Revitalizing North Adams and its Concrete River

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Introduction

“Revitalizing North Adams and its Concrete River” was undertaken for the Environmental Studies 302 class at Williams College in Williamstown, MA in the Fall Semester of 2009. The project involves an analysis of a short section of the flood control system in the city of North Adams, MA and proposes solutions to remediate the ecological and recreational loss the chutes have created.

Project Goals

This river restoration project falls within the context of a larger project to improve the ecological, recreational, and economic value of the Hoosic River while still maintaining proper flood control mechanisms. The goals of this larger overall project are twofold: first, to conduct a river restoration project to restore the river ecosystem to make it more suitable for wild trout populations and other aquatic wildlife; and second, to provide residents and visitors with access to a more aesthetically pleasing river to enjoy recreationally, which can contribute toward other efforts to revitalize downtown North Adams.

Within this larger goal, our project will focus on a smaller section of the flood control system, beginning south of Noel Field and continuing to Heritage State Park. Following extensive research, we will propose and rank solutions into three tiers based on simplicity, cost and compliance with Army Corps standards.

Background

Clients

The two clients for our project are Lauren Stevens and Judy Grinnell. These two clients worked to guide our project to completion, as both were quite familiar with the flood control system in North Adams. While each client works within a different organization, they share the same goal of restoring and revitalizing the Hoosic River in North Adams, both ecologically and as a social and recreational asset to the community. Lauren Stevens is with the Hoosic River Watershed Association (HooRWA), which is a group concerned with improving the river's ecosystem along its entire 70 miles. Judy Grinnell is with the Hoosic River Revival Coalition, which is concerned more directly with restoring the river to increase public use and in revitalizing the downtown area. Although their motivations may differ, efforts by each group will benefit the other. Completing the clients' goals of a river restoration will result in both a revitalized ecosystem and a rejuvenated downtown area.

Site History and Demographics

The city of North Adams lies at the confluence of the North and South branches of the Hoosic River, home to one of the last wild trout populations in Massachusetts. It is this location that helped to make North Adams a booming community in the 1800s when the Hoosic's fast-flowing water was used to power the machinery in its cotton mills. Unfortunately, these mills developed at a time before our modern environmental regulations, such as the Clean Water Act. As a result, the Hoosic River was heavily polluted throughout the 19th century.[1]

In addition to problems associated with toxic waste and the foul smell of the river, the Hoosic periodically overflowed, posing a serious threat to city residents and businesses. The

[1] Hoosic River Revival Coalition Brochure

Army Corps of Engineers, due to large floods in the 1930s and 1940s, constructed a series of concrete chutes in downtown North Adams, channelizing the two and a half mile section of the river that ran from Eclipse Mill on the North Branch, to Noel Field on the South Branch, and east through the city of North Adams. [2] The federally funded flood control project was designed to accommodate a 500-year flood event.

While the flood control project has successfully prevented flooding in North Adams, it has done so at great ecological, recreational, and aesthetic cost. Due to the river's history, swimming has been considered for "only the brave hearted and foolhardy"[3]. However, recent improvements to recreational areas, particularly Noel Field Athletic Complex, have provided North Adams with an opportunity to re-introduce kayaking, canoeing, swimming, and other aquatic-based recreational activities.

The city of North Adams is an industrial community located in the northwestern corner of Massachusetts. First settled in 1737, North Adams prospered as a mill town in the late 18th and 19th centuries because of its ideal location at the confluence of the two branches of the Hoosic River, which provided water power for small-scale industries including shoe manufacturers, ironworks, and textile manufacturers. The textile industry declined in the 1930s, causing several factories to close in the city. Fortunately, in early 1940s, the Sprague Electric Company, a major research and development company in the field of electricity and semi-conductors, bought one of the closed textile factories and employed more than 4,000 residents. The company went on to become one of the leading producers of electronic products in the world. Competition abroad eventually caught up, and the company closed in 1985, pushing North Adams into a devastating

[2] Elena Traister, *Proposed Dechannelization of a Segment of the Hoosic River in North Adams*. 2004, 3
[3] North Adams Transcript, 2009

economic recession, which the town is still struggling to recover from.[4]

In 1987, the old site of the Sprague Electric Company was converted into the Massachusetts Museum of Contemporary Art, under the leadership of WCMA director Thomas Krens and Mayor John Barrett III. The project, which cost more than $8 million, was made possible by great community and private support. Mass MoCA opened in 1999 and is now the nation's largest museum of contemporary art. This project played a key role in the economic transformation of North Adams from an industrial community to one centered around culture, recreation, and education.

While the establishment of Mass MoCA has been beneficial to the local economy, bringing in visitors from outside the area who in turn help local businesses, it has created a somewhat unusual dynamic between the blue-collar residents and cultural tourists. Mass MoCA is a good first step in the revitalization of North Adams, but there is more to be done. The Hoosic River Restoration project is example of a project that can increase the city's economic potential, but in addition it will also benefit its residents more directly. A restored river with access and recreational opportunities will provide residents of all socioeconomic levels with something they can enjoy and will make North Adams a more cohesive community that residents can feel a part of.

The 2000 Census provides information, which indicates North Adams is still in an economic slump. With 16,787 residents, the "town" is technically a city, although it is the least populated in the state. The median household income is $27,601 and the median per capita income is $16,381, which puts 13.5% of families and 18.2% of individuals below the poverty line. Also, almost 13% of the town's housing units are subsidized. As a result, North Adams

[4] http://en.wikipedia.org/wiki/North_Adams,_Massachusetts

ranks among the most financially needy towns in Massachusetts. However, increased cultural and recreational opportunities indicate that the town may potentially be on the upswing.[5]

Because such a large percentage of the population is lower to middle income, it is important that the Hoosic River restoration project is framed in such a way that it appeals more directly to the interests of residents in the community. The Hoosic River revival project is unique in that it can potentially have multifaceted benefits that include providing the community with an inexpensive and appealing recreational opportunity, attracting tourists, and improving the river ecosystem. The project may gain more community support if it is framed in such a way to promote the river's potential to become a vital part of the community and a place to recreate with families on the weekend.

Problem Identification

While the flood control project has successfully prevented flooding in North Adams, it has done so at great ecological, recreational, and aesthetic cost. There are two main problems from the channelization of the river that the Hoosic River Revival Project will attempt to alleviate.

The first is ecosystem degradation resulting from lining 2.5 miles of previously natural river with concrete. The Hoosic River is one of the few cold-water rivers in Massachusetts that still contains a self-sustaining population of wild trout, but the flood control features are contributing to unsuitable living conditions.[6] The water in the flood control chutes is significantly warmer than surrounding areas due to decreased depth, poor aeration, and lack of overhead cover by vegetation. In addition to the harm done to trout populations by warmer water, the smooth surface of the concrete, rather than a more natural river bottom with boulders

[5] http://www.census.gov/
[6] http://www.nan.usace.army.mil/project/mass/factsh/pdf/hoosic.pdf

and cobble, provides unsuitable conditions for trout as well as other aquatic life, such as plants and invertebrates.[7]

The second problem caused by channelizing the Hoosic is the loss of recreational and economic opportunity to the community. The river is not viewed positively by North Adams residents and is seen more as a nuisance than a positive attribute. These negative attitudes are clearly exemplified by the fact that most of the buildings have their backs to the river; almost in effort to pretend it's not there. The flood control system blocks the view of the river in many sections, and chutes make access to the river virtually impossible. In some instances, such as the athletic fields at Noel Field, residents are not even aware of the proximity of the river beyond the berm that blocks it from view. While an urban river could be viewed positively as a place to socialize and recreate, the Hoosic has no such access.[8]

Physical Site Description

While there are improvements that could be made to the river throughout all of North Adams, our project focuses more specifically on a 1-mile section of the South Branch of the Hoosic that runs from Hunter Foundry Bridge Road, north past Noel Field, to Western Gateway Heritage State Park. At the southern tip of the site, after running underneath Hunter Foundry Bridge Road, the river turns from a natural curving streambed to a straight bermed channel with rock bottom (See Figure 0 for an illustration of the flood control in the area we are studying). The berms are artificially created grassy slopes that regulate the water levels. While they are flat and grassy along the top, offering a soft and supportive running surface, they do not allow park goers to readily access the river.

[7] Elena Traister, *Proposed Dechannelization of a Segment of the Hoosic River in North Adams*. 2004, 3
[8] Personal Communication with Judy Grinnell, October 27, 2009

The river passes vegetative wetlands on the west side until it intersects with Noel Field, where the earthen berms turn to riprap for about 300 feet. Riprap is more stable and protects against erosion as the water is quickly funneled into the cement chutes at the north end of Noel Field. Noel Field is composed of a baseball field, basketball courts, a walking track and open grass playing fields that border on the berm area. On the east side of the river in this area is a steel recycling plant set back about 100 feet.

After entering the cement flood chutes at the northern end of Noel Field, the river races by residential and commercial space with property abutting the river. The north end of our project site is Heritage State Park, which is at a critical intersection of Route 8, the railroad, the Hoosic and pedestrian traffic. Heritage State Park offers a historical museum that could provide a historical and cultural link to future changes to the Hoosic in this area.

The water level in August is low, perhaps not more than a few inches in the chutes, and little more in the earth berm area. There is little riparian vegetation along the river and fish and other aquatic life are noticeably absent. This site offers a variety of challenges in regard to modifying the flood control apparatus in North Adams.

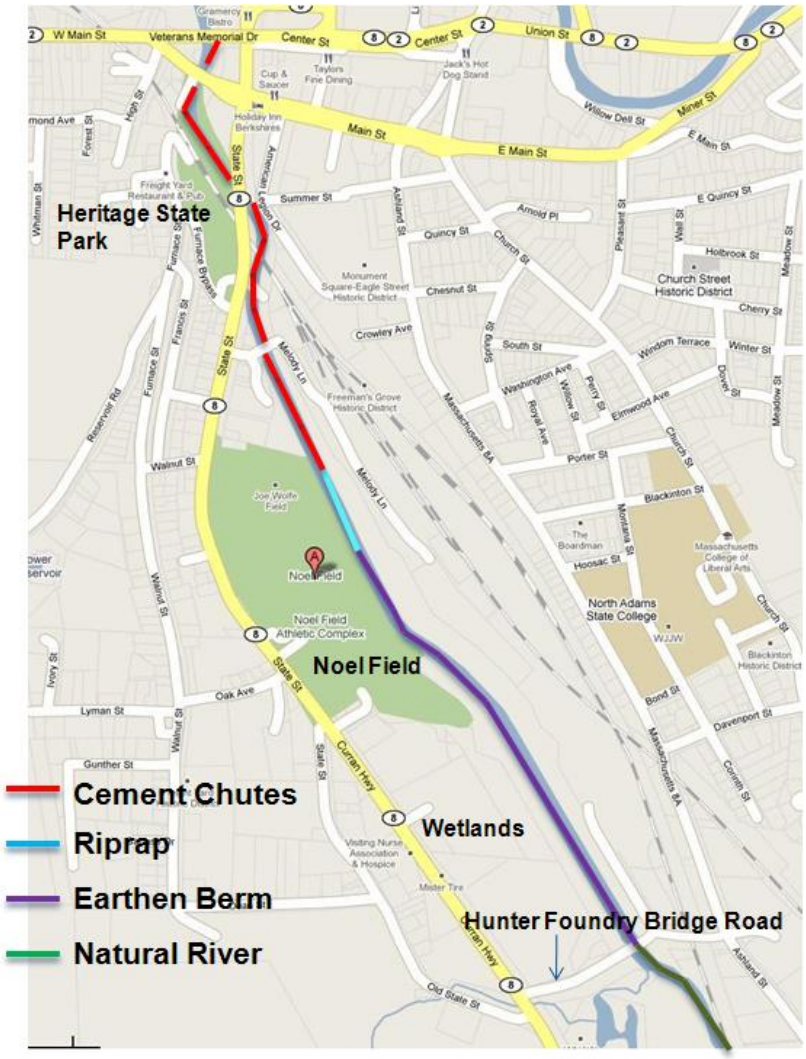

Figure 0: Composition of flood control system within the Noel Field and Heritage State Park section of river we are analyzing

Background Research

Fortunately, our group is not starting from scratch in its efforts to revitalize a small section of the Hoosic River in North Adams, and can benefit from research, feasibility studies, and projects already completed for the Hoosic River as well as similar restoration projects in other cities.

