Project Registration Number_____

Niagara River Greenway Commission
Consultation and Review Form

Type of Review Required: **___X___Mandatory Consultation**

_____Voluntary Review and/or Endorsement

PROJECT SPONSOR INFORMATION

Name: _Buffalo Museum of Science_____

Mailing Address: _1020 Humboldt Parkway_____

State: _New York_____ Zip Code: _14211-1208_____

Federal Id# _16-6000178_____ Charities Registration #_03-51-04_____

PROJECT TYPE

Check all that apply: __**X**__ Environmental _____ Cultural/Heritage _____ Land or Water Public Access

_____ Cultural _____ Trail __**X**__ Educational/Interpretive

_____Waterfront or Land Based Development _____ Signage

__**X**__ Recreational __**X**__ Other (Research)

Project Name: _Tree Regeneration at Tifft Nature Preserve_____

Location: _Tifft Nature Preserve_____

Site Address: _1200 Fuhrmann Boulevard_____

State: _New York_____ Zip Code: _14203_____

Minor Civil Division(s):_City of Buffalo_____

County: _Erie_____

Project Proponent Property Interest (own, lease, easement or other):_Lease from the City of Buffalo with Management Authority and Responsibility_____

AUTHORIZED OFFICIAL

Name: _Mark Mortenson_____ Title:_President & CEO_____

Business Address: _1020 Humboldt Parkway_____

State: _New York_____ Zip Code: _14211-1208_____

Telephone Number: _716-896-5200 ext.332_____ Cell Number: _____

Fax Number:_716-897-6723_____

E-Mail Address: _mmortenson@sciencebuff.org_____

PROJECT POINT OF CONTACT

Name: _David Spiering_____ Title: _Ecologist_____

Organization/Firm: _Buffalo Museum of Science – Tifft Nature Preserve_____

Business Address: _1200 Fuhrmann Boulevard _____

State: _New York _____ Zip Code: _14203_____

Telephone Number: _716-825-6397_____ Cell Number: _____

Fax Number: _716-824-6718_____

E-Mail Address: _dspiering@sciencebuff.org_____

PROJECT NARATIVE

1. In a brief paragraph, describe the project and its purpose, how and when it will be accomplished, and why it is important.

Brief Narrative

The Buffalo Museum of Science is requesting $300,000 over three years ($100,000/year) from the Niagara River Greenway for Tree Regeneration at Tifft Nature Preserve. This project includes three major components: Habitat Enhancement, Environmental Education, and Research & Monitoring. There will be a major planting of tree seedlings to maintain the tree canopy in the 100 acres of woodlands on the preserve that provides valuable habitat for migrating songbirds and other wildlife. Other habitat enhancements include the planting of small trees and shrubs, protecting trees and seedlings from wildlife damage, enhancing soils with clean onsite wetland spoils, and controlling invasive species. Research on tree seedling survival and deer browsing will be conducted through the construction of deer exclosures and research plots. Deer populations and the effectiveness of invasive species control techniques will also be monitored. The ecological concepts and research methods of this project will be conveyed to students and the general public through education programs and direct participation. Students will gain a deep understanding of their environment and the scientific process by assisting with the collection of real scientific data on tree seedling survival and deer populations. This project will provide several benefits including wildlife habitat and natural community enhancement, educating students and the public through involvement with authentic management and research, preserving the aesthetics of a popular natural area, and contributing to our understanding of urban wildlife management and natural community restoration.

Detailed Narrative

Project Benefits

The Buffalo Museum of Science, which has operated Tifft Nature Preserve since 1982, aims to improve tree regeneration on the preserve for a variety of positive benefits including: (1) enhancing important habitat for wildlife, (2) maintaining a natural and outdoor setting for environmental education, (3) providing an esthetically pleasing location for nature walks and bird watching, and (4) increasing knowledge and understanding of urban wildlife management and invasive species control methods.

1. Tifft Nature Preserve is designated as an “Important Bird Area” by *Audubon* and over 260 species of birds have been observed there, including 77 species of birds identified by the New York State’s Comprehensive Wildlife Conservation Strategy as “Species of Greatest Conservation Need.” The preserve is an important stop-over spot for migrating songbirds traveling along the Niagara River Corridor which require forest habitats for resting and feeding. This includes the Golden-wing Warbler and Cerulean Warbler, which are both listed as “Special Concern” species in New York State and are documented to use the preserve during migration.

2. The Buffalo Museum of Science has fulfilled the mission of providing environmental education for all ages at Tifft Nature Preserve for over 25 years. Countless students, families and life-long learners gain knowledge and increase their appreciation for the natural world after visiting the preserve. In 2007 alone, 6,626 people participated in public and school programs at the preserve. At Tifft Nature Preserve, students and the public have the ability to learn about a variety of habitats and the species they harbor including wetlands, grasslands, and forests, as well as the unique history of the preserve and how it impacted those habitats.

3. Tifft Nature Preserve is located only three miles from downtown Buffalo and provides a close natural recreational opportunity for the 600,000 residents in the greater Buffalo area. Visitors can stroll the five miles of walking trails that run along the wetland edge and through sunny fields as well as shady woods. With its diverse and numerous bird fauna, Tifft Nature Preserve is not only a hotspot for local birders, but a designation for bird watchers from across the region and beyond. The Niagara River Corridor is also designated as an "Important Bird Area" and is a world renowned bird migration corridor with Tifft Nature Preserve functioning as the southern gateway for birds and tourists alike.

4. A central mission of the Buffalo Museum of Science is to conduct research and disseminate scientific information. There are multiple research components included in this project including deer population monitoring, determining the impacts of deer browsing on tree seedling survival, and evaluating the effectiveness of invasive species control methods. Student groups will be involved with collecting the actual data for this research and all results will be published and also shared with the public.

