CONCEPTUAL PLAN

for the

B-4 RIVER DISTRICT RIPARIAN RESTORATION AND TRAIL PLANNING AND DESIGN PROJECT

Prepared for:

Village of Shorewood
3930 North Murray Avenue
Shorewood, WI 53211

Prepared by:

Marek Landscaping, LLC
820 East Knapp Street
Milwaukee, WI 53202

May 2009

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Ecological Services of Milwaukee, Inc.
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May 2009

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1.0 Executive Summary

The Village of Shorewood has undertaken a planning process to improve and expand upon its green spaces. This includes the bluff along the east bank of the Milwaukee River, extending from Hubbard Park to East Capital Drive (STH 190). This document presents a plan for developing a trail system along the bluff and its restoration. Following an extensive survey of existing conditions and public outreach, recommendations are provided on trail alignment and connections, bluff stabilization, maintenance, signage, plant community restoration, budgeting, and implementation.

Three main trails could be used to guide visitors along the bluff. A paved trail along the top of the bluff would serve as a connector between the Oak Leaf Trail, the bluff, and East Capital Drive. The trailheads at each end are important nodes that should have welcoming entrances and signage. A great vista of the river can be created half way down this trail by cutting back the top of bluff and exposing a buried ravine. The trail should allow for multi-use unless a direct connection to the Oak Leaf Trail at East Capital Drive is established.

Two naturally surfaced trails would provide the visitor a more intimate experience near the river and on an upland section north of Hubbard Park. The lower river trail should become part of the East Bank Trail system already established to the south of the project area, and the ecologically significant section north of Hubbard Park should be limited to pedestrians. The multi-use upland trail would provide an alternative route for non-pedestrians.

The trails should be enhanced by improving the surface tread, moving the trail upland where possible, developing more inviting trailheads, and adding site specific amenities such as boardwalks and entrance gates. Trail surfaces should slope towards the river and avoid concentrating water next to the trail. Stabilization techniques range from constructing living walls, boardwalks, hand grubbing, and rock armoring. Some sections require re-routing to achieve proper drainage and solid footing. Disturbed sections should be immediately vegetated and stabilized.

Additional non-vehicular access to Hubbard Park from the Oak Leaf Trail can be established in two ways; providing an entrance in the current fence line that leads to Hubbard Park Lodge and the River Club and by improving an existing path originating by River Park that enters the Hubbard Park behind the Youth Pavilion. Other amenities include a universally accessible canoe launch at Hubbard Park, fishing access points along the lower river trail, and signage.

Vegetation restoration of the bluff should be accomplished through non-native/invasive species control, planting and seeding, germination of the existing seed bank, and natural recruitment from surrounding lands. Management must be adaptive and based on monitoring. An annual schedule is provided for managing these areas.

Maintenance is crucial to the plans' success, and this plan should not be implemented without available maintenance funding. A combination of a trail contractor, non-profit organizations, and user groups could uphold the maintenance under the Department of Public Works oversight.

The budget for implementing the entire conceptual plan is around $570,000. However, this plan can be implemented in parts with vegetation management as the priority. Funding can be found through grants and supplemented by volunteers.

2.0 Introduction

The Village of Shorewood has undergone a significant planning effort to coordinate, enhance, and provide better access to its park and recreational spaces. This document continues these efforts by providing a trail design and bluff restoration plan along the Milwaukee River. This includes developing a pedestrian trail at the top of the river bluff, rehabilitating an existing trail along the river's edge, identifying trail access and connections, and restoring the bluff in terms of stabilization, drainage, and vegetation.

The plan has been prepared in conjunction with other ongoing improvements to the Village. Private sites adjacent to the project area are to be redeveloped, East Capital Drive is to be renovated with bike lanes, and a new pedestrian bridge over East Capital Drive is planned along the Oak Leaf Trail. All of this is being done as part of the Village's plan to revitalize, and improve walking and biking opportunities in the Village.

The project area is mostly undeveloped along the east bank of the Milwaukee River, extending between Hubbard Park and East Capital Drive (STH 190) in the Village of Shorewood, Milwaukee County, Wisconsin (Figures 1 and 2). It is described as riparian woodland, being in an undeveloped, natural condition, that surrounds a managed parkland.

The need for this plan arose from prior planning efforts that recommended focusing visitors onto designated trails, decommissioning the social trails that are contributing to the degraded condition of the bluff, enhancing the vegetative quality of the bluff, providing better access to Hubbard Park and the Oak Leaf Trail, and connecting to the regional Milwaukee River trail system. The idea is to provide a walkable Shorewood, bring more visitors to the wonderful yet under utilized Hubbard Park, and provide better access to the River.

Major project elements are as follows:

- Evaluate existing conditions
- Develop alternatives for trail alignment and connections
- Public outreach
- Provide recommendations to trail alignment and features, drainage/erosion/bluff stabilization, vegetation, monitoring & maintenance, implementation, permits/approvals, and cost.

This conceptual plan provides several detailed recommendations and design guidelines for the project area including example construction details for developing trails and stabilizing the bluff, choosing and preparing grants, annual budgeting, organizing volunteers, enhancing existing plant communities, and overall prioritizing of projects. The information is presented such that the Village may decide to implement the recommendations over a longer timeframe while understanding which tasks to undertake first.

Chapters 2 through 6 provide a summary of work completed to develop recommendations. This includes understanding the purpose and need of the project (Chapter 2), reviewing prior work completed by the Village of Shorewood (Village) and understanding the regional context of the project (Chapter 3), surveying and inventorying the existing conditions of the site (Chapter 4), and gathering input from stakeholders and the public (Chapter 5).

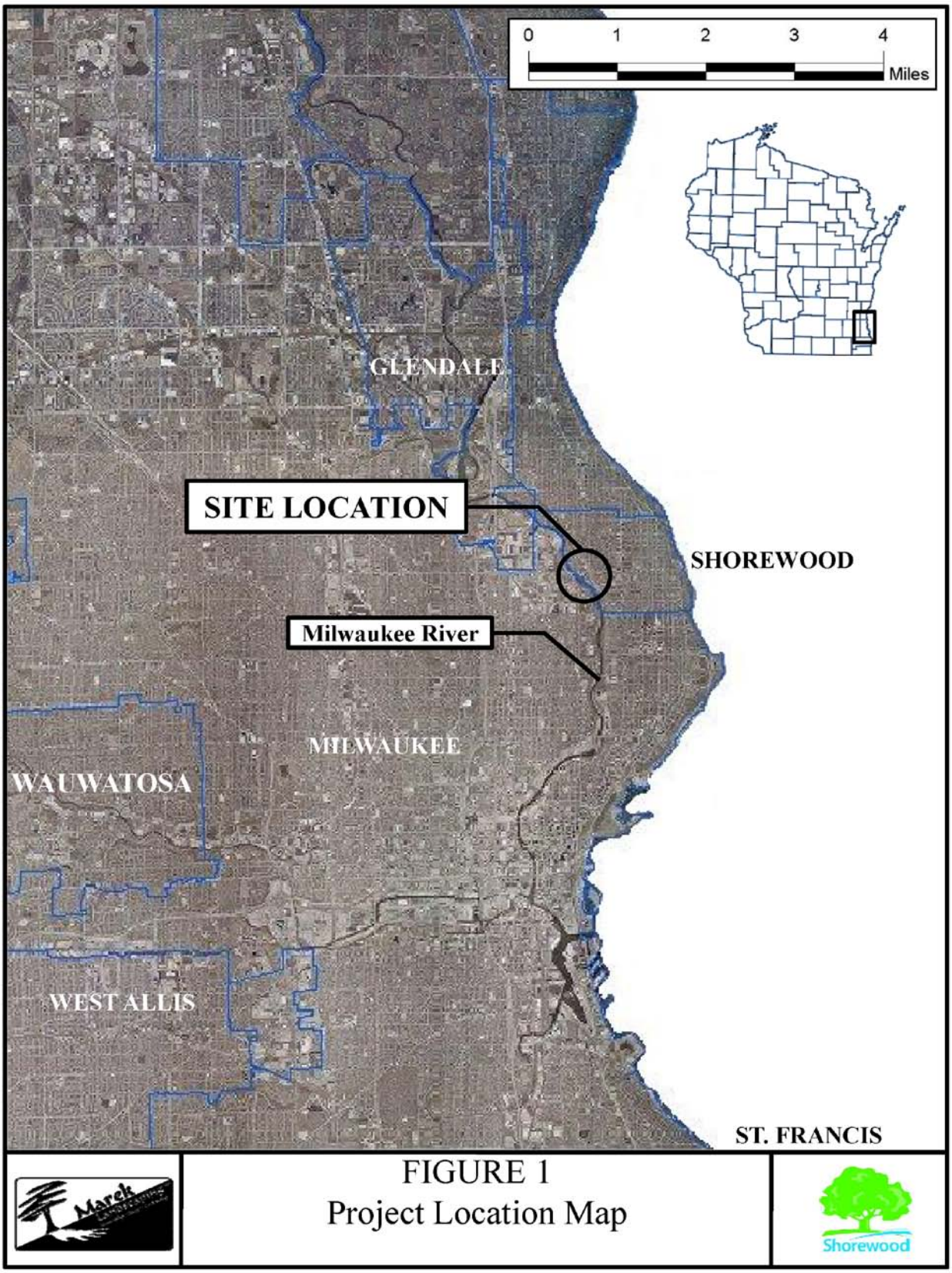


FIGURE 1
Project Location Map

FIGURE 2
Project Area and Features Map

Chapter 6 provides recommendations that were developed after careful consideration of the information presented in Chapters 2 through 5. The trail alignment and the bluff stabilization recommendations provide a map and example detail drawings. The plant community restoration and maintenance/monitoring recommendations provide a complete management plan that is ready for implementation and for grant preparation. The implementation plan prioritizes the steps needed to go from planning into actions. Several permits are recommended for regulated activities. Finally, cost estimates are provided as a budgeting tool for the Village. These are followed by a discussion of volunteer opportunities and grant opportunities that may be used to help implement and fund the entire or portions of the project.

3.0 Prior Work Completed

The plan described herein is a continuation of several prior studies that were completed as part of the Village's overall planning process for improving its open spaces, roadways, and business district. In addition, several designs regarding an adjacent development, a paved trail, and East Capital Drive are currently being developed. The following is a list of the studies and designs that were reviewed:

- *Central District Master Plan*. Prepared by The Lakota Group. July 2006.
- *The Comprehensive Outdoor Recreation Plan: Parks, Trails, Open Space, and School Grounds*. Prepared by the Planning and Design Institute. Adopted December 17, 2007.
- *Village of Shorewood Comprehensive Bicycle Study*. Prepared by Graef, Anhalt, and Schloemer & Associates, Inc. July 25, 2008.
- Drawings for Site Plan Approval: Sunrise of Shorewood. Prepared by Professional Engineering Associates. In progress.
- Milwaukee River Bluff Trail. Prepared by Bonestroo, Inc. In progress.
- East Capital Drive Roadway Improvements (30% Complete). Prepared by Graef, Anhalt, and Schloemer & Associates, Inc. In progress.

Other regional plans considered include:

- *The Milwaukee River Greenway: Protecting the Milwaukee River Greenway to Enhance Our Natural Urban Experience*. The Milwaukee River Work Group.
- *Off-Street Bikeway Study: Milwaukee's Best Opportunities for Trail Expansion*. Prepared by Bicycle Federation of Wisconsin.
- *Milwaukee County Trails Network Plan 2007*. Milwaukee County Department of Parks, Recreation, and Culture.

4.0 Existing Conditions

4.1 Topography and Landscape Position

The project area consists of a narrow floodplain abutted by relatively steep slopes, is about 0.56 miles in length, and 19.2 acres in area. Elevations range from an approximate 595 feet MSL (above mean sea level) in the Milwaukee River floodplain to over 640 feet MSL at the top of the bluff.

4.2 Hydrology and Drainage

The primary sources of water within the project area are from overbank flooding adjacent to the Milwaukee River, runoff originating from adjacent uplands, and stormwater from pipes that discharge onto the side slopes of the river valley. Past disturbances within the local watershed include placement of fill for road and railway construction, and commercial, industrial and residential development. As a result, local hydrology has been affected by filling and construction of impervious surfaces which prohibit infiltration. The flood stage of the river is also affected by areas upstream that route stormwater towards the river.

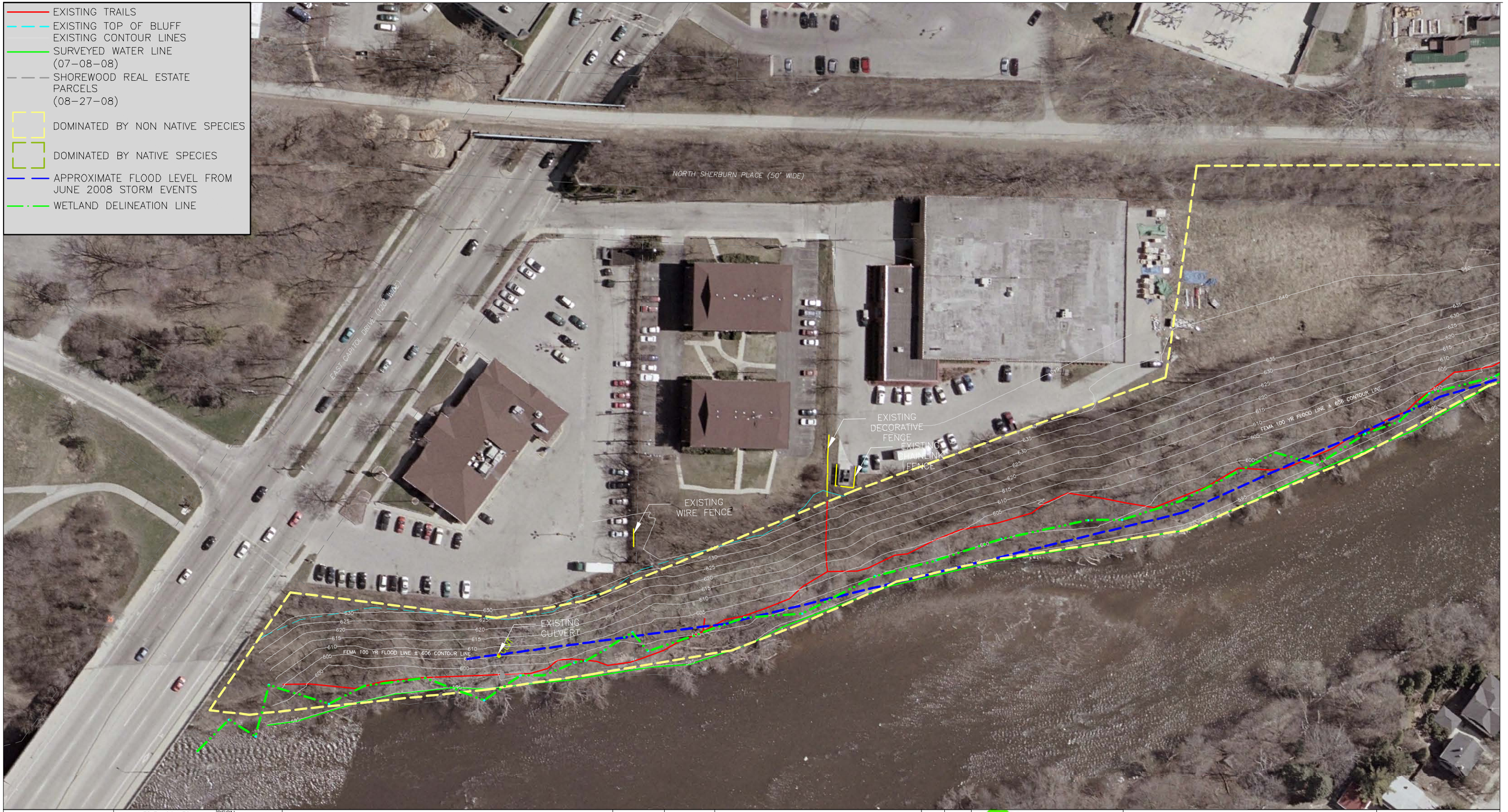
The Milwaukee River water levels are between 590 feet, MSL at the southern end of the project area and 595 feet, MSL at the East Capital Drive bridge. The Federal Emergency Management Agency (FEMA) 100-year floodplain for the site follows the 606 feet, MSL contour line (FEMA 2008). The flood height during the June 2008 storms, where record 48-hour rainfalls fell over the Milwaukee area, was observed and is shown on Figure 3.

The main water flow patterns for the project area include runoff (flow across the land surface) and infiltration into the subsurface. Runoff originating from precipitation either flows as a layer of water across the surface (overland flow) or is concentrated into narrow channels (rill or gully flow). The latter flow types are more erosive, because they concentrate flow. They are found in gullies, sewer outfalls, and user-defined trails, especially the trails that follow the fall line of slopes.

Example of trail being widened and split to avoid a perennially wet spot.

Water that infiltrates into the subsurface forms several seeps and springs that were noted along the bluff and the user-defined trails. Seeps and springs are points where groundwater flows to the surface and are often found along hillsides and bluffs. They are important for wetland vegetation and habitat. Seeps that intersect the trail have caused users step outside the wet zone and, in effect, widening the trail.

Several sewer pipes outfall along the bluff and the riverbank. The outfalls range from 4- to 36-inches diameter in size and appear to originate from developments on top of the bluff and as storm sewers originating from East Capital Drive and Morris Boulevard.. Flows from the pipes have caused soil erosion.



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IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

DSGN	M. MAREK
DR	D. SETHER
CHK	M. MAREK
APVD	M. MAREK

Project Title: B-4 River District Riparian Restoration and Trail Planning and Design Project

Figure 3 – Existing Conditions

REV. NO.	DATE	REVISION DESCRIPTION	BY	APVD

VILLAGE OF SHOREWOOD
3930 N MURRAY AVE
SHOREWOOD, WI 53211

MAREK LANDSCAPING, LLC
820 E KNAPP ST
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Phone: 414.272.0242
Fax: 414.272.0243
E-Mail: info@mareklandscaping.com

DRAWING NO.:	B-4-3
SHEET:	1-3
DATE:	11-10-08

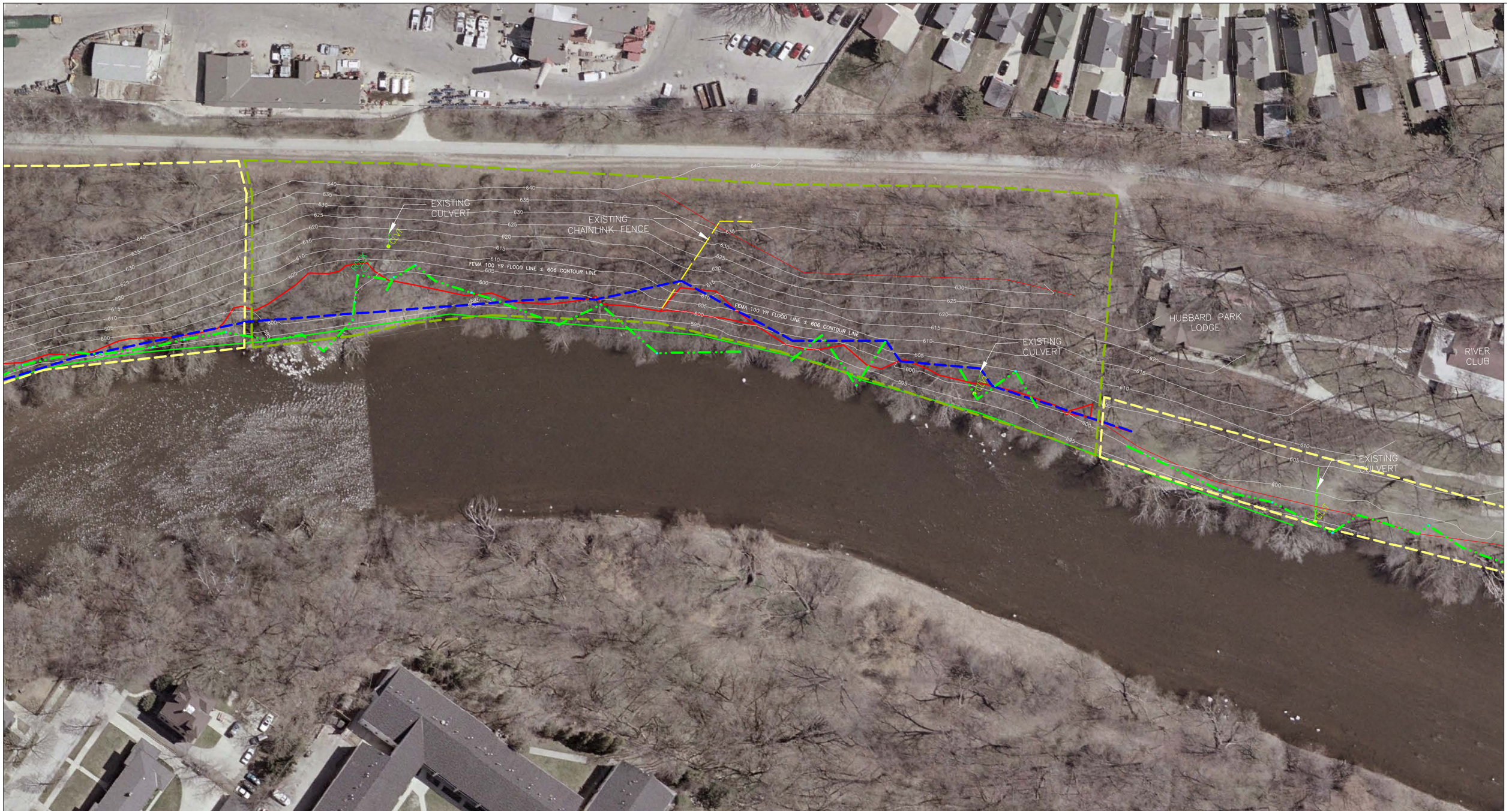

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Figure 3 – Existing Conditions

REV. NO.	DATE	REVISION DESCRIPTION	BY	APVD

VILLAGE OF SHOREWOOD
3930 N MURRAY AVE
SHOREWOOD, WI 53211

MAREK LANDSCAPING, LLC
820 E KNAPP ST
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DRAWING NO.:	B-4-3
SHEET:	2-3
DATE:	11-10-08

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DSGN	M. MAREK
DR	D. SETHER
CHK	M. MAREK
APVD	M. MAREK

Project Title: B-4 River District Riparian Restoration and Trail Planning and Design Project

Figure 3 – Existing Conditions

REV. NO.	DATE	REVISION DESCRIPTION	BY	APVD

VILLAGE OF SHOREWOOD
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DRAWING NO.:	B-4-3
SHEET:	3-3
DATE:	11-10-08

4.3 Erosion and Stabilization

In general, the bluff and river bank are relatively stable due to the combination of stable slope angles, vegetation, soil types, and drainage. However, destabilization of the bluff and river bank occurs in areas where any one of these have been compromised. This section discusses several situations where destabilization of the bluff and bank has occurred.

User-defined trails have been established throughout the project area. These trails criss-cross the bluff and vary in age and usage. There is one main north-south trail that traverses the entire project area, referred to as the lower river trail. It is close to the river and is between 2 to 12 feet wide and 2,943 feet long (0.56 miles). There is a second north-south trail near the top of the bluff and leads to the Hubbard Park Lodge. This trail is 732 feet long (0.14 miles) and about 2 feet wide.

Along with many beneficial attributes, trails can serve as pathways for invasive plant species to spread and cause soil compaction and erosion if they are poorly planed and graded. The numerous paths that have developed on the bluff are contributing to the bluffôs degraded condition.

Example of erosion caused by sewers. Dumping & filling of the bluff has altered natural drainage, soil stability due to the fill materials (note rebar & concrete in photo), and the inability for vegetation to grow in given condition.

Native soils within the project area have been affected by scour flooding events and dumping of fill material. Evidence of dumping is most prominent in the northern half of the project area and consists of concrete, asphalt, rebar, lumber, silt fencing, plant debris, and mounds of soil. This is further evidenced by observations made from soil borings advanced on top of the bluff at 1111 East Capital Drive (G2 Consulting Group 2008). The fill layer depth ranges from 3 to 29 feet below grade, is very loose in terms of compaction, contains bricks, plastic, and cinder fragments, and overlies native granular to silty soils. Dumping of plant material was also observed north of Hubbard Park Lodge; this material includes invasive species, such as garlic mustard, and is a source of seed to the surrounding plant communities.

Groundwater was encountered in five of fifteen borings. The approximate depth to groundwater is 23.5 to 43.5 feet below grade and corresponds to approximate elevations of 612.5 and 589 feet, MSL. These groundwater flows are the source for many of the seeps and springs along the bank and for the river (Milwaukee River river stage is between 590 and 595 feet, MSL).