Mrs. Judy Grinnell of the Hoosic River Revival Coalition has already conducted a successful outreach program to gain public support. She has held several meetings with

merchants and various local organizations to raise awareness regarding the lost opportunities resulting from the current state of the river. On Tuesday, October 27, our group attended one of her presentations at the North Adams City Council Meeting, which was met with great support and enthusiasm by all attending. Mrs. Grinnell has gained the support of Mayor John Barrett III in her project, and has also built a broad coalition of support for the revival of the river, including citizens, local businesses, and MASS MoCA.[9] Lauren Stevens and Judy Grinnell proposed a rehabilitation effort focused on the two and half mile stretch of flood chutes positioned in downtown North Adams. As highlighted by Mrs. Grinnell, the flood chutes have remained unaltered for 50 years, leaving room for "new ways of thinking about flood protection and providing uses of the river" (Hutton, 2009). The proposal acknowledged the importance of flood protection, suggesting that areas where 500-year plus 25% flood protection needs to remain intact could use the river's buffer zone as a safe flood zone and a park. Any recreational area open to the public would consequently be built to accommodate a major flooding event. If chutes were left unchanged, artistic displays such as murals were posed as aesthetically appealing options. The potential for outdoor experiential education of local elementary children and MCLA students was mentioned as well.

The Hoosic River Revival Coalition's next step will be a charrette held in the spring of 2010, where professional developers, municipal officers, and residents will meet to discuss the goals and scope of the restoration project, so a professional master plan can be developed. Once the master plan is established, the Revival group will have a better idea as to the amount of funding required for the project. The charrette will also include a discussion of completed studies

[9] http://www.iberkshires.com/story/30815/Hoosic-River-Revival-Group-Spreading-Message-of-Revitalization.html

on sections of the Hoosic in North Adams, and hopefully our report on the area of the river between Noel Field and Heritage State Park will be considered in this meeting.[10]

There has not yet been a professional, comprehensive feasibility study for the river restoration project as a whole. However, there have been a number of studies done on certain sections of the Hoosic that are applicable to the North Adams project.

An important feasibility study currently underway is being done by the U.S. Army Corps of Engineers, the government agency that originally constructed the flood control chutes in the 1930s and still has responsibility and authority for flood control on the river. Their study, which covers the section of the river that flows through Adams, MA (just south of North Adams), was initiated because the flood chutes are nearing the end of their 50-year lifespan, which makes it an opportune time for re-evaluating alternative methods of flood control that take into account the ecological and recreational value of the river. The study will be completed by December of 2009. Although this study deals with a different section of the river, its results will have implications for the approach to be taken in North Adams as well.[11]

Howard Itzkowitz, an architect in North Adams, put together a paper on "Preliminary Observations" regarding the Hoosic River in North Adams. In his report, Itzkowitz claims that the flood control chutes can be reduced, if we first reduce the amount of water flowing into the river as it enters and passes through the city. This can be done by creating additional ponds and wetlands along the south fork, beginning at Cheshire Lake. Itzkowitz also divides the river into 5 different sections within the city, called "Design Opportunity Zones". This is the same technique that has been employed by San Antonio in their river revitalization project, and will prove helpful as different sections of the river lend themselves to different restoration methods based

[10] Personal Communication with Judy Grinnell and Lauren Stevens, October 27, 2009
[11] http://www.nan.usace.army.mil/project/mass/factsh/pdf/hoosic.pdf

on landscape, terrain, land ownership, and general land-use. Itzkowitz's "Preliminary Observations" will be helpful in organizing a general plan of attack.[12]

Elena Traister, a Williams Grad, performed a study on the Hoosic flood control system in North Adams during her graduate study at Yale in 2004. Ms. Traister's report focuses on the section of the Hoosic by Mass MoCA at the confluence of the North and South branches. Ms. Traister offers suggestions to improve the recreational and ecological value of the river, including removing part of the flood wall in the area between the Hoosic and River Street in order to create a more natural wetland. Ms. Traister also suggests smaller scale changes such as more riparian vegetation to increase stream cover and a more natural channel bottom.[13]

There are two other groups interested in the Hoosic River Revival Project: the Massachusetts Department of Ecological Restoration, and the Trout Unlimited Hoosic River Chapter. Both of these organizations focus on river restoration mainly for habitat restoration purposes, but as we mentioned, most of the steps taken to improve the river ecologically will also improve the recreational aspects of the river. The Department of Ecological Restoration has already conducted feasibility study as well as proposed conceptual designs and restoration alternatives in Adams and Clarksburg.[14] The Hoosic River Trout Unlimited Chapter is also extremely interested in the restoration project for the protection of coldwater fishery. Their Home Rivers Initiative could make them an important ally in our efforts to restore the Hoosic River, as the organization supplies volunteers as well as grants to aid in conservation efforts.[15]

Studying how other cities have accomplished similar restoration projects can also be a useful source of knowledge in guiding our efforts. San Antonio, Texas and Providence, RI, are

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[12] Itzkowitz, Howard. *The Hoosic River and North Adams: Preliminary Observations*. August 25, 2009.
[13] Elena Traister, *Proposed Dechannelization of a Segment of the Hoosic River in North Adams*. 2004
[14] http://www.mass.gov/dfwele/river/programs/riverrestore/riverrestore.htm
[15] http://www.tu.org

two examples of other cities that have had success in accomplishing the difficult task of restoring a troubled river and making it a vital part of their communities.

The city of San Antonio's River Improvements Project is an attempt to restore a 13-mile channelized section of the San Antonio River to its previous natural condition. Like the Hoosic River, major floods that look place in the mid 1900s triggered the building of flood control mechanisms by the U.S. Army Corps of Engineers to protect these cities from future floods. However, as both cities have come to realize, the unattractiveness of these solutions has resulted in a loss of ecological, recreational, and economic opportunities.

While much larger in scope, with a $279 million budget, the San Antonio Project shares the goals of environmental restoration, economic development, and recreation with the Hoosic River Restoration Project. As a result, their plan can help us determine possible courses of action in accomplishing our similar goals as well as offer guidance as to how to manage a project of this type. In addition, this project has shown that technological advances in fluvial geomorphology have made the possibility of reversing the ecological damage to these rivers more feasible, while still maintaining, and possibly enhancing, flood control capacity.

In terms of improving the river ecosystem, the San Antonio project plans to line the river bottom with natural cobblestones in order to create a healthier environment for fish and other aquatic organisms. They also plan to reintroduce native vegetation along the river's banks, which will in turn encourage wildlife to forage along the river.

To accomplish the goal of improving recreational value, San Antonio plans to increase public access by introducing pedestrian paths and picnic areas along the river's banks. San Antonio is also establishing cultural connections by enhancing appreciation of the river's historic significance to the city. As San Antonio is making cultural connections between the river and its

museums and historic sites, North Adams could also, in a similar manner, work with MASS MoCA and other cultural attractions within the city to enhance the sense of history and enjoyment. As a result, the river restoration project could actually have the effect of transforming the negative image of the river into a source of pride for the community[16]

An example of how mitigation of the effects of river channelization can be achieved and the economic success that follows is prominent in the Providence River Relocation project in Rhode Island. This project was the culmination of 30 years of planning as well as massive funding strategies and cooperation between many groups. The goal of the project focused more on improving vehicle and pedestrian traffic through downtown, making the river accessible, creating space for public art, and revitalizing downtown, rather than environmental restoration.

Providence has a history similar to that of North Adams, as it was a major industrial and shipping center in the 1800s. However, with expansion and construction, the river was covered over, channelized and forgotten. When industry died, so did the city and by 1970, downtown Providence was nothing more than a shell of the past. Around this time, multiple ideas and plans were floated to revitalize the downtown area. With community and political involvement, different projects that eventually merged gained momentum and capital. In essence, the project called for drastic changes along the river, including the removal of many "bridges"—long segments of paving that covered the river—that would bring the river back into view.

The project rerouted the confluence of the Woonasquatucket and Moshassuck rivers, moved roads, and created an inviting pedestrian walkway along the waterfront, an urban park with amphitheater and restaurant, public art in the open spaces, and brought the historical buildings back into use. A notable success of this project was the effective use of art to bring thousands into the downtown area. The WaterFire art project involves open fires just above

[16]http://www.sanantonioriver.org , October 16, 2009

water level along the downtown stretch of the river, which are lit at night and are a spectacle to behold. Since completion, massive amounts of investment have been taking place in Providence with the construction of new hotels and businesses.[17]

In 2003, this Providence project received a Silver Medal from the Rudy Bruner Award for Urban Excellence. The project received the award because

> "The Selection Committee recognized the project for the attainment of a wide range of goals, for literally changing the face of downtown Providence, for an impressive level of cooperation among public agencies; for design excellence in the detailing and design of the riverfront; and for the heroic proportions of the effort. The Committee also noted the excellence and creativity of programming for the relocated river"[18]

Law and Policy of Army Corps of Engineers

The Army Corps of Engineers has strict guidelines for the maintenance and care of their projects. This unfortunately limits options for modifying the flood chutes. Any changes we propose will need approval by the Army Corps of Engineers. Approval requires in-depth studies demonstrating that the modification will not reduce the efficacy of current flood control measures. Relevant studies require the input of several experts, including engineers, biologists, environmental engineers, and landscape architects. EM-1110-2-301 is the Army Corps manual that details exact requirements for plantings near Army Corps projects. Chapter 4 specifically lays out the procedure for determining the feasibility of plantings. Army Corps approval of a feasibility study is a prerequisite for any vegetation changes we may want to employ. Should

[17] *Providence River Relocation.* Excerpt from unknown source. 2003.