Project Rationale

Tifft Nature Preserve is 265 acres with approximately 100 acres of woodland habitat (see map below). As described above, this wooded area provides important wildlife habitat, an outdoor classroom, recreation in a natural setting, and research opportunities. Trees currently grow on much of the preserve, but the long-term presence of forest habitat is uncertain. Most trees on the preserve are cottonwoods which naturally established themselves following commercial and industrial abandonment of the site. As colonizers of disturbed areas, cottonwoods are adapted to grow quickly, but the trade-off is a short life. Many of the trees on the preserve will be reaching the end of their life in the coming years and most are already showing signs of aging and decline. Although, the trees will not all die at once, young trees take many years to mature and the process of regeneration begins decades in advance. However, this is not naturally occurring at Tifft Nature Preserve. There are several reasons natural tree regeneration is limited or absent on the preserve including large deer population, invasive plant species, a shallow soil profile over rocky fill, and limited natural seed sources. This project is designed to mitigate all of these deterrents.

Project Components

The scope of the Tree Regeneration at Tifft Nature Preserve project includes three major components: Habitat Enhancement, Education Programming, and Research & Monitoring.

Habitat Enhancement Component

There are several activities that will together result in improved tree regeneration on the preserve. These include: Invasive Species Control, Relocating Wetland Spoils, Construction of Deer Exclosures, Planting of Tree Seedlings, Small Trees, and Shrubs.

Invasive plant species will be controlled using an Integrated Vegetation Management (IVM) strategy involving a combination of control techniques over multiple growing seasons. The strategy will consist of repeated control over three growing seasons including hand pulling, mechanical cutting, covering resprouts with ground cloth, scorching with a weed torch, and herbicide application. There are several invasive species to control including Japanese knotweed, Garlic mustard, Honeysuckle, Buckthorn and others, so specific methods will depend on the target species in a particular area. It is expected that a combination of techniques with over multiple years will be needed for effective control. Herbicides will be applied following all label instructions and NYS DEC regulations and only by Certified Pesticide Applicators. If invasive species can be controlled to a level where understory herbaceous vegetation will be competitive and can be established, native wildflowers and grasses will also be planted.

Wetland soils from the dredging of wetland ponds in 2006 to improve wildlife habitat in the cattail marsh are still piled and remaining onsite. These soils are currently free of the invasive wetland plant *Phragmites* and should be utilized before they are invaded with *Phragmites* rhizomes (roots). In the first year of the project (2010), the soils will be moved with small non-destructive equipment, such as a bobcat, to locations in the woodlands on the preserve where the layer of topsoil over rocky fill is very shallow. These wetland soils are rich organic soils and will greatly enhance growing conditions for tree seedlings.

Deer exclosures will be constructed to protect planted tree seedlings from deer browsing as part of a research project detailed below. Six to ten deer exclosures will be constructed following general specifications detailed in the construction drawings below. The exact dimensions of the exclosures may vary from these drawings, but each will be large enough to encompass a 5x5 meter research plot. A pilot deer exclosure will be constructed in the fall of 2009 through an Eagle Scout Leadership Project and design specifics may be modified based on this pilot exclosure. All other deer exlcosure will be constructed in the first year of the project (2010).

Following relocation of wetland soils, construction of deer exclosures, and one year of invasive species control, areas will be ready for the planting of tree seedlings, small trees, and shrubs. Tree seedlings will be planted following the experimental

designed detailed below, but thousands more seedlings will also be planted throughout the 100 acres of woodlands. Many native tree species that are adapted to a variety of soils types will be planted (see species list below), thereby increasing the diversity of tree species at Tifft Nature Preserve and improving wildlife habitat. Many of these tree seedlings will be protected from deer browsing with tree collars. In addition to tree seedlings, native small trees and shrubs will be planted. Fewer small trees and shrubs will be planted due to the greater cost and labor required for planting. However, the species and location of these small trees and shrubs will be planned to maximize aesthetic and wildlife benefits. These small trees and shrubs will also be protected from damage from wildlife by tree collars, wrapping, or fencing. Planting of seedlings, small trees, and shrubs will continue through years two (2011) and three (2012) of the project.

List of Possible Tree and Shrub Species*

Common Name	**Scientific Name**
Trees	
Cottonwoods	*Populus deltoids*
Basswood	*Tilia americana*
Red Maple	*Acer rubrum*
Silver Maple	*Acer saccharinum*
Black Willow	*Salix nigra*
Swamp White Oak	*Quercus bicolor*
Sycamore	*Platanus occidentalis*
Quacking Aspen	*Populus tremuloides*
Ashes (Green, White & Black)	*Fraxinus spp.*
Elms (American & Slippery)	*Ulmus ssp.*
Shrubs	
Dogwoods	*Cornus ssp.*
Arrowwood	*Viburnum spp.*
Gooseberry	*Ribes spp.*
Raspberry	*Rubus spp.*
Elderberry	*Sambucus canadensis*
Sumac (Smooth and Staghorn)	*Rhus spp.*

* This list is not meant to be comprehensive, but representative of the native tree and shrub species that will be planted at Tifft Nature Preserve. The species list was compiled from species lists in the NYS DEC produced book "Ecological Communities of New York State" by Carol Reschke (1990) and "Buffalo River Greenway Plan and Design Guidelines" prepared by The Friends of the Buffalo River (1996).

Education Programming Component

The Buffalo Museum of Science will develop and conduct educational programming at Tifft Nature Preserve involving school students of several ages. The Museum's Center for Science Learning uses the teaching method of engaging students in authentic scientific research and allowing them to learn first hand by collecting and analyzing data. This approach is the model for the successful Authentic Learning Communities (ALC) program that the museum offers to local school districts. Current ALC programs include: Invasive Species, Urban Ecology, Biodiversity, and Ice Age Dig.