The river bank is in relatively stable condition with evidence of sediment deposition and bank vegetation. The banks are partly protected due to vegetation slowing down the velocity of river water reaching the bank and a well armored toe slope. There are several locations where sediment loss and erosion has occurred partly due to soil compaction and loss due to the proximity of the existing river trail being to the bank.

4.4 Plant Community

Vegetation within the project area has been studied previously by others (Barloga 2008 and 2008a; SEWRPC 1993 and 1994) who noted the presence of floodplain and upland deciduous forest dominated by native species in a portion of the project corridor. A plant community investigation was also conducted by Ecological Services of Milwaukee, Inc. (ESM) on June 18 and 25, 2008 as part of this project. Plant communities observed in the project area predominantly consist of floodplain forest, with interspersed small patches of fresh wet meadow, shrub carr, and shallow marsh in the floodplain. Deciduous hardwood forest extends up from the floodplain on abutting side slopes.

Plant communities throughout the project corridor have been adversely affected by placement of fill for park amenities, roadways, trails, and residential and commercial developments. The effect of these disturbances is most evident in the northern one-half (approximate) of the project corridor, which is largely dominated by non-native and/or invasive species throughout the floodplain and associated uplands. This northern section contains floodplain and upland forest with a high density of common buckthorn (*Rhamnus cathartica*) and shrub honeysuckle (*Lonicera* spp.) in the shrub layer, with garlic mustard (*Alliaria petiolata*) in the herb layer. However, native species including box elder (*Acer negundo*) and green ash (*Fraxinus pennsylvanica*) dominate the canopy layer.

Hop tree [Ptelea trifoliata]

Musclewood [Carpinus caroliniana]

Plant communities observed in the southern one-half of the project area consist primarily of relatively undisturbed floodplain forest and upland hardwood forest. The floodplain forest contains interspersed, small areas of shrub carr, fresh wet meadow and shallow marsh adjacent to the river's edge, the size and composition of which changes due to alternate scouring and deposition caused by flood events. The floodplain forest is dominated by a dense canopy of green ash and box elder. The upland side slopes extending up to the bluff contain red maple (*Acer rubra*), elm, sugar maple (*A. saccharum*), silver maple (*A.saccharіunum*), green ash (*Fraxinus pennsylvanica*), basswood (*Tilia americana*) and oak species (*Quercus* spp.) in a continuous canopy layer. The shrub layer contains native species such as nannyberry (*Viburnum lentago*), staghorn sumac (*Rhus typhina*), and downy arrow-wood (*Viburnum rafinesquianum)* in upland areas, with silky dogwood (*Cornus amomum*) and grey dogwood (*C. racemosa*) present in the floodplain. The herbaceous layer in the upland portions of this section of the project area is

dominated by native species such as goldenrod species (*Solidago* spp.), wild leek (*Allium tricoccum*), wild onion (*A. canadense*), Solomon's plume (*Smilacina racemosa*), wild geranium (*Geranium maculatum*), white snakeroot (*Eupatorium rugosum*), and woodland sunflower (*Helianthus divaricatus*).

Small populations of forked aster (*Aster furcatus*), a State of Wisconsin endangered species and globally rare (G3 status), were also observed within southern one-half of the project area. The global status of G3 indicates that the species is either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g., a single state or physiographic region) or because of other factors making it vulnerable to extinction throughout its range; in terms of occurrences, in the range of 21 to 100 (WDNR BER 2008).

The presence of forked aster and other native species observed in the southern portion of the project area are indicative of an intact plant community with a lack of recent disturbance. While this portion of the project area contains common buckthorn, honeysuckle and garlic mustard, the density of these species is relatively low in comparison to the remainder of the project corridor and on similar sites. Few plant community remnants of this quality remain throughout Southeastern Wisconsin. Richard Barloga, an ecologist who has been inventorying the Milwaukee County area over the last 30 years, notes that the project area is one of few remaining areas within the Milwaukee area that maintain such a high quality floral assemblage. A list of plant species observed during the project area investigation performed in 2008 and historical floral inventory records are included in Appendix A.

The open space of Hubbard Park surrounding the Lodge and the River Club has a savannah like setting. The area between the Hubbard Park Lodge and the River Club contains several large black oak (*Quercus velutina*). This area has been under the care of the village forestry staff and is generally well maintained. If it has not been performed, a detailed tree inventory should be conducted by a certified arborist or forester and any necessary work performed.

Wetlands were delineated by the Southeastern Wisconsin Regional Planning Commission (SEWRPC) on September 11 and 12, 2008 and are illustrated on Figure 3. In general, the wetlands are at or below the 600 feet, MSL contour line. The existing lower river trail crosses into wetlands at several locations for a total of 735 feet or approximately 0.05 acres (using a trail width of three feet).

4.5 Land Use

The northern half of project area is currently zoned as River District (B-4) (Shorewood 2008), and the land use is commercial and multi-family/condos (Shorewood 2007). The southern half of the project area is zoned as Park Preservation District (P-3) (Shorewood 2008), and the land use is exempt – open space (Shorewood 2007). Property owners include the Village of Shorewood, Milwaukee County, and private land owners. The existing property lines for the private land owners encompass land on top of the bluff and continue down to the river. The Village of Shorewood plans to acquire the bluff portion of these properties to ensure public access to the bluff and Milwaukee River. Figure 4 illustrates the zoning and land ownership.

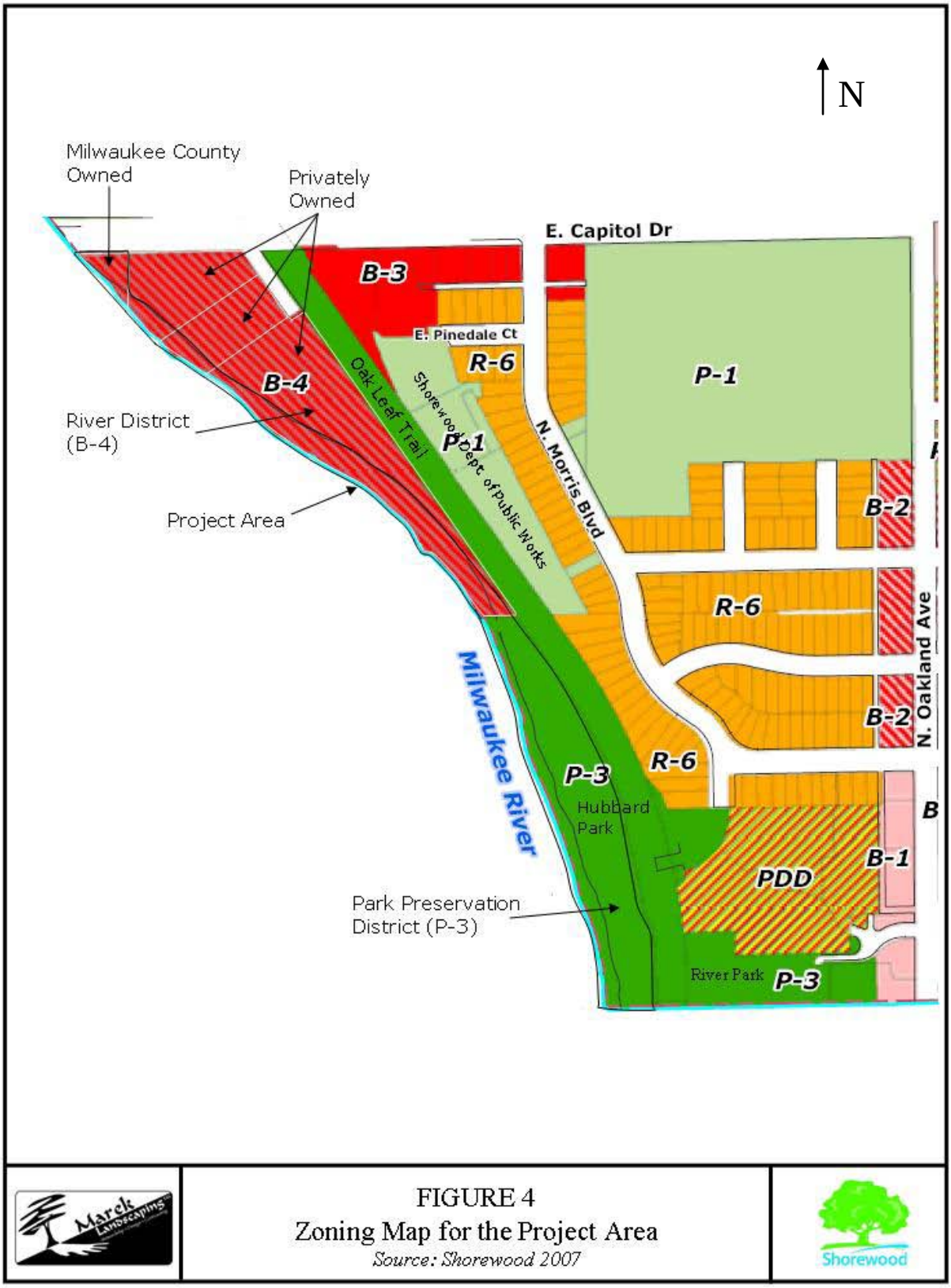


FIGURE 4
Zoning Map for the Project Area
Source: Shorewood 2007

Estabrook Park is located to the north of the project area, residential neighborhoods, the Village Department of Public Works (DPW) yard, and River Park are located to the east, and a similar forested, undeveloped bluff, also known as Cambridge Woods, lies to the south of the project area. Residential and commercial developments are located to the northeast. Milwaukee Metropolitan Sewerage District owns and operates one combined sewer outfall located on the southern project boundary.

The project area contains one development, Hubbard Park, which includes a terraced bluff with benches, Hubbard Park Lodge, the River Club, a boathouse, and the Youth Pavilion. There is an abandoned concrete fountain in a grotto behind the Lodge. A chain link fence lines the eastern, northern, and southern property boundaries of Hubbard Park. The northern and southern portions of the fence are in a degraded condition.

There are several transportation corridors through or near the project area, including East Capital Drive (STH 190), that crosses the Milwaukee River. The multi-use Oak Leaf Trail, maintained by Milwaukee County, lies on top of the bluff between the project area and the residences and River Park to the east. It follows the former railroad grade in a general north-south direction. Morris Avenue enters into the lower terrace area of Hubbard Park and ends in a circle drive. There is one parking lot off of Morris Avenue that serves Hubbard Park.

SEWRPC has included the project area as part of the region's primary environmental corridor, which are areas that contain concentrations of high value natural, scenic, historic, scientific, and recreational features that are important to both the region's and residents' environmental quality (SEWRPC 1997). The current SEWRPC regional land use plan recommends that steps be taken by State, County, and local governments to preserve and these protect environmental corridors, which is in concurrence with the Village's land use plan.

4.6 Connectivity, Accessibility, and Signage

Existing connections to the project area are limited. In general, access to the bluff has been made through user-defined trails. These trails cut across the bluff in all directions. From the north, there is user-defined trail from Estabrook Park that accesses the river trail beneath the East Capital Drive bridge. In the southern half of the project area, there are numerous paths that cut across the bluff. Some of these paths follow each side of the chain link fence that lines the Hubbard Park property. There are numerous trails that cut down the bluff to the lower river trail in this area, are void of any stabilizing vegetation, and are eroding.

Connections to the southern project area exist through holes in the chain link fence, through Morris Boulevard, the Hubbard Park parking lot, and a trail that follows the river from the Cambridge Woods area in the City of Milwaukee. There is a well used, eroded path connecting the Oak Leaf Trail to Hubbard Park that begins near the southwest corner of River Park and enters the park behind the Youth Pavilion.

Wheel chair access is limited to the Hubbard Park Lodge and River Club where there is a paved connection from the parking lot to the buildings. Widths, grades, and tread materials of the social trails along the bluff do not meet current American Disabilities Act (ADA) standards. The river terrace of Hubbard Park is accessible via Morris Avenue that ends in a circle drive. Several handicap parking spaces are present in the parking lot, but none are available in the river terrace of the park. Ideas and recommendations for improving accessibility are included in Section 6.1.

Currently, there is no signage for the bluff or the Oak Leaf Trail within the entire project area. Two posted signs lead visitors to Hubbard Park at the intersections of North Oakland Avenue and East Menlo Boulevard and at Morris Boulevard and East Menlo Boulevard. There are no signs along East Capital Drive or in River Park. Recommendations for signage are included in Section 6.4.

5.0 Public Outreach Efforts

Public outreach efforts were completed to gather feedback on concepts and to collaboratively discuss the trail and restoration efforts. These outreach efforts are integral to developing goals and ideas presented in the conceptual design and are in conjunction with outreach completed for prior planning efforts (Planning & Design Institute, Inc. 2007). The following sections discuss the outreach efforts with stakeholders and the public.

5.1 Stakeholder Meetings

Several stakeholder meetings were held through telephone interviews, individual meetings, and one large group meeting. Telephone interviews were conducted to receive initial ideas, concerns, and priorities for the project before developing a conceptual plan. Table 1 summarizes the telephone interviews based on the questions, "*What are your concerns, ideas, or hopes for this project? What should we make sure we pay attention to?"* The table provides the specific comments made by stakeholders and groups them into five general categories.

Table 1. Summary of Telephone Interviews with Stakeholders

The following comments were given to answer the questions, "*What are your concerns, ideas, or hopes for this project? What should we make sure we pay attention to?"*

Trail Routes, Amenities, & Use

- Suggest connection features at Capital Drive and River Park
- Integrate with redevelopment occurring near the north-end of project area
- Suggest getting down to river trail via connection in Estabrook Park, easier grade
- Supports hard surface bike connection at top of bluff from Capitol Drive to Oak Leaf Trail
- If use switchbacks – add barriers to keep others from skipping across
- Do not always follow edge of river – where floodplain has room, move to the interior, to change views
- Allowing mountain biking on river and top of bluff trails – yes & no
- Signage - unobtrusive within corridor, bolder at entrances
- Visibility of park/accessibility
- Open up vistas/views of the river; would like more open view of river at some spots
- Add a canoe launch at Hubbard and open the boathouse
- Restroom at Hubbard
- Service, delivery, and better ADA access to Hubbard Park Lodge

Trail Materials

- Permeable surfaces for trails – perhaps permeable surface for top of bluff trail
- Want natural, high durability, very low maintenance trail by river

Maintenance

- Snow removal needed for upper trail

- Good possibilities for volunteer group projects for maintenance and building trail improvements
- DPW cannot maintain trail along the river, because of equipment access and resource limitations

Public Safety

- Safety with crossing at Capital Dr.
- Concerned about safety/security around redevelopments near the north end of the project area with the nearby woods providing screening and possible hiding and get-away routes. Suggest these redevelopments have perimeter fence.
- Concerned about multiuse traffic on upper trail with elderly, walking, and biking competing
- Want to keep perimeter fence or install new chain link to control access between Hubbard Park and the Oak Leaf Trail. Helps keep traffic on trails and reduces vandalism.

Restoration & Management

- Use native species
- Soil stabilization
- Long-term survival of critical/endangered species that are located along river trail
- Protecting water quality during the restoration work
- Restoration efforts – two zones with strong intermediate gradient between them – If trail is only for hiking, then restoration can be made. If allow biking, then it becomes a mixed mission for restoration.
- Cannot promise total restoration by Capital Dr. and where filling has occurred; match the process to a small set of plants that could serve as a foundation to a plant community in 20-40 years. Won't be able to plant sensitive species; want species that could clone, handle drier conditions, and have berries.
- Possibilities of improving rainfall infiltration from adjoining land to improve hydrology of riverbank and help with native flora diversity
- Enforce private property owners to be ecologically minded with development requirements.

A draft conceptual plan was developed using ideas gathered from the telephone interviews. The draft plan was then presented to a large group meeting on July 10, 2008 at which twenty-five people attended and eighteen groups were represented. The purpose of the meeting was to present conceptual ideas that incorporate initial stakeholder input gathered from telephone interviews, facilitate discussion among different stakeholder groups, and receive feedback on concepts. The meeting consisted of a walking tour of the project area where conceptual ideas were discussed. The groups then re-convened as one group to review discussions and develop a consensus on conceptual ideas. Meeting minutes are included in Appendix B. Further individual meetings with Milwaukee County, National Parks Service Rivers & Trails Program, Milwaukee River Workgroup, and the Village of Shorewood were held to further the conceptual plan, discuss topics, and collaborate efforts.

5.2 Public Informational Meetings

A public meeting was held on March 2, 2009 to present a draft of the conceptual plan after an initial review by the Village of Shorewood. In general, attendees had a very positive impression of the plan, but they also provided valuable feedback. The following summarizes the comments.

Several comments were given regarding off-road biking, including providing bike racks to encourage visitors to stay at Hubbard Park, clearly marking with signage and maps where off-road bikers are and are not allowed to ride, and providing a sign explaining ecological reasoning why bikers are and are not allowed in specific areas. In general, attendees were encouraged that the trail plan included off-road biking.

In regards to access, there was positive feedback on providing additional access from the neighborhood and DPW yard to the bluff, connector trails leading down to the lower river trail, and improved access to Hubbard Park. However, to alleviate potential conflict at the River Park, Oak Leaf Trail, Hubbard Park intersection it was suggested to paint the word "SLOW" on the pavement to alert users of potential crossing traffic. Comments were made to improve the existing access to Hubbard Park from behind the Youth Pavilion building as its existing condition is too treacherous. It was encouraged to provide ADA access from the Hubbard Park circle to the canoe launch and to provide direct access from the Hubbard Park parking lot to the Oak Leaf Trail.

Concern was raised that increasing access to Hubbard Park would increase the potential for vandalism. However, comments countered this opinion in that greater access to Hubbard Park will serve to discourage vandalism and other unfavorable activity. It was noted that vandals already have access to these areas, and the closed appearance of the park has the opposite effect of keeping visitors away.

Attendees favored the Sanctuary concept as it helps elevate awareness of the river and its features. It was suggested to use natural ground cover on the terraced areas of Hubbard Park to reduce the expense of lawn care.

It was noted that the bioengineering principles were well considered but have concern for their short-term effect versus their long-term sustainable solution.

It was suggested to incorporate more riverfront features such as a deck and picnic area near the Capitol Drive end of the project area and even include a few camping sites for family oriented activities near Hubbard Lodge.

6.0 Recommendations

6.1 Trail Alignment & Connections

This section provides recommendations for aligning trails and making connections to surrounding trails, parks, and neighborhoods. Figure 5 illustrates the recommendations, and the notes associated with Figure 5 provide specific recommendations at locations along proposed trails through the use of numbered points.

6.1.1 Paved Upper Bluff Trail

This connector trail, which will be referred to as the paved upper bluff trail, consists of an 8 to 10-foot wide path that would connect East Capital Drive to the Oak Leaf Trail north of the DPW yard and adjacent to the developments located on top of the bluff. This trail would be a main connection point for the properties located near the north end of the project area. The trail is being aligned and engineered by Bonestroo, Inc. Trail surfacing is recommended to be asphalt or concrete for ease of use by pedestrians using walkers and wheel chairs. Some aesthetic improvements could be made for this connection in an effort to make it more attractive. For example, the incorporation of recycled glass into the surface aggregate is one method used at the Urban Ecology Center entrance that has proved to be durable and attractive. A stamped 6 to 8-inch border of the walk could serve as a detectable edge for the visually impaired and illustrate the connection to the river. Repeated images of native fish, shore birds, wetland plants, wave patterns, Native American symbols, and fishermen stamped into the border would make a symbolic reference to the riparian roots of the trail.

It is recommended that the trail be accessible to bikers, if a direct connection to the Oak Leaf Trail is not made at East Capital Drive. This is dependent on the final configuration of the East Capital Drive improvements that plan to incorporate a bike lane. The safety and enjoyment of pedestrian users from the redevelopments can be enhanced by creating a slower, traffic design, places for seating, dense native planting with a low canopy of smaller native trees close to the trail with groves of larger trees where space is available. This trail will meander gracefully through this woodland setting offering shade and newly created glimpses of the river.

The trailheads at either end are important nodes and should have welcoming entrances. The East Capital Drive trailhead should be visually and physically connected to the new streetscape design and serve as a prominent connection to and from Estabrook Park. While this connection to the urban grid needs to be coordinated with the same materials and layout as the streetscape, it must also act as a portal into a quieter, slower place. Tree tops should touch over the entrance just south of the plaza. Huge multi-stemmed ironwood or hawthorn would serve well as the sentries for this gateway. The landscape surrounding this plaza should envelope the space in witchhazel or musclewood to the west and mixed sizes of quaking aspen to the east. This will blend the existing tree line into the contemporary streetscape. An understory of woodland shrubs to flank these larger trees will help ease the height transition. Red dogwood and fragrant sumac are tough native shrubs that will thrive here. Ferns and sedges in the ground layer will set the scene for the rest of the trail. It is important to replace the compacted construction soil with deep organic soils in order for this area to thrive. Subgrades should drain towards the river. Without good soil preparation, the trailhead gardens will always appear unhealthy and uninviting. Time spent in these areas on soil preparation will return manifold in maintenance reduction. Refer to Section 6.4.2 for a discussion on permanent trailhead signage.