[18] Rudy Bruner Award. http://www.brunerfoundation.org/rba/index.php?page=2003/river.

our project proposal fail the feasibility study, Chapter 5 of EM-1110-2-301 describes measures to render the structure suitable for planting. For berms, unless a root barrier is installed, vegetation cannot encroach beyond 15 feet on either side of the structure. For floodwalls, vegetation cannot encroach beyond 8 feet from the toe and any drains associated with the floodwall. These restrictions basically make the flood control structures stand alone with grass deemed to be the only safe planting.

Compliance with Army Corps standards is required, or else North Adams will lose eligibility for federal relief funding if the flood chutes fail. Variances from the Corps vegetation guidelines can be requested to in order to meet state laws or enhance environmental value. However, a variance comes with many stipulations. It must not compromise the safety, integrity or functionality of the flood control apparatus, nor inhibit accessibility or the cleaning of certain vegetation types. The requirements can be meticulous, but they sum up to "change nothing but what the Army Corps tells you to, unless you have ready the studies to prove to them that the change you've proposed does not compromise the Corps' project." [19]

[19] http://140.194.76.129/publications/eng-manuals/em1110-2-301/entire.pdf January 2000

Methodology

Public Survey

In order to gauge current use of the river by the community and interest in increased use of the river, we conducted a survey of North Adams residents. We administered the survey in several public locations in North Adams. To survey only park-goers at Noel Field and Heritage State Park may not accurately reflect the North Adams community as a whole, limiting our sample to individuals more interested in green space. Thus Heritage State Park and Noel Field are only two of several locations we surveyed. Downtown locations, both commercial stores and cafes such as Brew Ha Ha were also locations of surveying.

Our survey questions asked about use of the river and use of neighboring green space, allowing for comparison: is the river neglected in relation to the park nearby? The survey also includes several open-ended questions, inquiring as to what benefits, if any the river currently offers, whether residents believe the river could be improved (and how), and their opinion of the flood chutes. We also inquired about prior knowledge of the Hoosic River Revival Coalition and concluded with some questions for the sake of demographics: age and residency. For reference, the survey is attached at the end of the document as Appendix 1.

In addition to our public survey given to the community, it is worth mentioning that we also have developed a basic questionnaire that will be used when talking to people who have been successful in similar restoration projects to ours. This questionnaire focuses on key points such as the previous state of the river, goals of the project, improvements that have been made with and without modification to flood control structures, and funding for the project. This questionnaire is attached at the end of the document as Appendix 2.

Support for the project demonstrated at the City Council Meeting resembled the majority of public opinion conveyed in the survey results. All participants agreed that the flood chutes detracted from the overall appeal of the river, often commenting on the limited access posed by the chutes. This perspective was supported by the irregular pattern of park visits, many of which were isolated to one to two occasions per year (Figure 1). Additional feedback encouraged ecosystem preservation, demonstrating a desire to naturalize the river through increased foliage and shading. All contributors had either been informed of the HRRC or had aided its initiative.

Survey results

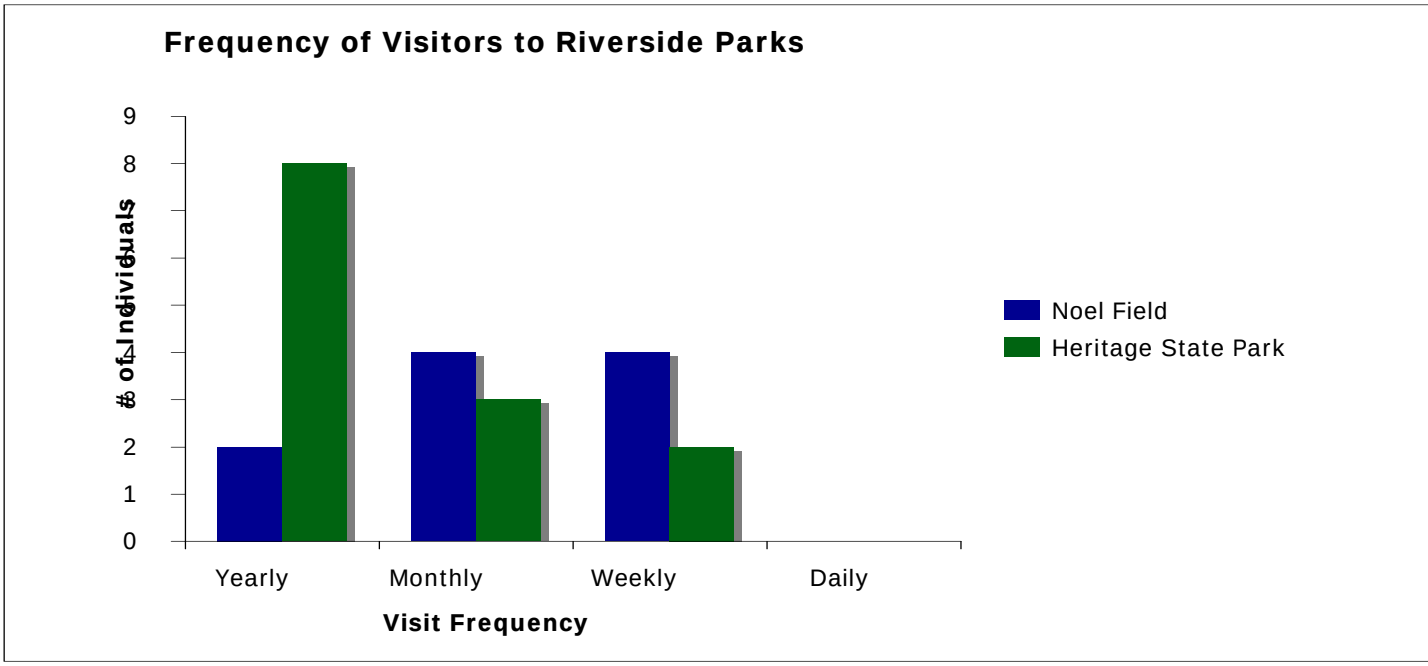

Figure 1. Visits to Noel Field and Heritage State Park, both riverside recreational areas, were commonly an annual occurrence. The distribution of monthly visitors and weekly visitors was fairly even. The figure does not delineate which individuals are North Adams residents.

Given the pollution history of the Hoosic River, the two-generation gap among the participants would suggest that the two age groups offer widely different viewpoints. It would be expected that the fifty-one to sixty-five age group would appreciate the chutes more as a result of their greater familiarity with the flood problems of the 1950s (Figure 2). However, only one

of the two individuals who presented positive attitudes toward the flood chutes was from the older age group. Generally, the chutes were viewed negatively (77% dislike), while the river was viewed positively (86% like it/ love it)—Figure 3.

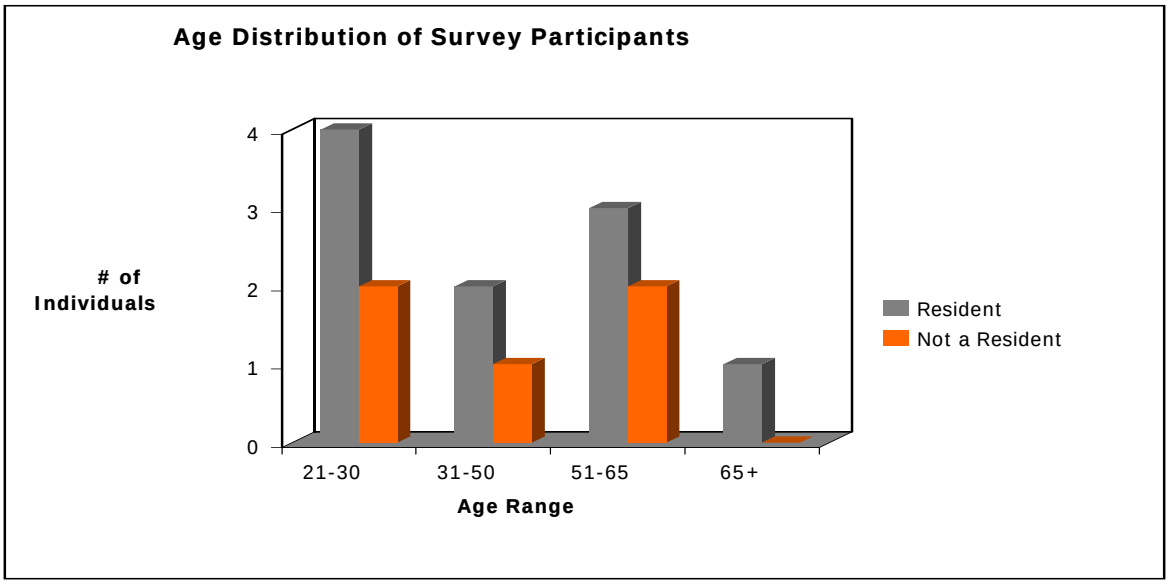

Figure 2. The age distribution of survey participants was broad, ranging from twenty-one to above sixty-five. Such a wide age-range is beneficial considering the small sample size the surveys offer. The majority of contributors fell into two age groups: twenty-one to thirty and fifty-one to sixty-five.

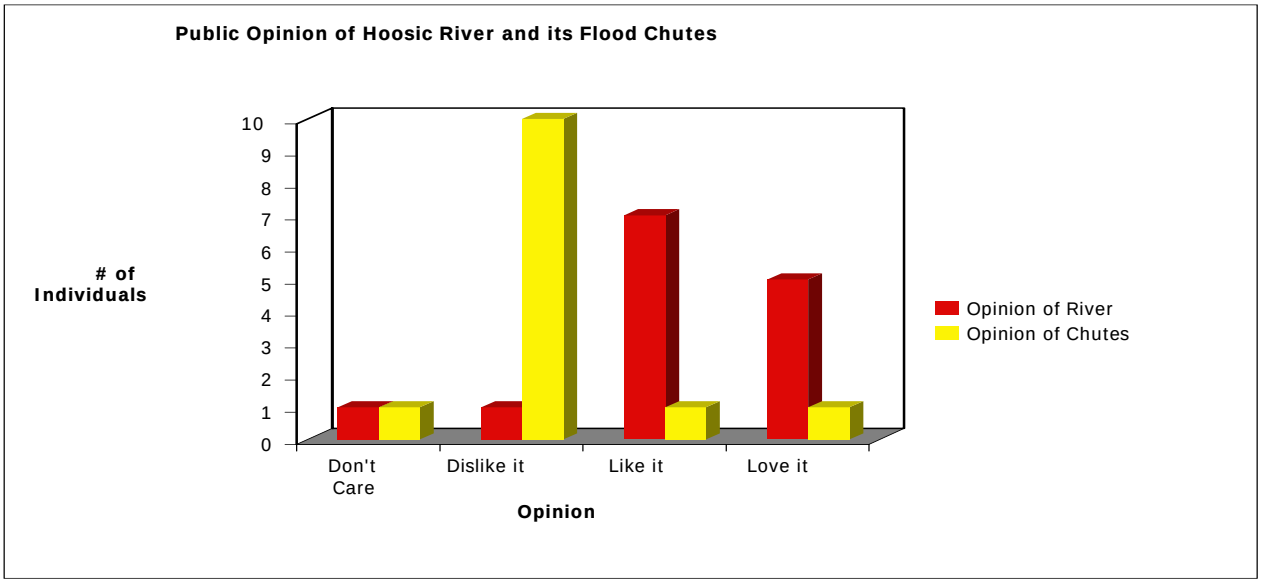

Figure 3. Public opinion of the river and its chutes displayed an inverse relationship of perspective, with flood chutes generally being disliked, while the presence of the river was viewed positively.

