MAY 2006

FINAL ENVIRONMENTAL ASSESSMENT

Milwaukee County Grounds Floodwater Management Facility and Underwood Creek Rehabilitation Projects

MMSD Contract No. W20004D01



prepared for

WISCONSIN DEPARTMENT OF NATURAL RESOURCES



and

MILWAUKEE METROPOLITAN SEWERAGE DISTRICT



prepared by

HNTB CORPORATION



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- Appendix A Butler's Gartersnake Conservation Plan
- Appendix B A Citizen Guide to the Role of the Wisconsin Environmental Policy Act
- Appendix C Responses to Public Comments

To the Reader:

This final Environmental Assessment (EA) for the Milwaukee Metropolitan Sewerage District Milwaukee County Grounds Floodwater Management Facility and Underwood Creek Rehabilitation projects fulfills part of the requirements of the Wisconsin Environmental Policy Act (WEPA) Wis. Stat. 1.11. WEPA requires state agencies to consider environmental factors when making decisions. The purpose of this EA is to provide the decision makers, the public, and other stakeholders with an analysis of the existing conditions, proposed action, and impacts related to the proposed rehabilitation of Underwood Creek, floodwater diversion structure and tunnel, basin, low-level outlet and spillway to the Menomonee River, construction of a Swan Boulevard bridge over the basin, and the construction of an upland open space area.

Several changes have been made to the draft EA. These changes have been made in response to written and oral comments received on the draft EA, new information, and as a result of additional analysis. There was a public information meeting on May 1, 2006 in the City of Wauwatosa. Changes include:

- Chapter 22 which analyzes the Federal Emergency Management Agency (FEMA) floodplain one percent probability event was revised to indicate that 281, not 249, structures would no longer be required to obtain insurance.
- Additional analysis of physical safety hazards was added to Chapter 22.
- Appendices A Butler's Gartersnake Conservation Plan and Appendix B A Citizen Guide to the Role of the Wisconsin Environmental Policy Act in DNR Decision Making were added to provide additional information.
- Appendix C has been prepared to respond to comments, questions, and concerns raised by members of the public and others interested in the proposal.

Alternatively, there is information that DNR staff have not been able to present in this document due to insufficient information. Some of these items include:

- The final design for Underwood Creek Rehabilitation is not yet final, so the number and locations of impacted trees is not established. The response to David Marsek's public comment indicates that 492 trees (4 inch diameter or greater) were surveyed because they could potentially be impacted during construction.
- The final designs for the diversion structure in Underwood Creek and the low-flow outlet and spillway to the Menomonee River are not yet final. There are no architectural drawings available to illustrate the measures that will be taken to prevent unauthorized entry and protect human safety. Chapter 22 does provide text with information and analysis of physical safety and drowning hazards.

DNR regulatory decisions will consider the environmental effects of their actions to the extent possible under statutory authorities. DNR regulatory action on the proposed project is expected in May 2006. Specific questions on the EA should be addressed to: Michael Thompson, Department of Natural Resources, (414) 263-8648, e-mail address: <u>Michael.thompson@dnr.state.wi.us</u>.

Executive Summary

The Wisconsin Department of Natural Resources (DNR) proposes to issue a Chapter 30 permit to the Milwaukee Metropolitan Sewerage District (MMSD) for the construction of a floodwater management facility on the Milwaukee County Grounds, in the City of Wauwatosa, Wisconsin. The facility would include a floodwater diversion structure at Underwood Creek, a tunnel, a basin, and a low-level outlet and spillway structure at the Menomonee River. The project would also involve the rehabilitation of Underwood Creek, from USH 100 to its confluence with the Menomonee River, the construction of a bridge to carry Swan Boulevard over the basin, and the construction of an upland open space area through the placement of fill excavated during the construction of the facility.

The Milwaukee metropolitan area has experienced nearly \$100 million in flood damages over the past eight years alone. Since 1973, Milwaukee County has experienced \$138 million in property damage and four fatalities. During this time period, the region had nine flood-related Presidential-declared disasters and two Presidential emergencies. In response to the need for floodwater management, the MMSD initiated a comprehensive and watershed-wide approach by developing a Watercourse System Management Plan for its planning area, including the Menomonee River. The Menomonee River Watercourse Management Plan consists of five main projects that are integrated and require each other to function properly for managing flooding in the Lower Menomonee River. The Milwaukee County Grounds floodwater management facility is one of the Watercourse Management Plan's component projects. The construction of the floodwater management facility, the development of an upland open space area, and the rehabilitation of Underwood Creek are consistent with local land use plans and the MMSD's long- term objectives to reduce flooding and improve habitat.

The MMSD would purchase ninety-one acres of land from Milwaukee County for the facility. The construction of the floodwater management facility would require the excavation of approximately 2 million cubic yards of material; much of this material would be placed on adjacent Milwaukee County land to develop an open space area with variable topography. Considering the size of the facility and the quantity of material to be relocated on the County Grounds, the MMSD has participated in an extensive public involvement process during the facility's design. Over the last few years, the facility's design has been revised to address the public's desire to preserve the site's cultural and natural resources. In addition to public meetings, the MMSD has extensively collaborated with state and local agencies to optimize the designs of the facility and the rehabilitation of Underwood Creek.

Floodwater conveyed to the basin would be diverted from Underwood Creek via a diversion structure along the east bank of the Creek. The diversion structure would intercept and divert flows with an approximate twenty-five percent probability event or greater. The diversion structure would pass water into a concrete-lined tunnel having a 17-foot inner diameter. The tunnel would convey water into an underground stilling basin to reduce the water's energy before the flowing into the basin. The basin would consist of two lobes that would be connected by a channel passing beneath a newly constructed bridge at Swan Boulevard.

The amount of water diverted would depend upon the amount and duration of flow in Underwood Creek. During the facility's one percent probability inundation event, water would reach a depth of about nineteen feet in the basin. The water would drain from the facility via a low-level outlet to the Menomonee River, within four days following a one percent probability event. The facility would be designed to pass high flows, greater than the one percent probability event, with an emergency overflow spillway. The low-level outlet and the emergency overflow spillway would be located within the same structure, in the vicinity of the existing MMSD Odor Control Facility.

Because of the degree of diversion involved, the Milwaukee County Grounds facility would be regulated as a dam and assigned

a high hazard rating due to the risk of downstream structures. Up to the one percent probability event, all outflows would pass through the low-level outlet. When larger events occur, flows would pass over the overflow spillway, which would be designed to pass a 0.1 percent probability event applied constantly over an extended period of time (an event that would have a probability of far less than 0.1 percent per year) while maintaining water levels within the facility at 683.0 feet. If water levels were to exceed 683.0 feet, the first point to overtop the facility would be immediately west of Swan Boulevard, and this flow would travel to the Menomonee River by way of Swan Boulevard. The second potential failure location is at the embankment along the eastern edge of the basin. A berm would be constructed by an existing water quality pond, located on the southeastern portion of the site, to alleviate potential flooding to downstream structures if a dam failure were to occur.

In addition to the construction of the diversion structure on Underwood Creek, the reach of Underwood Creek from STH 100 to the confluence with the Menomonee River would be rehabilitated by replacing the concrete-lined channel with natural banks. The diversion of water from Underwood Creek to the floodwater facility during high-flow events creates an opportunity to rehabilitate Underwood Creek as the removal of concrete, alone, would increase flood elevations along Underwood Creek. The rehabilitation of Underwood Creek would improve riparian and aquatic habitat, reduce the risk of drowning during high flow events, create better watercourse aesthetics, and also maintain the appropriate water level for floodwater management.

Milwaukee County Grounds and Underwood Creek contain a variety of cultural and natural resources. Cultural resources include two cemeteries, community gardens, and historic buildings. Natural resources include stands of hardwood forests, a primary environmental corridor, isolated natural areas, critical species habitat, Tier 3 Butler's Gartersnake habitat, and wetlands.

Impacts

The primary physical impacts from this project involve; grade changes associated with the basin excavation, fill placement in the open space area on the Milwaukee County Grounds site, and concrete lining removal, and flood management berm construction along Underwood Creek. Naturalized plantings would be established in all disturbed areas.