- POTENTIAL NEIGHBORHOOD CONNECTIONS
- POTENTIAL TRAIL CONNECTIONS
- POTENTIAL TRAIL CROSSINGS
- STABILIZATION AND VEGETATION MANAGEMENT FOCUS AREAS
- SANCTUARY SIGNAGE
- DECOMMISSION EXISTING PATH
- ① POINTS WITH RECOMMENDATIONS (SEE NOTES FOLLOWING DETAIL)
- POTENTIAL MIXED USE TRAIL
- EXISTING TRAIL
- POTENTIAL PEDESTRIAN TRAIL
- 20' TOP OF BLUFF CORRIDOR
- POTENTIAL ADA PEDESTRIAN TRAIL
- EXISTING CONTOUR LINES
- EXISTING FENCE LINE
- SURVEYED WATER LINE (07-08-08)
- SHOREWOOD REAL ESTATE PARCELS (08-27-08)
- SURVEYED TOP EDGE OF SLOPE BUFFER ZONE
- WETLAND DELINEATION LINE

NORTH SHERBURN PLACE (50' WIDE)

EAST CAPITOL DRIVE (120' WIDE)

RECOMMEND NATIVE PLANTINGS

COORDINATE TRAILHEAD AND CROSSWALK WITH G.A.S. STREETSCAPE PLAN & TRAILHEAD WITH STONE BOLLARDS, BENCHES AND INTERPRETIVE SIGNAGE

POTENTIAL PEDESTRIAN TRAIL

EXISTING DECORATIVE FENCE

EXISTING WIRE FENCE

EXISTING CHAINLINK FENCE

EXISTING CULVERT

FEMA 100 YR FLOOD LINE ± 606 CONTOUR LINE

PROPOSED BLUFF CUT WITH SWITCHBACK TRAIL AND OVERLOOK

EXISTING TRAIL

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0" 1" = 80'-0" 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

DSGN	M. MAREK
DR	D. SETHER
CHK	M. MAREK
APVD	M. MAREK

Project Title: B-4 River District Riparian Restoration and Trail Planning and Design Project

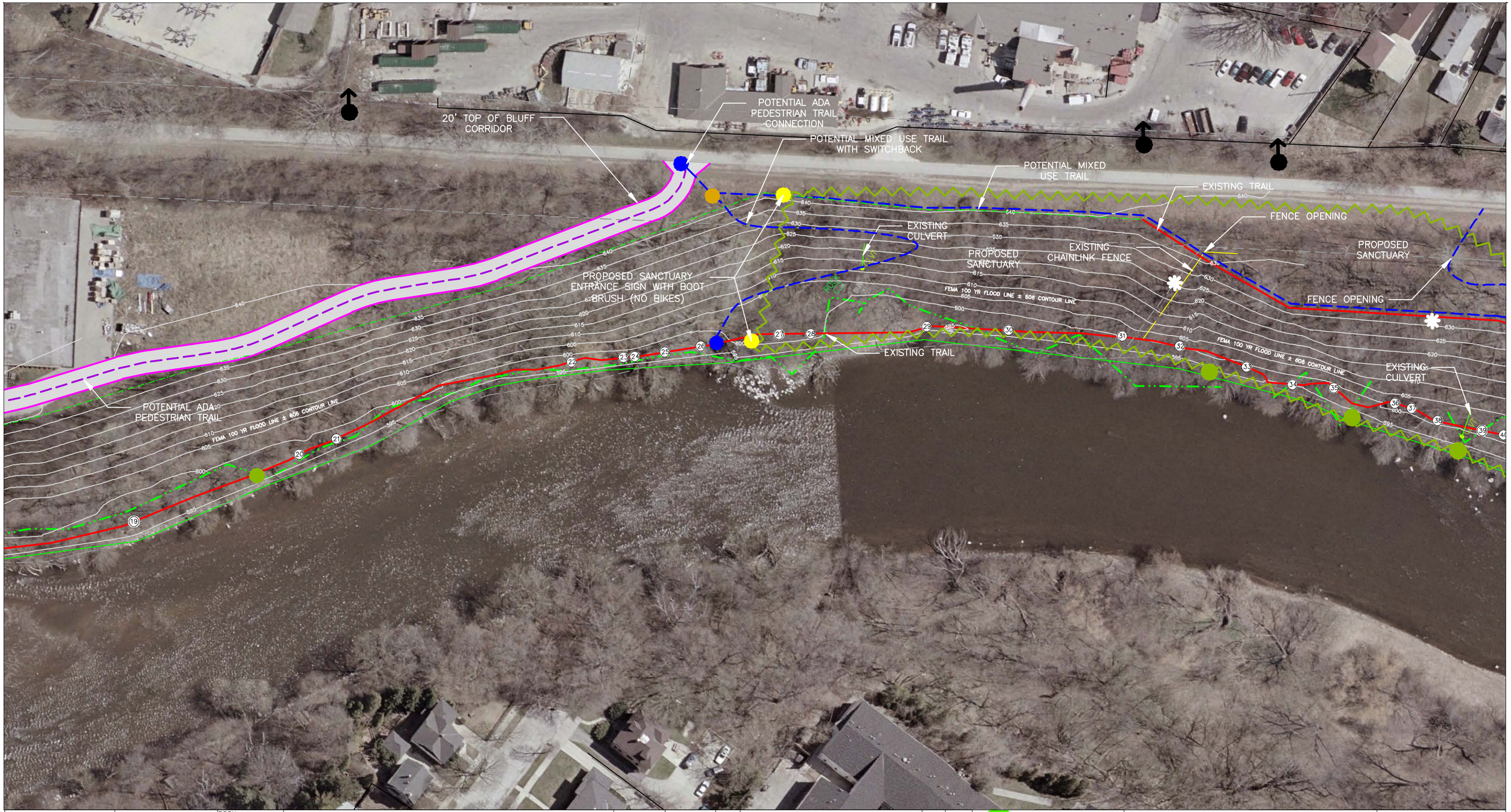
Figure 5 – Conceptual Plan

REV. NO.	DATE		REVISION DESCRIPTION	BY	APVD

VILLAGE OF SHOREWOOD
3930 N MURRAY AVE
SHOREWOOD, WI 53211

MAREK LANDSCAPING, LLC
820 E KNAPP ST
MILWAUKEE, WI 53202
Phone: 414.272.0242
Fax: 414.272.0243
E-Mail: info@mareklandscaping.com

DRAWING NO.:	B-4-5
SHEET:	1-3
DATE:	12-19-08



VERIFY SCALES
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DSGN	M. MAREK
DR	D. SETHER
CHK	M. MAREK
APVD	M. MAREK

Project Title: B–4 River District Riparian Restoration and Trail Planning and Design Project

Figure 5 – Conceptual Plan

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3930 N MURRAY AVE
SHOREWOOD, WI 53211

MAREK LANDSCAPING, LLC
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MILWAUKEE, WI 53202
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DRAWING NO.:	B–4–5
SHEET:	2–3
DATE:	12–19–08

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0" 1" = 80'-0" 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

DSGN	M. MAREK
DR	D. SETHER
CHK	M. MAREK
APVD	M. MAREK

Project Title: B-4 River District Riparian Restoration and Trail Planning and Design Project

Figure 5 – Conceptual Plan

REV. NO.	DATE		REVISION DESCRIPTION	BY	APVD

VILLAGE OF SHOREWOOD
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MAREK LANDSCAPING, LLC
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DRAWING NO.:	B-4-5
SHEET:	3-3
DATE:	12-19-08

Notes to Figure 5

Point on Figure 5	Distance Pt. (feet)	Note
Lower River Trail		
	0	Starting point is South Beam of East Capitol Drive bridge.
1	<0	Top dress path under bridge.
2	26	Construct a 12' long rolling grade dip.
3	85	Existing slope angle is 24% for a distance of 25'. Move trail ~30' east away from river, make cut at top of slope and fill for descent.
4	150	Sandy soil loose in spots. Stabilize with coarse aggregate, clay, and organic material.
6	230	Very loose sand. Stabilize with coarse aggregate, clay, and organic material.
7	230 - 260	Stabilize bank at ~ 2.5' height.
8	250	Move trail upslope from river ~15' and on opposite side of Box elder
9	298	Are at the top of slope/mound, existing south slope ~24% grade, north slope ~19% grade. Cut top of hill and fill in on river side.
10	344	Box elder across trail needs to be removed, ~12" in diameter
11	378	Fork in trail, decommission trail closest to river, use Tamarack and Aspen
12	380 - 462	Remaining trail to be top dressed
13	390 - 480	Move trail ~ 15' up slope
14	536	Trail crosses live tree trunk. Build over trunk with, geo-fabric, clear stone, and top dress
15	560	Small trail goes to river, consider steps to the existing large boulder or a switch back trail, make trail or steps ~2' wide. Existing distance from trail to boulder is ~25' with a height difference of 7'7".
16	627	Highly eroded path that goes upslope to development at top of bluff. Decommission path and restore vegetation.
17	700 - 766	Woods sedge & Solomons seal present. Trail widening could impact these higher quality species adjacent to trail.
18	766	Big tooth aspen present. Bottom location for proposed bluff cut.
19	910	Construct a 6' long rolling grade dip.
20	1066	Large black walnut with large green ash gateway.
21	1102	Stabilization needed along 12' of river bank.
22	1319 - 1331	Stabilization needed along 30' of river bank.
23	1345 - 1397	Move trail upslope 4' and/or stabilize bank.
24	1385	Black willow.
25	1408	Low willow over path, only 4' clearance. Consider removal.
26	1440 - 1455	Stabilization needed along 15' of river bank with a height of 3'.

27	1515 - 1535	Move trail ~ 15' upslope.
28	1552	Concrete located here [18" x 6' x 10"], can be used for step material.
29	1664	Trail has a downslope of ~ 23% for a length of ~25', height difference is 5', located at box culvert. Match elevation to top of boardwalk using a short switchback section.
30	1685 - 1790	Multiple trails exist due to wet conditions. Construct boardwalk and revegetate.
31	1808 - 1873	Move trail upslope 30', return to existing trail by Bur Oak. Last 20' needs slope stabilization.
32	1890	Multiple trails exist. Decommission upslope trail, use ~40 plants such as chokeberry, viburnum, and musclewood.
33	1955	Existing cyclone fence goes directly upslope and is in a degraded condition. Consider repairing or removing.
34	1998	Bank and slope stabilization needed for ~40ft along trail and a height of 2' on the slope and 4' on the bank.
35	2034	Decommission north bound path, use ~ 40 plants such as hawthorn, basswood, and downy arrow-wood.
36	2071 - 2116	Stabilization needed along river bank for a length of 45' and ~2' height.
37	2110	Potential river access point.
38	2135	Fallen, living willow; fill behind roots.
39	2175	Move trail 10' upslope, return to trail at distance point 2186 feet. Existing trail could be used, but a major disturbance is necessary if make ADA accessible for those coming from Hubbard Park. Potential location for creating a turn around for ADA.
40	2187 - 2203	Steep slope existing for a distance of 16' and a height change of 5'2" (measurement after moving previously mentioned trail upslope). Small switchback should be added.
41	2203	Decommission northbound upslope trail.
42	2222 - 2265	Continuous ground water seep. Multiple trails exist. Decommission upslope trail. Construct fieldstone paving crossing.
43	2368	Dirt ramp leading to steps going up towards Hubbard Park Lodge. Improve and move ramp 10' east; revegetate former ramp.
44	2399	Steps to Hubbard Park Lodge.
45	2680	Use spoil to stabilize soil around Linden tree and restore grass.
Trail Between Hubbard Park and Oak Leaf Trail		
	0	Starting point is guard house for tunnel.
	113	Exit sidewalk to existing path that goes behind Youth Pavilion and leads to the Oak Leaf Trail.
46	155	Construct steps over eroded path. Elevation change to first landing is 6'1" for a distance 21'; from landing to top of slope elevation change is 11'1" for a distance 57'. 24% grade from top of slope to bottom; total slope length is 103'.

The entrance to this leg from the Oak Leaf Trail by the DPW yard does not need to be as developed but does need to be well marked and inviting. Square limestone columns, 10 by 10-inches in size, with a simple map engraved or mounted onto it, along with the trail name can be made from a single piece of snapped limestone set in concrete. The entrance garden can be a pared down version of the East Capital Drive entrance. Aspen could be used to create depth to the entrance while ironwood would be used again to arch over the entrance in the same fashion as at the East Capital Drive entrance. Here, hop tree will make a natural transition into the existing tree line.

About half way down the trail, a great vista of the river can be created by cutting back the top of bluff to restore an old ravine that has been filled in. This concept is further discussed in Section 6.1.5.

Throughout the river bluff, vegetation management guidelines will coincide with bluff stabilization efforts (refer to Section 6.5 and Appendix C). Some measures of work recommended here will help to maintain good water infiltration and reduce surface runoff. An 8-inch vegetated filter sock placed on the downslope side of all paved areas will reduce the velocity and volume of runoff by absorbing water. Subgrades should slope towards the river and clear stone base courses should be used under paving to help increase infiltration. Refer to Section 5.1.3 for more discussion regarding trail construction means and methods.

6.1.2 Naturally Surfaced Trails

There are two major trails and several connectors that should be naturally surfaced, including the lower river trail and an upland trail north of Hubbard Park. Figure 5 shows the proposed alignment for these trails and their connectors, and the following Sections 6.1.3 – 6.1.5 provide a discussion on their use, construction, and maintenance based on capacity, existing conditions, and stakeholder input.

The lower river trail should become a continuation of the East Bank Trail already established to the south of the project area. This can be coordinated through the National Parks System River & Trails Program and the River Revitalization Foundation.

After much discussion with stakeholders and ecologists and careful consideration of current and future uses of the trail and other open space in the immediate area, the lower river trail located north of Hubbard Park should be protected as a sanctuary due to its ecological significance (refer to Section 4.4 for a description of plant communities) and the presence of endangered species adjacent to the trail. Therefore, use of this trail should be limited to pedestrians versus being a multi-use trail that would include bikers. Several factors led to this conclusion, the most important being the sensitivity of the plant community to impacts. The bikes themselves would not cause damage, in fact biking could potentially be a lower impact use with a well built trail and experienced riders because of the narrower footprint of the bike. However, since this section will be open to pedestrians, the combined use would cause too many conflicts to maintain the narrow trail width and not impact plant communities immediately adjacent to the trail.

The lower river trail in its current condition has been widened, eroded, and rutted at numerous locations. It needs to be brought back in width, revegetated, and graded. Too much traffic on the trail will not allow for its permanent restoration. The trail does not have the potential to be wider than 2 to 3 feet without major earthwork and therefore, will not be wide enough for hikers and bikers without users continually stepping off the trail. This is a non-sustainable solution in terms

of the trail and bluff restoration. Creating a sustainable multi-use trail upland is our proposed resolution to this conflict of uses. It offers hardier soils and sustainable grades and drainage, resulting in less impact to surrounding plant community while providing great views of the river. This segment would require two openings in the fence surrounding Hubbard Park and a small switchback about 200 feet north of Hubbard Park Lodge in a shallow ravine. This upland trail would provide an off-road link for bikers going to or from the river north of the proposed sanctuary.

6.1.3 Trail Construction Means and Methods

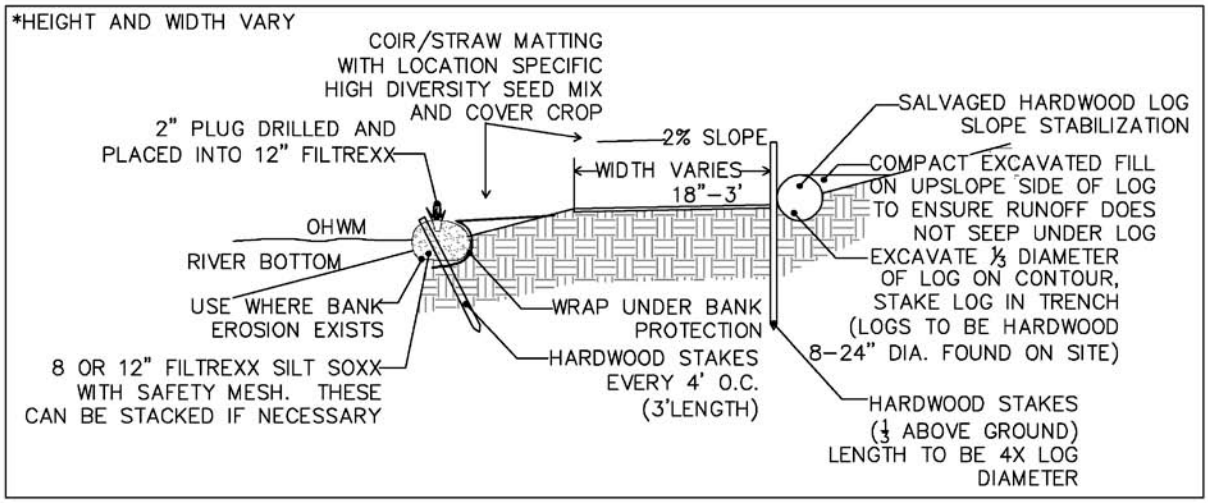
The trail alignment and connections should be enhanced by improving trail surface conditions, moving the trail upland wherever possible, developing more inviting trailheads at existing nodes, and adding several site specific amenities, such as boardwalks and entrance gates.

A set of specific solutions has been created for the lower river trail based on an inventory of trail conditions and are described in the notes to Figure 5. The existing lower river trail was walked with a measuring wheel to generate site location specific solutions based on existing conditions, which are illustrated on Figure 5. Many sections of the existing trail were found to be sound, well drained, and suitably located. Those sections need little to no additional work to ensure their long-term sustainability. The sections that do need work are either located close to an eroding river bank or are wet, poorly drained, and eroding. The recommended solutions are based on the lowest impact, highest durability, and most ecologically appropriate means possible. Stabilization techniques vary from construction living walls and boardwalks to hand grading work and rock armoring.

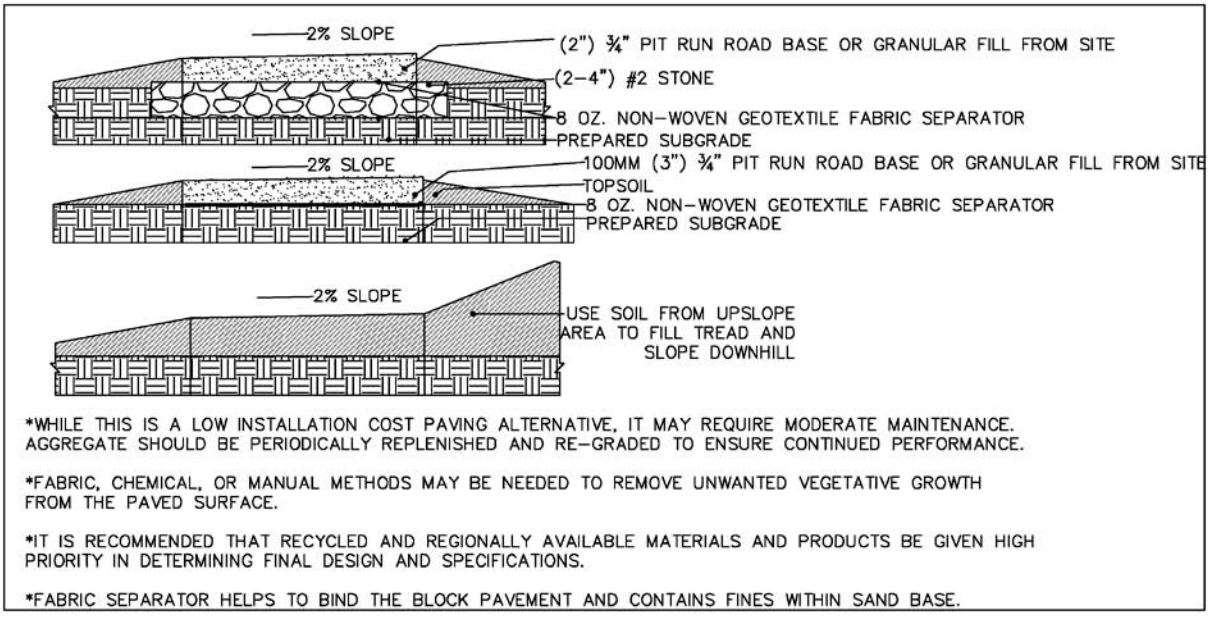
In each case, trail surfaces should slope towards the river. On wet sections where the trail is being moved up slope and away from the river, tree clearing should be kept to a minimum to provide just enough room for a trail user to avoid bumping them. The trail should be situated on the upslope side of trees, taking advantage of their erosion resistance.

The overall grading and surfacing concept for the trail is to avoid concentrating flows of water next to the trail. Encouraging sheet flow across the entire trail surface will eliminate erosion problems caused by channelization or ponding within the trail tread. For the most part, the existing trails only require re-working of the existing tread to pitch the tread downslope. Some sections warrant re-routing to achieve proper drainage and solid footing. In either case, the tread needs to be pitched to drain runoff to stay dry and stable. Most of this can take place through hand work. Any disturbed sections of the trail should be immediately vegetated (seeded) and stabilized with compost on upland areas or treated with a coir/straw blend double net erosion matting on areas that may become inundated. Refer to the following examples for details.

TYPICAL TRAIL SECTION SOLUTION DETAIL

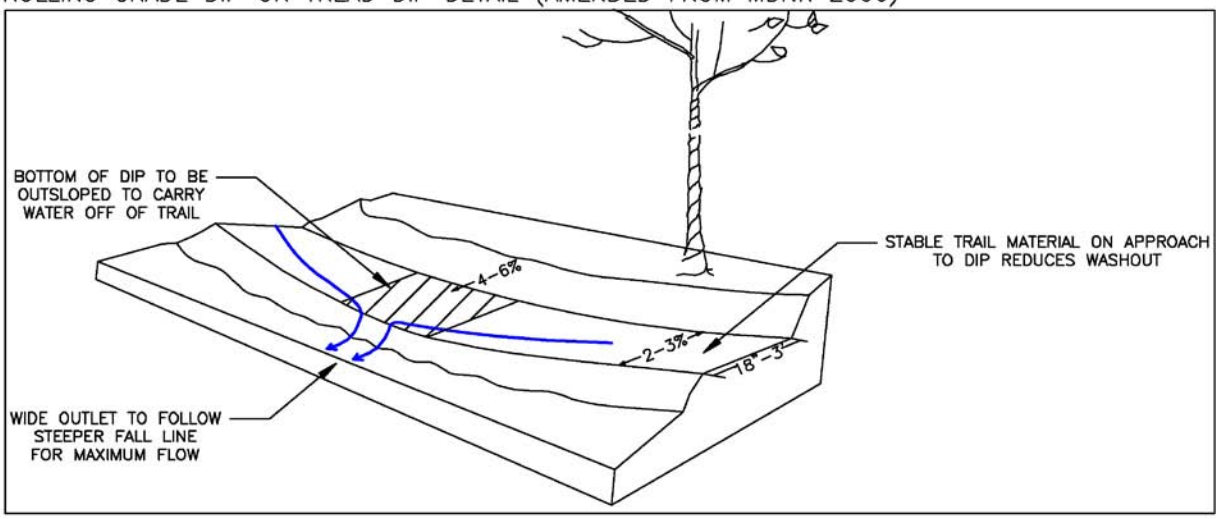


TYPICAL TRAIL CROSS SECTION DETAILS

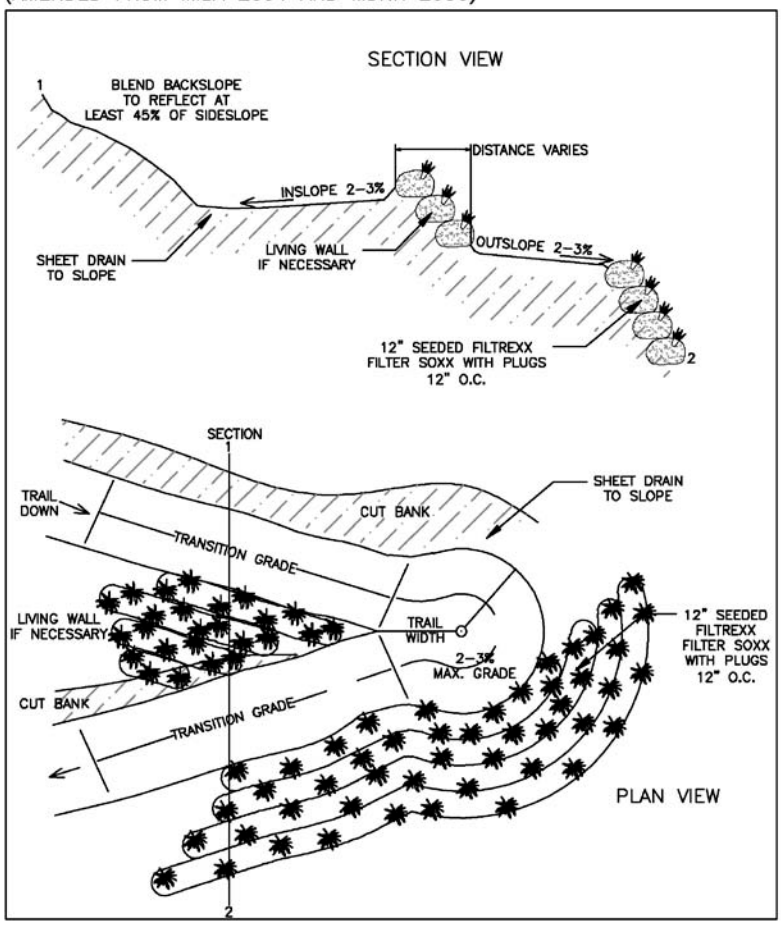


A switchback should be constructed to connect the lower river trail to the Oak Leaf Trail with slopes of 8 to 12% and potentially a short section with 12 to 15% slopes. It will need to be carefully built to fit the slope and maintain good drainage using rolling grade dips that effectively maintain a 2% cross-slope of the tread surface to keep water flowing across the tread. Water bars should be avoided here as they will concentrate flows and create erosion. Good placement and careful grading will make this an enjoyable, long lasting connection. Example details are given below for rolling grade dips and switchbacks.

ROLLING GRADE DIP OR TREAD DIP DETAIL (AMENDED FROM MDNR 2006)



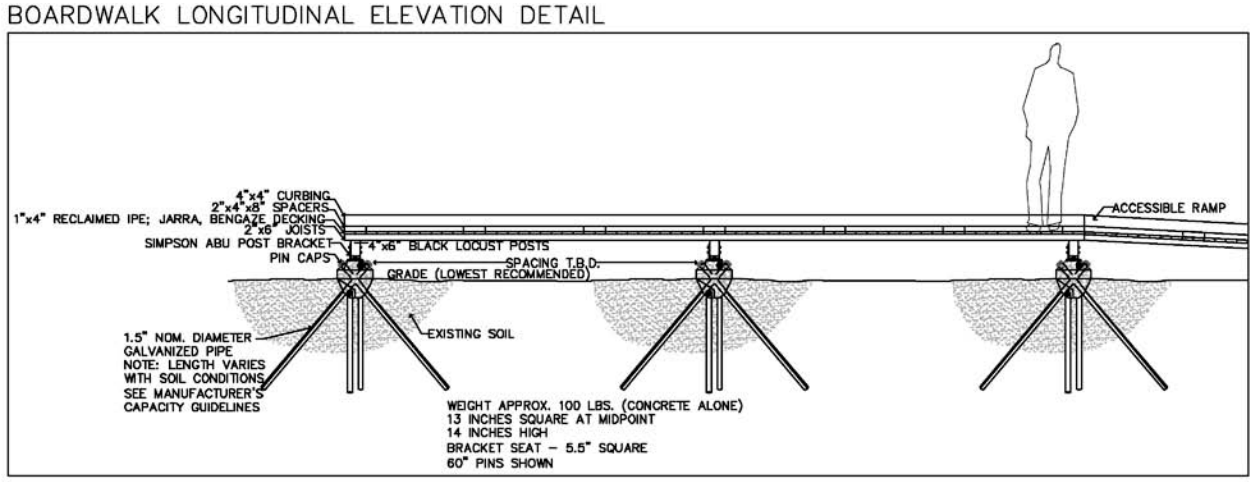
ROLLING CROWN SWITCHBACK DETAIL
(AMENDED FROM IMBA 2004 AND MDNR 2006)

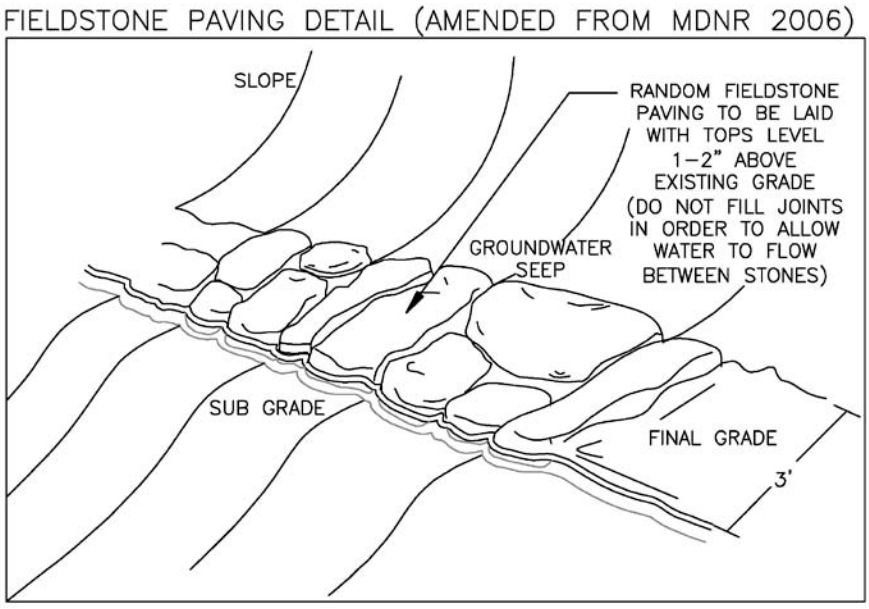


Walls at the upper curve, inside curve, and bottom edges of the switchback can be built from a mix of boulders (imported and some found on-site) and living walls. Filtrexx Living Walls™ are a new treatment for slopes that function the same way as all mechanically stabilized earth (MSE) walls, but it can be vegetated. The living walls can be bio-degradable, leaving the plants to naturally stabilize steep slopes. It is recommended that growing media and materials used must meet the requirements set out by the Filtrexx® design manual (Filtrexx 2007), and vegetation should be selected specifically for the location.