While local opinion of the Hoosic River has been positive, the majority of contributors only visited riverside parks annually. Anyone interviewed at Noel Field or Heritage State Park never displayed a visit frequency higher than once per month. The majority of those who fell into the annual visitor category were from the twenty-one to thirty age-group.

It must be noted that the survey results were based on a small sample size, making our results not statistically reliable. As such, these results did not play a large part in our ultimate recommendation for modifications to the flood chutes.

Results from Interviews

Cindy Delpapa – November 6, 2009

On November 6, our group met with Cindy Delpapa who is the Stream Ecologist and Urban Rivers Coordinator for the Massachusetts Department of Ecological Restoration. Mrs. Delpapa has been especially successful in the restoration project on the North Nashau River in Fitchburg, but is also familiar with and excited about the possibility of a river restoration project on the Hoosic River in North Adams. Mrs. Delpapa is knowledgeable and was helpful in explaining the process of restoration in Fitchburg, proposing some ideas for our section of the Hoosic, explaining how to best negotiate with the Army Corps, and outlining some opportunities for project funding. While it became clear to us from this meeting that changes to the flood control system will be a difficult process that involves studies, and close work with the Army Corps, Mrs. Delpapa remained optimistic.

Mrs. Delpapa showed us the River Restoration Master Plan that the town of Fitchburg created in conjunction with the Massachusetts Department of Ecological Restoration. A project

master plan like this outlines sections of the river and specific changes that can be made in each section, and hopefully North Adams can create a master plan for flood chute modifications as well. The Fitchburg River Restoration plan was developed at the same time as the overall City master plan, which looks at general city redevelopment. While the city of North Adams does not currently have a master plan, both Mrs. Delpapa and Mrs. Grinell feel that a Hoosic River Restoration plan could be a catalyst for creating a citywide plan that furthers the idea of revitalization.

We also learned about Mrs. Delpapa's success in negotiating with the Army Corps, which has allowed them to take down a floodwall in Fitchburg. Hearing about this process gave us valuable information as to how a similar project could take place in North Adams. Basically, Fitchburg has a park that is lined in flood walls (similar to what we have at Noel Field), and the function of the floodwall was replicated by creating an Army Corps approved berm at the *back* of the park. Theoretically a flood would cover the park with water, but the berm prevents the floodwater from leaving the park and causing infrastructure damage. The berm at the back of the park also serves as a sitting area where people can watch sporting events at the park. Tearing down the floodwall along the river gives people better access to and visibility of the river, while increasing the flood protection because of the berm at the far side of the park. This project is a great candidate for what could be done in North Adams along Noel Field.

Mrs. Delpapa is familiar with the section of the Hoosic we are dealing with, and was able to answer questions regarding the feasibility of potential ideas. The basic response was that any and all alterations require proving to the Army Corps that these changes do not jeopardize the flood control capability. This includes changes as simple as adding rocks or boulders to the bermed section of the river in order to create riffles and pools that would make the river more

hospitable to fish. Mrs. Delpapa was also able to propose a few other ideas as to what could be done in our section of the river, and these will be explained in detail in the next section.

We also learned about the general process of dealing with the Army Corps. This is not something that we will do within our project, but it is worth mentioning because it will need to be done in order to make any of these ideas a reality. Engineering and hydrologic studies are conducted to determine the feasibility of flood chute alterations, and are then brought to the Army Corps who will consider allowing the proposed alteration to take place. Mrs. Delpapa also mentioned that the Army Corps is old-fashioned and that there is talk of reform that could happen in the next 10 years which may help in creating a more progressive way of thinking about modifications to existing structures.

Finally we learned about some of the funding opportunities that are possible for a project like this. North Adams has applied as a priority project to the Massachusetts Department of Ecological Restoration, and will find out in December if accepted. Being accepted will provide our project with funding and in depth feasibility studies as to what exactly can be done. If approved, the Massachusetts Department of Ecological Restoration will be able to sponsor the spring 2010 charette.[20]

Joe Overlock – November 11, 2009

Joe Overlock of North Adams, is a member of the Hoosic River Chapter of Trout Unlimited, which is a national organization committed to protecting trout in cold water fisheries throughout the United States. Though Trout Unlimited is currently uninvolved with the push to remove the flood chutes through North Adams, they are supporters of the idea. If given direction by the Hoosic River Revival Committee, they will happily help in any efforts to restore the river. Trout Unlimited offers yearly grants called EAS—Embrace A Stream—that are for $10,000 and

[20] Personal Communication with Cindy Delpapa, November 6, 2009

are usually for small projects that improve fish habitat, such as the removal of a dam. Trout Unlimited cannot provide anything more than political support for the major project of altering the flood chutes, as they do not have the funding to take on such large-scale projects.

Mr. Overlock states that there is no fish movement through the flood chutes in North Adams, mainly due to two major roll dams. These roll dams are located on the North Branch at the Eclipse Mill as well as at the bottom of the flood chutes to the West of North Adams. Fish would be able to move between the chutes at high water if it were not for the roll dams.

To restore a viable ecosystem to the flood chute area in North Adams, Mr. Overlock suggests the removal of the roll dams, or the installation of fish ladders at these two roll dams. Fish ladders involve a concentrated flow of water at a reduced grade that allows fish to pass.

To restore habitat in the chute area, Mr. Overlock suggests a series of pools and riffles that would provide refuge for fish and other aquatic creatures. This idea could be implemented by cutting a trench down the center of the chute that would concentrate the water at times of low flow. Mr. Overlock also posed an idea for radical change that entails the construction of a subterranean pipe that would catch floodwater and pipe it underneath the city. This would allow for complete removal of the flood chutes and in their stead, the creation of a natural river with a controlled rate of flow. These ideas will be discussed later in the paper.[21]

Russ Cohen – November 13, 2009

Russ Cohen with the Massachusetts Department of Ecological Restoration is a seasoned rivers advocate who identifies waterways in need of ecological restoration. The Department of Ecological Restoration provides funding and guidance to groups seeking to improve local rivers and streams throughout the state. Mr. Cohen began by speaking of the decreased need for the flood chutes in North Adams that can accommodate a 500-year flood plus 25%. Since the time

[21] Personal Communication with Joe Overlock, November 11, 2009.

the chutes were constructed, the surrounding forests have regained much of their vegetation, making the river less prone to big floods as well as reducing its flashy nature. However, with the impacts of climate change, an increase in the severity of storms may lead to increased floodwater in North Adams.

With regard to modifications of the flood chutes, Mr. Cohen stated that the Army Corps of Engineers are an impediment that cannot be negotiated. Citing years of hard work in Adams that produced no results, Mr. Cohen said that he is skeptical of ever seeing success in North Adams. In order to overcome the barrier posed by the Army Corps, Mr. Cohen suggests taking the issue to congress to have the project de-authorized so that the flood chutes are no longer considered a flood control apparatus. This would allow the city of North Adams to make modifications as they so choose, however, with loss of Army Corps oversight, North Adams would also lose the ability to apply for federal funds if a major flood event did scourge the city.

Mr. Cohen said he would like to see the river returned to its natural state. However, as this is not likely, he suggests re-evaluating the flood danger posed to North Adams. Mr. Cohen suggests widening the river in areas where possible (Noel Field and by the Porches Hotel) to accommodate more floodwater. As well, protecting the river from the sun would be key to reducing water temperature and restoring health to the ecosystem downstream. He suggested the construction of trellises and the planting of vegetation to provide shade. These ideas will be discussed later in the paper.[22]

Elena Traister – November 13, 2009

Elena Traister of MCLA, is a river ecologist who during her graduate study at Yale, reported on the flood control systems in North Adams and Adams. On November 13, 2009, Ms. Traister spoke to the Envi 302 Hoosic team about alternatives to the flood control chutes in

[22] Personal Communication with Russ Cohen, November 13, 2009.

North Adams. Ms. Traister stated that to restore ecological function, it would be necessary to create a natural stream bottom that includes pools, riffles and riparian vegetation.

Ms. Traister's idea for removing the flood chutes, while still retaining the flood protection, involves substituting the chute capacity with added floodwater storage space in the area. This would involve construction of flood parks that would be usable to the public except during times of high floodwater. To construct such parks, the City of North Adams should make it a priority to purchase buildings and land along the river as they go up for sale, which would provide adequate acreage for the expansion of a flood plane that would not only provide flood protection, but also a much needed recreational opportunity for locals and tourists alike. With the inclusion of benches, bike/running paths and riparian vegetation, the river could become a thriving area where the city of North Adams would come to play and relax.[23]

Joe Thompson – November 17, 2009

A phone meeting with Joe Thompson of Mass Moca produced a few brilliant ideas for art projects that could be incorporated into the flood chutes. In of themselves, the chutes are quite interesting with abstract shapes, but Mr. Thompson stressed the importance of having water present in the flood chutes, as their appeal is greatly enhanced when there is a few feet of water in the chutes—though this only happens during times of rain. Mr. Thompson proposed the idea of strategically installing inflatable dams throughout the chutes that would cause the water to back up and increase in depth during times of low flow. This would make the chutes look more appealing. At times of high water, the dams could be deflated so flood waters would not be impeded. Mr. Thompson spoke of an idea that involves mounting a neon blue florescent light along the rim of the chutes that would create a neat haze/illumination of blue light at night as the river snaked through the city. As well, a theatre space could be installed in the chutes, so that at

[23] Personal Communication with Elena Traister, November 13, 2009.

times of low water performances could be held in the chutes, and at high water, the cement seats would be submerged but would not be washed away. Mr. Thompson also suggested lighting the walls with abstract colors which would bring people to look and be aware of the river. Another idea posed by the Harrisons involved putting a cap on the chutes and painting a realistic faux river on top.

Tom Matuszko – November 30, 2009

This phone interview is discussed at greater length in the future recommendations section of the paper. Mr. Matuszko spoke of the two long term solutions we suggest. The first involves re-authorizing the flood chutes in North Adams as a community development project. The second involves applying to the Army Corps Section 1135 program that provides funding and oversight to projects focused on ecosystem remediation.