The project would impact approximately 4.69 acres of wetlands along Underwood Creek and on the Milwaukee County Grounds. This impact assumes that no wetlands on Milwaukee County's proposed economic development area would be filled with excavation materials from the basin. Through ongoing coordination with the DNR and U.S. Army Corps of Engineers (USACE) staff, wetland mitigation for both the Milwaukee County Grounds and Underwood Creek projects is proposed within the Underwood Creek corridor in accordance to USACE guidance. In addition to mitigation, wetlands would be created within the Underwood Creek corridor beyond the USACE mitigation requirements and in the floodwater facility's basin bottom. These latter wetlands would not be used towards USACE mitigation requirements, because the basin's primary function is to manage floodwater. Nonetheless, the wetlands would be created and would also create the opportunity to use the bottom of the basin as mitigation for impacted Butler's Gartersnake Tier 3 habitat.

Approximately 17.7 and 10.5 acres of Tier 3 Butler's Gartersnake habitat would be impacted by the project within the Milwaukee County Grounds and Underwood Creek corridor, respectively. This impact is considered short term. Snakes would be relocated to a temporary holding area on Milwaukee County Grounds during construction. The habitat will be restored and maintained in perpetuity per MMSD's commitment to DNR that is outlined in a snake habitat conservation plan for the basin and Underwood Creek. The plan is expected to result in no net loss of snake habitat. The project is anticipated to provide a long-term benefit of preserving Butler's Gartersnake and wetland habitat.

Orchard oriole, Forked aster, and Wafer ash have been observed on the County grounds. The oriole and the aster are legally protected. The project would not impact Forked aster, but would potentially impact nesting orioles if trees are removed in early

summer. Construction in the vicinity of oriole habitat should be avoided during the active nesting period between mid-May to mid-June. Some Wafer ash may be removed during project construction, but large stands of the trees would be avoided.

The DNR has expressed concern about groundwater drawdown during construction under the proposed DNR Forestry Education Center from both tunneling and excavation activities. Groundwater drawdown at the Center, due to tunneling, would be mitigated by the use of a tunnel boring machine that minimizes the amount of groundwater that flows into the tunnel. The impact of groundwater drawdown at the basin would potentially extend about 260 feet up-gradient and would likely be a few inches or less at the edge of the DNR Forestry Education Center. Groundwater elevations in the vicinity of the forest would be monitored during construction.

The impact of diverting water from Underwood Creek would be minimized as diversions would occur during flows with an approximate twenty-five percent probability event or greater that would leave a considerable amount of flow remaining in the Creek. The diversion of a portion of the peak flow during a one percent probability event has the benefit of allowing Creek rehabilitation efforts downstream of the diversion structure. Without the diversion, the rehabilitation of Underwood Creek would not be possible.

Extensive public involvement led to design changes that would preserve the cemeteries and tree stands and would avoid historic buildings on the County Grounds site. About one-third of the community gardens would be relocated within the County Grounds site; the remaining garden plots would be relocated within Milwaukee County per the County's discretion.

The U.S. Army Corps of Engineers (USACE), as part of its Section 404 permit review, found that both the Underwood Creek and Menomonee River parkways are eligible for listing on the National Register of Historic Places. The State Historic Preservation Officer concurred with the USACE's finding. The proposed outfall structure on the Menomonee River would have an adverse effect on a historic revetment wall along the river. The USACE, MMSD, and the State Historic Preservation Officer have developed a Memorandum of Agreement to mitigate adverse impacts.

Alternatives Considered

During the MMSD's watercourse planning process for the Menomonee River watershed, the agency developed a number of alternatives for managing floodwater at the watershed scale. MMSD considered detention in alternate local, sub-regional, and regional locations, along with other measures such as removing structures from the floodplain, constructing floodwalls and levees, lowering floodplains, natural storage, and local stormwater runoff controls. Through an extensive public involvement process, consideration of community impacts, and an independent Southeastern Wisconsin Regional Planning Commission review, the MMSD selected an alternative that included the Milwaukee County Grounds facility as the most effective measure to eliminate one percent probability event flooding in the Lower Menomonee River and that minimizes impacts to communities and natural resources. The function of the Milwaukee County Grounds floodwater management facility would also allow the rehabilitation of Underwood Creek, by reducing flow that otherwise would cause flooding if the concrete lining was removed. The other alternative considered for the Underwood Creek rehabilitation involved considerable excavations along the bank to address effects of removing the concrete and was not considered feasible.

While the construction of the floodwater management facility would permanently preclude development or other land uses at the facility, the grading, landscape, and vegetation plans facilitate maintaining the project area as open space. This is consistent with the City of Wauwatosa and Milwaukee County's long-term land use plan. The rehabilitation of Underwood Creek is consistent with the MMSD's Watercourse Policy and implementation guidelines and would not preclude future rehabilitation upstream of the project reach.

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FOR AN ENVIRONME	ENTAL IMPACT STATEMENT (EIS)
(DNR)	
Farma 4000 4	Dev. C 2004

Form 1600-1

Rev. 6-2001

Department of Natural Resources

Region or Bureau South-East Region Type List Designation

Contact Person: Jennifer Jerich		
Title: Water Regulations & Zoning Specialist		
Address: WDNR Sturtevant Service Center		
9531 Rayne Road, Suite IV		
Sturtevant, WI 53177		
Telephone Number:		
(262) 884.2300		

Applicant: Milwaukee Metropolitan Sewerage District

Address: 260 W Seeboth St Milwaukee, WI 53204

Title of Proposal: Milwaukee County Grounds Floodwater Management Facility/Underwood Creek Rehabilitation Project

Location: City of Wauwatosa, WI; Milwaukee County

Township Range Section(s): T 7N, R 21E, Sections 20 and 21

PROJECT SUMMARY

1. Brief overview of the proposal including the DNR action (include cost and funding source if public funds involved)

The Wisconsin Department of Natural Resources (DNR) proposes to issue a Chapter 30 and Chapter 31 permit to the Milwaukee Metropolitan Sewerage District (MMSD) for the construction of the Milwaukee County Grounds Floodwater Management Facility (MCG) and the rehabilitation and modification of Underwood Creek (UC), in the City of Wauwatosa, Wisconsin (Figure 1).

The project includes the construction of a floodwater management basin on the Milwaukee County Grounds (Figure 2). The basin would be sited on a ninety-one acre parcel purchased by the MMSD and would consist of two lobes, connected by a





channel. One lobe would be located at the former County nursery, northwest of Swan Boulevard, and the other would be located southeast of Swan Boulevard. The basin would be designed to receive water diverted from Underwood Creek during high-flow events. Diversions of a portion of Underwood Creek flows would start during flow events that have an approximate twenty-five percent probability of occurring in a given year. For reference, the twenty percent probability event is defined as an event that has a twenty percent probability of occurring in a given year and may occur due to a storm that delivered 2.40 inches of rain over a six hour time period in the Underwood Creek subwatershed.

Water would enter the basin via an approximately half-mile long tunnel that would extend northeast, from Underwood Creek, to the west lobe of the basin. The tunnel would be bored to a diameter of approximately nineteen feet and lined with concrete so that the inner diameter would be seventeen feet. The tunnel would be bored at a maximum depth of ninety feet below grade. At Underwood Creek, water would be diverted by a diversion structure located on the east creek bank approximately 1,200 feet upstream of the USH 45 Highway Bridge (Figure 3). This structure would consist of a 225-foot long concrete box with an opening at the top; the top of the structure would be covered by a series of grates and be constructed at an elevation of 694 feet. The grates would consist of 12-inch diameter bars. The centers of each bar would be 18 inches from each other and result in a series of 6-inch gaps through which water would flow through during a diversion. Directly beneath the concrete box, a collection chamber would channel the diverted water into the tunnel.

