 for land and $489,600 for improvements. http://csc-ma.us/PROPAPP/display.do?linkId=1966137&town=LeePubAcc.

Findings

The Rest of River cleanup is estimated to have a long-term positive effect of $0–795 million on property values in the study area, with nearly all of the effect coming from residential properties. The positive effect on property tax revenues could range from $0 to $11 million annually, based on current tax rates. Conversely, on-site disposal could have a negative effect on property values near the landfills of about $20–40 million per landfill. It is possible that property values may decline temporarily during the cleanup project; this potential temporary decline is estimated to range from $0 to $397 million, which would lead to a decline of $0 to $5.6 million in annual property tax revenues.



LOCATOR



SCALE

0 0.25 0.5 Miles

LEGEND

Basemap Information

- Housatonic River
- Vernal Pool
- Agricultural Area
- 1 mg/kg PCB Isopleth
- Housatonic Railroad
- Major Road
- Dam

Remediation Information

Sediment Remediation Type(s)

- Removal of Top 2 ft
- Removal of Top 3 ft
- Removal of Top 3.5 ft
- Removal of Top 4 ft
- Removal of Top 6 ft
- Floodplain Soil Removal
- Access Road/ Staging Area

SED 8/FP 7 includes bank removal/ stabilization for Reaches 5A and 5B.

Figure 8-7a.

Remedial Action(s) for SED 8/FP 7 in Reaches 5 and 6.

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Woods Pond Dam

Columbia Mill Dam

Former Eagle Mill Dam

Glendale Dam

Willow Mill Dam

Rising Pond Dam

Reach 7A

Reach 7B

Reach 7C

Reach 7D

Reach 7E

Reach 7F

Reach 7G

Reach 7H

Reach 8

LOCATOR

N

SCALE

0 0.5 1 2 Miles

LEGEND

Basemap Information

- Housatonic River
- Vernal Pool
- Agricultural Area
- 100-yr Floodplain
- Housatonic Railroad
- Major Road
- Dam

Remediation Information

Sediment Remediation Type(s)

- Removal of Top 2 ft
- Removal of Top 3 ft
- Removal of Top 6 ft
- Removal of Top 7 ft
- Floodplain Soil Removal
- Access Road/ Staging Area

Figure 8-7b.

Remedial Action(s) for SED 8/FP 7 in Reaches 7 and 8.

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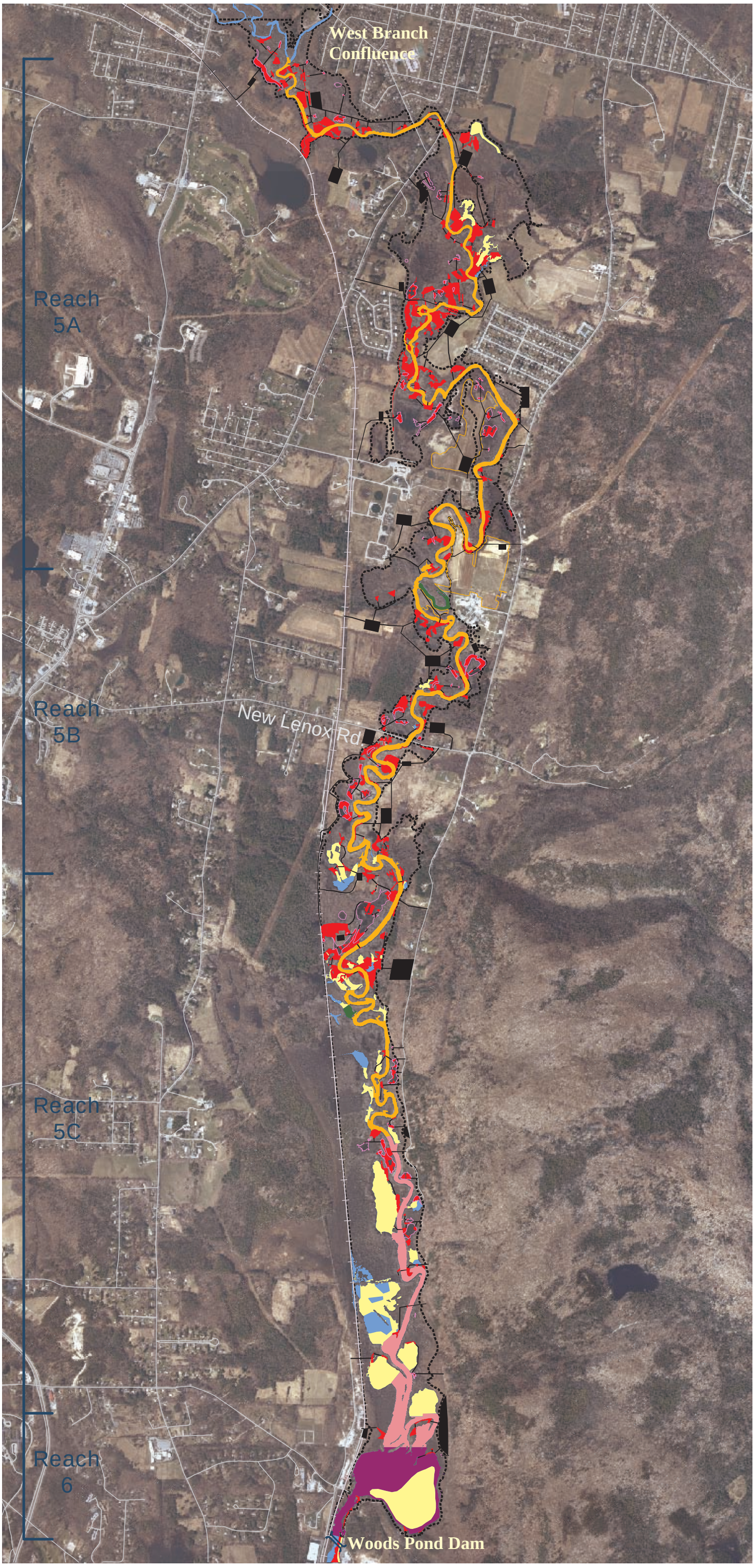