With support from the Niagara River Greenway, the museum will develop a pilot program for a new ALC program on Wildlife Ecology. This Wildlife Ecology ALC program will target students in fourth to sixth grades. Students will collect data on deer populations at the preserve using wildlife cameras, walking transects, and through track and scat surveys. They will also monitor research plots to assess tree seedling survival and deer browsing. For older students, middle and early high school, a Tifft Nature Preserve Summer Science Institute Program will be created. The Summer Science Institute will cover the same topics as the Wildlife Ecology ALC program, but in much greater depth. This will be a week long workshop at Tifft Nature Preserve where students will design their own research project, collect wildlife and vegetation data, use technology such as GPS (Global Positioning Systems) and GIS (Geographic Information Systems), and learn about the process of science first hand by working along side scientists. The Summer Science Institute students will not only collect data, but will also synthesize the data into estimates of the deer population and any impacts to vegetation on the preserve. As a final project, the students will need to present their work including the research questions, methods, results, and analysis in a format similar to posters presented at a scientific conference.

In addition to students participating in the Wildlife Ecology ALC program and a Tifft Nature Preserve Summer Science Institute, school groups, scouts, families, and the general public visiting the preserve will benefit from this project. Habitat enhancements and research undertaken through this project will be highlighted during tours, field trips, and public programs. Topics will include urban wildlife ecology, invasive species, migratory bird habitat, and the importance of trees in urban areas. Tifft Nature Preserve already participates in, and will continue to engage citizen scientists in, collecting data for projects such as Celebrate Urban Birds, The Great Backyard Bird Count, and Project BudBurst.

Research & Monitoring Component

The current paradigm for natural resource management is “Adaptive Management” which requires monitoring all management activities so that methods can be adapted and improved with data gathered through monitoring. The Tree Regeneration at Tifft Nature Preserve project includes research and monitoring on three topics: Deer Populations, Tree Seedling Survival, and Invasive Species Control.

Although no active management of the deer population at Tifft Nature Preserve is proposed in this project, an accurate population estimate is needed for future decisions on deer management. Deer populations will be monitored by students through a Wildlife Ecology ALC program, scout groups, and volunteers. All population monitoring will be supervised by preserve ecologist to assure accurate and scientifically credible results are obtained. Monitoring techniques include observational transect surveys, track and scat surveys, and wildlife cameras.

The major goal of this project is to improve tree regeneration at the preserve. Therefore, the survival of tree seedlings and the amount of deer browsing on seedlings will be monitored. Research plots will be established throughout the 100 acres of

woodland with seedlings planted under three treatments: (1) inside a deer exclosure, (2) protected with tree collar outside a deer exclosure, and (3) unprotected outside a deer exclosure. These seedlings will be monitored for survival and evidence of deer browsing by students in a Wildlife Ecology ALC program under the supervision of the preserve ecologist. Six to ten deer exclosures will be constructed with each surrounding a 5x5 meter research plot where 25 tree seedlings will be planted. For each deer exclosure, two additional plots of each of the other treatments will be established and planted with 25 tree seedlings. This experimental design will create a replicated complete-block design with a sample size between 150-250 seedlings.

Various invasive control methods will be used in this project and they will be monitored for effectiveness at reducing or eradicating target species. This project will use separate research plots from the tree seedling survival experiment and will compare "conventional" herbicides with newly emerging "natural" herbicides. The use of herbicides is a controversial, but often necessary technique to effectively control invasive plant species, particularly noxious species such as Japanese knotweed and Garlic mustard. A variety of invasive plant species will be treated with a "conventional" herbicide such as Garlon or Roundup, and other plants will receive an application of "natural" herbicide. These "natural" herbicides contain ingredients such as soybean oil, clove oil, vinegar, etc. that are all nontoxic and biodegradable. Treated plants will be monitored for symptoms such as: browning and loss of leaves, wilting, lack of growth or flowering, and eventual death. Due to the use of conventional herbicides in this research project, no students or volunteers will apply herbicide or monitor these plants. All treatments and monitoring will be conducted by the preserve ecologist who is a Certified Pesticide Applicator. Product labels will be followed for the use of all herbicides.

Project Timeline

Year 1 (2010)	Years 2 & 3 (2011 – 2012)
Habitat Enhancement Component	
Control Invasive Species	Control Invasive Species
Relocate Wetland Spoils to Enhance Soils	Tree Seedling Planting Inside Exclosures
Construct Deer Exclosures	Tree Seedling Planting Outside Exclosures
	Planting of Small Trees and Shrubs
Education Programming Component	
Wildlife Ecology ALC Pilot Program (offered to one school or district)	Wildlife Ecology ALC Program (offered to interested school or districts)
Tifft Nature Preserve Summer Science Institute (one workshop offered each summer)	Tifft Nature Preserve Summer Science Institute (one workshop offered each summer)
School and Public Programs on Urban Wildlife, Invasive Species, & Migratory Birds Offered Year-Round	School and Public Programs on Urban Wildlife, Invasive Species, & Migratory Birds Offered Year-Round
Research & Monitoring Component	
Deer Population Monitoring	Deer Population Monitoring
Collect Pilot Data on Research Plots	Seedling Survival & Deer Browse Monitoring
Invasive Species Monitoring & Evaluating Control Methods	Invasive Species Monitoring & Evaluating Control Methods

Prior to Niagara River Greenway support, the Buffalo Museum of Science will complete the following work on the Tree Regeneration Project at Tifft Nature Preserve:

1. Continued monitoring of deer populations through weekly transect surveys
2. Establish of research plots throughout the 100 acres of wooded habitat
3. Construct a pilot deer exclosure through an Eagle Scout Leadership project
4. Develop a curricula course content for education components of the project

Project Deliverables

The Tree Regeneration at Tifft Nature Preserve project will produce several products and deliverables including:

1. Thousands of trees seedlings planted and growing throughout the 100 acres of woodlands on the preserve

2. Hundreds of small trees and shrubs planted and growing on the preserve and protected from wildlife damage

3. Hundreds of students participating in environmental education programs conducting authentic scientific research

4. Construction of deer exclosures and establishment of research plots for long-term monitoring and study of deer browsing and natural community restoration

5. Reliable estimates of deer population size and impacts to the vegetation to guide preserve management and natural community restoration

6. Two or more research papers submitted for publication in peer-reviewed science journals, as well as results shared through non-technical articles and public presentations

2. Referring to the Niagara River Greenway Plan, clearly document and describe how the proposed project will advance the Niagara River Greenway vision including the principles, goals, and criteria that define that vision.