In addition to the construction of the diversion structure on Underwood Creek, the reach of Underwood Creek from STH 100 to the confluence with the Menomonee River (Figure 4), would be rehabilitated and modified. With the exception of approximately 300 feet in the vicinity of USH 45 and the Canadian Pacific Railroad (CPR) bridge, the Underwood Creek reach from STH 100 to approximately 4,100 feet downstream, would be rehabilitated by complete concrete removal (See Typical Sections B and F on Figures 5A and 5B, respectively). The 300-foot section in the vicinity of USH 45 would be modified by replacing the concretelined channel bottom with stone and floodplain vegetation. The sideslopes would remain concrete-lined (See Typical Sections C on Figure 5A, and Sections D and E on Figure 5B). The Underwood Creek reach from approximately 1,300 feet downstream of USH 45 to near its confluence with the Menomonee River would be modified by replacing the concrete in the channel bottom with stone (See Typical Section A on Figure 5A). Comparable to the existing condition, the sideslopes along this reach would be concrete-lined. For the purposes of this EA, the aforementioned description of reach by reach modifications to Underwood Creek will be referred to as "rehabilitation". The diversion of water from Underwood Creek during high-flow events creates an opportunity to rehabilitate Underwood Creek as the removal of concrete, alone, would increase flow elevations along Underwood Creek. The rehabilitation of Underwood Creek would create better watercourse aesthetics by allowing the public to experience Underwood Creek in a more natural condition. The rehabilitation would also improve habitat for resident and migratory fish populations. The rehabilitation would reduce the risk of drowning during high flow events and also maintain the appropriate water level for floodwater management. The design for the rehabilitation of this reach of Underwood Creek is currently in the preliminary phase; this means that the design would not be finalized until 2007. While the descriptions of the Underwood Creek rehabilitation are conceptual, the design has been advanced sufficiently far to indicate that the rehabilitation activities are feasible. The channel rehabilitation would include removal of all or a portion of the concrete lining and four weir / grade control structures, and include the construction of a floodplain and stream channel. A bankfull stream channel would be constructed with an inset sub- or pilot channel to confine low flows. The bankfull stream channel would be located in a slightly meandering pattern within a constructed floodwater conveyance corridor, designed to convey the one percent probability event within the Underwood Creek corridor. The one percent probability event is defined as the event that has a one percent probability of occurring in a given year. Hydraulic modeling results indicate that a storm that dropped 4.7 inches of rain over a









six hour time period, in the Underwood Creek subwatershed, is an example of a storm that would lead to a one percent probability flow event in Underwood Creek. Natural plantings, boulders and cobbles would be established along the corridor in a pool and riffle configuration that would achieve both the floodwater management and the riparian corridor habitat improvement objectives.

When the water elevation in the rehabilitated Underwood Creek reaches 693.5 feet, water would flow into the diversion structure and would be conveyed through the tunnel and into the basin. Water would flow out of the tunnel into a tunnel stilling basin that would be contained in an underground structure (Figure 6). The slowed water would flow into the basin and along the bottom of the basin; if the volume of diverted water was great enough, the water level would eventually rise throughout the basin. Whether produced by the twenty-five percent probability or one percent probability event, any flow that would enter the basin would flow southeast from the west side of the basin, under a new bridge that would be constructed at Swan Boulevard (Figure 7), through the east lobe of the basin, and outfall into the Menomonee River. The basin would temporarily store water during times of peak flow in the Menomonee River and have the capacity to temporarily store water produced by up to the one percent probability event, estimated to be 970 acre-feet. Stored water would outfall, by gravity, from the basin and into the Menomonee River, after peak flow times and highest floodwater elevations on the Menomonee River have passed. The length of time that the basin would store water would be related to the volume of water diverted. The basin would take a maximum of approximately four days to drain following a one percent probability event.

Water would drain from the facility at the basin low-level outlet and spillway (Figure 8). It would be located in the vicinity of an existing MMSD Odor Control Facility, on the north edge of the eastern lobe. Normal flows from the low-level outlet would pass through a control structure and into a set of culverts that would convey flow under the CP Rail tracks and into the Menomonee River. During extreme flow events, the facility would fill to 679 feet, above which water would begin to flow through the emergency overflow spillway and into culverts leading to the Menomonee River. Spillway flows would increase with increasing basin water levels; the spillway would be sized to pass the 0.1 percent probability event when the water level in the basin is at the maximum elevation of 683 feet.

Under normal, non-precipitation conditions, groundwater would seep into the west side of the basin. Water may also enter the basin as runoff from the basin's small tributary area and direct rainfall on the basin. Stormwater runoff from new development in the area would not be managed by the floodwater management basin. Water in the basin would flow gradually towards the basin low-level outlet and spillway structure at the Menomonee River. As it flowed through the basin, water would be concentrated in a central swale that would sustain wetland habitat.

The required grading for the MCG basin would generate fill material that would be placed in a designated "Open Space Area" and Milwaukee County economic development area; approximately 58,000 cubic yards of material would be transported offsite. Consistent with Milwaukee County's 1999 Land Use plan and follow-on Ecological Restoration Plan (HNTB 2005), the fill and grading on the Open Space area is intended to create a natural setting for future active and passive recreational areas (Figure 9). Diversified natural plantings representing a range of upland to lowland plant species would be used to revegetate the area. Future recreational programming and planning, by Milwaukee County, would determine the potential level of active and passive recreation in the open space area.

The floodwater facility is characterized as a dam, because it impounds water when a portion of Underwood Creek flow is







FIGURE 8 Basin Low Level Outlet Mand Spillway

Preserving The Environment Improving Water Quality Environmental Assessment Milwaukee County Grounds Floodwater Management Facility and Underwood Creek Rehabilitation Project Milwaukee, Wisconsin





diverted into the facility during high-flow events. With any dam, there is a risk of damage arising from flows occurring from structural failure. In order to protect several downstream residences in the event that a structure within the facility fails, a berm would be constructed adjacent to the water quality pond (Figure 10), located in the southeast portion of the site. The earthen berm would be raised to an elevation of 670 feet. The berm height would range from four feet along the west side of the pond, to a maximum of 8 to 12 feet along the north and northeast side of the pond. The crest of the berm would be approximately 8-feet wide, the side slopes would range between 2:1 and 3:1 (two or three horizontal feet to one vertical foot), and the entire berm would be finished with natural plantings. Four culverts would be placed in the western portion of the berm to convey surface drainage to the Menomonee River.

2. Purpose and Need

Background - the Menomonee River Watershed

During the last thirty years, rainfall events occurring within the Menomonee River Watershed have caused extensive flood damage. A one percent probability event occurring in April 1973 and a two percent probability event occurring in August 1986 caused overland flooding and stormwater drainage problems and backups (SEWRPC 1990). Flood events occurring in 1997-1998 affected the entire MMSD planning area, but some of the greatest damage occurred along Underwood Creek in the City of Brookfield and the Village of Elm Grove and along the Menomonee River in the City of Wauwatosa from overland flooding, stormwater drainage and sanitary sewer backup problems (SEWRPC 2002). The events also resulted in two fatalities, flooded roads, and damaged infrastructure (National Weather Service 2002). Estimated damages, in Milwaukee County, from 1997, 1998, and 2000 flood events were \$78 million, \$11 million, and \$6.8 million, respectively.

The Milwaukee Metro area has experienced nearly \$100 million in flood damages over the past eight years alone. Since 1973, Milwaukee County has experienced \$138 million in property damage and four fatalities. During this time period, the region had nine flood-related Presidential-declared disasters and two Presidential emergencies. Review of meteorological data, from 1990 to 2003, further substantiates the need for floodwater management in the Milwaukee area. During this time, Milwaukee County has experienced 112 severe thunderstorm watches and eighty severe thunderstorm warnings. As recently as May 2004, the region experienced the fourth wettest month on record.

In response to the need for floodwater management and mitigation, the MMSD initiated a comprehensive approach to stormwater management and flood abatement. This included the development of a Watercourse System Management Plan for providing flood abatement measures in the six watersheds, including the Menomonee River watershed, (Figure 11) located within MMSD's planning area boundary. Key elements of the plan include: development of a watershed-based management plan, formulation of comprehensive and long-term solutions, development of solutions that are environmentally friendly and multi-purposeful, and achievement of a consensus among stakeholders (CDM 2000).

Further supporting the Watercourse System Management Plan, the MMSD adopted a Watercourse Policy in 1999 that supports a watershed-based management approach. The policy outlines the goals and objectives for managing watercourses and drives the decision-making process and implementation of watercourse projects.