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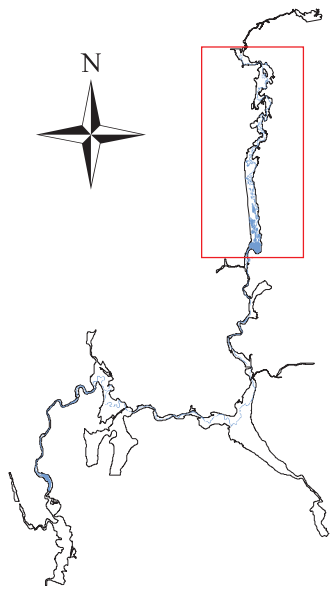

SCALE

0 0.25 0.5 Miles

LEGEND

Basemap Information

- Housatonic River
- Vernal Pool
- Agricultural Area
- 1 mg/kg PCB Isopleth
- Housatonic Railroad
- Major Road
- Dam

Remediation Information

Sediment Remediation Type(s)

- Removal of Top 1 ft
- Removal of Top 1.5 ft
- Removal of Top 2 ft
- Removal of Top 3.5 ft
- Engineered Capping
- Floodplain Soil Removal
- Access Road/ Staging Area

SED 9/FP 8 includes bank removal/ stabilization for Reaches 5A and 5B.

Figure 8-9a.

Remedial Action(s) for SED 9/FP 8 in Reaches 5 and 6.

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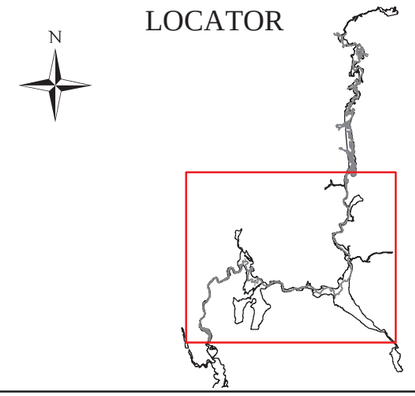

SCALE

0 0.5 1 2 Miles

LEGEND

Basemap Information

- Housatonic River
- Vernal Pool
- Agricultural Area
- 100-yr Floodplain
- Housatonic Railroad
- Major Road
- Dam

Remediation Information

Sediment Remediation Type(s)

- Removal of Top 1 ft
- Removal of Top 1.5 ft
- Removal of Top 3.5 ft
- Engineered Capping
- Floodplain Soil Removal
- Access Road/ Staging Area

Figure 8-9b.

Remedial Action(s) for SED 9/FP 8 in Reaches 7 and 8.