Principles – Excellence, Sustainability, Accessibility, Ecological Integrity, Public Well-Being, Connectivity, Restoration, Authenticity, Celebration, Partnerships, Community Based

The Tree Regeneration at Tifft Nature Preserve project advances the vision of the Niagara River Greenway and is well in line with the principles of that vision. How this project will meet the principles of Sustainability, Accessibility, and Connectivity are stated below under the Goals section. The remaining Principles are discussed below.

Excellence – Tifft Nature Preserve is positioned at the south end of the Niagara River Greenway which is a world renowned bird migration corridor. This project will enhance this outstanding natural resource and add to its national reputation. The proposed work will build upon the 150 year history of research and science education at the Buffalo Museum of Science.

Ecological Integrity – Tifft Nature Preserve is a tremendous natural asset within the Niagara River Greenway with its natural communities and diverse wildlife fauna. This project will improve the natural communities on the preserve and enhance habitat for wildlife.

Public Well-Being – Tifft Nature Preserve provides a location for students and the public to expand their knowledge and understanding of their environment, as well as a place to relax and unwind on a peaceful walk in a natural setting.

Restoration – Improving tree regeneration at Tifft Nature Preserve will continue the restoration process of a recovering brownfield. This project will enhance the natural plant communities as well as wildlife habitat on the preserve.

Authenticity/Celebration – A major mission of Tifft Nature Preserve is to promote the environment and natural resources of the Niagara River Greenway and to create a 'green place' within the area. At the same time, we interpret the rich industrial history of the area and make connections between environments of the past and present.

Community Based – Tifft Nature Preserve serves the entire community of the Niagara River Greenway including: school children, youth groups, families, bird watchers, seniors, and nature lovers of all types.

Goals* – *Improve Access, Make Connections, Protect and Restore Environmental Systems, Spark Revitalization and Renewal, Promote Long Term Sustainability, Extend the Legacy of Frederick Law Olmsted, Celebrate History and Heritage

Access – Tifft Nature Preserve is open to the public at no charge seven days a week during daylight hours. There are five miles of trails, two wetland boardwalks, and three wildlife viewing blinds at the preserve.

Make Connections – Tifft Nature Preserve provides a valuable site to connect students and the public with the environment and natural resources of the Niagara River Greenway. This project will further expand and develop those connections.

Protect and Restore Environmental Systems – Tifft Nature Preserve is a recovering brownfield and this project is designed to continue the restoration process by restoring native communities and enhancing wildlife habitat. This project will also inform and educate students and the public about value and importance of the Niagara River Greenway's natural habitats and resources.

Celebrate History and Heritage – Tifft Nature Preserve has a rich history as a commercial and industrial site. How this history and past land used affect the current environment and management of the site will be communicated to students and the public.

Spark Revitalization and Renewal – Tifft Nature Preserve provides valuable natural and recreational amenities that add greatly to the quality of life of area residents, as well as attracting tourists and new investment to the area. This project will maintain and improve the natural and aesthetic qualities of the area.

Promote Long Term Sustainability – Improving tree regenerating at Tifft Nature Preserve is a long-term goal to maintain and enhance the aesthetics and wildlife habitat on the preserve for decades into the future.

<u>Criteria</u> – Consistency with the NRG Principles, Priority Status, Focus Area, Environmental Soundness, Implementable, Economic Viability, Availability of Local Sponsors or Partners, Ability to Match or Leverage Funds, Consideration of Other Planning Efforts, Clear Benefits

Consistency with the Principles – The Tree Regeneration at Tifft Nature Preserve project is consistent with all of the principles of the Niagara River Greenway and makes significant contributions in Ecological Integrity, Public Well-Being, and Restoration.

Priority Status – The Tree Regeneration at Tifft Nature Preserve project includes several priorities identified in the Niagara River Greenway Plan: providing access to water front resources, restoration of Niagara River Ecosystem, and interpretation and education about the region's cultural, natural and historic resources.

Focus Area – Tifft Nature Preserve is within the focus area delineated in the Niagara River Greenway Plan where it functions, along with South Park, as the southern gateway to the Niagara River Greenway.

Environmental Soundness – The very purpose of the Tree Regeneration at Tifft Nature Preserve project is to improve the environment on the preserve by increasing the numbers and species of trees, controlling invasive species, and managing wildlife to restore and enhance natural communities and habitat.

Implementable – The Tree Regeneration at Tifft Nature Preserve project is implementable and feasible as outlined in this proposal. Further detail on aspects of this project and overall management of the preserve are covered in the Tifft Nature Preserve Management Plan (see copy included with application materials).

Availability of Local Sponsor or Partners – The Buffalo Museum of Science has managed and operated Tifft Nature Preserve since 1982 as a high quality natural, educational, and educational resource for the region. Recently, the museum has gained the help of Friends of Tifft Nature Preserve, Inc., a separate non-profit group, to assist with all aspects of operating the preserve. Also, see letters of support for this project from additional organizations.

Ability to Match or Leverage Funds – The budget for this project includes $23,000 per year for three years for at total of $69,000 in addition to the funds requested from the Niagara River Greenway. These additional funds comprise almost 20% of the total project budget. Financial assistance would come directly from the Buffalo Museum of Science, foundation support, and Friends of Tifft Nature Preserve.