Guiding principles of the policy include:

- Floodwater management and stormwater management must focus on watershed-based approaches, not solely local solutions.
- The watershed perspective is important both for avoiding increases to peak flows downstream and for environmental protection.
- Proper stormwater management in future development is a necessary condition for investing in projects to reduce flood exposure.

MMSD's Chapter 13 Surface Water and Storm Water Rule implements the MMSD watercourse management plan by specifically stating that:

- Flood abatement projects include features and techniques to restore stream habitat, improve water quality, protect wetlands, and enhance public access to and use of watercourses, to the maximum extent practical,
- The District shall utilize non-structural flood abatement techniques, such as conservation easements, whenever practical, and
- Straighten a channel, line a channel with an impervious material, or take other activities that merely accelerate flow rates only if no feasible alternative exists.

Similarly, the Watercourse Policy declares that existing, natural river channel lowering is the least preferred alternative for floodwater management and is to be considered only when other alternatives are not feasible.

Thus, the watercourse plans and policies set by MMSD have guided floodwater management solutions for the Menomonee River watershed in a manner that can also rehabilitate natural stream functions, improve water quality, and reflect public input.

This Environmental Assessment (EA) focuses on two projects located within the Menomonee River Watershed: the Milwaukee County Grounds Floodwater Management Facility and the Underwood Creek Rehabilitation Project (Figure 12). The general purpose of these projects is to provide floodwater management and mitigation measures within the Menomonee River Watershed. In accordance to the watershed-scaled management approach, the projects are needed to complement other flood abatement projects occurring at up and downstream locations, and their identification is an outcome of a long history of planning, studies, engineering, and stakeholder and public involvement meetings.

Milwaukee County Grounds Floodwater Management Facility

The Milwaukee County Grounds Floodwater Management Facility would be located by the confluence of the Menomonee River Mainstem and Underwood Creek on the Milwaukee County Grounds (MCG). The ninety-one acre site has mostly remained undeveloped. However, some of the worst flooding along the Menomonee River occurs downstream in developed areas. These areas include Wauwatosa's Hart Park area, the western portion of the City of Milwaukee, and the Valley Park neighborhood (Figure 13).

The MMSD initiated the Menomonee River Watercourse Management Plan (CDM 2000) in response to their Watercourse Policy with the following goal: to develop environmentally responsible, cost-effective floodwater management recommendations. Table 1 outlines the ten fundamental objectives of the Watercourse Management Plan.





Table 1

Fundamental Planning Objectives

Menomonee River Watercourse Management Plan			
Utilize and develop watercourse models that are	Identify problems and design solutions for the one		
consistent with SEWRPC methodology and anticipate	percent probability event (the 100-year event)		
future planning efforts			
Utilize a watershed-based approach	Utilize future land use conditions to identify problems		
	and develop solutions		
Focus on environmentally sensitive and aesthetically	Integrate local stormwater runoff control features		
acceptable engineering solutions			
Incorporate current regulatory requirements	Identify costs and benefits of solutions		
Identify and resolve policy issues critical to the	Obtain community input to develop acceptable		
implementation of the watercourse plan	solutions		

Source: CDM 2000

MMSD's watercourse plan essentially updated prior watershed planning efforts completed by SEWRPC and were completed in two phases. Phase I (CDM 2000) identified where flood damages would occur for the one percent probability event and developed floodwater management alternatives and solutions to alleviate potential damages. Phase II (Tetra Tech 2003) further investigated Phase I recommendations and provided preliminary engineering information on the recommendations. The analyses focused on providing solutions and engineering at the watershed-scale, such that the effects of proposed solutions on other locations within the watershed are considered integral to the overall planning effort.

Hydrologic modeling for year 2020 land use conditions estimated that 375 structures and 425 properties would be flooded during a one percent probability event within the Menomonee River watershed (CDM 2000). Total damages, as a result of this flood event, are estimated to approach \$13 million. The majority of the structures projected to be damaged, including 190 residential structures, were located in Hart Park, Western Milwaukee, and the Valley Park Neighborhood. The Menomonee River floodplain in these areas is constrained by urban development (CDM 2000), which limits the types of feasible floodwater management alternatives for the areas and increases the need for upstream mitigation. The Hart Park area in the City of Wauwatosa appears to be the most critical location for flow reduction, since it is where water levels need to be reduced the most to reduce flooding.

Four floodwater management projects were identified in the Menomonee River Watercourse Management Plan for areas located downstream of the Menomonee River Mainstem and Underwood Creek confluence, including the Falk Floodwall, Valley Park neighborhood, Western Milwaukee, and Lower Wauwatosa/Hart Park. These projects use a combination of floodplain lowering, flood walls & levees, bridge removal, property acquisition, and structure floodproofing. However, these projects require upstream storage or detention to further reduce flood flows, peak water surface elevations, and to remove structures from the floodplain. The Menomonee River Watercourse Management Plan's component projects are integrated and require each other (including the MCG floodwater management facility) to function properly.

The watercourse plan recommended outlying upstream areas of the watershed to have open space conservation programs that would preserve existing floodplain and wetland areas. A floodwater detention basin at Timmerman Airport was also recommended. These floodwater management solutions would provide benefits to the upper reaches of the Menomonee River. However, major runoff sources to the river occur downstream from these locations and, therefore, lower reaches of the river see little to no effect on flood levels from these upstream solutions (SEWRPC 2003a).

The Milwaukee County Grounds is a potential floodwater storage site because its strategic location offers advantages for managing downstream flooding. Other alternative sites for regional floodwater storage identified in a 1976 SEWRPC study would not be feasible, optimal or economical due to existing development at the site, sub-optimal locations in the watershed, and individual site constraints (CDM 2000). Analysis of natural storage along Underwood Creek determined that available areas would not effectively and economically achieve the necessary storage volume for downstream flood mitigation and would affect several SEWRPC-designated natural areas (CDM 1999).

SEWRPC also completed an independent evaluation of MMSD's watercourse management plan in regards to the floodwater storage facility (SEWRPC 2003b). It confirmed that the facility is essential for alleviating downstream flooding problems, removing properties out of the one percent probability event floodplain, and meeting watershed management planning objectives.

In summary, the Milwaukee County Grounds site was chosen to provide regional floodwater storage, because it would not require residential or business acquisition, would minimize the number and magnitude of downstream floodproofing structures, would decrease downstream flood flows and peak water surface elevations, and would keep the site as open green space in accordance with *Milwaukee County's Land Use Study* (1999).

Performance Objectives

To assist with developing site-specific alternatives at Milwaukee County Grounds, the MMSD developed hydraulic and landscape design and performance objectives.

Hydraulics – Performance objectives for the floodwater management facility are directly linked to the successful implementation of downstream floodwater management projects:

- The primary performance objective is that the facility reduces flood heights on the Menomonee River sufficiently to allow downstream flood protection projects to maintain a one percent probability event-level of protection.
- The frequency of diversion from Underwood Creek had to be consistent with maintaining the ecological quality of Underwood Creek.
- The performance during storm events, exceeding the one percent probability event design levels, had to be sufficient to protect public safety and the investment in infrastructure represented in the facility.

Landscape Design– This broad term intends to capture the design considerations that local agencies and the public have raised throughout the Milwaukee County Grounds project development planning and design process. The Milwaukee County Grounds 1999 Land Use Plan laid out the long-term goal to maintain the area that includes the floodwater management facility as open space. Thus, the MMSD project team developed landscape design criteria with the intent to be consistent with the land use plan.

Through design workshops and public involvement meetings, the project team developed a landscape plan that addressed the following needs:

- Provide pedestrian and vehicular circulation Utilize grading, viewshed and pedestrian/vehicular access compatible with surrounding land uses, especially the future DNR Forestry Education Center.
- Topography The fill area should mimic Wisconsin glacial landscape.
- Revegetation The revegetation plan is to include distinct vegetation communities ranging from aquatic environment in the basin to upland species. Vegetation would be natural rather than formal.
- Preservation of Key Natural Resources There are select tree stands that should be preserved, Butler's Gartersnake habitat, and wetland areas that should be protected during construction.
- Multiple Use Area The project site is to accommodate an area for future active and passive recreational uses.
 Specific uses would be addressed through future Milwaukee County Parks Programming efforts.