Example of Filtrexx ® soxx planted and filled with compost.

Several groundwater seeps emerge from the slope and saturate the lower river trail tread. Because these seeps are directly related to many of the rare plants and plant communities along the east bank, they must not be disrupted or impeded. The recommended solution is to elevate the trail over the larger seeps with boardwalks and use rock paved crossings over the smaller ones. Below are two example details for elevating the trail; a boardwalk and raised fieldstone steppers.





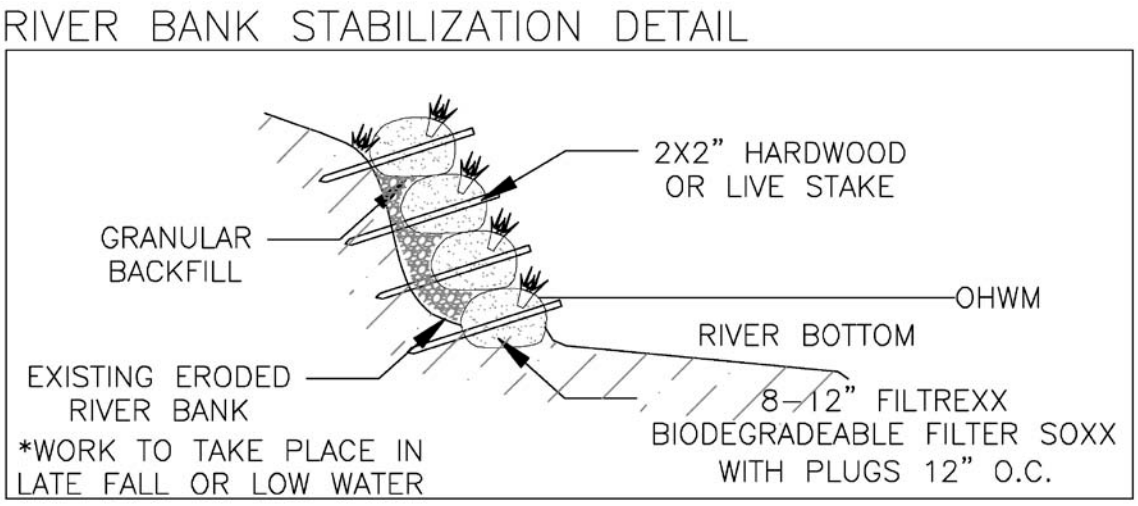
The following are photographs that depict the boardwalk and fieldstone paving.

On the trail tread itself there is a continual challenge with the biggest erosive force on the bank - people. Besides compaction, the soft pounding of feet causes material to displace resulting in tread creep. Soil from the uphill side of the trail may deposit onto the tread, causing users to walk along the outside of the trail tread. This effectively causes the trail to widen to the downhill edge of the trail (also known as tread creep) and adversely affects drainage. The deposited soil should be redistributed to maintain the original trail width. Traffic can also cause a berm to form on the downhill side of trails as a result of compaction and material displacement. The berm should be removed as it becomes an impoundment to water flowing over the trail. Good surface grading and diligent maintenance will keep these forces in check.

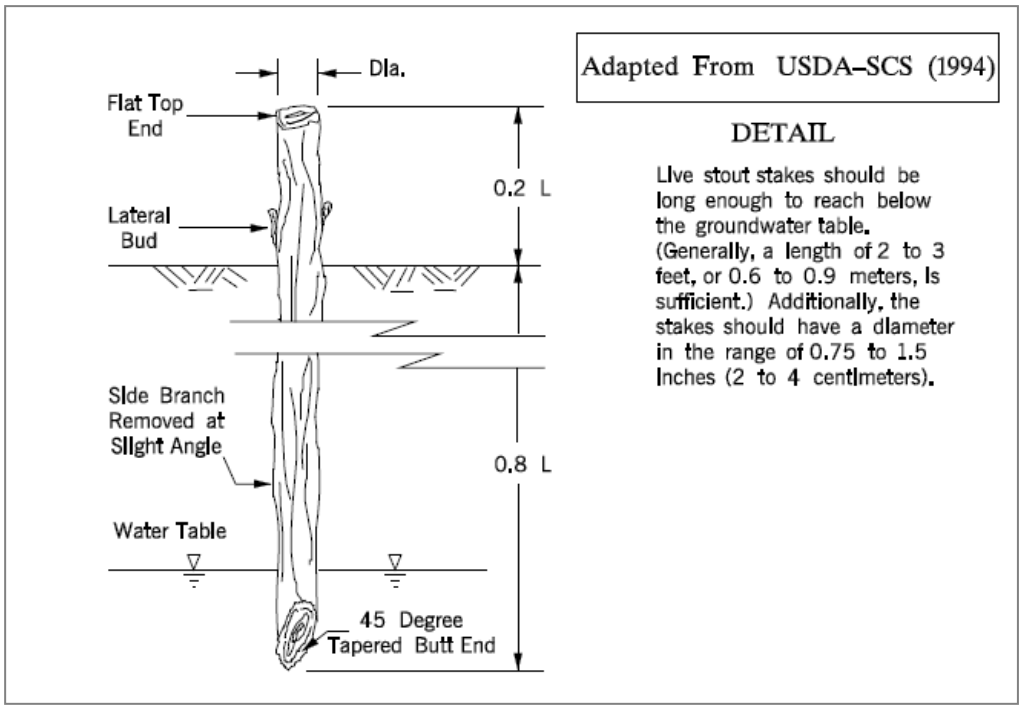
6.1.4 River Bank Stabilization

As mentioned previously in Section 4.3 the overall river bank condition is stable and healthy. This is largely due to the slowing of the river water caused by the "roughness" of bank vegetation and trees that lean into the water. The main strategy for bank stabilization is to preserve existing vegetation and avoid damaging the network of roots that knit the bank together. In several sections along the bank, however, there is erosion and bank failure. While this is part of a natural process, the proximity of the trail and the steepness of the bank warrant intervention and repairs. Another factor is the wading approaches that are caused by fishermen. These areas have become eroded and destabilized. The trail alignment section addresses moving the trail upland wherever possible, and the river access discussion (Section 6.1.5) suggests a way to stabilize the river access/wading approaches with steps. However, there are river bank sections that need to be restored with vegetation without being a river access point.

Bank vegetation can be restored through several, low cost, low impact methods. One of the most common and inexpensive methods is Live Staking (refer to example details below). This method can be done in early spring with cuttings from easily rooted trees and shrubs that are native to the area. Another technique that helps to hold cuttings, plugs, or rootstock in place during establishment is the Filtrexx Edgesaver™. These bio-degradable, soil filled socks can be built up against the eroded bank and held in place with hardwood stakes or live stakes. They can be vegetated with plugs and will degrade over time while the plants become establish and become the main means of stabilizing the bank. Other materials used for this process include coir logs (Biologs), Fabric encapsulated soil (erosion matting wrapped around soil lifts), and hard armoring (rip rap). It is recommended to use the Filtrexx solution as it incorporates the best attributes of each of these alternatives, requires less excavation, is simpler to install, and supports plant life better.



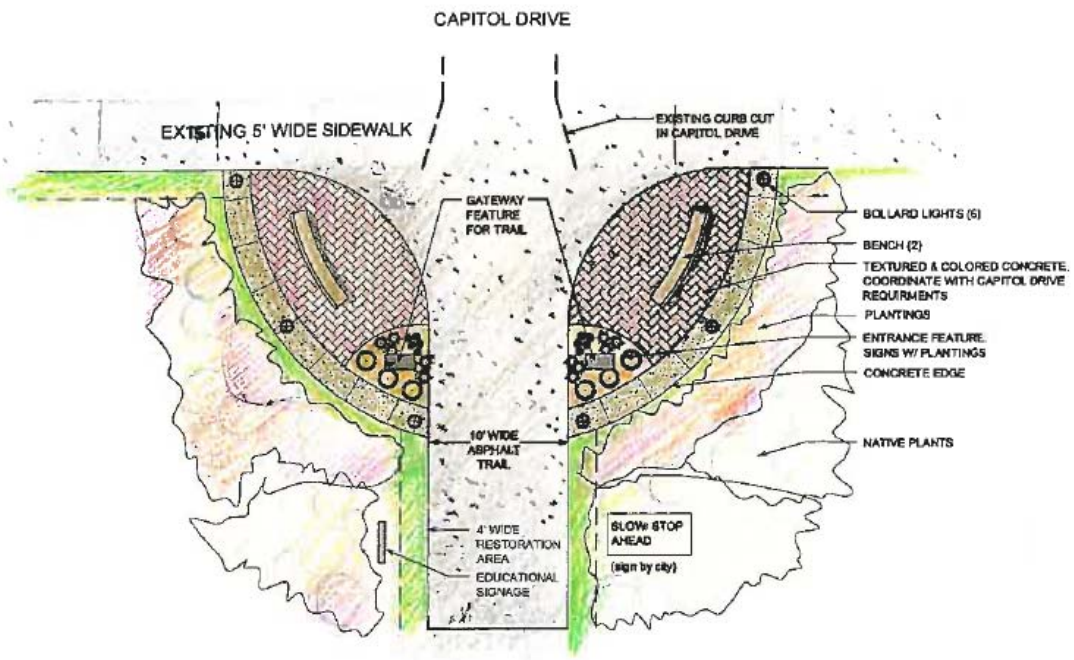
OHWM = ordinary high water mark



6.1.5 Trail Connections and Amenities

There are several concepts on connections in this plan that link Shorewood, neighborhoods, and parks to the river in a permanent, sustainable way. The goal is to make the river accessible and enhance the river experience while improving the ecological function of the bluff, shoreline, and river.

New connections are proposed from the bluff to the river near East Capital Drive, from the Oak Leaf Trail to the river, from the Oak Leaf trail to Hubbard Park, and from the surrounding neighborhoods to the Oak Leaf Trail. Existing connections from the lower river trail to Estabrook Park, from the lower river trail to the river, from the Oak Leaf Trail to Hubbard Park's south end at the river terrace, and from Hubbard Park to Cambridge Woods would be enhanced. Existing and new connection details will be treated individually. Prominent connections should receive interpretive signage, columns, and paving details while smaller connections will remain subtle. Here the trail user will be allowed to figure out, explore, and discover. This is part of the charm of the current trail network. Below is a rendering of the proposed connection for the paved upper bluff trail at East Capital Drive (Bonestroo 2008).



FUTURE TRAIL ENTRANCE DETAIL AT CAPITOL DRIVE
NOT TO SCALE
Prepared by Bonestroo, Inc.

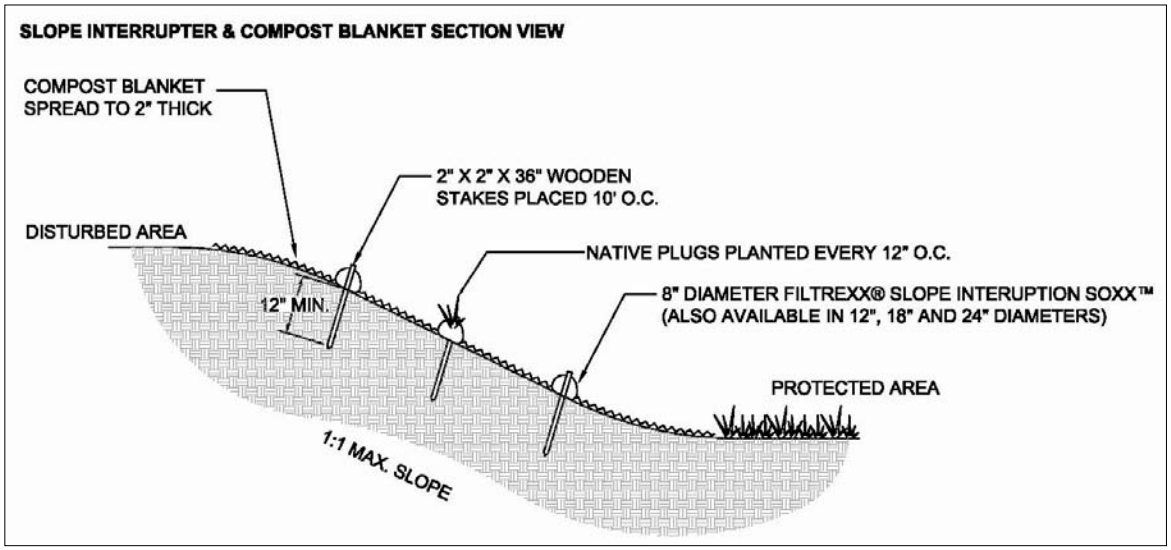
Below is a rendering of the connection from the Oak Leaf Trail that leads to Hubbard Park and to River Park. It also illustrates interpretive signage and directional signage as described in Section 6.4.2.

Rendering of connections to Hubbard Park and River Park from the Oak Leaf Trail

While most connections will be enhanced, others will be eliminated. Several trails have developed through repeated use and deliberate construction that are not sustainable due to steep grades, soft soils, and sensitive plant communities. These should be decommissioned through a series of measures, including physically removing the trail tread by decompacting the soil, covering it with compost and leaf litter, and revegetating with appropriate trees, shrubs, and ground layer species through seeding and plugs. The trees and shrubs should be substantial enough to create a visual and physical barrier to the decommissioned trail.

Bluff Cut

In order to gain access to the river south of East Capital Drive, it is proposed that the small ravine at the top of bluff starting between two private properties, the former apartment complex and the Milwaukee P.C. building, be cleaned out (it has decades worth of debris in it) and pulled back approximately 40-feet. The slopes should be graded to 3:1 with 1.5:1 to 2:1 side slopes. A switchback trail could wind down the bluff cut to the river with a cantilevered overlook located about half way down the bluff. The bluff cut would not only stabilize the steep slope, but could be gently terraced to greatly enhance views, and river access. Revegetation and stabilization would consist of native woodland trees and shrubs with woodland ground layer of native grasses, sedges, and flowers. Eight-inch slope interrupters should be placed at 10-feet intervals and consist of compost filled Filtrexx Filter Soxx™. After they are installed the larger woody trees can be planted and a 2-inch vegetated compost blanket can be pneumatically applied and seeded. This stabilization could be further augmented with a bonded fiber matrix, but this may be overkill if slopes do not exceed 2:1. These stabilization solutions have proven to perform better than conventional rolled erosion control products (i.e., erosion control matting) and generally cost less. The following provides an example detail.



The proposed bluff cut received positive feedback from stakeholders. More information about the soils at this specific point need to be collected and analyzed in order to ensure that the sideslopes and trail would remain stable. A minimum 45-foot deep boring is recommended at the bluff cut location to determine the depth of fill as it appears to vary across the project area.

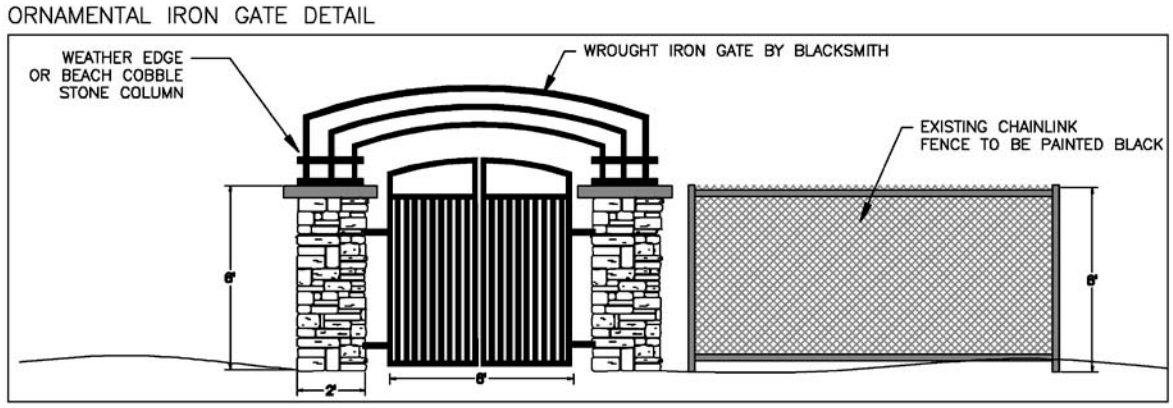
Construction would optimally take place during site work of any redevelopment of the neighboring properties. This would take advantage of existing haul roads and clean-up efforts.

Mid-Way Connection

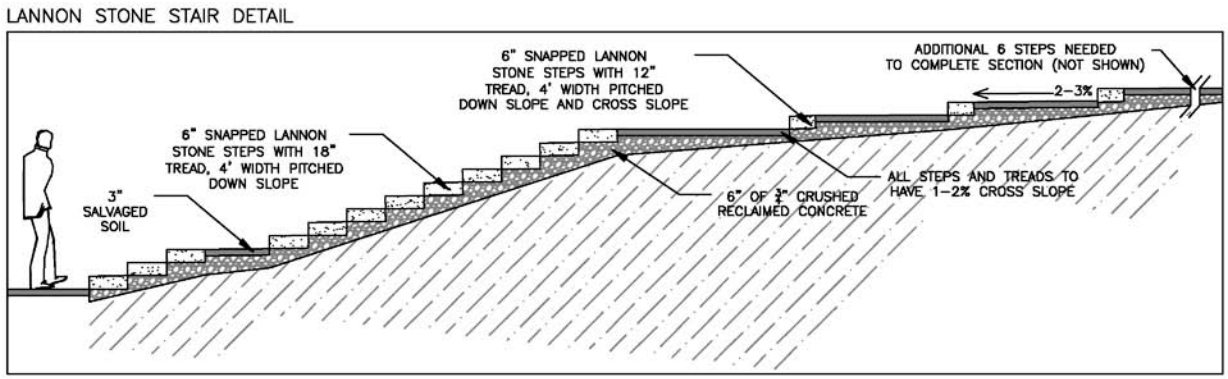
A proposed connection just north of the sanctuary area can be made by means of a switchback trail traversing the slope and connecting the Oak Leaf Trail to the lower river trail. The trail provides a connection mid-way between East Capital Drive and Hubbard Park, and it will offer bicyclists a fun, challenging way to get up and down between the two trails. Construction of the switchback is further discussed in Section 6.1.3

Hubbard Park Access

It is recommended to have direct pedestrian and bike access to the Hubbard Park Lodge and the River Club from the Oak Leaf Trail. A 6-foot wide ornamental iron or heavy wooden gate could be hung from two weathered edge limestone or beach cobble columns (refer to example detail below). This gate could be closed and locked at night to limit access to the park. Opened or closed, the gate would be a fitting portal to the historic park. Its ideal location would be approximately half way between the two buildings and at the current fence line. A 6-foot wide gravel trail would suffice for this connection. With a welcoming entrance, more visitors would come to enjoy the park, the Hubbard Park Lodge, and the River Club. Several bike racks near the gate and at the river terrace level are also recommended.

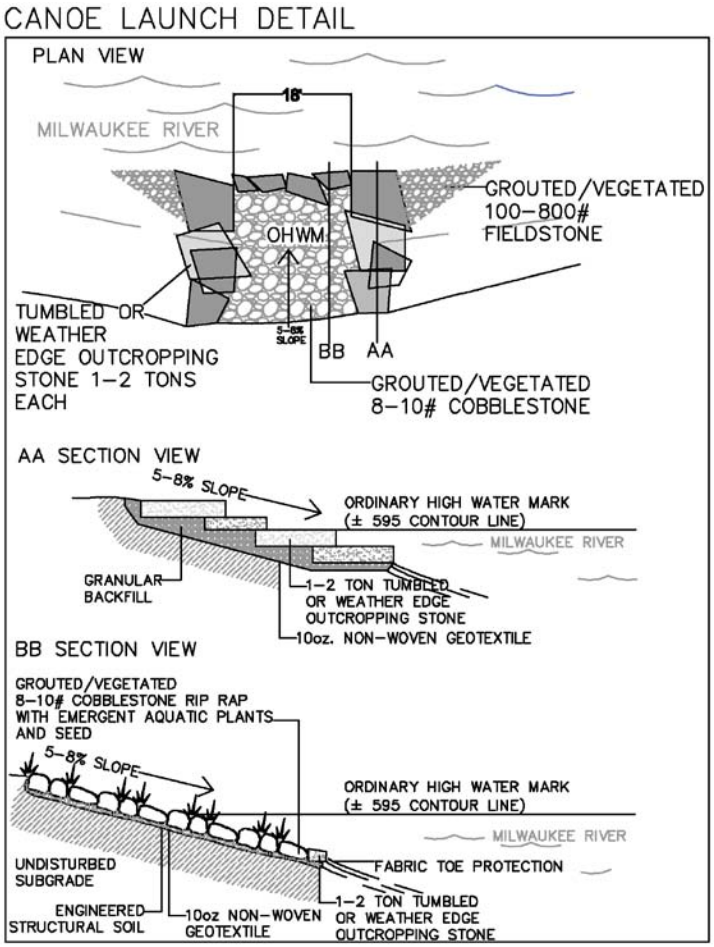


Additional access to Hubbard Park can be gained by enhancing an existing trail that originates by River Park and the Oak Leaf Trail. The existing trail becomes steep, wide, and highly eroded as it enters Hubbard Park from behind the Youth Pavilion building. A stairway is recommended along the steep section. The stairs would provide an even tread surface and concentrate foot traffic while allowing drainage and vegetation restoration. The following are an example detail and photograph for the stairs using Lannon stone steps.



Hubbard Park Canoe Launch

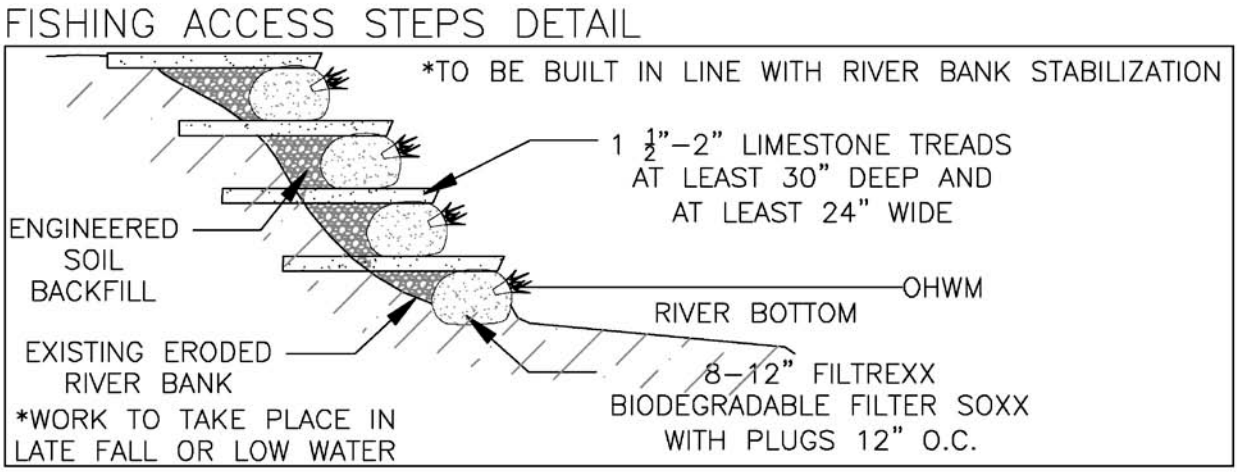
A canoe launch area exists at the park but is unstable, eroding, and not universally accessible. It is recommended to rework the area with a 5 to 8% slope that starts about 20 feet east from the current top of bank and slopes to the current river bottom. Flanking this ramp with large limestone or fieldstone outcrops that step down with the grade will allow for a step that could be used to enter canoes and kayaks at varying water levels. It is important that these materials be smooth, natural, and very durable so as not to damage boats. It is also important that it be vegetated to provide resilience and beauty. Refer to the example detail below.