Considerations of Other Planning Efforts – The Tree Regeneration at Tifft Nature Preserve project is consistent with, and would help achieve, the vision and goals of many other planning efforts including: City of Buffalo Comprehensive Plan, Local Waterfront Revitalization Plan, New York State Open Space Conservation Plan, New York State Comprehensive Wildlife Conservation Strategy, New York State Significant Coastal Fish & Wildlife Habitat, South Buffalo Brownfield Opportunity Area (BOA) Plan. See below for more detail on how Tifft Nature Preserve is mentioned in these documents.

Clear Benefits – The Tree Regeneration at Tifft Nature Preserve project would provide many benefits within the Niagara River Greenway. Major benefits include: enhancement of natural communities and wildlife habitat, providing environmental education in context, improving the aesthetics of a popular natural recreation area, and providing scientific information on management on an urban natural areas. The products and deliverables stated above also clearly demonstrate the project benefits.

3. Define the budget for the proposed project and include costs for the following: Planning, Construction, Acquisition, Administration, Operation and Maintenance/Year

Category	Niagara River Greenway	BMS[1] Science Dept.	BMS CSL[2] Dept.	Darling[3] & Baird[4]	FOT[5]	Volunteers	Totals
Planning	-	-	-	-	-	-	**$0**
Construction Supplies Planting Contractors							
• Materials & Services	$63,000	-	-	$5,000	$2,500	$250[7]	**$70,750**
• Staff Implementation[6]	$5,000	$7,750	-	-	-	-	**$12,750**
Acquisition	-	-	-	-	-	-	**$0**
Administration	$10,000	-	-	-	-	-	**$10,000**
Education Program Support							
• Materials & Transportation	$12,000	-	-	-	-	-	**$12,000**
• Staff Implementation	$10,000	$2,000	$5,250	-	-	$250	**$17,500**
One-Year Totals	**$100,000**	**$9,750**	**$5,250**	**$5,000**	**$2,500**	**$500**	**$123,000**
Three-Year Totals	**$300,000**	**$29,250**	**$15,750**	**$15,000**	**$7,500**	**$1,500**	**$369,000**

[1] BMS – Buffalo Museum of Science, [2] CSL – Center for Science Learning, [3] The Darling-Sullivan Family Foundation, [4] The Baird Foundation, [5] Friends of Tifft Nature Preserve, Inc., [6] All amounts for Staff Implementation include 21% Fringe Benefits, [7] Volunteer time will be valued at $7.50/hour

Long-term Maintenance

Benefits of this project will be long-lasting such as preserving a tree canopy, enhancing natural communities, establishment of a long-term research project, and increase environmental awareness of visitors to the preserve. These benefits and physical project components will be maintained into the future by Buffalo Museum of Science staff from the Science, Operations, and Education Departments. Planted trees will continued to be protected from wildlife and deer exclosures will maintained by operations staff and volunteers, research will continue by the preserve ecologist, and environmental education will continue through the museum's Center for Science Learning.

4. Describe the measures taken at the local level to gain community and government support for this project (hearings, petitions, public surveys, resolutions of support, or other methods).

In early 2008, the Buffalo Museum of Science undertook the task of natural resource planning for Tifft Nature Preserve. There had been no major planning for the preserve since its creation in the mid-1970's. These efforts lead to the creation of the Tifft Nature Preserve Management Plan which was completed in early 2009. During the planning process stakeholder and public input was sought and incorporated into the final plan through private and public meetings. Prior to release of the final version of the plan, a draft version and request for comments was sent to external reviewers representing local government, state and federal natural resources agencies, college and university professors, environmental consulting firms, members of the local environmental community, and other interested parties. The Management Plan for Tifft Nature Preserve identifies several priorities for protection and enhancement of the preserve's natural resources. The top three priorities are controlling invasive species, managing White-tailed deer, and improving tree regeneration, all of which are addressed in this project. Please see a copy of the Tifft Nature Preserve Management Plan that is included with this project proposal.

See the letters of support included with the application materials from the following individuals and organizations:

- Herb Darling – Friends of Tifft Nature Preserve, Inc.
- Michael P. Kearns – South District Council Member
- Thomas O'Donnell – Buffalo Ornithological Society
- Paul D. Maurer – Re-Tree WNY

If this project has been cited or described in a local planning document or some equivalent thereof, attach copies of that documentation highlighting the sections that are relevant to the proposed project.

In addition to this project being identified as a high priority in the Management Plan for Tifft Nature Preserve, the general framework of the project is part of the Niagara River Greenway Plan. The Greenway Implementation Concept of Protecting, Preserving, and Restoring Important Ecological Resources states that removal of invasive species and replacement with native species is a priority (p. 87), and identifies Tifft Nature Preserve as an important upland area within the Niagara River ecosystem (p. 87-88), as well as and impaired habitat and brownfield in need of restoration due to invasive species and past land uses (p. 91). Habitat Improvements at Tifft Nature Preserve was also suggested as a project by Buffalo Niagara Riverkeepers (Fig. 45) while gathering stakeholder input for the Niagara River Greenway Plan. This project would address all of these points and greatly improve Tifft Nature Preserve and the Niagara River Greenway.

Tifft Nature Preserve is also mentioned and highlighted in the following local and statewide documents:

- City of Buffalo Comprehensive Plan – Tifft Nature Preserve is cited as part of the city's "Green Infrastructure" (Fig. 32) and as a "Destination Park" (Fig. 35), a distinction given to only 16 of Buffalo's 120 parks. Also, the City of Buffalo's Comprehensive Plan lists several goals including "…fully restored and enhanced natural … heritage."

- Local Waterfront Revitalization Plan – In this plan Tifft Nature Preserve is highlighted for its Public Access and Recreation (Map 2-8, p. II-44), but more importantly for it wildlife habitat and states, "Wildlife frequents wooded and open space areas around wetlands and vacant areas in Sub-Area 4, particularly in the Tifft Nature Preserve" (p. II-81). The plan also lists Tifft Nature Preserve and adjacent lands as a "Conservation/Habitat Restoration Area" on Map 4-1D.