Underwood Creek Rehabilitation Project

The MMSD considered various locations to divert floodwater into the MCG Facility. Diverting floodwater from Underwood Creek offered an opportunity for stream rehabilitation in a reach where floodwater management alternatives are constrained by nearby development.

The Underwood Creek subwatershed covers about 19.8 square miles, about eight miles of creek bed, and encompasses about fifteen percent of the Menomonee River watershed (Figure 14). The subwatershed is approximately eighty-four percent developed with the majority of the creek being concrete-lined (CDM 2000).

Between 1961 and 1969, the removal of natural streambed features in Underwood Creek by lining with concrete resulted in impaired function. The existing project reach is very "flashy" characterized by relatively high peak flows and velocities during rainfall events in the Underwood Creek subwatershed. These high flows and velocities stress the creek and require the stream channel to carry large volumes of floodwater. To avoid flooding of surrounding developed areas, the stream channel is lined with concrete to convey floodwater. However, the trapezoidal and U-shaped stream bottom does not concentrate flow during low-flow conditions, resulting in minimal habitat complexity and minimal vegetative cover. The current conditions, with existing drop structures, do not provide refuge opportunities for aquatic organisms in the form of permanent pools or allow resident or migratory fish passage in lower section of Underwood Creek.

As previously described, flooding problems have occurred within the subwatershed. Multiple studies have focused on floodwater management and streambank stabilization in the Underwood Creek subwatershed with and without the MCG Floodwater Management Facility (CDM 2000 and SEWRPC 2000). Several ongoing and planned construction projects resulted from the studies and are currently underway or anticipated in the future (Figure 15).



Current Projects

1 Brookfield Flood Management Project (Completed)

- Construct 18 acre-foot storage area northwest of intersection of North Avenue and Lilly Road
- 2 Elm Grove Flood Management Project (Currently Under Construction)
 - Village Park Floodwater Storage shallow extension of existing Village Park pond to accommodate 52 acre-feet of wet detention
 - Remove concrete channel liner restore approximately 475 feet of channel between Juneau Boulevard and the entrance drive to Village Hall off of Legion Drive
 - Legion Post/TV John Storage shallow "bowl" excavated at site of former Legion Post and former TV John building providing 6 acre-feet of temporary flood storage
 - Underground Overflow Culvert 12 feet wide by 6 feet high, 2,430-foot long underground overflow culvert
 - Grass Swale
 - Villager Apartments/Sleepy Hollow Motel Storage – shallow "bowl" excavated to provide 33 acre-feet of temporary flood storage

3 MMSD Underwood Creek Restoration

- Project at Bluemound Road (Completed)Replace concrete from Bluemound Road
- to 400 feet downstream
- Rehabilitate 50 feet of channel downstream of 124th Street

4 Friends of Milwaukee's Rivers – Channel and Floodplain Restoration Study (Planned)

- Rehabilitate 3,200 feet of channel and 25 acres of floodplain
- 5 Underwood Creek Rehabilitation (Preliminary Design Ongoing)
 - Concrete removal feasibility study from STH 100 to confluence with Menomonee River

6 MMSD Diversion Structure for County Grounds

Detention Facility (Final Design Ongoing)
Determine effective location for diversion structure

7 SEWRPC's Analysis of Alternative Plans for Removal of the Concrete Lining in Underwood Creek in the City of Wauwatosa (Study Only)

- Construct 280 acre-foot retention basin
- Lower floodplain to increase channel storage by 125 acre-feet
- Replace culvert at 115th Street
- Lower streambed up to 3.9 feet
- Construct floodwall





FIGURE 15 Underwood Creek Flood Management Projects

Environmental Assessment Milwaukee County Grounds Flood Management Facility and Underwood Creek Rehabilitation Project Milwaukee, Wisconsin



The projects are all located upstream of the project area and include:

- 1 Brookfield Flood Management Project,
- 2 Village of Elm Grove Preliminary Engineering of Flood Control Alternatives,
- 3. MMSD Underwood Creek Restoration Project at Bluemound Road,
- 4. Friends of Milwaukee's Rivers Channel and Floodplain Restoration Study,
- 5. U.S. Army Corps of Engineers Section 206 Study,
- 6. MMSD Diversion Structure for County Grounds Floodwater Detention Facility, and
- SEWRPC's Analysis of Alternative Plans for Removal of the Concrete lining in Underwood Creek in the City of Wauwatosa.

The purposes of the first four projects are to reduce impacts to flood flows and flood stages from future developments, solve local structural flooding problems, stabilize the stream bed, and/or make ecological improvements. However, their effects on the stream flows and flood stages downstream of Highway 100 are relatively minor (HNTB(a) 2004). The last three projects directly affect the Underwood Creek project reach. The USACE study is on hold pending additional funding. The last two projects are discussed as part of this Environmental Assessment.

Within the Underwood Creek stream reach between the Menomonee River and Highway 100, the residential area along Fisher Parkway, Our Redeemer Lutheran Church and School, the Serafino Square Apartments, and the Hansen Golf course are considered flood-prone (HNTB(a) 2004). In addition, during a one percent probability event, backwater from the Menomonee River affects Underwood Creek about a quarter mile upstream of its confluence with the river (SEWRPC 2000). Several studies have investigated modifications to the Underwood Creek reach including concrete removal and natural bank replacement, and potential storage areas to determine the benefit to the subwatershed and to the Menomonee River watershed floodwater management planning (CDM 1999, CDM 2000, SEWRPC 2000). SEWRPC's analysis concluded that removing concrete from Underwood Creek, without other mitigation measures, increases the one percent probability event flood stages throughout the stream reach, which impacts several adjacent structures. Further analysis of concrete removal along with other mitigation measures such as overbank lowering, adding retention area, and streambank stabilization still did not avoid the flood hazard to structures along Underwood Creek. Furthermore, even though flood hazard could be eliminated for nearby structures, adjacent recreational fields along the stream reach would experience increased flooding.

When the diversion for the MCG Floodwater Management Facility was proposed, there was a new opportunity to rehabilitate the Underwood Creek channel by removing the concrete and still meet flood abatement objectives in the Menomonee River watershed. MMSD and DNR then developed objectives in order for the channel modifications to be compatible with overall watershed improvements and to support the development, with regulatory approval, of the MCG Floodwater Management Facility.

Performance Objectives

The concrete-lined channel, with drop structures, currently precludes the lower reach of Underwood Creek from being used either for migrating or resident fish and is not an aesthetically pleasing water corridor. There are also inherent public safety risks with concrete-lined channels during flood events due to the velocity of the floodwater and the lack of egress for people caught in the channel (HNTB(a) 2005).

The MCG Floodwater Management Facility is a key component of the success of the Underwood Creek Rehabilitation project. The County Grounds diversion would facilitate the removal of concrete, because it is upstream of the most constricted reach and the diversion of flood flows to the storage facility would reduce stress on organisms, by reducing the creek's water velocity during large storm events. The MMSD developed performance objectives according to the following priorities:

- Flood protection Develop measures to reduce flooding of structures along Underwood Creek.
- Stability and Maintenance Design the stream channel, floodplain and corridor slope to remain stable while still providing as much riparian habitat as possible. Provide access for long-term maintenance.
- Fisheries and Stream Biota Design the channel to allow for upstream passage of migrating fish. Provide habitat for warm water fisheries as well as streambed (substrate) habitat for fisheries food sources.
- Wildlife Provide a more naturally functioning stream corridor and improve habitat.
- Public Use Provide an aesthetically pleasing corridor for recreational kayak and canoeing at higher flows; provide a trail (if possible) for hikers and anglers that also minimizes stream impact and maximizes public safety.

Public Involvement

Public involvement activities over the last seven years of floodwater management studies in the Menomonee River Watershed has played a substantial role in determining watershed management goals, objectives and alternatives development. The purpose of the public involvement program has been to identify community concerns, facilitate a community dialogue of project alternatives and issues, and to provide thorough, easily understood information to the public in an effort to help them provide meaningful input to the development of plans and designs.