River Access

Fishing access to the river is excellent throughout project area. This is a popular steelhead, salmon, bass, walleye fishery and has become a well-known "secret spot" for fishing. For instance, a gentleman had travelled from Ireland just to fish the salmon and steelhead run on this section of the Milwaukee River. "This is the best," were his exact words.

While the fishing is great and the access is good, the durability of the river bank at the several fishing access spots is low. There are several solutions to revegetate the bare soil and maintain good access. Vegetated bank stabilization can be established with Filtrexx EdgeSaver™ that can be stacked against eroded banks, staked, and vegetated with emergent aquatic plants (refer to example detail below). In localized approaches, steps could be built into these living walls either with stone or wooden treads set into the layers of the wall. This would offer a sure footed egress point and allow the rest of the bank to be revegetated.



OHWM = ordinary high watermark

Stone Box Culvert

About 700 feet north of Hubbard Park lodge, just off the lower river trail, lies a stone box culvert near Point 30 on Figure 3. It was likely built during the construction of the DPW yard or the rail road; either as a storm drain or spring housing. Remarkable in its construction, it has huge limestone slabs, 4 to 6 feet square (16-36 square feet) and 8 to10 inches thick that bridge over masonry walls. The inside measures about 3 feet wide and 4 feet high, and the floor consists of vertically shingled pieces of limestone flagging. It seems to have been designed to be as rough as possible at the opening to slow the water flow. The water source was not determined at the time of this draft, and initial inquiries regarding its historic significance were inconclusive. However, a lot of resources were used in its creation, and it must have been important historically. Its restoration may be worthwhile.

Restoration would have its challenges, but the use of high line rigging techniques would make low impact work manageable. Quality masonry restoration could be guided by local experts that specialize in historic masonry work. It would be located at the north end of proposed boardwalk, and some interpretive signage could describe its purpose.

6.2 Bluff Stabilization and Erosion Controls

All upland landscaped areas and upland development strategies should be subsoiled to a depth of at least 12 to 15-inches before receiving topsoil to fracture the hardpan caused by construction. Using topsoil high in organic matter, at least 10%, mixed with compost having 30 to 40% organic matter will increase water infiltration, improve soil and plant health, and reduce surface runoff. One to two-inch compost blankets placed over all topsoiled areas will provide better erosion control and reduce cost when compared to rolled erosion control products (Faucette, et. al. 2005, Faucette, et. al. 2007). These upland areas are critical to the health of the bluff plant communities and river and to the overall success of the project.

Minimization of impervious surfaces, collection, use, and infiltration of all rainwater should be mandated for future river bluff development. Green roofs, green parking lots, and native landscaping that allows water to infiltrate into the ground will improve the bluff, slopes, and river ecology. This will be a catalyst of change from low diversity mostly non-native plant communities to higher diversity native plant communities that are sustainable, resilient, and beautiful. The potential in this section of the trail for these new development sites to set the scene of sustainable, river centric, and beautiful design is critical to tap. Without this being emphasized, the full value of these sites will not be realized.

All plant materials and restoration is to be selected for specific areas and to be comprised of the most conservative species that will thrive in that spot. In some cases where existing conditions are supportive of conservative species, seed should be collected from the site and re-distributed in the repaired areas, while in other cases where the site is highly disturbed and receiving pressure from weed competition and has poor fill soils, plants can be purchased from local suppliers and used. Refer to Section 6.5 for more information.

Specific plant lists should be generated for the two general restoration categories described in Appendix C: upland deciduous and floodplain forest. Different soils and moisture regimes and weed pressure exist between these categories, so some flexibility should be given to the installer for target sewing of seed and plants into niche areas. The categories that typify the lower river area restoration mixes are: woodland ephemeral, open oak woodland/forest edge, disturbed/partially shaded woodland edge, and disturbed woodland.

Erosion controls and revegetation strategies are required where amenities are being added, vegetation is being altered, or grading work is occurring. The following summarizes the over-all erosion control strategy and are addressed from upslope to the river. Be mindful that knowledgeable trail building requires field specification for the best solution for each situation.

Due to the patchy, undulating nature of the existing upslope surface erosion, gullies, and random design lines, vegetated compost blankets are the most appropriate surface erosion control measure. After any displaced soil is replaced, a 1 to 2-inch layer of certified compost can be pneumatically or hand applied to prepared and decompacted soil and a native seed mix with multi-species cover crop blended for the site should be broadcast. This method works for all but the steepest slopes. Slopes steeper that 2:1 should receive a turf reinforcement mat, such as lock down netting or be covered with a bonded fiber matrix mulch that is hydraulically applied. This method has out performed all other rolled erosion control products in recent ASTM testing (Faucette, et. al., 2007). Compost blankets have the additional advantage of smothering existing weed seed.

6.3 Trail Maintenance

Slopes with long steep runs and gullies need slope interrupters placed parallel to contours of the slope at ± 10-foot intervals. This will disperse concentrated flows across a wider area reducing gully forming erosion. Slope interrupters can be formed from salvaged logs or with 8-inch compost filled biodegradable Filtrexx® slope interruption soxx. These would be vegetated with a mix of native plants placed 1-foot on center.

The maintenance and monitoring of all of these structures and amenities is like the fibrous root systems holding the river bank together. It holds the plan together, protects the investment, and makes it last. The vegetation management plan (refer to Section 6.5) proposes a methodical approach to protecting biodiversity. This is the key to building and maintaining the roots and soil that will be resistant to disturbance and erosion. With good vegetation management that is planned, organized, and routine, trail maintenance becomes a matter of housekeeping that would be manageable and enjoyable.

Basic maintenance will include trimming and pruning of branches, clearing of downed trees and debris, and regrading of the tread surface should it begin to creep and develop puddles. Inspection of hardware on the boardwalks, eventual replacement of broken or rotten boards (more than 40 years after installation), and resetting of any loose stones will also be necessary.

The best way to ensure the long-term maintenance of a trail system is to set up an endowment or an annual budget item and contract it out on a long term cycle, or assign it to the DPW. This will ensure that a responsible party is in charge of trail maintenance whether it be a trail contractor, non-profit organization, DPW, or a combination of. The funding, the tools, and the time to maintain the trail needs to be set in advance.

Development of these amenities should not occur without proper planning and budgeting for maintenance. A combination of a trail contractor working with non-profit organizations and user groups under the oversight of the DPW would be the cost-effective, sustainable solution.

Table 2 addresses a 5-year maintenance plan and a proposed agenda for their completion.

Table 2. Maintenance and Long-Term Management Agenda

Reference	Task	Year 1	Year 2	Year 3	Year 4	Year 5
A	Check and maintain trail tread and erosion control structures.	X	X	X	X	X
B	Replace & water plants, as necessary after warranty.			X	X	X
C	Ensure the use and application of the vegetation management plan.	X	X	X	X	X
D	Ensure that construction specifications are met before the end of warranty period.	X	X			
E	Begin supplemental seeding of native vegetation and cover crops in accordance with the vegetation management plan.		X	X	X	X
F	Inspect and perform erosion repairs after storm events.	X	X	X	X	X
G	Ensure the engagement, evaluation, and attraction of user groups through changes in signage and press releases.	X	X	X	X	X
H	Evaluate all hardscape, signage, and boardwalk features.		X			X
I	Assess use, design, and maintenance objectives.					X
J	Hold stakeholder meeting to assess and communicate successes and failures of trails and bluff restoration.					X

A = Monitor and repair eroded areas, trail creep, and grading of trail tread. Inspect for bio-degradation or cover geosynthetic materials in Year 4. Remove if possible.

B = Inspect the establishment of plants and livestake cuttings. Watering new plants should occur during drought. Most plants should be well established after Year 2. Add one spring, summer, and fall clean up, trim, and augment vegetation in Year 3 and Year 5.

F = Close trail when inundated or saturated throughout.

6.4 Trail Signage Plan Framework

How this project communicates from day one is important to a more thoughtful design and implementation. It provides opportunities for strengthening education about the environmental concerns and cultural resources of the river corridor.

6.4.1 Temporary Signs during Planning Process and Work Process

Temporary signs were placed within the project area as part of the planning process and preceding the initial stakeholder meeting. For stakeholders, in conjunction with a group hike through the proposed project areas, these signs more strongly communicated possibilities and ideas, got everyone to a common understanding of initial ideas more quickly, and got us further in the discussion of priorities, changes, and refinement. For the community, planning-process and work-process signs help avoid unwelcome surprises, provide a real way to for residents and trail users to participate early and meaningfully in planning, and they help set a broader foundation for community stewardship of the project in the future.

Temporary signs should continue, as the project elements are clarified, defined and prioritized, and as phases of the project including implementation continue.

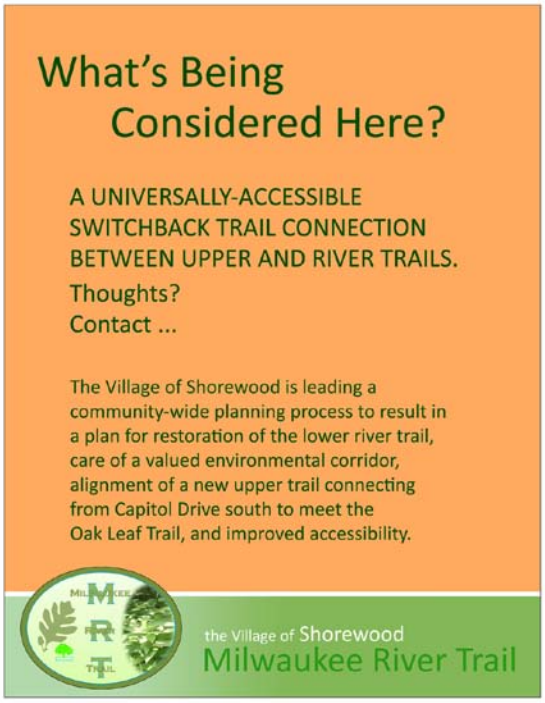
Temporary signs have the following characteristics:

- Appropriate materials – inexpensive, low embodied energy, ability to last for a few months, and perceived as temporary. (Simple laminated paper signs on posts of fallen tree branches were used for the planning process signs).
- Dated and Timely. Date should appear on the sign, and signs should generally be up for no more than a few weeks or a small number of months, and should be posted with time enough for the desired response.
- Genuinely welcome participation, and be clear about the kind of participation (responses to ideas, come to a meeting, call to volunteer, etc.).
- Provide a practical and clear feedback mechanism.
- Provide reasoning. Anticipate questions likely to arise. For example, the signs posted for the planning process have a paragraph briefly explaining the project and the phase of the project, and the changes under consideration should use language that implies reasoning – not just adding a trail here, but one that is universally-accessible and connects into Hubbard Park. As work progresses, such as management of invasive exotic species, a temporary sign would concisely express the nature of the problem and the technique and timing being employed – and perhaps how the results of the work will look, to alleviate unneeded concerns (e.g. dying vegetation) and encourage helpful concerns (e.g., reporting of noticed erosion problems).

Temporary signs should be simple and textual and will typically overlap in time with permanent signs. Since they can be used during the work process, and later, during ongoing stewardship of the trail, they will remain a part of the project. As permanent signs are implemented, they could physically incorporate space for temporary notices and begin to incorporate the visual look of the permanent sign. This will provide perceived continuity,

The following illustrates the temporary sign incorporated in this planning process (on the left) and an example sign that can be used during the work process (on the right):

CONCEPTUAL TEMPORARY SIGNS
DURING PLANNING PROCESS



CONCEPTUAL TEMPORARY SIGNS
DURING WORK PROCESS
(after plan finalized)

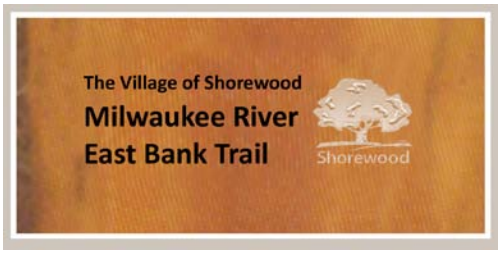
Left: A very temporary sign used at the UW Arboretum for volunteer stewards.

6.4.2 Permanent Signage Framework

It is recommended that permanent signs should be few and purposeful. The project area is in a place with few undeveloped natural areas. In the Sanctuary area in particular, signs of any sort might detract from the natural experience, which is one of arching tree branches, graceful flowering plants, animals, birds, patterns of light and shadow, the sound of the river, the flap of the heron's wings, the "eep" of a frog. Thus, few permanent signs should be used to alleviate from detracting the natural experience but enough should be present to provide direction and inform the visitor.

Sometimes an informational sign with rules is not the most effective way of communicating. For example, decommissioning certain trails up and down the riverbank through planting, positioning of fallen logs and branches, and visually directing pathways, could be more effective than a "do not use trail" sign. On the other hand, an interpretive sign at the entrance to the Sanctuary could explain how the trails have been limited to increase the health of the Sanctuary, and why it matters.

The following permanent signs are suggested:



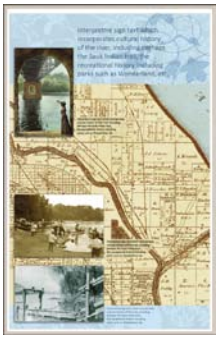
1. Entrance signs
    a. At the new trail entrance to Hubbard Park from the Oak Leaf Trail (with an interpretive section, see below), and
    b. At the East Capitol Drive entrance to the trail.

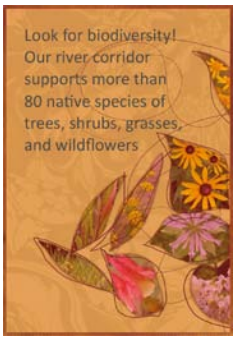
2. Sanctuary Entrance signs
    a. At the four trail entrances to the Sanctuary (with interpretive sections, see below).

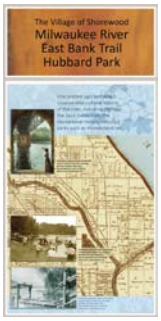
    These Sanctuary signs are to be accompanied by boot brushes for visitors to brush off seeds and dirt in their shoes that might contain invasive exotic plants. The boot brush visually signifies the importance of helping to protect the Sanctuary ecosystem.

3. Urban Water Trail sign

    a. At the proposed canoe launch, incorporation of the Urban Water Trail sign into frame and post consistent with the look and materials of the rest of the signs will help unify it to the Shorewood East Bank Trail and to the Milwaukee Urban Water Trail.







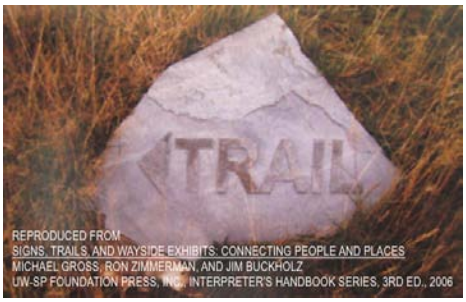
4. Interpretive signs

    a. Accompanying the Oak Leaf Trail to Hubbard Park Entrance sign. Interpretive text regarding the cultural history of the river, the Sauk Indian trail, and the recreational history including parks such as Wonderland, etc. is suggested.

    b. Accompanying the Sanctuary entrance signs, in a way that is changeable seasonally or periodically. Interpretive text should regard ecology and stewardship. It should also provide reasoning for the single-use trail.

    c. As determined, at rare places of interest, such as the CCC-era limestone box culvert, to interpret natural or cultural history. This may be a long-term ongoing project in collaboration with the Historical Society to periodically place an interpretive sign.

    d. A map of the bluff showing trails and adjacent parks (Hubbard, River, and Estabrook).



5. Directional signs

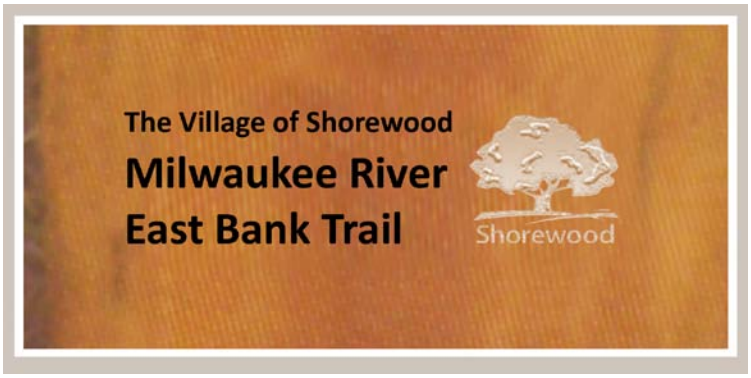
    a. Use unobtrusive address signs along the trail to serve as identifying markers in case of emergency and for communicating location. Possibly, other Milwaukee River trail sections could eventually add such markers.

    b. Directional signs, such as from River Park to Hubbard Park.

    c. Square limestone columns, 10 by 10-inches in size, with a simple map engraved or mounted onto it, along with the trail name can be made from a single piece of snapped limestone set in concrete. This could provide direction to the parks, schools, and the business district.

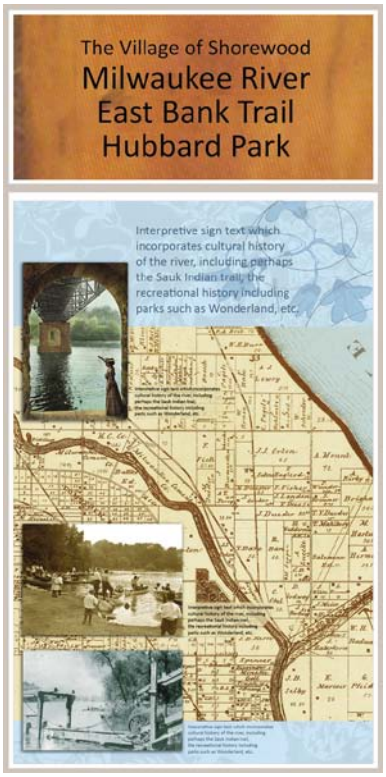
The following provides more detail on the suggested permanent signs. The signs are considered conceptual and should be used as a preliminary framework to spur discussion of desired characteristics and thus inform the design process. Implementation of the project should include a cohesive visual design. Consistency in materials (but not uniformity) is important, as is a visual template for various types of signs.

The two significant trail Entrance signs at the Oak Leaf Trail and East Capital Drive should incorporate the material displayed below, but perhaps with more contemporary framing, or framing consistent with other Village signs. Engraved wood panels could be used but framed differently at each location. For example, the Entrance sign at Capitol Drive could simply include the arrival sign.



Example of a wooden entrance sign for the East Capital Drive trail access point with an engraved Village of Shorewood logo

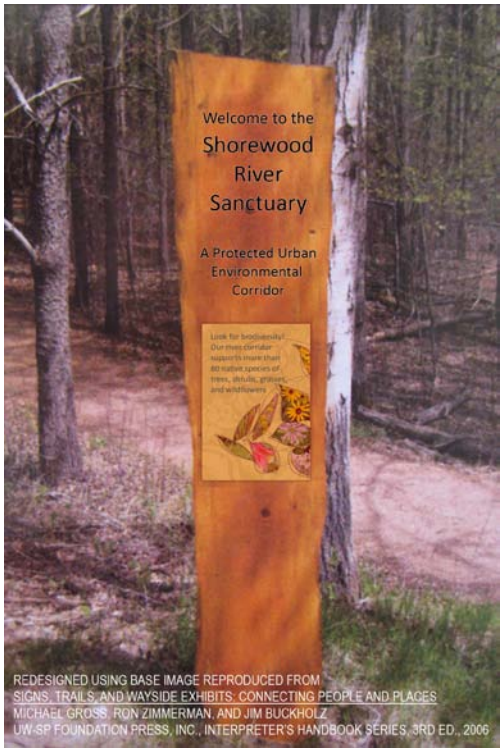
The combination of an Entrance sign with an Interpretive sign could be used at the Hubbard Park entrance from River Park and the Oak Leaf Trail. The example shown to the right includes a description of the historical background of Hubbard Park.



Example sign for the entrance to Hubbard Park by River Park that includes entrance and interpretive signs.

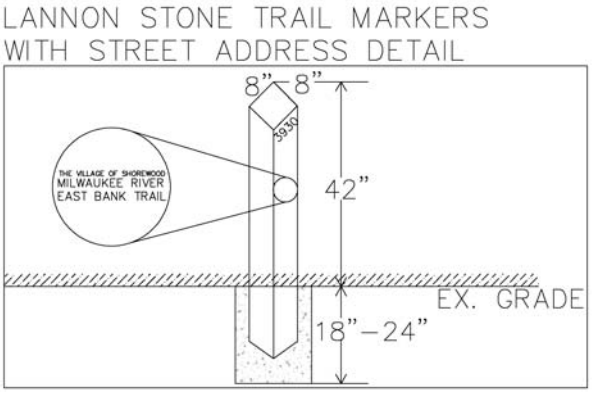
The Sanctuary Entrance signs should use materials that blend as gracefully as possible with the riparian forest – vertical and made of wood – and help reinforce the message of the Sanctuary. In the shaded forest, dark lettering on a lighter background will be most readable. These signs have successfully been built for the Schmeeckle Reserve in Wisconsin, who is a possible source for manufacture.

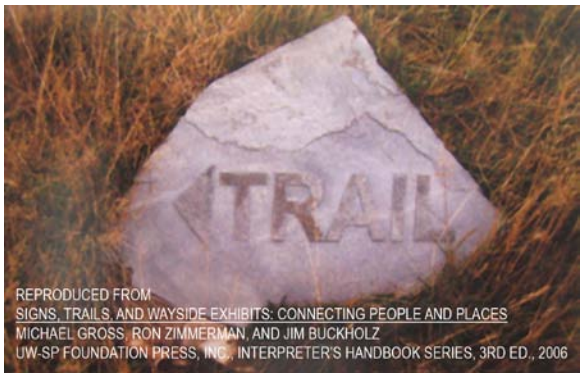
An inset plate which allows for the adhering of a semi-permanent, small interpretive sign adds an unobtrusive educational opportunity at the entrances to the Sanctuary. These small signs can be changed seasonally or periodically. Possible topics for the insets could include plant communities that exist along the bluff and riverbank (perhaps using botanical plant drawings which are beautiful and better for plant identification than photographs, and not needing to be printed in color); wildlife along the river; and the ways in which the community participates in stewardship of the bluff.



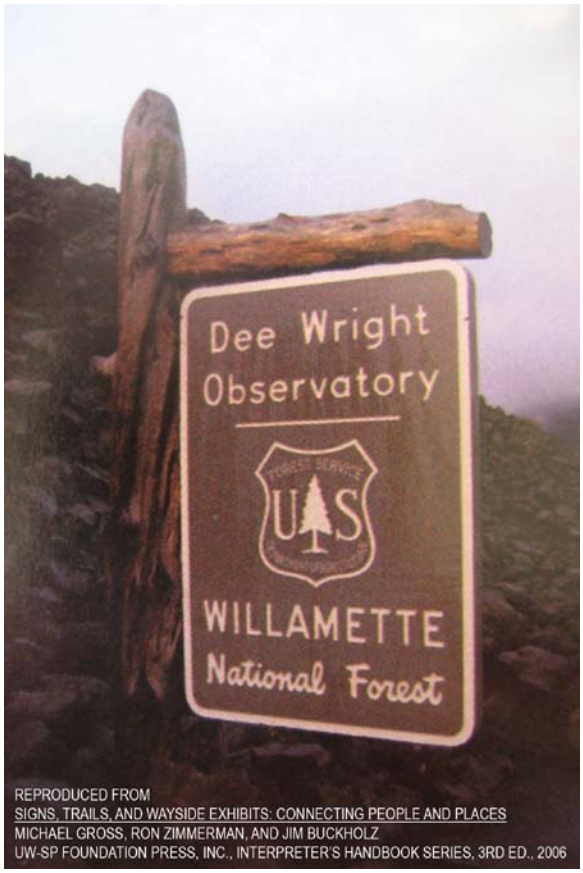
Example Sanctuary Entrance sign. A boot brush could be placed next to it visitors to clean off their shoes.