Potential Solutions

Because there are many different options to improve the river, some of which are much more feasible than others, we decided to organize our solutions into three tiers. The driving force of these solutions is their simplicity, their cost, their ecological and recreation benefits and their contingency on Army Corps guidelines. Our three tiers vary from relatively simple and inexpensive changes, to moderately expensive and more involved projects to, highly involved and very expensive. These three tier are not necessary mutually exclusive, as ideas from all three can be drawn upon to address specific issues in different areas in North Adams. We can look at these tiers as a phased project where simple actions can be taken first, and over the long term bigger changes can be made.

Tier I – Most Simple and Least Involved Changes

The first tier consists of simple and relatively cheap solutions to the problem of revitalizing downtown and restoring the ecological viability of the river. While these solutions will still require approval from the Army Corps, they probably have a better chance of being approved because they do not fundamentally alter the flood chutes.

The installation of fish ladders, an idea proposed by Joe Overlock of Trout Unlimited, would allow greater freedom of trout movement upstream by creating an opportunity for them to get past the roll dams that are currently impeding their movement. A united trout population improves overall river health and increases the areas where trout can spawn. While there are no major roll dams in our section of the river we are studying, there are two impassible dams – one by the Eclipse Mill Loft and one by the downstream end of the flood chutes west of Brown Street

that should be considered. There is also a smaller roll dam at the start of our section of river at the south end of Noel Field, but is likely not an impediment to fish movement.[24]

Another way to potentially improve fish habitat in the bermed section of the river by Noel Field would be altering the river bottom. Currently in the bermed section, the bottom is gravel (rather than the cement found in chutes) allowing for more freedom in changes while retaining the structural integrity of the flood control apparatus. There is potential to anchor large rocks that would create riffles and pools, creating a more ideal aquatic ecosystem. Also, adding cobbles to create a more natural bottom would help improve the habitat. Permission to do such improvements would require a discussion with the Army Corps because these improvements would impede the flow of water in this section of the river and potentially increase the risk of flood. In addition the ecological benefits of added anchored boulders to the river, these additions would also give some texture to the river, improving aesthetics and making it more enjoyable to look at.

Planting vegetation along the river has both ecological and aesthetic benefits, but also poses a problem because root systems can damage the structural integrity of the flood control system. The City's Department of public works is in charge of maintaining and keeping the flood control system clear of all vegetation. According to Cindy Delpapa the maintenance of this vegetation in Fitchburg is "nearly impossible". The importance in trying to keep to these Army Corps standards comes from the fact that if a serious flood were to occur, the city would not receive Federal Disaster Relief if the flood control system was not maintained as they instructed.

The root systems of plants and trees pose potential risks to both the berms and the cement chutes. The berms are composed of a clay liner and hard packed dirt that is used to fully contain the water and prevent leakage. Roots could potentially fracture this clay liner and structurally

[24] Personal Communication with Joe Overlock, November 11, 2009.

compromise the integrity of the berm by allowing water to seep through and widen cracks. With the cement chutes, roots are also a risk because they can create and enlarge cracks particularly at the seams of cement panels. Because of these dangers, planting vegetation would require Army Corps approval. The Army Corps guidelines are straightforward and strict regarding the planting of vegetation, so we do not feel that this is a particularly likely solution. However, because of the fact that planting trees is a relatively cheap way to help the problem, it is still worthwhile to consider.

There is, however, a more expensive solution to the problem of root damage that would allow for the planting of vegetation. This involves planting trees with root systems that are encased in an impermeable concrete planter so that they are contained and will not damage any of the flood control. This is a much more expensive solution to the vegetation problem, but it is definitely more feasible and should be considered by the city if it is thought to be a worthwhile project.[25]

An opportunity to greatly improve the recreational value of the river would involve creating a trail / bike path to connect Noel Field to Heritage State Park which could create a link to the downtown North Adams area. People currently use the 1/2 mile bermed section of the river in Noel Field for jogging / walking and thus a formal extension along the state owned buffer zone along the flood chutes to Heritage State Park is only natural. With the addition of benches and art displays, the river area in Noel Field could become a more widely used site. There is currently a coalition working to construct a path along Route 8 that links Adams to North Adams, and this path could potentially work in conjunction with the River Path project.

A bike / walking path through Noel Field that links the park to the rest of downtown North Adams could bring great recreational benefits to the community. There is currently a

[25] Personal Communication with Cindy Delpapa, November 6, 2009.

project being undertaken by the Berkshire Bike Path Council regarding the creation of a path that runs along Route 8 and connects Adams to North Adams. The Hoosic River Revival Coalition is currently working in conjunction with the Berkshire Bike Path Council as the two groups' goals and intentions of a revitalized and more close-knit community overlap.[26]

Noel Field is a perfect area for a bike path providing a more scenic alternative to continuing up Route 8 into North Adams. Although the Berkshire Bike Path Council's progress has come to a standstill, there is no reason why the feasibility of a path along our section of river cannot be examined. We propose that the path could leave Route 8 on Hunter Foundry Bridge Road and run on top of the .6 miles of berm before descending and leaving the north end of the park and continuing to Heritage State Park.

According to City Council Member Gail Cariddi, in 2000 the committee proposed to route the Bike Path through Noel Field, but the off-road path was not approved because of complications having to do with Army Corps Standards as well as Department of Transportation bike path standards. The berm is not wide enough for the current Bike Path standards, so it cannot be paved unless dirt is used to widen the path. Army Corps approval would need to be obtained before a trail on top of the berm was created, since the project would alter the flood control structures. However, since a path would not decrease flood control capability in anyway, obtaining Army Corps approval would hopefully not be difficult.[27]

Assuming that the berm was widened and a path paved along the top, a bike path could run past the wetlands at the southern end of the park and the ball fields at the northern end. Given that the berm is already used frequently for jogging / walking, creating a more established path could only help the recreational opportunity at Noel Field.

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[26] Personal Communication with Judy Grinnell, November 19, 2009.
[27] Email Correspondence with Gail Cariddi, December 3, 2009.

The path would go on top of the berm for .6 miles from Hunter Foundry Bridge Road to the flood chutes, but there are options for how to route the path as it leaves Noel Field. We have developed three main options for how a path can continue through the town, linking it to Heritage State Park and eventually the rest of downtown North Adams. Generally speaking, these options involve routing a path *along* the chutes, *within* the chutes, or *on top* of the chutes.

The first idea is the simplest: having the bike path run along the flood chutes in the City-owned buffer zone. This idea was originally thought to be unviable because of the decreasing width of the buffer zone, which could mean dealing with private property easements. Our doubts on the feasibility of this original idea lead us to come up with more creative and radical approaches to a downtown bike path, but as explained in the next section, our field study indicated to us that our initial option might not be so much of a stretch.

The second idea we had for a bike path route incorporating the chutes was to put the path inside the flood control system. Since the flood control chutes are designed for the 500-year flood, there is a possibility that the Army Corps could be convinced to allow a portion of the chute to be raised up and designated as a bike path. This idea is obviously problematic because it would indeed decrease the flood control capability of the chutes, which the Army Corps strongly opposes. Also, in-depth engineering studies would need to take place in order to establish a viable route within the flood control apparatus.

The third idea involves a bike path that would run on top of the chutes, accomplished by covering a section of the chutes with a metal grate. Since the path would run on top on the chutes, it would not decrease the flood control capability and it is therefore more likely to be approved by the Army Corps. However, the engineering involved in constructing a path that

bridges the cement chutes would still be fairly involved. Additionally, the idea of covering the river detracts from the "river revival" aspect of this project.

Figure 4: Potential Bike Path Linking Noel Field to Heritage State Park

Tier II - Moderately Expensive / More Involved Solutions

Because shading the river with vegetation is problematic as outlined above, the construction of bridges or trellises could allow for both artificial and natural shading. Bridges across the river would have the added benefit of linking the two sides of the river. Unfortunately the east side of the river contains a scrap metal yard. However, MCLA is thinking of purchasing a section of this scrap metal yard, allowing for the construction of a bridge linking MCLA to Noel Field. Trellising, which would entail metal wires being run across the top of the flood chutes, which creeping vegetation could then grow on, would create a vegetative roof that would

provide shade for the river. This shade would help the water retain its cooler temperature as it flows through the flood chutes which inherently cause the temperature to rise. Trellising also has an added aesthetic appeal as it may help to disguise some of the cement chute as well as bring greenery to the area.[28]

Currently the cement chutes are impassable to fish, and due to their extensive width, the water is very shallow because it is spread out. The only viable option to make the chutes more hospitable to aquatic life is cutting a v-shaped trough that would concentrate the flow of water making it deeper and cooler. The addition of rocks to this trough would provide necessary habitat for aquatic life and would allow the passage of trout. The Army Corps are unlikely to approve this type of project because of the damage to the chute structure. The structure of the cement chutes relies on a complete and intact cement bottom as it provides support for the walls. However, there are sections of chutes where the walls have been back-filled, and thus the creation of this trough could be possible. Once again a study by the Army Corps needs to be done to determine the feasibility of such a project.[29]

[28] Personal Communication with Lauren Stevens and Judy Grinnell, November 19, 2009.
[29] Personal Communication with Cindy Delpapa, November 6, 2009.

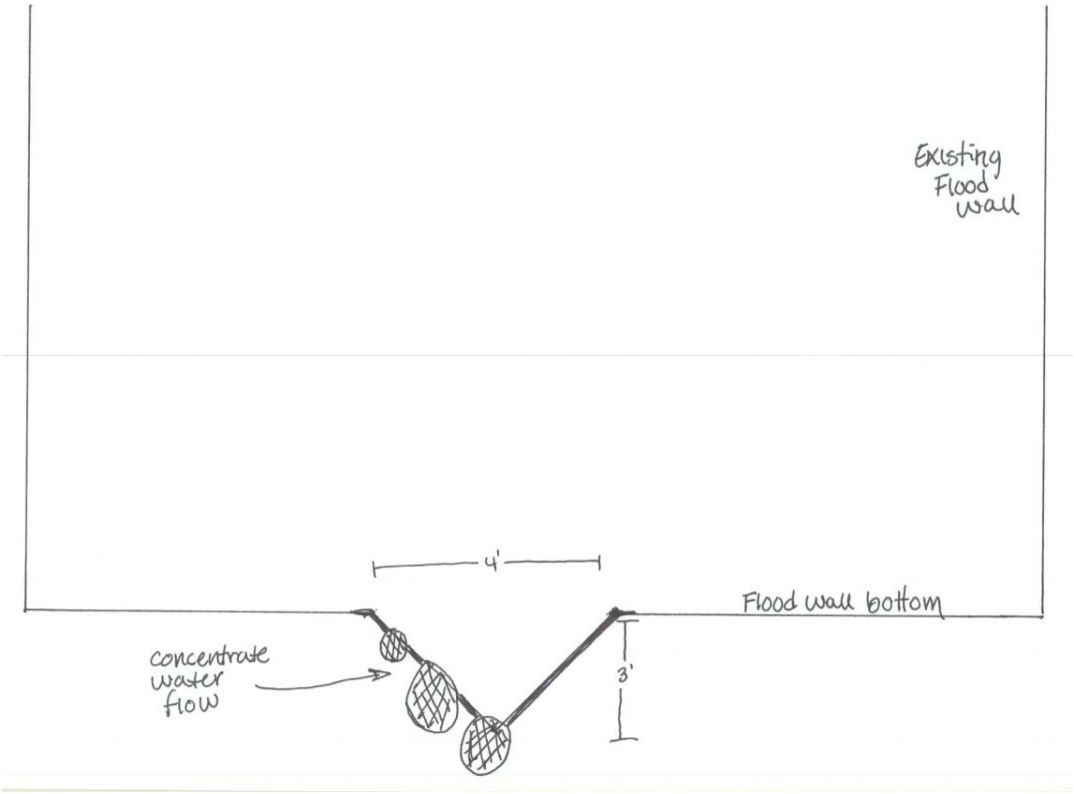

Figure 5: V-shaped Trough to increase fish movement through flood chutes

Tier III –Major Long Term Solutions

We also considered several highly involved and expensive projects that would be particularly beneficial to ecosystem health as well as city revitalization. We will first look at two alternatives that could potentially allow for almost complete removal of flood control throughout the south branch of the Hoosic where feasible (ie. flood control walls near Mass MoCA play to the structural stability of the nearby buildings and cannot be removed).