During the Phase I Watercourse Management Plan study, six public meetings and six community workshops were held in 1999 and resulted in a recommendation for floodwater storage at the Milwaukee County Grounds. The MMSD and others hosted and attended a variety of public forums to further refine design considerations at the Milwaukee County Grounds site. Table 2 summarizes these activities.

Table 2 Milwaukee County Grounds Floodwater Management Public Involvement Summary

Public Involvement Activities	Dates
Project Public Meetings:	
Six open house meetings have been held since 2001 to seek public input on the	02/01, 09/01, 05/02, 11/03, 01/05, 07/05
planning and design process for the County Grounds floodwater management	
basins. Some meetings were held jointly with the DNR, Milwaukee County and	
the City of Wauwatosa to also review activities at the propose Forestry Center,	
the Hart Park floodwater management project, the Underwood Creek	
Rehabilitation and Floodwater Management Project, the Elm Grove Floodwater	
Management project and the Wauwatosa Park Planning and Design project.	
Milwaukee County sponsored a public meeting to present the results of an	06/03
independent review of the project. (SEWRPC completed the independent	
review.)	
A forum was sponsored by Wauwatosa Tomorrow featuring speakers from	9/13/00
MMSD and from parties interested in the project recommendations.	
A town hall meeting was sponsored by County Supervisor Schmitt and former	9/25/00
Supervisor Jasenski to facilitate discussion of the project alternatives and	
recommendations.	
Small Group Meetings:	6/2/00, 11/28/00, 3/3/01, 5/3/01, 5/9/01,
At least eleven meetings were held. The groups included neighborhood groups,	3/19/02, 3/16/03, 3/2/04, 4/15/04, 5/13/04,
the Wauwatosa Kickers, environmental groups, and other interested parties.	6/24/04.
Newsletters:	6/00, 3/02, 6/04
Three project newsletters were sent out to stakeholders and were inserted in the	
City of Wauwatosa newsletters (distribution: 24,000 each mailing).	
Design charette:	5/18/02
An invitation-only design charette was held with key project partners and	
stakeholders. Alternatives were discussed and considered.	
Bus tours	9/99, 7/00, 5/01, 6/02
Tours to other floodwater detention basins were held for local officials and	
interested stakeholders.	
Steering Committee	10/02/01, 06/04/02, 06/24/04,
Steering committee meetings were conducted with select groups for the project.	
Ecological Plan Steering Committee and Fill Site Discussion Group	3/2/04, 4/15/04, 12/21/04, 02/08/05
The Ecological Plan Steering Committee was established to review the	
ecological plans for the open space area adjacent to the basins. The Fill Site	
Discussion Group formed to discuss issues pertinent to the early fill site	
planning.	

Table 2 (continued) Milwaukee County Grounds Floodwater Management Public Involvement Summary

Northeast Quadrant Committee	4/14/00, 5/8/00, 5/23/00, 9/21/00, 10/30/00,
Milwaukee County facilitated a committee of project partners. The group often	12/14/00, 1/29/01, 2/12/01, 9/21/01,
included representatives from: Milwaukee County Economic Development,	11/15/01, 1/10/02, 2/22/02, 4/18/02, 6/5/03,
County Board, County Executive's office, County Parks, County DPW, City of	6/24/03, 7/17/03, 8/12/03, 9/16/03, 10/13/03,
Wauwatosa, Milwaukee Regional Medical Center, UW-Extension, Camp Wil-O-	11/18/03, 11/26/03, 12/18/03, 1/20/04,
Way, DNR Forestry Division, and MMSD.	5/11/04
Middle School Education Unit	11/6/01
The project was a focus of a multi-day effort at the Longfellow Middle School.	11/13/01
The effort included tours, a design charette and teaching the project across the	11/15,16,26/01
curriculum in various disciplines.	11/20/01
	12/6/01

Source: Foy and Associates, 2005

While design concepts for the basin were being formulated, land use planning for the Milwaukee County Grounds was being established (Engberg-Anderson 1996, SEWRPC 1998, MCLUPC 1999, HNTB(b) 2004). The consensus of stakeholders, general public, and surrounding community was to leave the site as open-space, which formed the base of the land use plan. The floodwater management facility would be consistent with the land use plan, because it would incorporate elements outlined in the plan (Figure 16), including passive and active recreation, natural area enhancement and preservation (HNTB(b) 2005), and cultural site preservation (HNTB(b) 2004).

The Milwaukee County Board has passed a number of resolutions relating to the Milwaukee County Grounds floodwater management facility since February 2004. In April 2005, a resolution requesting the approval of the Ecological Restoration Plan for the Northeast quadrant of the Milwaukee County Grounds was passed. In May 2004, a resolution was passed to authorize an Intergovernmental Cooperation Agreement (ICA) between Milwaukee County and MMSD concerning construction of Milwaukee County Grounds floodwater management facility.

The Milwaukee County Grounds facility is proposed to be constructed in two Phases. Phase I would include basin construction and placement of fill in the open-space area between years 2006 and 2008. Phase II of the project would consist of constructing the inlet structure, the tunnel, the low-level outlet and spillway structure, and the berm at the water quality pond between years 2009 and 2011. A public meeting may be held prior to commencing construction on Phase II of the project to update the public on the project's status and inform on the second phase of construction.


3. Authorities and Approvals (list local, state and federal permits or approvals required)

		lecuing	Estimated	
Permits/approvals	Construction consideration	agency	approval	Permittee
Chapter 30/Section 404	Navigable waterway, Wetlands		6 to 12	MMSD
	(will address mitigation with USACE). Possibly grading	USACE	months	MINIGD
Environmental Analysis, NR	Analysis and sharing of	DNR	6 to 12	MMSD
150 Wis. Adm. Code.	information about alternatives and impacts		months	-
Wetland Alternatives Analysis and Water Quality Certification, s. 281.22 and 281.37 Wis. Stats. and NR 103, NR 299 Wis. Adm. Code	The placement of fill in a wetland requires a practicable alternatives analysis.		6 to 12 months	MMSD
WPDES construction site stormwater discharge notice of intent (NOI) (NR 216)	Stormwater discharge from grading more than one acre.	DNR	3 week	MMSD
WPDES for construction de- watering, Pit Trench Dewatering permit, & High Capacity Well (NR 812)	Groundwater draw- down during construction.	DNR	3 weeks	Contractor
Characterization of excavated material and Solid Waste Low Hazard Exemption, NR 500	Material management plan for waste and contaminated material that may be encountered during excavation.	DNR	3 weeks	MMSD
Exemption to Build on a Landfill, NR 500	Review of solid waste management.	DNR	3 weeks	MMSD
Spoil disposal plan	Spoil material	DNR	2 weeks	Contractor
Air quality permit	Spoil disposal	DNR	2 weeks	Contractor
Chapter 31 and NR 116 Wis. Adm. Code	Earthen berm/High hazard dam	DNR	3 months	MMSD
Threatened and endangered species Incidental Take Authorization, s. 29.604 Wis. Stats. and NR 27 Wis. Adm. Code	Butler's Gartersnake protection/habitat management	DNR	6 months	MMSD
Culvert permit, NR 320 Wis. Adm. Code	Addition of culverts to berm by water quality pond	DNR	3 weeks	MMSD
Erosion control	Site disturbance	City of Wauwatosa	10 days	Contractor
Hydrant use permit	Use of fire hydrant	City of Wauwatosa	Same-day to 10 days	Contractor
Haul routes	Hauling of backfill/spoils	City of Wauwatosa	Same-day to 10 days	Contractor
Traffic control plan	Diverting traffic	City of Wauwatosa	Same-day to 14 days	Contractor
Right-of-way occupancy	Use of right-of-way for work in Swan ROW	City of Wauwatosa	1 week	Contractor
Curb Cuts	Work on Swan Blvd.	City of Wauwatosa	1 week	Contractor
Work noise	Work between 7:00 a.m. and 7:00 p.m.	City of Wauwatosa	1 week	Contractor
Utility Relocation Permits	•	Local	1 week	Contractor
Intergovernmental		DNR/	6 to 12	MMSD
Cooperative Agreements (ICA)		Milwaukee	months	
and Conservation Easement		County/MMSD		

PROPOSED PHYSICAL CHANGES

4. Manipulation of Terrestrial Resources

The MCG floodwater management facility is in the final design stage. The MMSD is considering and addressing two major objectives with this project. The MMSD is charged with addressing flooding throughout the watershed, but seeks to improve the habitat and ecological value of its water resources. In order to construct the MCG floodwater management basin, approximately two million cubic yards of material would need to be excavated from the basin's footprint, estimated to be approximately sixty-five acres. The basins would be naturally-contoured with gentle side-slopes to emulate natural landscapes. Most of the material excavated during basin construction would be re-used on the Milwaukee County Grounds.