The use of engraved stone is recommended for directional signs along the trail. They could be marked with address numbers (e.g. 3900N) to aid in describing a location along the trail. Salvaged stone from Village projects could be engraved economically. The stones would be set into the ground alongside the trail to form an unobtrusive but recognizable marking scheme. Refer to the illustrations below and to the right for examples.





It is always helpful to work with local fabricators, which have offered wood posts with a refined finish, such as the work done by La Lune in Milwaukee for the Urban Ecology Center, or wood signs done by Riverworks for the Urban Ecology Center (both above). An example sign with wood posts in similar vein is shown below.



The following table provides a summary of described signage while recommending materials and sources.

Table 3: Summary of Recommended Signs, Materials, and Their Sources

Sign	Material	Size	Source	Notes
Sanctuary	Cedar, routed and painted lettering, routed inset panel	5' high x 15" wide	Schmeeckle Reserve, UW-Stevens Point	Riverworks and/or La Lune could be local sources; black locust a possible local material.
Entrance	Cedar, routed and painted lettering	24" wide x 12" high	Schmeeckle Reserve, UW-Stevens Point	
Interpretive Panel for Sanctuary signs	Graphic High Pressure Laminate	1/16" exterior grade, 10"x13" vertical	Folia, www.folia.ca (to the trade)	Folia has manufactured interpretive signs for the Hank Aaron State Trail in the Menomonee Valley and others locally; good working experience and quality manufacturing.
Interpretive Panel for Hubbard Park Entrance sign	Graphic High Pressure Laminate	1/2" exterior grade, 24"x48" vertical	Folia, www.folia.ca (to the trade)	
Directional Column at River & Hubbard Park Entrance	Weathered edged Lannon stone or beach cobbles.	4 ½' x 2' x 2' with a 2% batter	To be built in place from Wisconsin stone	Directional panels could be inset into masonry or sand blasted into stone.
Address Stones	Local limestone, sandblasted lettering and numbering	9"x16"x 2 1/4"	Lemke Stone	

6.5 Plant Community Restoration

The purpose of the B-4 River District Restoration and Trail Project is to establish upper (bluff) and lower (floodplain) trails and to provide for stabilization of eroded areas. Proper placement of the trails and bluff stabilization will provide an environment that promotes the long-term viability and protection of the plant communities within the project corridor by focusing recreational use onto specific areas designed to withstand repeated use.

Following trail construction and plant community restoration, vegetation management will occur throughout the project area to remove non-native vegetation and increase the diversity of native plant species. The primary goals and objectives of these revegetation and management efforts can be achieved through restoration of the natural functions and values of plant communities within the project corridor, resulting in increased botanical diversity, enhancement of wildlife habitat characteristics, improved aesthetics, and maintenance of recreation, flood storage, and stormwater functions. The broad goals for the project in terms of its relation to riparian

vegetation protection and restoration within and adjacent to the Milwaukee River floodplain includes:

- Maintain the level of significance for wetland functional values such as wildlife habitat, water quality, shoreline protection, aesthetics, and floral diversity by restoring native plant communities
- Establish native stream bank and floodplain vegetation (herbaceous and woody plant species) that mimic natural stand conditions (spacing, density, composition and age)
- Incorporate efforts to reestablish a diverse riparian plant corridor, ranging from upland hardwood forest to near-stream, frequently inundated floodplain forest
- Manage non-native / invasive plant species, removing or discouraging these species to encourage the reestablishment of native plant communities
- Manage the riparian vegetation to support a continuous tree canopy that provides shade to the water surface, thereby mitigating thermal impacts

Goals established for the proposed planting plan should address the overall objectives for vegetation protection and restoration within and adjacent to the Milwaukee River floodplain. The planting plan should propose to establish diverse riparian vegetation including forested areas in wetland and upland areas. Revegetation efforts should focus on development of native herbaceous and woody streambank, floodplain and upland forest vegetation. Both the floodplain and upland forest planting areas would provide shading for the river. In addition, they would be a source of woody debris, an important fisheries habitat component. Public education should be identified as an important component in the site design, because restoration could be inhibited by inappropriate recreational use of the area if the public does not commit to the long-term goals and objectives for reestablishment of native plant communities.

A complete restoration plan that discusses construction and management objectives, restoration recommendations, monitoring guidelines, and management guidelines, including invasive species control, are provided in Appendix C.

For Hubbard Park, consideration should be given for a buffer planting along the lower river terrace leading towards the southern edge of the Sanctuary. This planting could contain aspen with native woodland understory shrubs, such as witchhazel, pagoda dogwood, and hazelnut. This buffer wood help to slow traffic, minimize impact to the woods, and reduce maintenance costs.

6.6 Permits/Approvals

Several permits and approvals would be required for implementing the conceptual plan. Table 4 summarizes those required for the trails and riverbank restoration. It is anticipated that permits are not required to complete the bluff restoration. However, the work should be coordinated with Village administration and public works staff.

Table 4. Permits Required for Implementing Conceptual Plan

Permits	Permit Description	Construction Consideration	Issuing Agency	Phase of Project
Section 404/ Ch. 30	Clean Water Act/Navigable Waterways	Work within wetlands and along Milwaukee River shoreline	U.S. Army Corps of Engineers/ WDNR	Lower river trail, riverbank restoration
NR 103, NR 299 Wis. Adm. Code	Wetland Alternatives Analysis and Water Quality Certification	The placement of fill or work within in a wetland.	WDNR	Lower river trail, riverbank restoration
NR 27 Wis. Adm. Code	Threatened and Endangered Species Incidental Take Authorization	Work within forked aster and other species identified through the Natural Heritage Inventory	WDNR	Lower river trail, riverbank restoration
NR 216, subchapter III Wis. Adm. Code	WPDES construction site stormwater discharge notice of intent (NOI)	Stormwater discharge from grading more than one acre	WDNR	All trail work, and riverbank restoration
Access agreements		Access to bluff through Hubbard Park, Estabrook Park, and private properties.	Land Owners	All project phases

In addition to the above permits, a Natural Heritage Inventory (NHI) Endangered Resources Review Request should be made to the WDNR to learn of other rare species, high-quality natural communities, and significant natural features found in or near the proposed project area that were not observed during site visits. The reviews cost between $60 and $500, depending on the length of time required to review lists and develop recommendations.

6.7 Plan Budget, Volunteer Opportunities, & Funding Opportunities

6.7.1 Plan Budget

The following provides a budget for implementing the conceptual plan. It considers initial construction and yearly operation and maintenance if all work is completed through private contracting. However, some of the work can be completed by volunteers, students, and non-for-profit groups, and several grant programs are available for funding bluff restoration, shoreline restorations, and trail development.

Trails			
1	Trail clearing/tree care		$20,000
2	Slope cut from upper bluff to river trail		$20,000
3	Switchbacks, grading, & construction		$50,000
4	Boardwalks along lower river trail (includes revegetation)		$30,000
5	Stairs and trail south of Hubbard Park linking to Oak Leaf Trail		$10,000
6	Canoe launch at Hubbard Park		$35,000
	Entrance markers/monuments		$20,000
7	River Park directional monument at Oak Leaf Trail		$10,000
8	Hubbard Park entrance sign		$3,000
9	Capitol Drive (includes benches, paving, trash bin, plants, soil)		$40,000
10	Signage - temporary, Sanctuary entrance, directional		$15,000
11	Ornamental gate to Hubbard Park from Oak Leaf Trail		$35,000
Budget for paved top of bluff trail being determined by others.			$288,000 Subtotal
Bluff Slope and Riverbank Stabilization			
12	Drainage solutions/Outfall reconstruction		$10,000
13	Trail decommissioning		$15,000
	Surface treatments/Erosion Control		
14	Compost blanket		$20,000
15	Slope interrupter		$15,000
16	Channel checks in steep drainages		$5,000
	River bank		
17	Bank stabilization & revegetation		$20,000
18	Living wall steps for river access		$5,000
			$90,000 Subtotal
Vegetation Management Plan			
19	Woody Invasives Removal	Year 1	$30,000
20		Year 2	$10,000
21		Year 3	$5,000
22		Year 4	$2,000
23		Year 5	$2,000
24	Invasives control *	Year 1 - 5	$50,000
25		Years 5 - 10	$5,000
26		Years 10 - 20	$5,000
27	Revegetation	Year 1	$30,000
28		Year 2	$15,000
29		Year 3	$10,000
30	Vegetation monitoring +	Years 1 – 5	$25,000
* $10,000 per year for 5 years.			$189,000 Subtotal
+ $5,000 per year for 5 years.			

Total budget for implementing the conceptual plan	$567,000

6.7.2 Volunteer Opportunities

It is important to provide meaningful work for volunteers, regardless of the activity. Meaningful work has the following components:

- Helps develop repeat volunteers and builds community support for the project.
- Has an educational component, because that enriches the volunteer experience; for example, learning the biotic communities while working to eradicate invasive exotic weeds, or learning a construction technique while building a boardwalk; or learning about Native American history along the river while working there.
- Is well-organized so that people feel their time and work is needed, valued, and that they are doing the work properly and effectively.
- Means no periods of standing around without direction or assignment (easier said than done).
- Tends to have achievable goals, per event or per time period, so that progress is clear and work is satisfying.

Potential volunteer activities can be generally organized in the following areas.

Initial Construction

The construction and maintenance of the lower river trail will primarily be performed as hand work and manual labor as most of this trail is not readily accessible with heavy equipment. Activities could include clearing and cutting, hand digging, moving and placement of materials, removal of brush and debris. This type of work is very suitable for volunteers interested in the trail and who can donate manual labor to the cause. Conceptually, work activities could be supported and supervised by Marek Landscaping or another qualified contractor with the labor forces supplied by volunteers.

This category of work also includes periodic trail improvement projects over time, such as a new boardwalk, or addressing a new erosion situation.

Volunteers engaged in this portion of work are typically managed in one of two ways:

(a) As intensive individual day calls for volunteers, e.g. one or more Saturday community events. Often organized groups will participate, as well as individual volunteers. There are two key challenges: first, the number of people tends to be unknown in advance. Pre-registration helps, but not everyone or every group pre-registers. Second, there is no required skill or experience from the volunteers – although there is some skill needed for the work. These events thus require substantial advance preparation – but benefits include inspiring repeat volunteers, and bringing substantial positive attention and community support to the project.

    These events require an especially high ratio of supervisors to volunteers, in order to provide and produce meaningful work. The advance preparation includes defining the tasks and setting goals for the event; planning of tools, supplies, and materials; planning of volunteer comfort (notice of appropriate clothing/footwear, providing of gloves, drinking water, restroom access, scheduled breaks if a long day, etc.); planning of direction and supervision; planning of how to incorporate educational components; and contingency planning for unexpected larger numbers of volunteers, unexpected weather, etc.

(b) In the framework of volunteer work crews who are committed to a substantial sequence of work sessions. Example crews include an eight-person Conservation Leadership Corps crew of Milwaukee area high school students, who commit to approximately eight weeks of work, a ten-person AmeriCorps National Civilian Community Corps (NCCC) crew sponsored locally by Groundwork Milwaukee, who commits to several consecutive days or a few weeks of work, or a Scout troup who commits to a few weekends of work. The extended time commitment allows for work on the scale of trail construction. Consistency of supervision is important, as well as many of the advance preparation tasks. Because of the extended time commitment, it is possible to build skills during the process, and that also allows for more complex work.

Trail Stewardship and Vegetation Management

Ongoing stewardship of the trails, in particular vegetation restoration and the management of invasive exotic species, is a volunteer activity common to area nature centers and trail systems, who have established Stewardship Crews in some form. A consistent thread in these programs is paid staff to manage volunteers in the field; sometimes this is staff of a Friends organization or existing organization with shared mission. Consistency and knowledge of a reliable leader, as well as the inspiration they provide through educational components, is important. Occasionally this person can be a long-term dedicated and knowledgeable volunteer, but this is rare. A significant portion of staff time is dedicated, especially in the early years, to recruitment and retention of volunteer stewardship crew members.

Typically stewardship crews meet on a regular basis at a regularly scheduled time or times. Consider a schedule that provides times during the day for retired volunteers or those with flexible schedules, as well as after work or weekend times. Pre-scheduled times are not ideal from the perspective of the work, since some stewardship activities are weather-dependent (e.g., after rain). However, frequent enough regular meeting times allow for work to suit the weather at any one time.

Stewardship Crew programs require annual planning within a long-range framework established in the trail design. As led by staff, annual planning activities and monitoring to support those plans are opportunities to broaden participants. An annual species survey, for example, could involve a pairing of students with stewards for an intensive event. A stewardship crew program also provides the framework to support service learning volunteers from area high schools and universities. Service learners might commit to a single day, or a limited number of hours, in supporting a community project. The community project generally needs to have the authority that is provided by a staffed organization. A stewardship crew can work well as a match for service learners, in providing mentors to give students a rewarding and learning experience, as well as give hard-working stewardship crew members an occasional infusion of new faces and fresh questions.

Most stewardship crews have a physical “meeting place”, which also serves to store tools and equipment. This meeting place is important to sense of belonging. Hubbard Park has buildings that could be configured for this use.

Trail Ambassadors

In the spirit of urban park rangers, a loosely organized trail ambassador program is another way to engage volunteers and provide benefit to the trail. Activities revolve around the idea of ambassadors regularly walking or biking the trail. Ambassadors can perform several tasks:

(a) Be regular eyes on the trail identifying issues, such as an obstacle along the trail, graffiti, problematic use of desire trails, litter, sprouting of an invasive exotic weed patch, etc.;

(b) Be a recognized and regular cheerful presence on the trail, answer questions about the trail, and provide the perception that the trail is cared for and should be treated well;

(c) In some cases do minor maintenance work such as picking up litter (see Eco-Runner below), clearing small obstacles, repairs after heavy rain, a degree of weeding, straightening signs, etc. – based on the interests of the individual ambassador.

A trail ambassador program requires an organizer; staff or volunteer. A centralized place is needed for collecting data from ambassadors and responding to their reports. This presumes there is a way to respond to reports – either through Village maintenance, or stewardship crews, or Parks staff, or trail contractors. No special expertise is required of ambassadors. Either periodic informative communication is needed to keep ambassadors in the loop (Trail news, informative tidbits) and/or annual training, mostly for camaraderie and an opportunity of education for ambassadors to enrich their volunteerism. Typically a friendly 'uniform' is used, which could be a t-shirt or vest. Ambassadors commit to a general time period each week for walking or biking the trails, and submit a brief report (perhaps by email or telephone) each time. Those who are already trail users might be the best pool of volunteers.

Another suggestion for trail ambassadors comes from the Eco-Runner idea recently publicized in local newspapers and at eco-runner.blogspot.com: "What is Eco-Running? Put simply, while you are out running, collect the rubbish, the garbage, the trash that you find along the pathways, roads and trails you frequent." The founder is a runner along the Oak Leaf Trail. Perhaps there is an opportunity to infuse this idea into a trail ambassadors program.

Appendix D provides a list of volunteer groups who have expressed an interest or may be available and willing to contribute to the construction and maintenance of the trail system.

6.7.3 Funding Opportunities

There are several opportunities to apply grants that would fund the project in addition to coordinating work with volunteer and non-for-profit groups. The following tables summarize applicable publicly and privately funded grants for bluff restoration and for trail development.

Table 5. Publicly Funded Bluff Restoration and Trail Development Grants

Grant/Program	Description	Contact
Southeast Wisconsin Watersheds Trust & Milwaukee River Basin Partnership Mini-grant program	The goal of the program is to support local activities that will teach citizens about water quality issues, enhance conservation, and improve water quality in the Milwaukee River watershed. Mini-Grants may be used for a single event or an on-going program, with preference given to projects with a long-lasting impact on the community.	Milwaukee River Basin Partnership Attn: Mini-Grant Program 1845 N. Farwell Ave. Suite 100 Milwaukee, WI 53202 414.339.2405
Urban Forestry Grant Program	Funds projects that improve a community's capacity to manage its trees, including emerald ash borer plan development, and for projects that conserve, protect, expand, or improve upon the urban forest resource.	Southeastern Wisconsin DNR/ Urban Forestry Coordinator
Urban Greenspace Program	Provides funds for protecting scenic or natural features, nature-based outdoor recreation, sensitive wildlife habitat, threatened or endangered species, and open natural linear corridors connecting open natural areas.	Southeastern Wisconsin DNR/ Urban Forestry Coordinator
Urban Rivers Grant	Funds are available to improve outdoor recreation opportunities by increasing access to urban rivers for a variety of public uses, economic revitalization through the improvement of the environmental quality in urban river corridors, and preserving and revitalizing historical, cultural, or natural areas.	Southeastern Wisconsin DNR/ Community Service Specialist
Recreational Trails Program	The program assists local communities and trail groups in the development, maintenance, or rehabilitation of recreational trails. Eligible projects include trailheads, trail linkages, maintenance and restoration of existing trails, construction of new trails, and trail acquisition and easements.	Southeastern Wisconsin DNR/ Community Service Specialist
Local Transportation Enhancements Program	Promotes activities that would “enhance” the surface transportation system including pedestrian and bike facilities, landscaping and scenic beautification, and mitigation of water pollution from highway runoff.	John Duffe/ Wisconsin Dept. of Transportation
Congestion Mitigation and Air Quality Program	Provides funding for transportation projects to improve air quality and reduce traffic congestion in counties classified as air quality non-attainment and maintenance areas for the federal criteria pollutant ozone. Eligible projects include pedestrian and bike facilities that show a strong diversion of auto trips to biking and walking.	John Duffe/ Wisconsin Dept. of Transportation
State Wildlife Grant Program	Provides funds for developing and implementing programs that benefit wildlife and their habitats, including species not hunted or fished. Priority is placed on projects that benefit species of greatest conservation concern.	Southeastern Wisconsin DNR/ Regional Ecologist

Knowles-Nelson Stewardship Program	Preserve valuable natural areas and wildlife habitat, protect water quality and fisheries, and expand opportunities for outdoor recreation. Includes development and renovation projects for the purpose of nature-based outdoor recreation such as trails and water recreation areas (including boat launches & fishing piers). It also includes riparian buffer rehabilitation for establishing native vegetation and control of exotic plant species.	Southeastern Wisconsin DNR/ Community Service Specialist
Land and Water Conservation Fund	Provides matching grants to local governments for the acquisition and development of public outdoor recreation areas and facilities such as parks, trails, wetlands, and wilderness.	Southeastern Wisconsin DNR/ Community Service Specialist
Wisconsin Coastal Management Program (WCMP)	Supports the management, protection and restoration of Wisconsin's coastal resources, and increases public access to the Great Lakes through matching grants.	WCMP staff or http://coastal.wisconsin.gov
Keystone Initiative Grants	The foundation awards matching grants to achieve measurable outcomes in the conservation of fish, wildlife, plants and the habitats on which they depend. This also includes control of invasive species.	National Fish and Wildlife Fund
Federal Aid in Sport Fish Restoration Act	Funds come from Federal excise taxes on fishing equipment and a portion of the federal gas tax. WDNR uses the funds for fish management projects such as land acquisition, habitat restoration and development, aquatic education, public fishing piers and shorefishing, fish propagation and stocking, research, and motorboat access.	Southeastern Wisconsin DNR/ Community Service Specialist

Table 6. Privately Funded Bluff Restoration and Trail Development Grants

Grant/Program	Description	Contact
National Trails Fund	Privately supported national grants program providing funding to grassroots organizations working toward establishing, protecting, and maintaining foot trails in America. National Trails Fund grants help give local organizations the resources to secure access, volunteers, tools, and materials for hiking trails.	American Hiking Society
Kodak American Greenways Awards Program	Small grants support the expenses needed for communities to complete, expand, or improve a greenway project.	The Conservation Fund or 703.525.6300
Recreational Equipment, Inc. (REI)	The grant funds conservation and outdoor recreation projects. An employee of REI must nominate the project for consideration.	REI, Brookfield Store 13100 W. Capitol Dr. Milwaukee, WI 53005 262.783.6150

6.8 Implementation Plan

Once this conceptual plan is finalized, implementation begins. Many things need to be brought together to bring a project to completion. Construction documents will need to be drawn up. All the easements will need to be acquired and documented. Funding will need to be secured for construction and for maintenance and starting the grant writing process immediately. Finally, permits should be acquired once funding and scheduling of work is determined. It is important that one person be appointed to oversee and coordinate implementation.

As mentioned in the signage section, good public relations can be maintained through temporary signs and press. This should be established early on in the process, as a way to communicate with trail users. An informed community will be supportive and helpful.

Any available grants for vegetation management can be applied for and implemented at any time. Fall and winter are the best time for woody invasives removal. However, the ideal scenario is to establish the trail grading and infrastructure first, in order to have a sound access route to the work. Much like construction roads are the start of any large construction project; sound access to the site would minimize damage and erosion.

The lower river trail construction work would best be done in mid summer when conditions are dry and there is still plenty of time to establish vegetation. This means that all revegetation measures should be complete by late August, allowing cover crops to establish in September and October. The paved upper bluff trail can be constructed as funding becomes available. If redevelopment of the neighboring private parcels is ready to begin prior to constructing the trail, the paving should wait. This is to ensure good construction access for the developments and to avoid damaging a newly constructed trail. Fence repairs and construction of the natural upland trail north of Hubbard Park can be started in spring and as a separate contract from the lower river trail and the paved upper bluff trail.

After trail construction and hard features (fences, gates, bridges, and columns) are established and revegetation is in place, the temporary signs can be replaced with permanent interpretive signage. Programming and ongoing maintenance would also begin. Ongoing maintenance will keep the investment working, looking great and is the key to a successful project. The plan should not be implemented without available maintenance funding.