An idea proposed by Howard Itzkowitz, an architect who wrote "Preliminary Observations of the Hoosic River in North Adams" looks at controlling the amount of water that flows down the south branch to North Adams. By creating dams and wetlands upstream of North Adams that would have the capacity to absorb large volumes of floodwater, the amount of water that enters the city can be controlled by monitoring the amount of water released through

the dams. We would not support this idea due to the ecological degradation that comes from the construction of a dam, but because there is an existing dam that is no longer at use at Cheshire Harbor, the idea becomes somewhat more reasonable. Although we currently do not know much about the Cheshire Harbor Dam, we do know that it has been silted in and is no longer functional. However, with the removal of this silt, the dam could again become functional and could theoretically provide the necessary storage capacity for control floodwaters headed to North Adams. By controlling the amount of water that flows through North Adams via the South Branch, the water levels could be kept constant during flood times, therefore greatly reducing the risk of flooding in the city, and thus reducing the need for flood chutes. Itzkowitz's study also mentions that there are few opportunities on the North Branch to construct dams and wetlands to absorb floodwater, so there is no plan for removing the flood control through this section.[30]

Figure 6: The Hoosic River, from Cheshire Harbor Dam to North Adams (approx. 7 miles)

A second way to lessen the need for flood control and move towards a more natural river comes from the idea posed by Joe Overlock of the Hoosic River Chapter of Trout Unlimited. This idea involves the installation of an underground pipe with a capacity to hold a 500-year

[30] Itzkowitz, Howard. *The Hoosic River and North Adams: Preliminary Observations*. August 25, 2009.

flood plus 25% (equal to existing flood protection), followed by complete removal of flood chutes and restoration of a natural river bottom. This project would entail removing existing flood chutes, lowering the grade, installing a pipe, and then bringing the grade back up to previous levels (Figure 7). The river would retain a natural flow of water year round through a natural river channel through the city. However, during flood times, high levels of water would flow into the pipe via a spillway similar to the backup drain found in a bathtub or sink. Clearly this is a serious and long-term project that needs to be carefully considered. While this project would restore a natural river through North Adams that would have significant ecological and recreational benefits, it would also require a great deal of engineering.[31]

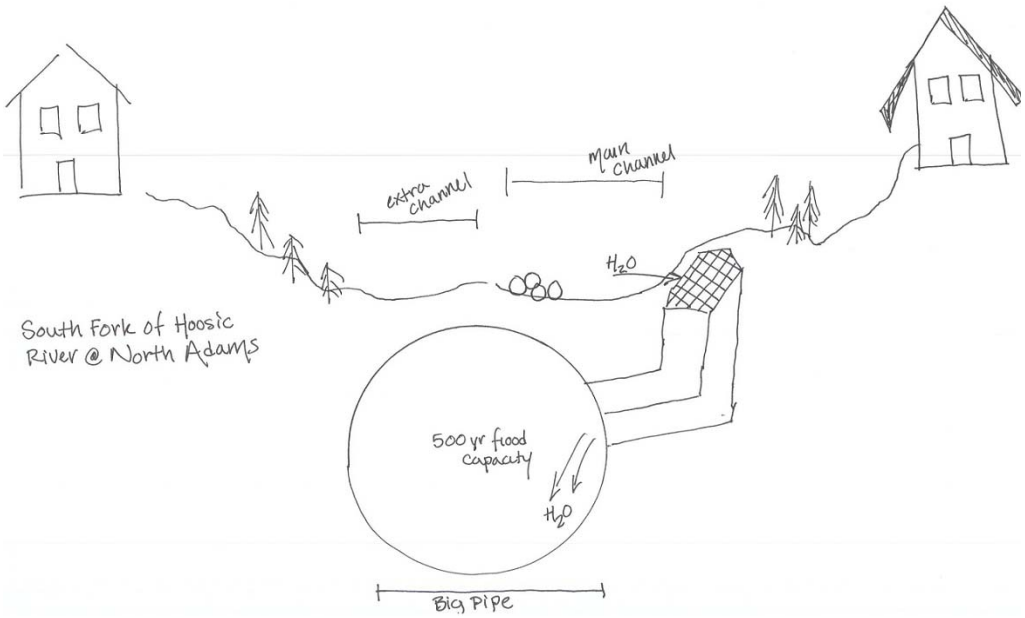

Figure 7: Proposed Subterranean Pipe through North Adams

While the two ideas mentioned above involve the entire Hoosic River flood control system in North Adams, we also have ideas that focus more specifically on the area around Noel Field. The first idea is similar to what has been approved in Fitchburg to remove a section of

[31] Personal Communication with Joe Overlock, November 11, 2009.

floodwall. Since flooding of Noel Field would not be very problematic, we propose that part of western berm of Noel Field be taken down, allowing the river to flood the park at times of high water. A berm could then be constructed along the western side of the park that would prevent potential floodwater from reaching the buildings constructed along Route 8 (Figure 8). A study needs to be conducted to prove to the Army Corps that this would not compromise flood control, but as seen in the Fitchburg project, using this method can actually *increase* the flood control capability. Taking down and moving the berm has a number of benefits - both ecological and recreational. Taking down the berm will provide visitors with the ability to actually see the river again and will offer greater access. A trail or bike path could then be built along the river. Also, because this section would no longer have a berm on the west side, trees could be planted along to help make the river more natural and to help reduce the warming effect that the water faces when running through flood control. Allowing the river to flow in a more natural path would help to restore the wetland ecosystem that exists along the southernmost section of the area we are studying. Finally, having a berm at the far side of the park could potentially provide visitors with a grassy slant on which to sit while watching sports at any of the three existing fields.[32]

[32] Personal Communication with Cindy Delpapa, November 11, 2009.

Figure 8: Proposed Berm Pushback at Noel Field

A second idea involving the area around Noel Field that would have significant ecological and recreational benefits would be to create a diversion stream where water from the Hoosic can be channeled into a small meandering river that would incorporate not only the wetlands, but also some of the field area in Noel Field (Figure 9). This river would then re-enter the flood control area at the northern end of the berm section. This would mean that the flood chutes would be dry during low flow times, as all water would flow through this diversion channel and through the park. However, during times of high flow, the diversion stream would have a maximum capacity maintained by a pipe that would carry the diversion stream under Hunter Foundry Bridge Road. The flood chutes would absorb all extra flood water as they are proven capable of doing. Because this diversion stream is not part of the Army Corps flood control project it can be planted with riparian vegetation to provide habitat for fish and other aquatic life, as well as reduce the water temperature from sunlight exposure.[33] This diversion stream would be easily accessible to the public and would provide an opportunity for people to

[33] Personal Communication with Cindy Delpapa, November 6, 2009.

interact with the stream (i.e. fishing, wading, lounging, etc.). It will be key to link this stream to the existing wetlands that exist on the west side of the berm in order to create a more natural wetlands ecosystem as well. Determining the exact course of this diversion stream including where it would enter and leave the flood chutes would require close work with the city of North Adams to determine which areas in the Noel Field Complex could support this stream.

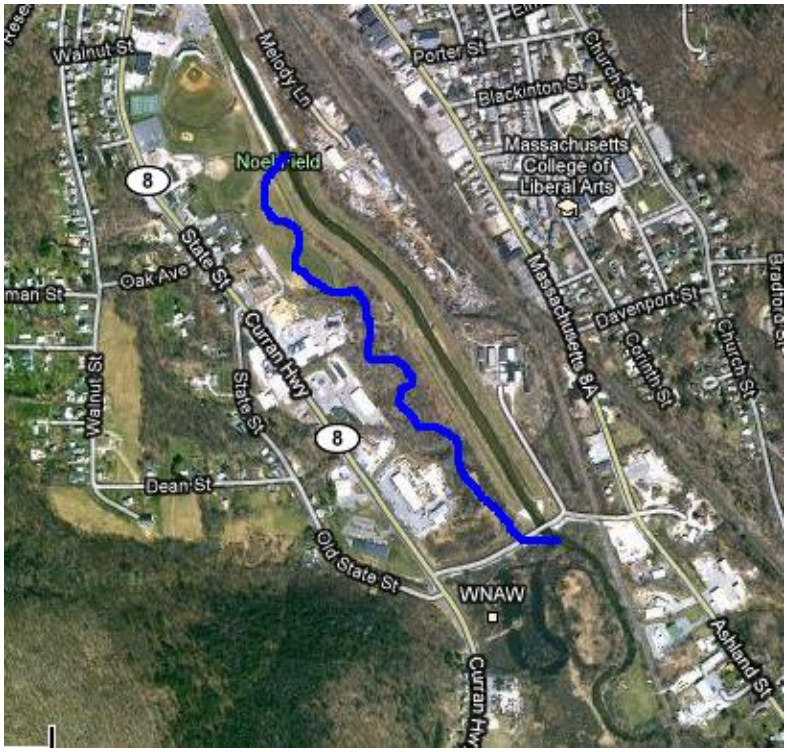

Figure 9: Proposed diversion channel beginning at Hunter Foundry Bridge Road and continuing north to the Noel Field complex.

Funding Opportunities

All of the above solutions will require funding of varying amounts, probably from numerous sources. Based on what we have learned from Cindy Delpapa, there are a few sources of funding that North Adams has applied for including corporate sponsorship from Toms of Maine, the Priorities Projects Program of the Massachusetts Department of Ecological

Restoration, and the National Park Service. Funding from Toms of Maine is a shot in the dark and winners of funding will be announced in November.

Based on reports from Russ Cohen, the Priorities Project Program awards funding to projects well on their way to completion. Projects awarded funding will be announced in December. Funding from the National Park Service was denied. However, there are other sources of potential funding, with Trout Unlimited offering up to $10,000 to make improvements to fish habitat. As well, artists and private residents of North Adams may contribute funds and it will likely be necessary to do a public fundraising campaign. Though, to secure big money from any federal organizations, it will be key to have a viable plan for success in place.