The excavated material would be placed in the area immediately south and west of the east lobe of the basin, including the existing community garden area. A grading plan was developed to emulate natural landforms commonly found in Wisconsin by incorporating low, poorly-drained areas, meandering drainage courses, and hilltops of various elevations to achieve this effect. This area is referred to as the "open space area." Some fill would also be placed in the economic development area to prepare this area for future development. The grading plan also addresses the transition between the open space area and the basin. To achieve as natural appearance as possible, this transition would incorporate varied slopes. However, the steepest slope would not be greater than 4:1. Based on public input, the grading plan was developed with the objective of preserving existing natural resources (such as trees) and cultural resources to the greatest extent possible. As a result, the grading would work around a number of existing stands of trees, two wetlands, and would not impact the two cemeteries located in the vicinity of the basin. The grading plan is illustrated on Figure 17; this figure depicts a cross-section along with a plan view of the hilltops and drainage ways planned to be included in the open-space area.

Excavated fill would also be used to construct a berm adjacent to the water quality pond. The berm serves to remove several residential structures downgradient of the MCG floodwater facility from its hydraulic shadow, meaning the "area of land downstream from a dam that would be inundated by water upon failure of the dam during the regional flood" (Wisconsin Administrative Code, chapter NR 333). The berm would wrap around the western and northern portions of the water quality pond and extend further east. The berm would be finished with natural plantings (See Figure 10).

The following table summarizes the volumes of material that would be excavated from the basin and placed in the open space area. The objective of having the open space area appear as natural as possible limits the amount of fill that would be placed in the open space area to approximately 1.7 million cubic yards. Since the amount of excavated fill would be approximately two million cubic yards and the open space area has the capacity to accept 1.7 million cubic yards, the rest of the excavated fill would be removed from the site (See Table 3).



Table 3

Estimated Excavation and Filling for Milwaukee County Grounds Floodwater Management Facility

	Basin	Open-Space Area	Difference
Material	[cubic yards]	[cubic yards]	[cubic yards]
Removed	2,167,000	57,000	
Added	131,000	1,790,000	
Net	2,036,000 (Removed from Basin)	1,733,000 (Added to Open Space Area)	51,400 *

and Open Space Area

* This number includes a soil shrinkage factor and accounts for approximately 7,000 cy of fill being used for constructing the berm located by the water quality pond.

Vegetation would be established in the floodwater basin and open space area; the revegetation plan for the basin is being refined by the DNR to insure the plantings enhance Butler's gartersnake habitat. The revegetation plan for the open space area is specified in the *Ecological Restoration Plan for the Milwaukee County Grounds* (HNTB(b) 2005). The types of vegetation and plant communities established on the basin and open space area would resemble Wisconsin's natural plant communities. Due to the variability of the landforms that would result from the construction of the basin and the Milwaukee County Ground's gently rolling terrain, the revegetation plan incorporates five plant communities.

The plant communities would be established in the following areas:

- 1. A wetland area would be located longitudinally along the bottom and in the vicinity of the stilling basin.
- The basin bottom and low-land area would be planted with appropriate vegetation, considering the effects of inundation.
- 3. The side-slopes of the basin would be planted with natural plantings.
- 4. The upland open space area would be planted with natural plantings.
- 5. The upland area located at the southwest side of the west lobe would be a mesic prairie demonstration area.

A single bridge carrying Swan Boulevard would span the channel connecting the two lobes of the basin and would be placed south of the intersection with Underwood Creek Parkway. Construction activities, including excavations and pile driving, would be required to construct this bridge. River rock would be placed in the vicinity of the bridge to protect against potential scour from high-velocity flows. Natural plantings, consistent with structure function and location, would be established at the diversion structure on Underwood Creek and the basin low-level outlet and spillway structure. Some areas would also be planted with trees and shrubs to enhance the undulating terrain. Tree plantings would be used to define outdoor spaces and land uses, when possible.

Currently, Underwood Creek is a relatively straight channel. The rehabilitation of Underwood Creek would involve removing the majority of the concrete lining within the Creek channel. Work in Underwood Creek would start after the Floodwater Management Facility is under construction. The creek rehabilitation would also result in the widening and the introduction of meanders to portions of the channel. This widening and meandering would require soil excavation and disposal. In addition, excavations and grading would be required to re-grade portions of the creek following the removal of drop structures (Figures 5A

and 5B). More detail on the Underwood Creek Rehabilitation is provided under Manipulation of Aquatic Resources, below.

5. Manipulation of Aquatic Resources

A diversion structure would be constructed on the east bank of Underwood Creek, approximately 1,200 feet south of USH 45 (Figure 3). The elevation would be set such that the diversion would be initiated during an approximate twenty-five percent probability event on Underwood Creek. The flow at this level corresponds to about 1,600 cubic feet per second (cfs). As flows in Underwood Creek rise above 1,600 cfs, a portion of the flows above 1,600 cfs would be diverted into the structure, through the tunnels and into the basin. When flow in Underwood Creek would reach approximately 7,500 cfs (which is nearly equal to the one percent probability event), the diversion would reach a level of 4,400 cfs. Flows higher than 7,500 cfs in Underwood Creek would only gradually increase diversion into the basin. The total diversion volume would depend on both the magnitude of flow in Underwood Creek and its duration. Diversion volumes for flow events with duration characteristics similar to the six-hour, one percent probability event are shown in Table 4.

Table 4

1					
Probability of	Upstream Flow	Peak Diversion	Volume Diverted	Approximate	Downstream
Event (percent)	in Underwood	from Creek	(acre-ft)	Duration of	Flow in
	Creek (cfs)	(cfs)		Diversion (hours)	Underwood
					Creek (cfs)
50	970	0	0	0.0	970
20	2,000	230	2.9	0.3	1,770
10	3,000	940	48	1.3	2,060
4	4,550	2,290	288	3.1	2,260
2	6,100	3,600	634	4.9	2,500
1	7,900	4,500	1,062	6.0	3,400

Preliminary Milwaukee County Grounds Facility Diversion Characteristics*

*Duration and volume estimates developed using hydrograph scaled from a one percent probability, six-hour event.

The basin low-level outlet and spillway would be constructed within a vertical wall that would both allow water to pass into an outlet chamber, through a forty-eight inch diameter culvert under the CPR tracks and to the Menomonee River. It would be located in the vicinity of the MMSD Odor Control facility on the north edge of the eastern lobe. The low-level outlet would be set at the bottom of the facility (elevation 658 feet), sized to adequately hold back flows, and outfitted with a trash rack. The low-

level outlet would be small enough to restrict enough flow to the Menomonee River, but would be large enough to allow the facility to drain within four days.

The rehabilitated reach of Underwood Creek would be constructed to function as a more natural channel and floodplain (Figures 5A and 5B). As noted earlier, with the exception of approximately 300 feet in the vicinity of USH 45, the Underwood Creek reach from STH 100 to station 33+10, approximately 4,100 feet downstream, would be rehabilitated by complete concrete removal. The 300-foot section in the vicinity of USH 45 would be modified by replacing the concrete-lined channel bottom with stone and floodplain vegetation. The sideslopes would remain concrete-lined. The Underwood Creek reach from station 33+10 to station 10+50 would be modified by replacing the concrete in the channel bottom with stone. Comparable to the existing condition, the sideslopes along this reach would be concrete-lined. For the purposes of this EA, the aforementioned description of reach by reach modifications to Underwood Creek will be referred to as "rehabilitation". Following the removal of the concrete lining and the four weir / grade control structures, a rehabilitated channel and floodplain would be constructed. A bankfull stream channel would be located in a slightly meandering pattern within a constructed floodwater conveyance corridor. The flood conveyance corridor would be designed to convey a one percent probability event down Underwood Creek.