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APPENDIX A

Vegetation Inventory for the East Bank of the Milwaukee River, Shorewood, Wisconsin

Table A-1. Vegetation Inventory for the Milwaukee River Trail (Observed during June 2008 Field Review)

Scientific Name	Common Name	Wetland Indicator Status	Native
Acer negundo	boxelder	FACW	X
Acer platanoides	Norway maple	UPL	
Acer saccharinum	silver maple	FACW	X
Actaea rubra	red baneberry	FACU	X
Agrimonia gryposepala	agrimony	FACU+	X
Agrostis sp.	grass sp.	UNK	
Alliaria petiolata	garlic-mustard	FAC	
Allium canadense	wild garlic	FACU	X
Allium tricocum	wild leek	FACU	X
Ambrosia artemisiifolia	common ragweed	FACU	X
Ambrosia trifida	giant ragweed	FAC+	X
Amelanchier arborea	serviceberry	FACU	X
Amphicarpa bracteata	hog peanut	FAC	X
Anemone canadensis	Canada anemone	FACW	X
Anemone quinquefolia	wood anemone	UPL	X
Anemone virginiana	thimbleweed	UPL	X
Apocynum androsaemifolium	spreading dogbane	UPL	X
Aquilegia vulgaris	garden columbine	UPL	
Arabis laevigata	rock-cress	UPL	X
Aralia nudicaulis	wild sarsaparilla	FACU	X
Arctium minus	common burdock	UPL	
Arisaema triphyllum	jack-in-the pulpit	FACW	X
Asclepias syriaca	common milkweed	UPL	X
Aster cordifolius	heart-leaved aster	UPL	X
Aster furcatus	forked aster	FAC	X
Aster lateriflorus	side-flowering aster	FACW	X
Aster macrophyllus	large-leaf aster	UPL	X
Aster novae-angliae	New England aster	FACW	X
Aster saggittifolius	arrow-leaved aster	FACU	X
Aster sp.	aster sp.	UNK	
Bidens frondosa	devil's beggar-ticks	FACW	X
Boehmeria cylindrica	false nettle	OBL	X
Bromus inermis	smooth brome	UPL	
Carex blanda	common wood sedge	FAC	X
Carex pennsylvanica	Pennsylvania sedge	UPL	X
Carex sp.	sedge	UNK	
Carpinus caroliniana	blue beech	FAC	X
Carya cordiformis	yellowbud hickory	FACU	X
Carya ovata	shagbark-hickory	FACU	X
Celtis occidentalis	hackberry	FAC	X
Chenopodium album	lamb's quarters	FAC-	

Table A-1. Vegetation Inventory for the Milwaukee River Trail (Observed during June 2008 Field Review)

Scientific Name	Common Name	Wetland Indicator Status	Native
Chenopodium hybridum	maple-leaved goosefoot	UPL	X
Cichorium intybus	chicory	UPL	
Cicuta maculata	water hemlock	OBL	X
Circaea lutetiana	common enchanter's nightshade	FACU	X
Cirsium arvense	Canada-thistle	UPL	
Cirsium vulgare	bull-thistle	FACU-	
Convallaria majalis	Lily of the valley	UPL	
Cornus racemosa (C. foemina)	gray dogwood	FACW	X
Cornus sericea	red osier-dogwood	FACW	X
Crataegus sp.	hawthorn sp.	UNK	
Dactylis glomerata	orchard-grass	FACU	
Daucus carota	Queen Anne's lace	UPL	
Echinocystis lobata	wild cucumber	FACW	X
Erigeron annuus	annual fleabane	FAC-	x
Elymus virginicus	Virginia wild rye	FACW	X
Equisetum arvense	common horsetail	FAC	X
Erigeron annuus	annual fleabane	FAC	X
Eupatorium rugosum	white snakeroot	UPL	X
Fragaria virginiana	thick-leaved wild strawberry	FAC	X
Fraxinus americana	white ash	FACU	X
Fraxinus pennsylvanica	red ash, green ash	FACW	X
Geranium maculatum	wild geranium	UPL	X
Geum aleppicum	yellow avens	FAC+	X
Geum canadense	white avens	FAC	X
Glechoma hederacea	gill-over-the-ground	FACU	
Glyceria grandis	reed manna grass	OBL	X
Helianthus decapetalus	pale sunflower	UPL	X
Helianthus sp.	sunflower	CBD	
Hemerocaulus fulva	orange day lily	UPL	
Heracleum lanatum (H. maximum)	cow-parsnip	UPL	X
Hesperis matronalis	dame's rocket	UPL	
Hydrophyllum virginianum	eastern waterleaf	FAC	X
Hystrix patula (Elymus hystrix)	bottlebrush grass	UPL	X
Impatiens capensis	orange touch-me-not	FACW	X
Juglans nigra	black walnut	FACU	X
Juncus tenuis	path-rush	FAC	X
Lactuca serriola	prickly lettuce	FAC	
Laportea canadensis	wood nettle	FAC	X
Leonuris cardiaca	motherwort	UPL	X
Linaria vulgaris	butter-and-eggs	UPL	
Lolium temulentum	darnel rye grass	UPL	
Lonicera prolifera	yellow honeysucke	UPL	X

Table A-1. Vegetation Inventory for the Milwaukee River Trail (Observed during June 2008 Field Review)

Scientific Name	Common Name	Wetland Indicator Status	Native
Lonicera x bella	showy fly honeysuckle	FACU-	
Lythrum salicaria	purple loosestrife	OBL	
Melilotus officinalis	yellow sweet clover	FACU	
Melilotus sp.	sweet clover	CBD	
Mertensia virginica	Virginia bluebells	FACW	X
Nepeta cataria	catnip	FAC-	
Oenothera biennis	common evening-primrose	FACU	X
Osmorrhiza longistylis	smooth sweet cicely	FACU	X
Ostrya virginiana	ironwood	FACU	X
Oxalis stricta	common yellow wood-sorrel	UPL	X
Parthenocissus quinquefolia	Virginia-creeper	FAC	X
Phalaris arundinacea	reed canary-grass	FACW+	
Phleum pratense	timothy	FACU	
Plantago major	common plantain	FAC+	
Polygonatum biflorum	Solomon's seal	FACU	X
Polygonum cuspidatum	Japanese knotweed	FACU	
Populus deltoides	cottonwood	FAC+	X
Prenanthes alba	lion's paw	FACU	X
Prunus serotina	wild black cherry	FACU	X
Prunus virginiana	choke-cherry	FACU	X
Ptelea trifoliata	hop tree	FACU+	X
Quercus alba	white oak	FAC	X
Quercus macrocarpa	bur-oak	FAC	X
Quercus rubra	northern red oak	FACU	X
Rhamnus cathartica	common buckthorn	FACU	
Rhamnus frangula	glossy buckthorn	FAC+	
Rhus radicans	poison ivy	FAC+	X
Rhus typhina	staghorn-sumac	UPL	X
Ribes americanum	eastern black currant	FACW	X
Robinia pseudoacacia	black locust	FACU	X (introduced locally)
Rosa multiflora	multiflora-rose	FACU	
Rubus occidentalis	black raspberry	UPL	X
Rudbeckia laciniata	wild golden glow (green-headed coneflower)	FACW+	X
Salix exigua	sandbar-willow	OBL	X
Salix nigra	black willow	OBL	X
Salix sp.	willow sp.	UNK	
Sanguinaria canadensis	bloodroot	UPL	X
Sanicula gregaria	clustered black snakeroot	FAC+	X
Sanicula marilandica	black snakeroot	FACU	X
Smilacina racemosa	feathery false Solomon's seal	FACU	X
Smilacina stellata	starry false solomon's seal	FAC	X
Smilax ecirrhata	upright carrion flower	UPL	X
Smilax herbacea var. lasioneura	common carrion flower	UPL	X

Table A-1. Vegetation Inventory for the Milwaukee River Trail (Observed during June 2008 Field Review)

Scientific Name	Common Name	Wetland Indicator Status	Native
Solanum dulcamara	bittersweet nightshade	FAC	
Solidago altissima	tall goldenrod	FACU	X
Solidago flexicaulis	zig-zag goldenrod	FACU	X
Solidago gigantea	smooth goldenrod	FACW	X
Solidago ulmifolia	elm-leaved goldenrod	UPL	X
Stachys palustris	hedge-nettle	OBL	X
Symplocarpus foetidus	skunk cabbage	OBL	X
Taraxacum officinale	common dandelion	FACU	
Thalictrum dasycarpum	purple meadow-rue	FACW	X
Thalictrum dioicum	early meadow-rue	FACU+	X
Tilia americana	basswood	FACU	X
Trillium grandiflorum	large flowered trillium	UPL	X
Ulmus americana	American elm	FACW	X
Ulmus rubra	red elm	FAC	X
Urtica procera	tall nettle	FAC+	X
Uvularia grandiflora	bellwort	UPL	X
Verbascum thapsus	common mullein	UPL	
Viburnum lantana	wayfaring tree	UPL	
Viburnum lentago	nannyberry	FAC+	X
Viburnum opulus	European highbush cranberry	FACU	
Viburnum rafinesquianum	downy arrow-wood	UPL	X
Viola sororia	common blue violet	FAC	X
Vitis riparia	river-bank grape	FACW	X

Table A-2. Vegetation Inventory for the Milwaukee River Trail (Additional Plant Species Observed by Others*: Historical Records)

Scientific Name	Common Name	Wetland Indicator Status	Native
Acer saccharum	sugar maple	FACU	X
Alnus glutinosa	black alder	FACW-	
Amelanchier sp.	juneberry	CBD	
Berberis thunbergii	Japanese barberry	FACU-	
Bidens sp.	beggar-ticks	UNK	
Carex cephalophora	short headed bracted sedge	FACU	X
Carex grisea	wood gray sedge	FAC	X
Carex sparganioides	loose headed bracted sedge	FAC	X
Celastris orbiculatus	oriental bittersweet	UPL	
Cornus alternifolia	alternate-leaved dogwood	FAC	X
Cryptotaenus canadensis	honewort	FAC	X
Epipactus helleborine	Helleborine orchid	UPL	
Erytrhronium albidum	white trout lily	UPL	X
Euonymus atropurpureus	burning bush	FAC	X
Eupatorium maculatum	spotted joe pye weed	OBL	X
Hammamelis virginiana	witch hazel	FACU	X
Iris virginica	southern blue flag	OBL	X
Morus sp.	Apple species	CBD	
Poa pratensis	Kentucky-bluegrass	FAC-	
Podophyllum peltatum	may-apple	FACU	X
Polygonatum sp.	Solomon's seal species	CBD	
Polygonum sp.	smartweed species	UNK	
Potentilla simplex	oldfield cinquefoil	FACU	X
Ranunculus arbortivus	small flowered buttercup	FACW	X
Ranunculus septetrionalis	swamp buttercup	FACW+	X
Scilla siberica	Siberian squill	UPL	
Scrophularia marilandica	late figwort	FACU	X
Silene stellata	starry campion	UPL	X
Stachys sp.	hedge-nettle species	CBD	
Symphiocarpus albus	snowberry	UPL	X (introduced locally)
Taenidia integerrima	yellow pimpernel	UPL	X
Veronicastrum virginianum	culver's root	FAC	X

* Species observation records from Southeastern Regional Planning Commission Report No. CA414-22 (SEWRPC 1993) and Preliminary Vegetation Inventory: The East Bank of the Milwaukee River, The Woodland North of the Hubbard Park Lodge within the Primary Environmental Corridor, Milwaukee County, Wisconsin (Barloga 2008 and 2008a).

APPENDIX B

Stakeholder Meeting Minutes – July 10, 2008

B-4 River District Riparian Restoration and Trail Planning and Design

Stakeholder Meeting Minutes

July 10, 2008, 4:00pm at Hubbard Park Lodge

Meeting Purpose: Present conceptual ideas that incorporate initial stakeholder input gathered from telephone interviews, facilitate discussion among different stakeholder groups, and receive feedback on concepts.

The meeting entailed a walking tour of the project area followed by a talking session in the Hubbard Park Lodge. Attendee list is attached.
4:00 - 5:00pm - Walking tour of project site, start at Hubbard Park Lodge
5:00 - 5:30pm - Reconvene at Hubbard Park Lodge and review maps
5:30 - 6:30pm - Discussion to refine concepts

Three groups walked the project area with maps and signs placed around the project area showing the conceptual ideas.

The following comments were made for the Hubbard Park area:

- For the canoe launch, be sure to protect trees & their roots. Would require DNR permitting. Include American Disabilities Act (ADA) compliant launch and ADA parking at the circle drive.
- Fence improvements wanted; paint black or green. Should fence on the southern & northern edge of Hubbard Park (going perpendicular to bluff) be removed and just leave fence along the Oak Leaf Trail (OLT)?
- Formalize proposed southern Hubbard Park entrance from OLT and across from River Park OLT entrance; include benches; concern with service vehicle access. Match signage with Milwaukee River Greenway & the Village. Add stop signs to those wanting to cross the OLT and pedestrian crossing signs to those traveling on the OLT.
- For the southern Hubbard Park entrance stairway, include bike gutters to alleviate erosion.
- Include bike racks in the lower Hubbard Park area.
- Add benches to any ADA connection; including the proposed trail going along River Park.
- Signage for river trail should denote it as an informal trail.
- Concern about graffiti if open up connection from OLT directly to Lodge. Although, many reacted positively towards this connection.
- Concern with using service entrance to Hubbard as a potential connection.
- Artesian fen has been capped, but support restoring grotto.
- Keep black oaks between buildings protected.

The following comments were made for the proposed Sanctuary area:

- Revegetate slope.

- Concern with BMX biking on already established trails.
- Bike challenge trail along top of bluff is too much a hazard. Maybe include cross-county skiing instead.
- Concern about displacing mountain bikers from sanctuary area; the vegetation still exists even with mountain bike use.
- Important to protect habitat.
- Limestone culvert – who would maintain if restore; maybe open up to river and to upper bluff trail; bikers are setting the stone to bike up and over culvert.
- Stewardship – generally municipal; do not want volunteers to use chain saws.
- Connection to DPW yard – like idea of easterly connection, but may be too constraining for safety if have narrow trail along existing southern fence.
- Keep the river trail as a dirt surface and do not bury tree roots.
- Include benches or resting areas along OLT.

The following comments were made for the area north of the proposed Sanctuary, including Capital Drive:

- The proposed mid-way bike connection should be <10% grade.
- For the river trail, control bike speed by the nature of the trail [narrow, dirt]; also make it a one-way bike route.
- Some of the river trail would need shoreline stabilization.
- For the upper bluff trail, use a permeable surface.
- May only need one connection to river trail near East Capital Drive instead of the proposed stairs at Capital Dr. plus the bluff cut.
- For the bluff cut, make the mid-way connection down to the river have switchbacks with natural character. Village currently cannot manage vegetation for views of river due to available resources.
- Somewhere between the proposed stairs and bluff cut, add a picnic area by the river.
- At Capital Dr., have a large entrance monument to denote trailhead. Suggest using iron with stone piers that people can walk under; a gateway.
- For the stairs at Capital Dr., include a bike gutter. Bikers will tend to ride alongside edge cause erosion. Need bike route.

Following the walking tours, the groups reconvened at the Hubbard Park Lodge to go over general comments and develop some consensus to the conceptual ideas presented. The following summarizes those comments.

- In general, people like the canoe launch idea in Hubbard Park. Some expressed concern with having enough vehicular room for dropping off/picking up boats in existing circle drive. Need ADA parking spot.

- Would like restrooms in lower Hubbard Park area.
- Like the idea of the southern connection & stairway into Hubbard Park from the OLT. Would have to shovel this during winter.
- Mixed expressions regarding direct connection from OLT to Hubbard Park Lodge.
- Would like better ADA access to Lodge & River Club buildings.
- Biking community concerned with losing potential biking area; make a good trail that is narrow = less speed.
- Use Hubbard Park as a picnic area verses establishing new ones along the lower river trail.
- Like the idea of continuing river trail south of Hubbard Park.
- Like the idea of having a connection to the neighborhood lying east of project area.
- Make the upper pedestrian trail look & feel like a public trail.
- Like stairway connection from Capital Dr. to lower river trail. Perhaps only one upper & lower trail connection needed at the northern end of project area.
- Make sure to have good bike connections to OLT from Capital Dr.; if these connections are easy to use and well marked, bikers are less likely to look towards the upper bluff trail as an OLT connection.
- Have trailhead signage coordinate with Shorewood & Milwaukee River Greenway trail signage.

In general, attendees favored the conceptual ideas and that Shorewood is looking to increase access, formalize trails, and enhance the bluff condition.

July 10, 2008 Stakeholder Meeting Invitee and Attendee List

Attended		First Name	Last Name	Company/Organizaton
	1	LeeAnn	Butschlick	Shorewood Dept. of Public Works
X	2	Chris	Swartz	Village of Shorewood
	3	Jim	Swenson	Shorewood Dept. of Public Works
	4	Ericka	Lang	Village of Shorewood
X	5	Robin	Mueller	Shorewood Dept. of Public Works
X	6	Judy	Kaiser	Shorewood Dept. of Public Works
	7	Mustafa	Emir	Bonestroo
X	8	Michael	Maher	Shorewood Village Trustee
X	9	Dawn	Anderson	Shorewood Village Trustee
	10	Lisa	Noble	Shorewood Conservation Committee
X	11	Dan	Ford	Shorewood Park Commission
	12	Diane	Buck	Shorewood Park Commission
X	13	Nik	Kovac	Milwaukee 3rd District Alderman
X	14	Kevin	Haley	Milwaukee County Dept. of Parks
X	15	Guy	Smith	Milwaukee County Dept. of Parks
	16	Tom	Blotz	Wisconsin Dept. of Natural Resources
	17	Therese	Gripentrog	Wisconsin Dept. of Natural Resources
X	18	Dan	Kaemmerer	Wisconsin Dept. of Natural Resources
	19	Don	Reed	SEWRPC
X	20	Angie	Tornes	National Park Service
X	21	Ann	Brummit	Milwaukee River Work Group
	22	Ken	Leinbach	Urban Ecology Center
X	23	Kim	Forbeck	Urban Ecology Center
X	24	Kimberly	Gleffe	River Revitalization Foundation
	25	Cheryl	Nenn	Friends of Milwaukee's Rivers
	26	Mary Beth	Driscoll	Groundwork Milwaukee, Inc.
X	27	Peter	McMullen	Cambridge Woods
	28			Milwaukee PC
	29	Laura	Hester	Sunrise Senior Living Center
X	30	Andrew	Stefanich	CB Richard Ellis
	31	Paul	Martens	JSD Professional Services
X	32	Pieter	Godfrey	
	33	Blane	McCann	Shorewood School Superintendent
X	34	Richard	Barloga	Botanist
X	35	Belle	Bergner	Bergner Associates
	36	Jack	Hirt	Bicycle Federation of Wisconsin
	37	Diana	Sullivan	Independence First
	38	Carol	Voss	Independence First
X	39	Margaret	Cibulka	Hubbard Park Lodge/Women's Hall
	40	Karen	Long	
X	41	Kelly	Kiel	UW-Madison
X	42	Roger	Retzlaff	Bicycle Federation of Wisconsin
X	43	Jessica	Winberg	Bicycle Federation of Wisconsin
	44	Harold	Smith	Friends of Estabrook Park
X	45	Marty	Weigel	County Trails Council
	46	Bruce	Keyes	Bike advocate
X	47	Tom	Metcalfe	Bike advocate

APPENDIX C

Vegetation Restoration Plan

C.1. Site Construction and Management Objectives

The primary objective for vegetation restoration is to establish self-sustaining forested plant communities. Restoration will be accomplished first through non-native / invasive species management, planting and seeding, germination of the existing seed bank and natural recruitment from surrounding lands. The project area should be monitored for a prevalence of native vegetation to determine if the conditions have been established to allow for meeting the overall objectives. In addition to the broad objectives for the revegetation effort, several detailed goals apply to the proposed plant species selected for the project. They include:

Vegetation Objectives

Trees: 100 percent survival of planted trees shall be established after two full growing seasons. A minimum of 80 percent survival of planted trees shall be established after three full growing seasons and a minimum of 70 percent after 5 full growing seasons. Replanting should occur in areas with survival rates below these criteria until these standards are met. The restored areas shall be dominated (greater than 50 percent areal cover or basal area) by native tree species after 5 full growing seasons.

Shrubs: 100 percent survival of planted shrubs shall be established after two full growing seasons. A minimum of 80 percent survival of planted shrubs shall be established after three full growing seasons and a minimum of 70 percent after 5 full growing seasons. Replanting should occur in areas with survival rates below these criteria until these standards are met.

Herbaceous Vegetation: Herbaceous plant communities shall be dominated by a minimum of 50 percent cover by desirable native species in restored wetland areas by the 3rd year following construction. At least 75 percent native species cover shall be established by the 5th year following construction. Reapplication of seed should be performed in those areas not meeting the minimum cover criterion in the 3rd and 5th year following construction.

Management Objectives

The primary objectives for vegetation management at the project area are to 1) prevent infiltration of non-native species into newly seeded and planted areas and to 2) eradicate non-native species from adjacent plant communities.

To enhance existing wetlands and increase the likelihood of success for the restoration project, all restoration and management areas should be managed for non-native species. Many non-native species have a competitive advantage over native species in colonizing disturbed areas and are able to become readily established where natural pathways for their dissemination are present. Pathways are the means by which species are transported from one location to another. Natural pathways include wind, currents, and other forms of dispersal in which a specific species has developed morphological and behavioral characteristics to employ. In the case of the Milwaukee River corridor, the most significant source of non-native species introduction is most likely from the adjacent wetlands and uplands and from deposition of seeds into the floodplain carried from upstream sources during flood events. Early treatment to eradicate non-native species where possible will reduce the chance of these species becoming dominant in areas disturbed by trail construction and restoration activities.

Adaptive management for the project area includes four steps:

1. *Develop performance criteria to describe the desired condition.*

Performance criteria for vegetation management are linked with those established for meeting the vegetation goals for the project area. Monitoring and responsive site management are both integral to the success of an effective adaptive management strategy. The criteria for success in areas requiring vegetation management include:

- at the end of the third growing season, the restoration areas shall not contain greater than 25 percent areal cover of invasive and/or non-native species including reed canary grass, garlic mustard, Canada thistle, smooth brome grass, giant ragweed, common ragweed, quack grass, black locust, sweet clovers, non-native honeysuckles and buckthorn
- at the end of the fifth growing season, the restoration areas shall not contain greater than 25 percent areal cover of invasive and/or non-native species including reed canary grass, garlic mustard, Canada thistle, smooth brome grass, giant ragweed, common ragweed, quack grass, black locust, sweet clovers, non-native honeysuckles and non-native buckthorns
- At the end of the fifth growing season following trail construction, reed canary grass, fruiting buckthorn, honeysuckle, and purple loosestrife should be completely eliminated from the project area

2. *Implement the management action to meet the performance criteria.*

Ecological reference standards are used as a framework with which declines or recovery of ecological functions can be compared. In developing these standards, researchers generally identify non-degraded ecosystems and quantify their structure and processes as the basis for comparison. Therefore, performance criteria for the project area have been established based on the need to increase the functional value of wetlands and uplands within the watershed using the condition of the portion of the project area that is dominated by native species for comparison. Methods for planting, seeding, erosion control, and managing and/or eliminating non-native species should be focused on increasing these functional values.

3. *Monitor the vegetation response to determine if the performance criteria have been met.*

Without valid monitoring data, site management may or may not result in improved conditions or compliance with regulatory permits. Assessment of the project area in a timely manner, based on valid monitoring data, will result in increased efficiency and higher probabilities of success.

4. *Adjust management efforts if the performance criteria are not achieved.*

Sometimes the performance criteria for a mitigation site must be re-evaluated by the site manager, environmental coordinator, and regulatory agencies to ensure that recommended management efforts are effective at a given site in achieving the predetermined goals and objectives. To facilitate periodic reevaluation of the efforts being undertaken at the project area, monitoring reports should be produced in years 1, 3, and 5, post-construction. These reports will describe the results of monitoring and comparison with the previous year's results, recommended management implementation schedule, and results of management efforts to date.

C.2. Restoration Recommendations

Restoration of native plant communities within the project area would require a variety of activities, beginning with management of non-native species (invasive plant control); bank and bluff stabilization; and reestablishment of floodplain wetlands and upland deciduous forest.

Planting zones would be defined based on the composition and condition of surrounding vegetation, proximity to the river, presumed depth to ground water and/or soil saturation, and the need for functional stability. Emphasis would be placed on development of naturally sustaining, low maintenance plant communities. While the majority of the restoration efforts would be focused on reestablishment of floodplain forest and upland deciduous forest, there could be opportunities to provide some diversity in the form of establishment shallow marsh and emergent plant communities as well.

A large portion of the existing project corridor contains highly diverse forested plant communities that show little evidence of major recent disturbance. In these areas containing relatively intact, native plant communities, activities related to trail construction and providing access to the public should be geared towards repairing the degradation caused by erosion and removal of non-native species combined with planting efforts that will promote the long-term stability of the existing vegetation. Efforts to minimize further soil and/or vegetation disturbance should be taken during construction or management activities to avoid creating conditions in which non-native species would thrive. As such, construction and restoration activities within high quality floodplain and upland forest areas should begin with bank and bluff stabilization in concert with non-native species removal, regardless of the timing for construction of trails or other park amenities. Bank and bluff stabilization could be accomplished with consideration of the ultimate location of the proposed trails. Once bank and bluff stabilization is completed, planting of native tree, shrub and herbaceous species are recommended for the restoration effort.

In those portions of the project area dominated by non-native species, the approach to restoration would be initially focused on eradication of common buckthorn, honeysuckle and garlic mustard. Management guidelines specify that larger buckthorn specimens be chemically treated in place because removal of the canopy would promote further spread of these undesirable species through creation of conditions that would promote germination of the soil seed bank. As such, it is imperative that plantings occur wherever the canopy is opened if larger plants are removed. Eradication of buckthorn is a long-term commitment and can be best achieved through elimination of fruiting buckthorn as a seed source followed by successive years of annual eradication of seedlings and saplings as they appear.

Box elder (*Acer negundo*) is present throughout all portions of the project area. While this tree species is generally not a preferred landscape plant due to its sprawling growth form, it is an important early successional species that stabilizes soil, provides stream shading, acts as a source of woody debris for fisheries habitat, and provides excellent wildlife habitat value. Because of its ability to provide these natural functions, box elder trees should be retained wherever possible. Likewise, the floodplain forest contains a high density of green ash (*Fraxinus pennsylvanica*), whereas the upland deciduous forest contains white ash (*F. americana*). Both of these species are at risk due to the introduction of the emerald ash borer in Wisconsin in 2008. As discussed in the management recommendations for the project, the emerald ash borer is capable of destroying virtually all ash trees within a woodlot within several years. Ash trees provide similar ecological benefits to those described for box elder trees. While planting of ash species is not advised due to the emerald ash borer threat, retention of existing ash trees is highly recommended as a means of retaining these ecological benefits as well as a maximum amount of tree canopy within areas that would be subjected to non-native species infiltration.

Planting and seeding species recommendations are based on the existing condition of the project area and the ability of the suggested species to thrive over the long-term as areas are managed

and public access is improved. Collectively, the existing and planted species would provide ecological value in terms of erosion deterrence, botanical diversity, enhanced aesthetics and improved wildlife habitat. Species identified for revegetation of the Milwaukee River floodplain and associated uplands have been selected based on their ability to become established in disturbance conditions, their native origin, compatible successional sere, and ability to compete with non-native species.