- New York State Open Space Conservation Plan – Tifft Nature Preserve is listed as a Priority Conservation Project due to its valuable urban wetland (p. 311-312). The plan goes on to state that urban wetlands require a protected upland buffer zone. This project is designed to enhance the woodlands that provide this buffer to the wetland on the preserve.

- New York State Comprehensive Wildlife Conservation Strategy – Tifft Nature Preserve provides habitat for 77 species of birds identified by the Comprehensive Wildlife Conservation Strategy as "Species of Greatest Conservation Need." This includes the Golden-wing Warbler and Cerulean Warbler, which are both listed as "Special Concern" species in New York State. The plan is available at http://www.dec.ny.gov/animals/30483.html.

- New York State Significant Coastal Fish & Wildlife Habitat – Tifft Nature Preserve is designated by the Department of State as a Significant Coastal Fish & Wildlife Habitat with an extremely high significance score of 84 points (the highest in Western New York). This high rating is due to natural features such as the largest remnant wetland in the Lake Erie coastal region and the presence of a diverse wildlife, including rare species. However, the rating form also states that the preserve "…is the most heavily used environmental education center in the region." This project will enhance the value of the preserve for wildlife and continue the providing quality environmental education to a large segment of the population. Rating form available at http://www.nyswaterfronts.com/index.asp.

- South Buffalo Brownfield Opportunity Area (BOA) Plan – Final release of the South Buffalo BOA plan is forthcoming, but Buffalo Museum of Science staff served on the steering committee and participated in the planning process. This plan highlights the importance of Tifft Nature Preserve as an asset to the region and integral piece of the revitalization of South Buffalo.

Describe the role of municipal agencies, stakeholder groups, consultants, volunteers, or others who will be involved in the proposed project.

Buffalo Museum of Science staff will take leading roles in implementing all aspects of the Tree Regeneration at Tifft Nature Preserve project with the assistance of partners and volunteers. Key museum staff roles and responsibilities are below, as well as partners and volunteer contributions.

David Spiering – Tifft Nature Preserve Ecologist

David will be the project coordinator and oversee all aspects of construction of deer exclosures, purchasing supplies, tree planting, deer population and seedling survival monitoring, invasive species control, and hired contractors. He will also assist with volunteer coordination and developing education content to interpret the ecological concepts of this project to students and the public. David received a BS in Zoology and Conservation Biology from the University of Wisconsin-Madison, a MS in Ecology from Colorado State University, and has ten years combined field and professional experience as a biologist. He has worked for the Buffalo Museum of Science since January 2008 and was previously working for the Minnesota Department of Natural Resources Nongame Wildlife Program.

Lauren Makeyenko – Tifft Nature Preserve Experience Manager

Lauren will oversee development of educational content for the project and assist with volunteer coordination. The Tifft Experience Manager provides leadership, direction, and management pertaining to the experiences at Tifft Nature Preserve. This includes important relationship building with all school and public audiences, and operational concerns relating to the delivery of Tifft programs. Lauren received a BS in Environmental Studies from SUNY at Buffalo. She has previously worked as an environmental educator for the Erie County Department of Environment and Planning and the New York State Department of Environmental Conservation.

Buffalo Museum of Science Facilitators of Learning

Museum Facilitators of Learning will assist with development and presentation of educational content to students and the public, as well as work with the preserve ecologist on student monitoring of deer populations and seedling survival. All Facilitators of Learning have at least bachelor degrees in science or education and experience teaching environmental programming to audiences of all ages.

Dr. John Grehan – Director of Science, Buffalo Museum of Science

Dr. Grehan supervises all science staff, including David Spiering, and will provide input on research and education aspects of the project. He will also assist with budgeting and administration. Dr. Grehan received a BS in Botany and Zoology, and a PhD in Zoology/Entomology from Victoria University of Wellington, New Zealand.

Karen Wallace – Director of Center for Science Learning, Buffalo Museum of Science

Karen Wallace directs the Center for Science Learning, the museum's education department that focuses on inquiry-based learning and teaching techniques. She supervises all education staff, including Lauren Makeyenko and the Facilitators of

Learning, and will provide input on the educational components of this project, as well as assistance with budgeting and administration. Karen received a BA in Biology and a M.Ed. of Science Education from SUNY at Buffalo. She also serves as an adjunct assistant professor in the Learning and Instruction Department at SUNY Buffalo.

Friends of Tifft Nature Preserve, Inc. – Non-Profit Support Group

The Friends of Tifft Nature Preserve was established to assist and support the Buffalo Museum of Science with operation of the preserve. Various forms of assistance are provided including: volunteers for leading tours and educational programs, financial support, fundraising, publicity and promotion, among others. Friends of Tifft Nature Preserve has committed $7,500 over three years for materials, payment of contractors, or other expense, and will continue with volunteer support throughout the project.

Volunteers

There will be many opportunities for individuals to volunteer in a number of ways such as tree planting, invasive species control, educational programming, and citizen science projects, among others. Volunteers will be a diverse mix of people including scout groups, families, college students, and retired citizens. A minimum of 80 hours of volunteer service, with a value of at least $500, will be dedicated to this project each year.

Students

Environmental education for students is a major component of this project. The Buffalo Museum of Science uses the strategy of actively involving students in authentic scientific research to most effectively teach complex science content. This project will engage students by allowing them collect real data on deer populations at the preserve and to monitor the survival of seedlings planted in research plots. Student collected data will be used for future management of the preserve and will be incorporated into peer-reviewed journal articles.