Section 1135 of the Water Resources Development Act of 1986 allows for the modification of existing Army Corps projects to restore the natural environment. Projects that qualify under Section 1135 must undergo a rigorous investigation into the feasibility of all proposed changes. There is up to $5 million available to approved projects, but further funding can be applied for though congress. This funding opportunity will likely prove key in bringing the North Adams project to fruition.

Final Recommendations

Goals Achievement Matrix

When evaluating our different plans, four aspects stood out as particularly important: (1) ability to restore the Hoosic River's ecology, (2) possible economic benefits, (3) community-building potential, and (4) difficulty of implementation. Our goals achievement matrix (GAM) lays out a mathematical calculation of these different aspects by breaking them down into their constituent factors, weighted so that more significant factors contribute more to an aspect. The weights are assigned so that more important aspects have more weight. For example, the economic benefits to North Adams, while not a negligible aspect of the plan, do not actually have a bearing on whether the goals of river revival and community building are achieved. Thus, all factors in the economic aspect are weighted less heavily. The final formula for the score (S) is shown below:

S = river + econ + community – implementation

A higher score corresponds to a more appealing plan. The negative sign for implementation indicates that this aspect is usually a cost of the plan, rather than a benefit. As such, factors of the implementation aspect will usually have a negative score: all scores are on a -5 to 5 scale, with negative values marking a drawback or weakness, positive values marking benefits, and 0 marking no change. The list below describes the various factors in each aspect and their relative weights. Note that the final GAM score is not our sole determinant of which plan we recommend, but is rather a tool to help determine the strengths and weaknesses of each plan.

river = makes the river a more viable habitat

- river = 3(cool) + 2.5(deep) + (slow) + 3(bed) + 1.5(link)
- cool = shaded/cooler waters
- deep = deeper waters

- slow = slower moving waters
- bed = introduces riverbed features such as pools and riffles that provide habitat for trout
- link = connects existing trout habitats, allowing free movement of fish throughout river

econ = economic revival of North Adams

- econ = 0.4(fish) + 0.5(vis)
- fish = attracts fishermen
- vis = provides reason for visitors to stay in the area longer

community = builds community

- community = 0.5(aesthetics) + 0.9(access) + (amenities) + 1.2(park) + 2(fund)
- aesthetics = beautifies river and surrounding area; ascetic appeal of plan
- access = improves access to the river
- amenities = provides new amenities
- park = expands use of the park
- fund = contributes enough to community to warrant funding for entire project as a community building project

impl = ease of implementation

- impl = –var(expense) –(ACoE)
- cost = cost of project
- var = –2 if cost > –4.5, –3 if cost $\leqslant$ 4.5
- ACoE = ease of approval by Army Corps of Engineers
    - ACoE = –(meets) –3(convince) –var(flood)
    - meets = meets Army Corps standards
    - convince = ease of convincing the Army Corps to allow the project
    - flood = flood control maintained
    - var = 5 if flood < 0, 0.1 if flood >0

Nota bene: All values should be added together. Minus signs were included for variables that will usually be a drawback (and hence their score on the -5 to 5 scale is usually < 0).

See Appendix 3 for GAM scoring table of all projects

The bike path built over the river was assigned a low positive score for aesthetics, but there is wide potential for variation here. If well-made (likely requiring more expense on artist and engineer), this unique design could be quite beautiful, but it also has potential to become an eyesore if poorly realized. The subterranean pipe is so much more expensive than all other plans, it may actually fall outside of the 5 to -5 scale, and so the cost of implementation may be

underestimated. The berm pushback receives the same score for slowing the water as the diversion stream, but they work rather differently. The diversion stream operates over a smaller area, slowing the river more abruptly and then returning it to the flood chutes, allowing the water to speed up again, while the berm pushback allows vegetation along an entire side of the river for a greater area; the effect is a less abrupt slowing over more time. We have estimated roughly equivalent effects, but it is an apples-to-oranges comparison that could benefit from a more in-depth study. Finally, the dam restoration idea scored negatively for connecting fish habitats, even though it allows the removal of the flood chutes, removing barriers to fish movement. This is because restoring the dam to active use makes it a permanent feature of the area and divides fish populations. In essence, this plan trades ecological harm in one area for harm in another area. We felt this was a drawback that needed noting, even if it did not perfectly fit into our GAM formula. This is why the GAM scores should only be an aid for comparison, not the final decider of which plan to choose. However, the GAM results indicate that the riverside bike path and a diversion stream are the best solutions

Proposed Solutions

In the last section of our report, we will explain in greater detail our final recommendations for a project that will help the ecological, recreational and community-building opportunities of the Hoosic River in North Adams. We previously explained the different projects and improvements that we considered by dividing them into three tiers based on feasibility and scale of the tasks. For our recommendations, we will focus on two aspects of the project – a river alteration taking place in the Noel Field complex to improve river access and river ecosystem; and a bike / walking path that will link Noel Field and the river to the rest of downtown North Adams. We feel that these two projects are the main large-scale improvements

that would provide the most benefit to the community, while still being relatively feasible. Our ability to make an evaluation and recommendation for this project based on the options we proposed came from two approaches. Firstly, we organized the various pros and cons of each option in a Goals Achievement Matrix to help determine which project would make the most sense quantitatively. Secondly, we did in depth field study with our Client, Judy Grinnell, where we were able to determine the more specific details of our recommendations.

Bike / Walking Path

On Monday, November 30, 2009 our group, along with Judy Grinnell, walked potential bike path routes from Noel Field to Heritage State Park. Following the walk, our group concluded that the most feasible and aesthetically appealing option would be to place the path along the side of the river/chutes, crossing both bridges between the two parks. The path would then exit Noel Field directly behind Jon Wolfe Stadium, and continue to the Melody Lane bridge across from the Sons of Italy. The bike path would then cross the river to the existing Sons of Italy Lodge, which is currently for sale, providing the Hoosic River Revival Coalition with the option of buying the building, removing it, and building a park in its existing location.[34]

From this location the path would cross the river a second time, via the bridge from the Sons of Italy parking lot located underneath the overpass on Route 8, to Heritage State Park. Heritage State Park is an urban park with restored buildings, a visitor's center, and the Freight Yard Pub. While Noel Field and Heritage State Park are less than ¼ mile apart, there is currently no clear path to walk between the two. This path would be a relatively simple and straightforward way to increase visitation of both parks. For example, after watching baseball games, fans and teams could stroll over to Heritage State Park to get a meal.

[34] Personal Communication with Judy Grinnell, November 30, 2009.

While this link would be beneficial in and of itself, there is an opportunity to do more, and to continue the path all the way to Mass MoCA at the heart of the city. There is currently a walkway that leaves the north end of Heritage State Park and continues over the train tracks and the Hoosic River. This walkway brings visitors out to Route 8, by the City Council Building. From this location there is a service road that runs to the rear entrance of Mass MoCA. If this walkway and service road could be approved for a bike path, a link from Noel Field to Mass MoCA could be established relatively easily.

Figure 10: Proposed Bike Path running north from Noel Field

Diversion Stream at Noel Field

The diversion stream concept appears to be one of the simplest yet most beneficial ideas for improving ecosystem health as well as creating community access to the river. Following a field study where we identified a tentative course for this stream, we are quite confident that this concept is viable and would prove successful. The general concept of the diversion stream is to divert the flow of the river in a controlled fashion allowing it to take a natural course through an area that is not governed by Army Corps Regulations. During normal times, the bermed flood control would run dry, and all water would be diverted through this new stream. Flood protection would be maintained by limiting the amount of water leaving the flood control apparatus during times of high flow.

South of Hunter Foundry Bridge Road, the river exists in its natural state. As it flows under the bridge, it flows over a roll dam and enters the Army Corps regulated earthen berms. Our proposed diversion stream would capture the natural river 50-200 feet south of the bridge and direct it west into the existing wetland. With the installation of a pipe underneath Hunter Foundry Road to the West of the bridge, it could flow to the wetlands on the other side of the road, thereby a creating a continuous and natural riparian ecosystem. The pipe that brings the river under Hunter Foundry Bridge Road is key, as it would have a maximum flow capacity that would ensure the diversion stream never posed any danger of flooding. The river would flow through the wetlands, which would not only slow the flow of the water, but would also provide shade and increased habitat for aquatic life.

The question then lies as to where the diversion stream would enter back into the flood control. Currently there are three existing storm drains along the berm area that collect runoff and direct it to the flood control system. These three drains could potentially be modified to

provide a location where the diversion stream could be directed back into the flood control system. We have identified a fourth possible location for the stream to re-enter the flood control that is not at an area where a pipe currently exists. See Figure 11 for the possible diversion stream re-entry points.

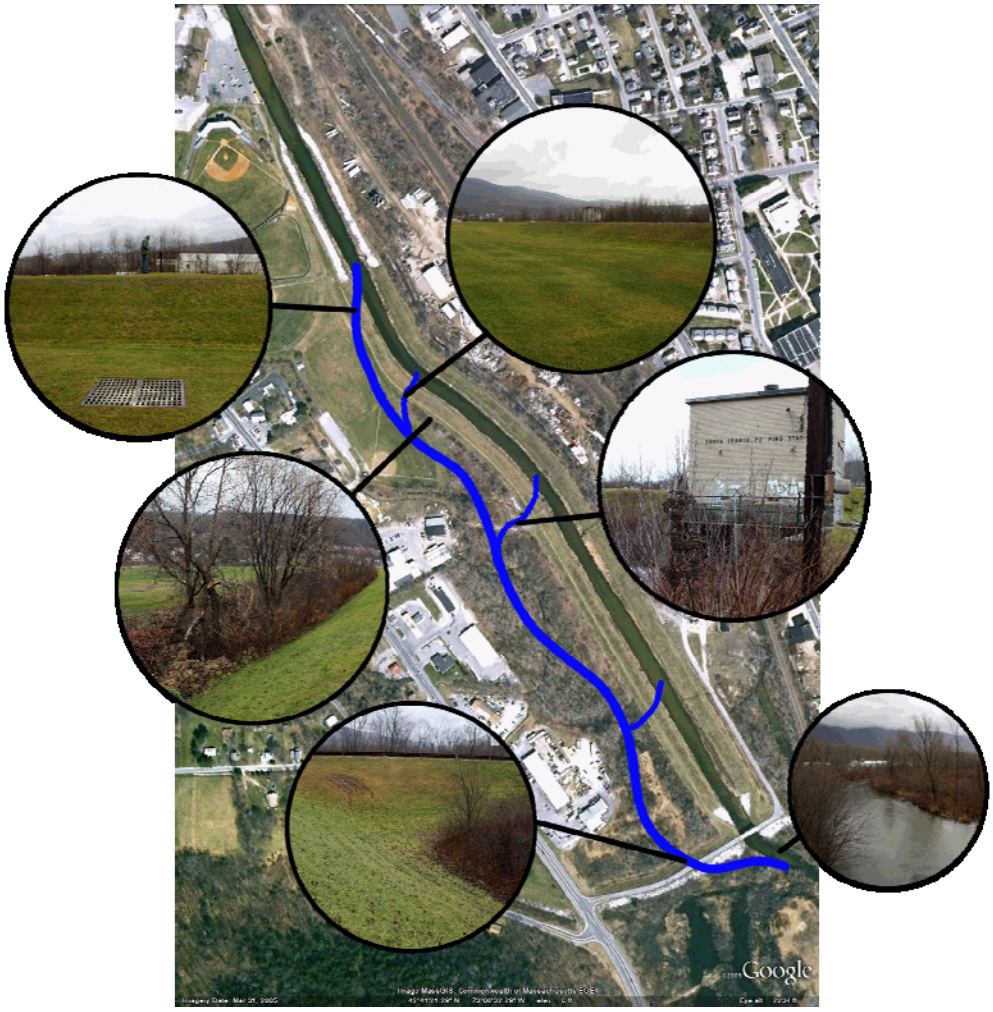

Figure 11: Proposed diversion stream with possible re-entry points

The two southernmost points would bring the diversion stream back into the flood control before reaching the actual field complex, and while improving ecosystem health, they would not be as effective in providing river access. The two northernmost points, however, would allow the

diversion stream to flow through the field complex for a brief period and therefore could provide more direct access for visitors to Noel Field. The diversion stream will act as an extension of the existing natural river that is found to the south of Hunter Foundry Bridge Road. The diversion stream will increase the amount of habitat for trout and other aquatic life and will make the river more accessible to the community.