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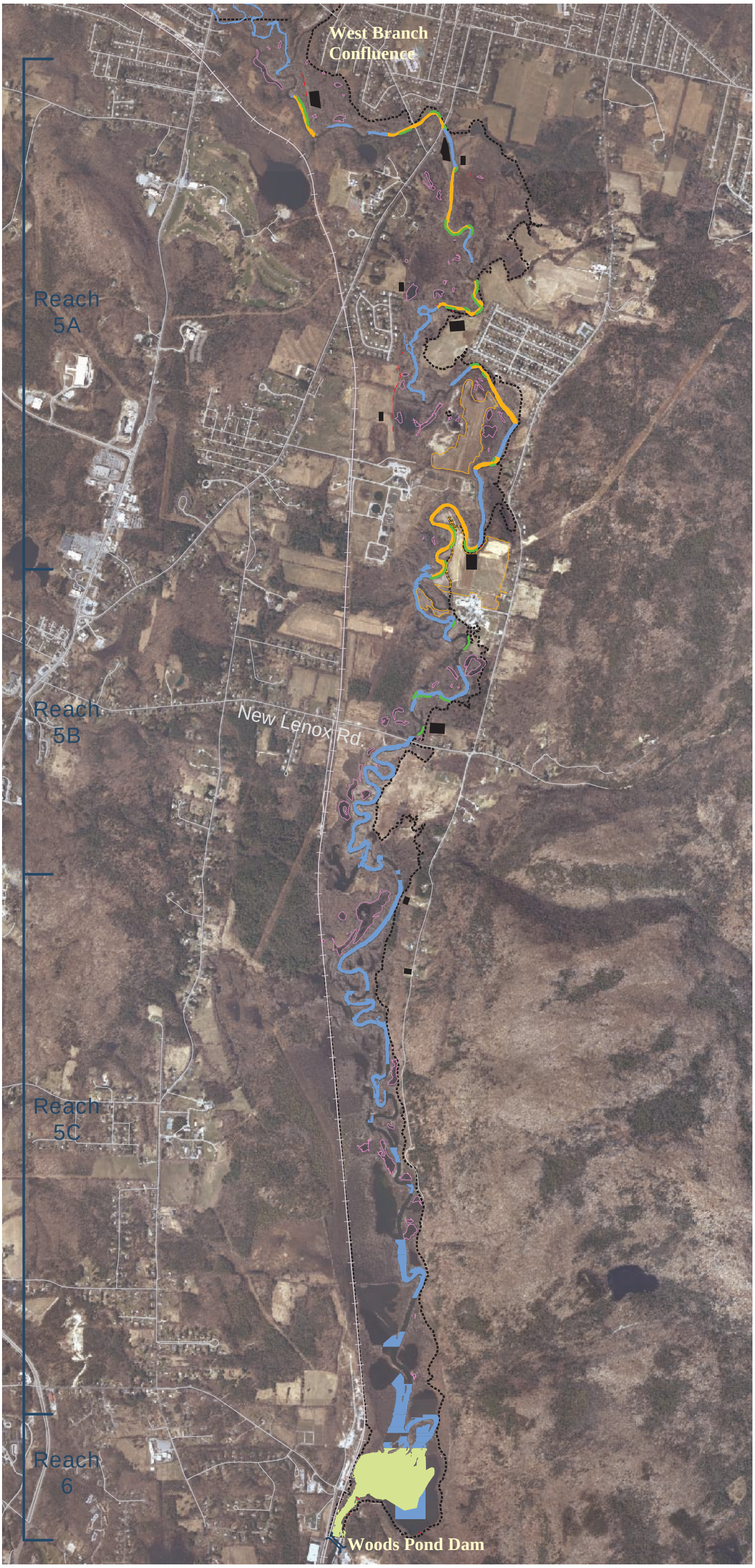

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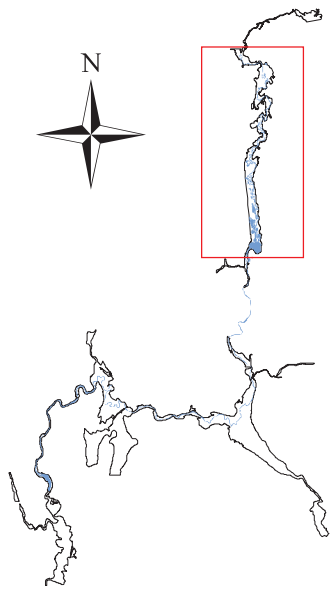

SCALE

0 0.25 0.5 Miles

LEGEND

Basemap Information

- Housatonic River
- Vernal Pool
- Agricultural Area
- 1 mg/kg PCB Isopleth
- Housatonic Railroad
- Major Road
- Dam

Remediation Information

Sediment Remediation Type(s)

- Bank Remediation
- Removal of Top 2 ft
- Removal of Top 2.5 ft
- Floodplain Soil Removal
- Access Road/ Staging Area

Figure 8-11a.

Remedial Action(s) for SED 10/FP 9 in Reaches 5 and 6.

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Woods Pond Dam

Columbia Mill Dam

Former Eagle Mill Dam

Glendale Dam

Willow Mill Dam

Rising Pond Dam

Reach 7A

Reach 7B

Reach 7C

Reach 7D

Reach 7E

Reach 7F

Reach 7G

Reach 7H

Reach 8

LOCATOR

N

SCALE

0 0.5 1 2 Miles

LEGEND

Basemap Information

- Housatonic River
- Vernal Pool
- Agricultural Area
- 100-yr Floodplain
- Housatonic Railroad
- Major Road
- Dam

Remediation Information

Sediment Remediation Type(s)

- Removal of Top 2.5 ft
- Floodplain Soil Removal
- Access Road/ Staging Area

Figure 8-11b.

Remedial Action(s) for SED 10/FP 9 in Reaches 7 and 8.

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