5. Describe and document the environmental setting and existing conditions at the proposed site.

Tifft Nature Preserve is a 264-acre urban nature preserve, operated by the Buffalo Museum of Science (see map below). Located in South Buffalo, the area was formerly used as a transshipment facility and dump until a group of concerned citizens successfully petitioned the city to create a nature preserve on the property in the early 1970's. Despite the industrial history of the site, this brownfield provides valuable wildlife habitat and needed greenspace within the city limits. Major habitats on the preserve include: a 75-acre remnant cattail marsh, woodlands, grasslands, and three ponds. The cattail marsh, which is the largest remnant wetland in Erie County, provides nesting habitat for rare marsh birds and the woodlands are an important stop-over site for migrating birds. Due this important bird habitat, Tifft Nature Preserve is designated as an Important Bird Area (IBA) by Audubon. The Buffalo Museum of Science is committed to protecting the significant natural resources on the preserve and achieving the full potential of Tifft Nature Preserve as a destination for scientific research, environmental education, and outdoor recreation in western New York.

The Tree Regeneration at Tifft Nature Preserve project will occur throughout the 100 acres of woodland habitats on the preserve (outlined in green on the map below). Although some of the trees in the woodlands are large, creating a tall canopy, these plant communities are relatively young. Fast growing, but short-lived Cottonwood trees (*Populus deltoides*) dominate and other species include: black willow, aspen, green ash, tree-of-heaven, and a few planted species such as tulip tree and black walnut. The shrub layer in the woodlands is dominated by non-native invasive species such as Japanese knotweed, buckthorn, honeysuckle, and tree-of-heaven (A*ilanthus altissima*). The herbaceous ground layer vegetation varies across the preserve, but is also comprised of mostly weedy species such as *Phragmites*, stinging nettle and garlic mustard. Despite being young plant communities with many non-native species, the woodlands provide habitat for several species of wildlife. Tifft Nature Preserve is a well known migratory stopover site for songbirds and the woodlands provide important habitat for those resting birds. Trees on the preserve also create perching and roosting sites for birds and nest sites for raptors and cavity-nesting birds. The woodlands also are habitat for mammalian species such as squirrels, bats, foxes, and others. Visitors to the preserve enjoy the many trails through the woodlands that create a feeling of isolation by blocking views of the surrounding urban landscape and providing cooling shade on warm summer days.

Therefore, maintaining the woodlands is a priority because of their wildlife and recreational values. There are several threats to the long term health and persistence of the woodlands. The biggest and most pressing is the negative impacts of the large deer population on the preserve. As mentioned before, most of the tree species are fast growing but short-lived and will be reaching the limits of their lifespan in the coming decades. Without adequate tree regeneration, which is currently prevented by heavy deer browsing, there will not be a new cohort of trees to replace the dying older trees. Invasive species are also another major threat to the future of the preserve's woodlands since they can reduce the value of wildlife habitat, crowd out native vegetation, and prevent tree regeneration. Other challenges to natural tree regeneration on the preserve are a shallow surface soil layer underlain with fill material preventing trees from establishing deep root systems and the lack of adjacent natural areas to provide a diverse and abundant seed source.

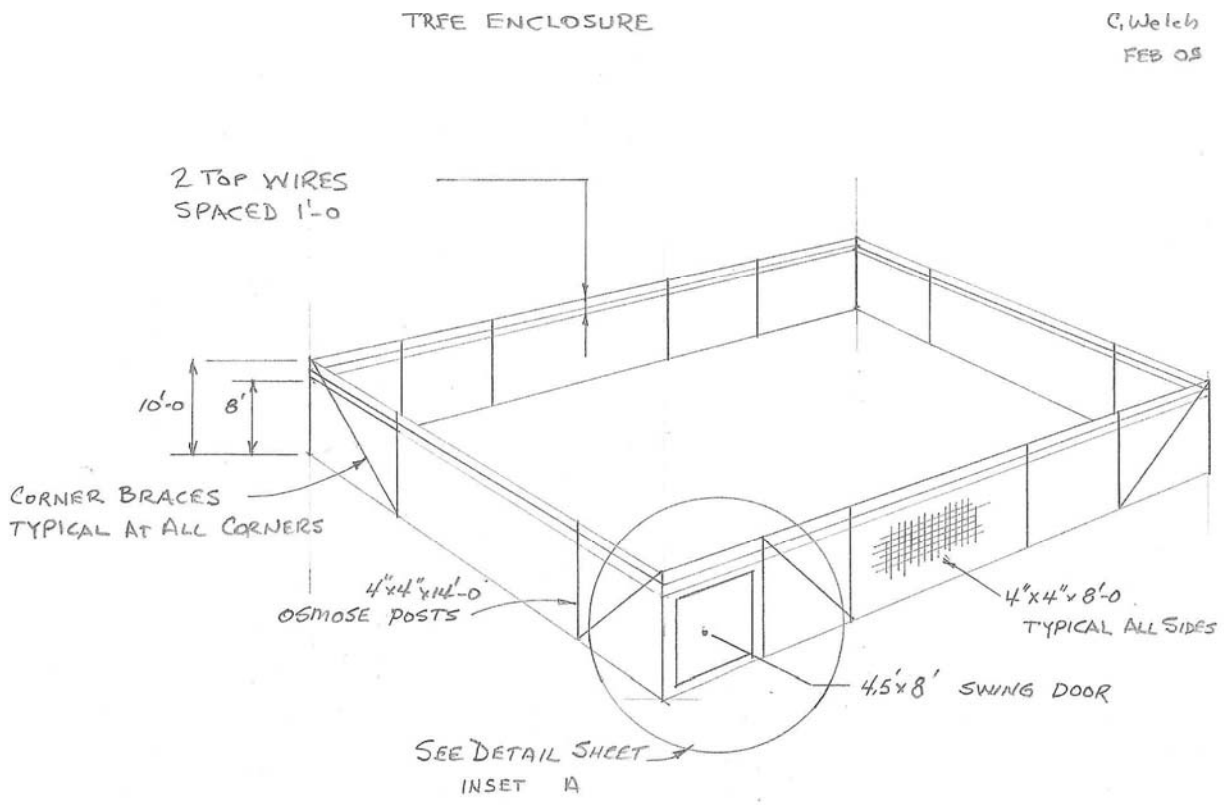
More information on the preserve and details on topics such as invasive species control, White-tailed deer management, and native tree planting can be found in the Tifft Nature Preserve Management Plan.