Upland Deciduous Forest Planting Recommendations

Some recommended tree species for planting at upland elevations include red maple (*Acer rubrum*), sugar maple (*A. saccharum*), beech (*Fagus grandifolia*), ironwood (*Ostrya virginiana*), musclewood (*Carpinus caroliniana*), white oak (*Quercus alba*), bur oak (*Q. macrocarpa*), basswood (*Tilia americana*), hackberry (*Celtis occidentalis*), black cherry (*Prunus serotina*), and shagbark hickory (*Carya ovata*). Recommended shrub species to be considered for planting include nannyberry (*Viburnum lentago*), high bush cranberry (*V. trilobum*), hazelnut (*Corylus americana*) and American plum (*Prunus americana*). Herbaceous vegetation would help to stabilize soils as woody species become established while competing with non-native species that are introduced into the planting and seeding zones either through germination of the existing soil seedbank or by means of other dispersal pathways. Herbaceous species can be seeded or planted as plugs, which would provide a more immediate ground cover. Some appropriate native herbaceous species recommended for planting include Canada anemone (*Anemone canadensis*), Virginia wild rye (*Elymus virginicus*), zig-zag goldenrod (*Solidago flexicaulis*), bottle brush grass (*Hystrix patula*), wild geranium (*Geranium maculatum*), Solomon's seal (*Polygonatum biflorum*), bloodroot (*Sanguinaria canadensis*), false Solomon's seal (*Smilacina racemosa*), and Pennsylvania sedge (*Carex pennsylvanica*).

Floodplain Forest Planting Recommendations

Some recommended tree species for planting at lowland elevations within the Milwaukee River floodplain and at seepage areas include swamp white oak (*Quercus bicolor*), cottonwood (*Populus deltoides*), black willow (Salix nigra), bur oak (*Q. macrocarpa*), American elm (*Ulmus americana*), and silver maple (*A. saccharinum*). Recommended shrub species to be considered for planting include silky dogwood (*Cornus amomum*), red osier dogwood (*C. sericea*), steeplebush (*Spirea alba*), common ninebark (*Physocarpus opulifolius*), and beaked willow (*Salix bebbiana*). Some appropriate native herbaceous species recommended for planting in wetter portions of the floodplain include emergent vegetation such as manna grass (*Glyceria striata*), giant manna grass (*G. grandis*), lake sedge (*C. lacustris*), bottlebrush sedge (*C. comosa*), soft rush (*Juncus effusus*), Canada bluejoint grass (*Calamagrostis canadensis*), joe-pye weed (*Eupatorium maculatum*), tall goldenrod (*Solidago altissima*), marsh milkweed (*Asclepias incarnata*), New England aster (*Aster novae-angliae*) and marsh aster (*A. simplex*).

C.3. Maintenance & Monitoring of Plant Communities

Restoration will be accomplished through planting rootstock and seeding, germination of the existing seed bank, and natural recruitment from surrounding lands and upstream wetland areas. The planted and seeded areas should be monitored for five years following construction to assess planting and seeding success. Development of an adaptive management strategy is a critical component of ensuring success in achieving the goals and objectives for the project area. Recommended annual schedules for monitoring and management of all restoration and

mitigation zones are included in Table C-1 located at the end of this section. Specific activities to be performed for monitoring and management are described below.

C.3.1. Monitoring Guidelines

Monitoring and management guidelines are typically geared towards successfully achieving site goals and objectives.

1. Initial Evaluation

During the spring following construction, the planting and seeding zones should be evaluated for the following:

- compliance with general and specific commitments
- correspondence to plan;
- correspondence to contract special provisions;
- elements of project requiring remediation and repair; and
- the need for future monitoring.

2. Record of Plant Species

Vegetation monitoring should be performed annually for five years. The restored floodplain and upland forest should be monitored during mid to late summer. A working plant list would be created and updated during each visit to facilitate accurate identification of species that bloom at different times during the year. Cover of plant species identified would be calculated using the line intercept method of vegetation sampling. This method is useful for sampling grasses, sedges and woody vegetation where individual counts can be tedious. The line intercept method would be accomplished by establishing transects in each of the vegetation planting zones identified on the planting plan. All transects would be identified by a permanent, yet inconspicuous marker installed at the end of each transect. Along each transect, vegetation will be identified and cover will be estimated. Plant species data will be sorted and compared according to their percent relative cover, wetland indicator status, life cycle (annual versus perennial) and seed source (native versus non-native). In order to maintain consistency, individual plants that can only be identified to the level of genus would be labeled as "unknown" when sorting for indicator status, etc.

Vegetation cover would be examined to determine if the criteria for vegetation success, as described in the Vegetation and Management Objectives (Section C.1), are being met and to evaluate the effectiveness of vegetation management efforts.

3. Photographic Log

Photographs showing all representative wetland restoration and mitigation areas will be taken at least once per year between July 1 and September 30 for a minimum of five years.

4. Wildlife Species Observations

Casual observations of all wildlife species should be recorded for each monitoring visit during the five-year monitoring period. The types of wildlife to be incorporated in the report include songbirds, waterfowl, amphibians, reptiles and mammals. Although this data will not be comprehensive, it will provide some measure of wildlife usage of the project area.

5. Site Maintenance and Invasive Species Monitoring

Each year, the project area should be monitored for the presence of non-native species. Steps to control any identified non-native species are provided in Section C.3.2.

6. Monitoring and Status Reports

Data should be collected and monitoring reports documenting project area conditions submitted on an annual basis. The first-year report should include the initial plant community type and acreage restored per the as-built plan. Information in these reports should include (at a minimum) data collected from tasks one through five above. Each report should compare current data with data collected in previous years. Monitoring reports should include the following:

a. General Site Description

b. Description of Existing Condition (vegetation)

1. Transect Data

2. Vegetation Results and Discussion

c. Project Coordination Summary

d. Assessment of the Success in Meeting Restoration Site Goals and Objectives

e. Assessment of the Success in Meeting Management Goals and Objectives

f. Recommendations for Future Management / Remedial Actions

C.3.2. Management Guidelines

To increase the likelihood of success for the restored plant communities, each newly seeded and planted area, as well as the abutting project corridor should be managed to control target non-native species (invasive plan control). Many non-native species have a competitive advantage over native species in colonizing disturbed areas. Early treatment to eradicate them will reduce the chance of non-native vegetation from becoming dominant in areas disturbed during construction.

Dominant non-native woody species present on the project area include common buckthorn and bush or shrub honeysuckles. Non-native herbaceous vegetation found on the perimeter of the floodplain forest restoration area includes reed canary grass, purple loosestrife, Canada thistle and garlic mustard. Each of these species is extremely invasive and capable of successfully competing with native vegetation. Construction activities and associated soil disturbance will occur throughout portions of the project area and non-native species are more likely than native species to colonize disturbed areas. Therefore, the need for vegetation management in the project area is critical to not only reduce the dominance of non-native species, but to prevent these species from invading restored areas as well.

Management techniques recommended for use, given the current conditions throughout the project area, are provided below. All management activities should begin as soon as possible according to the following guidelines and the schedule provided in Table C-1 following the guidelines.

Reed Canary Grass (*Phalaris arundinacea*)

Reed canary grass is found along the floodplain in several areas in the northern portion of the project area, while in the southern portion, smaller areas of wet meadow adjacent to the Milwaukee River are infested with this invasive, nonnative grass. To prevent reed canary from gaining a foothold in the restoration areas, as well as other portions of the project area that have healthy native plant populations, treatment should begin at the start of the trail construction project because if left unchecked, reed canary grass can form dense, monotypic stands that become increasingly difficult to manage.

Apply a foliar solution in early in spring. Vantage®, a cyclohexane-based herbicide can generally used in upland areas, while Rodeo®, a glyphosate-based herbicide is suitable for aquatic areas. Reed canary grass, like many invasive species, begins growing while most native species are still dormant. Therefore, early herbicide treatment will help to prevent accidental damage to native species intermixed or adjacent to reed canary grass. A second application should be conducted in fall (October) when most native plants have again become dormant, but reed canary grass is still green and will translocate the herbicide into the root system, thereby killing the rhizome as well as the vegetative portion of the plant. It is important to apply cyclohexane-based herbicides during ideal weather and during active growth. All herbicide applications should be performed according to manufacturer's instructions. .A prescribed burn conducted in late fall will remove dead vegetation and encourage germination to deplete the reed canary grass seed bank prior to the fall herbicide application. However, if prescribed burns are not possible due to regulatory or other constraints, mowing should be substituted. The need for persistence and repeated treatments is stressed in the research concerning reed canary grass, as management of this species is notoriously difficult. In addition, reed canary grass seed will constantly be introduced into the project area as it is carried in flood waters and deposited in the floodplain. While this Site Plan provides guidance for the first five years following construction activities, it is important to note that periodic treatments to eradicate reed canary grass will most likely need to occur in perpetuity.

Common Buckthorn (*Rhamnus cathartica*) and Glossy Buckthorn (*R. frangula*)

Common and glossy buckthorn is present throughout wooded areas, but is dominant in the northern one-third of the project area. Buckthorn species grow in a shrubby form, but can reach small tree size up to 25 feet. Although young plants are capable of producing seed, more mature and larger plants will probably produce the greatest number of seeds. Therefore, treatment should focus on the largest specimens first.

Treatment to eradicate buckthorn can be accomplished using a variety of methods ranging from cutting and removal to treatment in place. The method selected for treatment depends on the condition of the surrounding vegetation including the presence of other non-native species and/or desirable native species, presence of buckthorn seed in the soil seed bank, light and other environmental conditions, and the potential for long-term management. In short, the strategy selected for buckthorn removal must consider the potential effects to the surrounding environment and whether or not the conditions created following eradication of adult buckthorn specimens will reduce or promote the long-term viability of the native plant community. One method is not always universally applicable to a site with varying conditions; as a result, it is sometimes best to combine methods as site conditions dictate.

For areas dominated by adult, fruiting buckthorn, treatment involves a basal bark application of Garlon 4® or other appropriate substitute. Methods of application include broadcast foliar, direct spray (hose and hand gun) and basal bark treatment. To avoid potential overspray into areas dominated by native species, basal bark treatment is recommended. Basal bark application allows the active chemicals (triclopyr compounds) to penetrate the cambium region of the woody stem. Basal bark treatments are are effective year-round provided there is no moisture or frost present on the stems. Effects of the active ingredient will be increased with the combination of bark penetrants, such as Pentrabark®. Garlon 4® is not approved for application to water surfaces, so should not be applied to plants in areas where it could come into contact with the river or other surface water. For aquatic areas, a glyphosphate-based herbicide such as Rodeo® is recommended. Following completion of basal bark treatment, plants should be left in place as a means of retaining as much canopy as possible in the early stages of management. Complete canopy removal would provide sites for buckthorn seeds to germinate and create conditions for existing buckthorn seedlings to grow rapidly, so it is important to follow up with additional management to prevent buckthorn from becoming dominant in the herbaceous and shrub layer if the canopy is opened.

In areas dominated by native species with interspersed buckthorn, treatment involves cutting the trunk at or near ground level, then treating the cut stump with Rodeo® (a glyphosate formulation) or Garlon 4® according to the manufacturer's instructions. Garlon 4® is generally used in upland areas, while Rodeo® is suitable for aquatic areas. The stumps may re-sprout and should be checked at least once a year and retreated, if necessary. Once the larger plants are treated, the smaller plants can be treated using the same method. Young saplings can also be pulled out from the roots, but the associated ground disturbance may promote the germination of

invasive species from the existing seed bank. To minimize this effect, disturbed areas should be tamped down following removal of the buckthorn. One advantage in treating buckthorn is that it can be treated at any time of year, although spring and fall treatments are least likely to affect non-target, native species because these species are typically dormant when buckthorn is still green and biologically active. Fall may be the best time to treat buckthorn because it is during that time translocation of materials (food, water, minerals and pesticides) occurs primarily downward into the roots of the plant. Regardless of the method used to eradicate buckthorn, it is important to recognize that the eradication process is a long-term effort requiring an annual commitment to remove plants until the soil seed bank is depleted of buckthorn seeds.

Honeysuckle Species (*Lonicera x bella, L. mackii, L. morrowii, L. tatarica*)

Bush honeysuckles are also found in the project area, although they are not dominant, but rather scattered sporadically throughout the project corridor. These upright, deciduous species originally spread from horticultural plantings and grow in a shrubby form, but can reach small tree size up to 18 feet. Bush honeysuckles grow vigorously and their early spring leaf out (one to two weeks before native species) can inhibit the growth of native species and also reduce food and cover for wildlife (Czarapata 2005).

Treatment should initially focus on the largest specimens in the floodplain forest restoration area that are capable of producing seed. Treatment involves cutting the trunk at or near ground level, then treating the cut stump with Garlon 4® or Rodeo® (a glyphosate formulation) according to the manufacturer's instructions. Garlon 4® is generally used in upland areas, while Rodeo® is suitable for aquatic areas. Bush honeysuckle stumps will resprout vigorously if not properly treated with herbicide and should be checked at least once a year and retreated, if necessary. Once the larger plants are treated, the smaller plants can be treated using the same method. Young saplings can also be pulled out from the roots, but the associated ground disturbance may promote germination of non-native species from the existing seed bank. Chemical control must be repeated for at least three to five years in order to deplete the bush honeysuckle seed bank. Chemically treating shrub or bush honeysuckles is best performed during the winter when native species are dominant and less likely to be harmed by chemicals. Chemical treatment of bush honeysuckles is least effective when performed during the spring (Czarapata 2005).

Garlic Mustard (*Alliaria petiolata*)

Garlic mustard poses a major threat to species diversity in the project area. As a result, the entire project corridor should be monitored annually for garlic mustard and new plants should be pulled by hand in May and June. This includes ceasing all dumping of brush and plant debris. Alternatively, plants could be cut at ground level, preferably during the flowering stage before seeds have ripened (Packard and Mutel 1997). Because garlic mustard seed may develop even after the plant has been pulled from the ground, all flowering plants should be bagged and disposed of off-site. Treated areas should be thoroughly tamped by foot to minimize soil disturbance and risk of re-establishment of garlic mustard or other non-native species from the seed bank. Another treatment option is to apply a foliar glyphosate solution (Roundup® or Rodeo®, as conditions require) to garlic mustard rosettes (the first-year vegetative stage) in March or April (Packard and Mutel 1997). Because garlic mustard germinates prior to most native plant species in spring, and glyphosate is inactivated by soil contact, early treatment would limit potential herbicide exposure to native plant populations. Like all mustards, garlic mustard plants are are prolific seed producers (up to 40,000 seeds produced per plant). As a result, treated areas must be monitored and retreated until the seed bank is depleted.

Canada Thistle *(Cirsium arvense)*

Canada thistle is a non-native, invasive plant that poses a minor threat to species diversity on the project area. Monitoring for its appearance in the floodplain forest restoration and wetland mitigation areas should be performed and any plants observed should be treated annually in spring and early summer prior to the flowering stage (July to September) (WDNR 2004). Treatment should include foliar application of glyphosate solution (Roundup® or Rodeo®, as conditions require) or cutting and spraying the remaining cut stem with herbicide to prevent resprouting. Since seeds can still develop from flowers or immature seed heads when stems are cut, the plants should be bagged and disposed of off site if flowers or immature seed heads are present.

Purple Loosestrife (*Lythrum salicaria)*

Although only several purple loosestrife plants were observed in the project area, this species is non-native and can be extremely invasive. Purple loosestrife plants observed during monitoring should be treated before the population has an opportunity to produce seed. Herbicides most often used for controlling purple loosestrife are glyphosate solutions (Rodeo® for wetland and Roundup® for uplands). Since these herbicides are non-selective, care should be taken to avoid accidental treatment of non-target vegetation (TNC 2001). Apply a foliar herbicide solution according to the manufacturer's instructions in spring and early summer before the flowering stage (June to September). If flowers are developing, they should be cut, bagged and disposed of off site to prevent seed dispersal.

Other Non-Native Species of Concern

Other non-native plant species can adversely affect the viability of the restoration areas as well as the diversity of native plant communities. While discussion of the most prevalent non-native species has been provided, annual monitoring of the project area could result in identification of other plant or insect species in need of treatment.

A non-native insect species of major concern for the project area is the emerald ash borer (*Agrilus planipennis*), an exotic beetle that was discovered in Wisconsin in Ozaukee and Washington Counties in July 2008. Emerald ash borer probably arrived in the United States on solid wood packing material carried in cargo ships or airplanes originating in its native Asia (USDA 2008). This species attacks ash trees including green ash (*Fraxinus pennsylvanica*), white ash (*F. americana*), and black ash (*F. nigra*). Both green and white ash are prevalent throughout the project corridor. While the adult emerald ash borer beetles feed on ash foliage, they cause little damage; however, the adult beetles deposit their larvae at the base of tree. These larvae feed on the inner bark (cambium), and disrupt the transport of water and nutrients from the tree root system to the rest of the tree's vascular system resulting in imminent death of the tree.

The emerald ash borer has killed more than 40 million ash trees in southeastern Michigan alone, with tens of millions more lost in Ohio, Illinois, Indiana, Pennsylvania, West Virginia and Virginia (USDA 2008). In an effort to reduce the spread of this insect, the Wisconsin DNR has developed the *Wisconsin Emerald Ash Borer Response Plan* (WDATCP & WDNR

2008), which outlines measures being developed to eliminate potential sources of introduction and treatment methods for infested areas. This plan is currently in the developmental stages; however, landowners are urged to take action now to avoid potential loss of woodland resources.

Methods being utilized to inhibit the spread of emerald ash borer include thinning ash tree densities, cutting and removal of all ash trees, and chemical treatments. The chemical treatments include foliar spraying, basal bark injection and soil injection. In regards to basal bark treatments, using a bark penetrant, such as Pentrabark®, can help to deliver active ingredients directly to the tree's vascular system while not adversely affecting overall tree health or the health of non-target vegetation. Pentrabark® can also be used to introduce nutrients systemically and could yield other health benefits to stressed trees as well. However, the most effective method for treatment in areas in which cutting of all ash trees is not feasible or desirable, as is the case with the Milwaukee River corridor, is soil injection. The soil injection is accomplished through injection of an insecticide at the base of the tree. The insecticide is then absorbed by the root system of the tree. The active ingredient of this insecticide is imidacloprid - a broad-spectrum, systemic insecticide. It blocks receptor sites in the nervous system of the emerald ash borer larvae and disrupts internal transmission of messages. Insects ingest imidacloprid, quickly stop feeding on the tree's vascular system, and then die. Imidacloprid-based insecticides are available at retail suppliers and the applicator does not need to be certified by the State of Wisconsin as a commercial pesticide applicator to apply these compounds. Because the project corridor tree canopy has a high percentage of ash trees, it is vital to the long-term viability of the upland and lowland forest areas to begin treatment immediately in order to retain as much canopy as possible. The largest ash trees and those providing the most ecological benefit (stream shading, slope stabilization) should be treated first, followed by smaller specimens. The current application methods require treatment on an annual basis during May or early June for a minimum of three years. As more information becomes available regarding the life cycle of the emerald ash borer, other methods for eradication of this insect could become available. Therefore, it is recommended that the State of Wisconsin DNR be contacted and consultation on an appropriate treatment method be undertaken prior to implementation of a treatment program.

Table C-1: B-4 River District Riparian Restoration and Trail Project Site Management and Monitoring Schedule for Years 1 through 5

SITE MANAGEMENT FOR FLOODPLAIN FOREST RESTORATION AND WETLAND MITIGATION AREAS													
		Month											
	Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Reed Canary Grass	Monitoring												
	Herbicide Application												
Buckthorn and Honeysuckle	Monitoring												
	Hand Pulling												
	Cutting/Mowing												
	Herbicide Application												
Garlic Mustard	Monitoring												
	Hand Pulling												
	Herbicide Application												
Purple Loosestrife	Monitoring												
	Cutting/Mowing												
	Herbicide Application												
Canada Thistle	Monitoring												
	Hand Pulling												
	Herbicide Application												
Emerald Ash Borer	Insecticide Application												
Other	Specific treatments for other non-native species												
SITE MONITORING													
	Vegetation Inventory*												
	Trees												
	Shrubs												
	Herbaceous Vegetation												
	Photographs												
	Wildlife Observations												
	Reporting (Years 1 through 5)												

See Section C.3.2 for specific monitoring and management requirements.

APPENDIX D

Potential Volunteer Groups

The following is a list of volunteer groups who have expressed an interest or may be available and willing to contribute to the construction and maintenance of the trail system.

Organization: **Shorewood Boy Scout Troop 6**
Troop 6 Boy Scouts uses the "Youth Building" in Hubbard Park for meetings and projects. Troop 6 can provided labor for special projects and regular maintenance. In addition, such a service project would be attractive to an Eagle Scout candidate.

Contact: John Dallman, Scoutmaster
Phone: 414.332.1882

Organization: **Wisconsin Off Road Bicycling Association (WORBA)-**
Metro Milwaukee Mountain Bikers Chapter
WORBA undertakes off road mountain bike trail building projects throughout the state. The Metro Milwaukee Mountain Biker Chapter has worked on several local projects including a trail loop in Hoyt Park. WORBA also organized work days primarily focused on spring and early summer trail maintenance. This group is very interested in sustainable trail building and maintenance practices, has practical experience, and the forces.

Contact: Marty Weigel
Email Address: marty@worba.org

Organization: **Groundwork Milwaukee/AmeriCorp NCCC**
AmeriCorps National Civilian Community Corps (NCCC) is a full-time, team-based residential program for men and women age 18–24. The mission of AmeriCorps NCCC is to strengthen communities and develop leaders through direct, team-based national and community service. In partnership with nonprofit organizations, state and local agencies, and faith-based and other community organizations, members complete service projects throughout the region they are assigned. Groundwork Milwaukee has written grants and facilitated several AmeriCorp projects in the Milwaukee area that have an environmental restortation focus including native planting and trail projects in the Menomonee Valley, East Bank Trail, and the Beerline Recreational Trail in Milwaukee's Riverwest neighborhood.

Contact: Mary Beth Driscoll, Groundwork Milwaukee
Phone: 414.405.3272
Email Address: mbdriscoll@groundworkmke.org

Organization: **Urban Ecology Center-Volunteer program**
Linking with volunteers at the UEC seems possible; the UEC has a strong interest in the entire Milwaukee river corridor, including Milwaukee's Central Park project. It is worth pursuing options for collaboration and

shared organization, as well as learning best practices from the UEC for the engagement of volunteers.

Contact: Susan Winans
Phone: 414.964-8505 x 110
Email Address: swinans@urbanecologycenter.org

Organization: **Shorewood Conservation Committe**e
The conservation committee undertakes projects in the community that foster environmental awareness and stewardship. Such a group could assist with promoting and publicizing the new trail system as well as suggested good practices and could participate in a community work day.

Contact: Lisa Noble, Conservation Committee Chair
Email Address: macnoble@sbcglobal.net

Organization: **Shorewood School District/Watershed Wisdom**

Contact: Michael Gregornick
Phone: 414.963.6962 x 5120
Email Address: mgregornick@shorewood.k12.wi.us

Organization: **University of Wisconsin – Milwaukee (UWM) Service Learning Program**
Each semester, UWM faculty offer students a service learning option in courses ranging from the humanities to the health sciences. Depending on the course, students commit to 10-15 hours of service at an area nonprofit or complete a service learning project. By melding academics with service, course work comes alive and students learn civic responsibility as they deepen their understanding of the community in which they live.

Contact: Institute for Service Learning
UW Milwaukee
Holton Hall G36
2442 East Hartford Ave.
Milwaukee, WI 53211

Organization: **The Volunteer Center of Greater Milwaukee**
The Volunteer Center is a clearinghouse, connecting volunteers with nonprofit agencies and organizations that need their services. It is also a focal point of volunteer operations and resources.

Contact: The Volunteer Center of Greater Milwaukee
2819 W. Highland Blvd.
Milwaukee, WI 53208-3217
414.273.7887

Organization: **Milwaukee River Keeper**
Milwaukee River Keeper's mission is to protect water quality and wildlife habitat in the river corridors and to advocate for sound land use in the Milwaukee, Menomonee, and Kinnickinnic River Watersheds. This group facilitates many volunteer activities including the annual Earth Day river clean-up activities.

Contact: Cheryl Nenn, Interim Executive Director
Phone: 414.287.0207 x 29
Email Address: cheryl_nenn (at) milwaukeeriverkeeper.org

Organization: **Recreational Equipment, Inc. (REI)**
REI organizes annual service projects in each of its retail store markets, recruiting local members and volunteers to perform hands-on, community-based conservation work.

Contact: REI, Brookfield Store
13100 W. Capitol Dr.
Milwaukee, WI 53005
Phone: 262.783.6150