Another complication that comes with bringing the diversion stream into Noel Field is its potential effect on the playing fields. It is unreasonable to sacrifice John Wolfe Stadium, where the North Adams SteepleCats baseball team plays, since this is likely a main attraction to Noel Field. However, there is also a soccer field and two other baseball fields that may be compromised by a diversion stream running through the park. The city needs to determine, which (if any) of these fields could be sacrificed to construct the diversion stream. Also, the elevation increases slightly as you move northward from the Wetland Area to the Field Complex, which would also have implications for the stream. The increasing elevation would mean that the diversion stream would need to be cut down deeper into the ground towards the end of its flow through the park.

Figure 12: Noel Field and wetland area including the proposed diversion stream and bike path

Opportunities for Incorporating Art

Art could be incorporated into the above two designs, in order to augment public interest and enliven the river. The chutes have a modern art-esque appeal because of the smooth grey cement that has been poured in straight planes. With a bit of creativity, it would be possible to play off the existing flood control structures in a way that not only makes them more aesthetically appealing, but also alters the way people view them. Mounting a high intensity neon light along the lip of the cement chute would not only illuminate them in an intriguing color at night, but would also create a haze of light above the river. Also using light as a medium, projecting abstract colors onto the walls (or painting directly) would make the cement more interesting and appealing. These ideas, in combination with the bike path, would provide an opportunity to make the public aware of the river and the unique cement walls that encase it and protect the city.

The dark and plain cement chutes are a manifestation of the greater North Adams community and its need for an economic stimulus. By illuminating the walls of the cement flood control, the plain becomes interesting and intriguing and perhaps would help manifest the revitalization of North Adams.[35]

Future Recommendations

Due to the Army Corps of Engineers' strict guidelines and regulations we have divided our long-term recommendations into two separate approaches: one that works with the Army Corps ecological restoration and planning division and one that addresses the federal definition of our project and thus its scope. To alter the chutes through the Army Corps of Engineers, the project would have to shift focus solely to improving fish population dynamics within the river. Any contribution to the project by the Army Corps would be received following the application for and acceptance into the Section 1135 Program. The Section 1135 Program is the Army Corps of Engineers' environmental restoration program. The program is focused on adapting existing flood chutes that have structurally excessive flood protection parameters into more reasonable and ecologically friendly flood protection systems. Furthermore, prior to receiving funding, the restoration and planning division would need to complete a series of flow and volume studies, extensive engineering analyses, as well as explore architectural options before any alterations to the chutes could actually occur. As indicated by Tom Matuszko, a member of the Berkshire Regional Planning Commission, such an approval process may take an extensive amount of time and money, given that the Army Corps' main concern is public safety, making them less inclined to compromise the structural integrity of the chutes.

However, alternative processes that avoid the Army Corps of Engineers may be no less exhaustive. Currently, the Hoosic River Restoration Project is defined as a restoration program

[35] Personal Communication with Joe Thompson, November 17, 2009.

subject to Army Corps policies. If the project were defined as a community development project where the city of North Adams could acquire ownership of the chutes, all regulations created by the Army Corps of Engineers could be bypassed. Such an endeavor would demand congressional reauthorization of the project and would involve mobilizing great public support as well as gaining the favor of the local congressman.

Both options, while likely be expensive and difficult, should be considered as potential 10-year project alternatives. Thus, the cost could be amortized by the anticipated time commitment for either solution. These solutions can also be worked towards while the Hoosic River Revival Coalition focuses on short-term, less expensive solutions.[36]

[36] Personal Communication with Tom Matuszko, November 30, 2009.

Conclusion

This research report offers recommended solutions for modifying the outdated flood control system in North Adams in a manner that improves public access and ecosystem health. The bike path and the diversion stream are the two solutions that are most feasible, especially considering the impediment that the Army Corps of Engineers poses to any modifications to their infrastructure. We hope this project will offer guidance and inspiration to the Hoosic River Revival Coalition and to all working to make the Hoosic River an intricate part of North Adams.

Appendix 1: Public Survey

Hello. We are students from Williams College in an environmental planning class. We are interested in the relationship between the Hoosic River, its flood channels, and the public space nearby.

Would you please help us by taking a few minutes to fill out this survey?

1. Do you go to Noel Field? Yes No

If yes, how often?

A. couple times per year B. couple times per month C. weekly D. almost daily

2. Do you go to Heritage State Park? Yes No

If yes, how often?

A. couple times per year B. couple times per month C. weekly D. almost daily

3. What is your opinion of the river?

A. Love it

B. Like it

C. Dislike it

D. Don't care either way

4. Do you ever go to the river? If yes, for what purpose? To look at it, to swim, to fish, to relax, to walk the dog, other?

4a. If no, why don't you go to the river?

5. In your opinion, does the river benefit North Adams?

Yes No

5a. How?

6. Do you think the River and its surrounding area is utilized by residents or visitors of North Adams?

Yes No

7. Do you think the river could be an asset to downtown North Adams? If so, how?

8. If the river or riverfront area were different, would this affect your previous answers? If so, how? Please also describe the changes you're considering.

9. Much of the river is contained within cement chutes to control flooding. What is your opinion of the chutes?

Love Like Dislike Don't Care

9a. Why?

10. Do you have any suggestions for how the river and surrounding areas can be improved?

11. Are you aware that there is a coalition working to revitalize the river? The Hoosic River Revival Coalition is working with the Hoosic River Watershed Association (HooRWA) to restore the river to a more natural environment without compromising flood protection. Are you aware of these efforts?

Yes No

Demographics

12. Are you a North Adams resident?

Yes No

13. If so, where do you live? No need for full address – street name is acceptable.

_____

14. What is your age?

A. under 15

B. 15-20

C. 21-30

D. 31-50

E. 51-65

F. 65+

Do you have anything you would like to add? Comments or suggestions? We'd like to hear them. Thank you very much for your time.

Appendix 2: Interview Questionnaire

Key points to hit upon when discussing other river restoration projects

- Location of your project? (river name, city, etc.)

- What was the condition of the river before you started your project?
    - What man-made structures were there – dams, flood chutes, etc.
    - What problems needed to be addressed?
        - Water quality (pollution)
        - Stream flow (inhibited by dams, chutes, etc.)
        - Poor aquatic habitats
        - Poor public accessibility

- What are your project goals?
    - Ecological
    - Recreational

- What constraints do you have in terms of modifications?
    - Corps of Engineer regulations?
    - Private property

- What, if any, actual modifications did you make to structures – removal of dams, chutes, etc.?
    - How was this accomplished?
    - What approval was needed?
    - Who did the actual work?

- What improvements were you able to make without the removal of structures?
    - planting vegetation along the banks
        - what types of vegetation?
        - Were you restricted as to where and what you could plant?
    - Modifying the bottom of the channels with rocks or other natural debris to make it more habitable for fish and other aquatic life
    - Increasing the flow of the river though modifying the shape of the channels
    - Creating paths/parks along the river
    - Canoe/kayak accessibility

- Do you have support from the community in which you are working?
    - How did you get it?

  - How is the community involved?

- How is your project funded?

- Are there any opportunities for grants or funding that the Hoosic River Revival Coalition could obtain for this project? If so, how do we go about that?

- What kind of help could we get from your organizations?

Appendix 3: GAM Results in a chart format

Table 1: GAM Scoring of Proposed Plans (weighted scores in parentheses)

	diversion stream	bike path (side)	bike path (over)	bike path (in chute)	underground pipe	berm pushback	dam
cool (3)	4 (12)	0.5 (1.5)	3 (9)	0	4 (12)	4 (12)	4 (12)
deep (2.5)	2 (5)	-	-	-	4 (10)	0	4 (6)
slow (1)	2	-	-	-	4	2*	4
bed (3)	2 (6)	-	-	-	4 (12)	0	4 (12)
link (1.5)	0	-	-	-	4 (6)	0	–1* (–1.5)
fish (0.4)	3 (1.2)	-	-	-	3 (1.2)	0.5 (0.2)	3 (1.2)
vis (0.5)	1 (0.5)	2 (1)	2 (1)	2 (1)	0	1 (0.5)	0
aesthetics (0.5)	3 (1.5)	3 (1.5)	1* (0.5)	0.5 (0.25)	3 (1.5)	3 (1.5)	2.5 (1.25)
access (0.9)	2 (1.8)	3 (2.7)	2 (1.8)	1 (0.9)	2 (1.8)	3 (2.7)	2 (1.8)
park (1.2)	2 (2.4)	-	-	-	1 (1.2)	1 (1.2)	1 (1.2)
fund (2)	1 (2)	3 (6)	3 (6)	3 (6)	1 (2)	1 (2)	1 (2)
cost (var)	-3 (-6)	-2 (-4)	-4 (-8)	-4 (-8)	-5* (-15)	–3.5 (–7)	–4 (–8)
meets (1)	-0.5	0	-0.1	-3	-1	–1	–3
convince (3)	-0.5 (-1.5)	0	-0.1 (-0.3)	-3 (-9)	-3 (-9)	–1 (–3)	–3 (–9)
flood (var)	1 (0.1)	0	0	-2 (-10)	4 (0.4)	0	4 (0.4)
riv	25	1.5	9	0	44	8	32.5

econ	1.7	1	1	1	1.2	0.7	1.2
comm	7.7	10.2	9.3	7.15	6.5	7.4	6.25
impl	–7.9	–4	–8.4	–30	–24.6	–11	–19.6
Total	26.5	8.7	10.9	–21.85	27.1	11.1	20.35