Provide photographs, conceptual plans, and drawings that show the site as it presently exists and how the site will change with the addition of the proposed project.

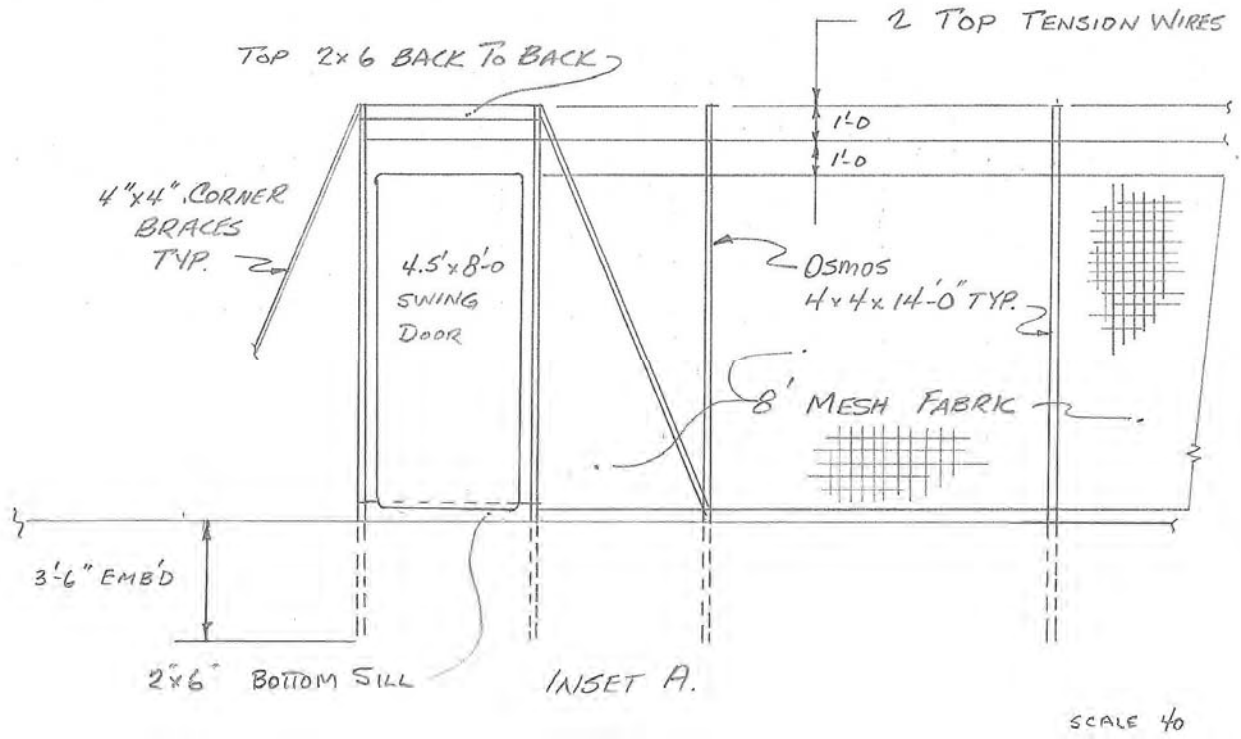
2004 aerial photo of Tifft Nature Preserve showing the boundary and significant natural communities. The Tree Regeneration Project would occur within the 100-acres of woodlands outlined above in green.

Photo showing no seedlings or small trees to replace large trees (Summer 2008)

Photo of canopy gap created by fallen and dying cottonwood trees (Summer 2008)



Construction drawing of proposed Deer Exclosure (exact design and dimensions may change)



Additional design drawing and detail Deer Exclosure (exact design and dimensions may change)

Describe how your project will comply with the State Environmental Quality Review Act (SEQRA). The existence of wetlands, significant upland and aquatic habitats, and plant or animal species that are classified as rare, threatened, or endangered should be noted. Explain how such natural resources will be protected and/or enhanced.

There are three aspects of this project where the State Environmental Quality Review Act (SEQRA) or other environmental regulation would apply. These include work within the 100-foot buffer of the DEC regulated wetland on the preserve and the use of herbicides for control of invasive species. Both are addressed below.

DEC Regulated Wetland

The boundary of the DEC regulated freshwater wetland (Wetland BU-15) on the preserve is outlined in the map above. This project requires no actual work within the wetland, but a 100-foot buffer surrounding a regulated wetland is also protected under Article 24 of the New York State Environmental Conservation Law. A permit application for herbicide application to control invasive species and construction of deer exclosures within the 100-foot buffer will be submitted to the DEC for review and permitting. The Buffalo Museum of Science has previously submitted and received permits from the DEC for herbicide use to control invasive species (*Phragmites*) within the marsh and for repair and maintenance of trails and boardwalks adjacent to the wetland.

Herbicides

An Environmental Impact Statement (EIS) was created through the SEQRA process for all pesticides that are registered for use in New York State. Only herbicides registered for use in New York State will be used for invasive species control in this project. All herbicides used in this project will be registered for use on target species and near water bodies, and will be applied only by certified pesticide applicators following all label instructions and herbicide regulations. David Spiering, the Tifft Nature Preserve Ecologist, is a certified pesticide applicator in New York State and will oversee all herbicide applications.

Rare, Threatened & Endangered Species

Tifft Nature Preserve provides habitat for several state listed bird species including: Least Bittern (Threatened), Pied-billed Grebe (Threatened), Golden-wing Warbler (Special Concern), and Cerulean Warbler (Special Concern). This project would not negatively impact these species in any way and is designed for improve habitat for migrant songbirds such as the Golden-wing and Cerulean Warblers.

Cite any relevant project related studies.

See the Literature Cited section in the Tifft Nature Preserve Management Plan for an extensive list of references on Tifft Nature Preserve, natural community restoration, invasive species control, deer management and other relevant topics.