The bankfull channel would have the following characteristics:

- Meanders back and forth within the floodwater conveyance corridor, where possible. Approximately 4,000 feet of the
 project reach is wide enough to accommodate the meandering bankfull channel. The remainder of the reach is too
 narrow to accommodate meandering of the bankfull channel; this portion of the reach would remain relatively straight
 as it currently exists.
- Varied depths along its length, exhibiting a series of riffle-pool-run configurations. In other words, the channel would sequentially exhibit characteristics of a shallower riffle, flowing into a deeper pool, and gradually extending into a longer run (or glide), until it again becomes a shallower riffle. This depth would be most pronounced at lower flows, when riffles may be a few inches deep, but pools may be two feet or more.
- Concentrated low flows. This would be accomplished by incorporating the smallest channel, referred to as the pilot channel, at the bottom of the larger bankfull channel. While the dimensions of this pilot channel have not been determined, it is likely that it would be approximately one-third the width of the bankfull channel. The pilot channel would likely be sized to carry flows in the five to ten cubic feet per second (cfs) flow range.
- Rock channel lining. The rock would consist of a variety of sizes, ranging from sands and gravels to cobbles and small boulders. The size of the channel bed material would depend on the erosive force exerted by the water during the maximum design flow. While such forces would move smaller sands and gravels, the majority of the bed material would remain in place. Preliminarily, it is estimated that the streambed material would be an average of eight inches in diameter. Larger boulders one to two feet in diameter would be used to promote habitat and diversity. Where the bankfull channel is constrained, larger streambed materials would likely be necessary to minimize movement of materials.

The floodplain surface would primarily have the following characteristics:

- Primarily consist of earthen material that would serve as a growing medium for riparian vegetation. It would be relatively flat, with slightly lower areas dispersed throughout the floodplain. These lower areas would be designed to support vegetation adapted to wetter conditions.
- Planted with trees, shrubs, grasses and forbs adapted to the anticipated riparian conditions. The spacing, density and composition would be designed to mimic patterns that would result from successional development.

The rehabilitation of Underwood Creek is currently in the preliminary design phases; estimates of the quantity of the materials impacted would be completed during subsequent final design.

6. Buildings, Treatment Units, Roads and Other Structures

Structures added or removed from the project site are summarized in Table 5.

Table 5

New and Impacted Structures at the Milwaukee County Grounds Floodwater Management Facility and Underwood Creek Rehabilitation

Structure	Purpose / Location	Size
Underwood Creek Diversion	East bank of Underwood Creek,	215 feet long; forty-one feet wide
Structure	approximately 1,200 feet upstream	
	of USH 45; divert floodwater to	
	facility	
Tunnel	Conveys water from Underwood	Approximately 1/2 mile long;
	Creek diversion structure to basin	approximately twenty feet wide
Basin	Temporarily store water to minimize	Approximately sixty-five acres
	occurrence of flooding along the	
	Menomonee River, downstream	
Berm along east side of east	Contain floodwater in basin	Approximately eighteen feet high
lobe		and 132 feet wide
(performing function of a dam)		
Emergency overflow spillway	At outfall location, this structure	A 160 foot by 60 foot concrete
structure and low-level outlet	would hold back flows up to the one	chamber
structure	percent probability event and release	
(performing function of a dam)	water after the basin fills to capacity	
	to avoid overtopping	
Outfall to Menomonee River	Located on the east side of basin,	Five, eight-foot diameter culverts
	the outfall would release water into	that would convey outflows
	the Menomonee River	approximately 300 feet from the
		emergency overflow spillway
		structure and low-level outlet
		structure
Floodwall at Odor Control	Floodwater protection for the facility	Approximately 1,000 feet long
Facility		
Existing Menomonee River	This stone wall is located at the	Approximately 100 feet of this wall
Revetment wall	outfall location on the Menomonee	would be impacted by constructing
	River; a portion of this wall would be	the outfall structure.
	removed	
Berm near Water Quality Pond	Alleviate downstream areas from	Between four and twelve feet high
	facility's hydraulic shadow	and about 1,200 long
Berm along Underwood Creek	Manage floodwater along north side	Approximately 930 feet long and an
	of creek, downstream of USH 45	average height of 2.5 feet

Ancillary structures on the Milwaukee County Grounds site that would also be constructed are summarized in Table 6.

Table 6

New Structures at the Milwaukee County Grounds Floodwater Management Facility and Underwood Creek Rehabilitation

Structure	Purpose / Location	Size
Service Drive	Basin maintenance and	Constructed around perimeter
	and west lobes (under Swan Boulevard)	feet wide, with a gravel surface
Swan Boulevard Bridge	Convey traffic over basin	200 feet long by 100 feet wide

In addition, several thousand feet of local roads would be re-paved by the MMSD following the completion of the project.

7. Emissions and Discharges

A range of construction equipment would by used to construct the facility, perform grading on the open space area and rehabilitate Underwood Creek. Air emissions from equipment would be required to comply with federal and state performance standards. Dust from excavation and equipment movement would be tempered by using various dust-control techniques. Noise would be managed by compliance with terms outlined on construction permits. These emissions would only occur during construction. No emissions would be expected from the facility and the rehabilitated creek following construction activities.

Erosion control would be implemented in accordance with state regulations and the DNR's technical standards for erosion control found at http://dnr.wi.gov/org/water/wm/nps/stormwater/techstds.htm to manage soil and sediment discharges caused by construction. Groundwater and rainwater that enters excavated and bored areas, such as the floodwater basin, tunnel, inlet structure and the Underwood Creek rehabilitation construction area, would need to be removed to allow construction equipment to operate. Construction dewatering activities would utilize best management practices to remove sediment prior to being discharged from the site.

Groundwater would be treated, in accordance with state regulations, during construction and discharged to the Menomonee River or Underwood Creek, depending upon where dewatering would take place.

Groundwater dewatering, whether during or after construction, would impact groundwater elevations in portions of the project area. Please see the Groundwater section in the Environmental Consequences for a discussion of these impacts.

- 8. Other Changes None
- 9. Identify the maps, plans and other descriptive material attached Figures are referenced throughout EA text.

AFFECTED ENVIRONMENT (describe existing features that may be affected by proposal)

10. Information Based On (check all that apply):



Literature/correspondence (specify major sources)

Refer to Bibliography beginning on page 84.

Personal Contacts (list in item 26)

Field Analysis By: X Author X Other (list in item 26)

Past Experience With Site By: Other (list in item 26)

11. Physical Environment (topography, soils, water, air)

Topography

Both the Milwaukee County Grounds and Underwood Creek sites lie in the western part of Milwaukee County. The landscape consists of glaciated uplands and gently sloping to rolling moraine ridges.

The topography of the Milwaukee County Grounds site varies. The total relief at the site is approximately 130 feet, ranging from an elevation of 784 feet mean sea level (MSL) at the south side of the site to 654 feet MSL, along the Menomonee River. Some areas are level to gently sloping, some are hilly, and some have rather steep ravines leading toward the Menomonee River and Underwood Creek. With the exception of a few level areas, the site generally trends downward in a northerly and northeasterly direction.

Topographically, the site is bounded on the west, north and east by Underwood Creek and the Menomonee River. The southern boundary of the project area is typically higher-elevation upland and is occupied by development, north of Watertown Plank Road. Underwood Creek flows northeast towards its confluence with the Menomonee River, north of the site. In general, Underwood Creek has been straightened, channelized and lined with concrete to form either a trapezoidal channel with 2:1 to

3:1 side slopes or a concrete-lined U-shape channel. The portion of Underwood Creek that is located within the project area contains four weir/grade control structures; these weirs range in height from two to 5.5 feet in height. Within the project area, Underwood Creek flows from an elevation of 700 feet MSL to approximately 655 feet MSL.

Geology

The site has variable subsurface conditions. Much of the site's subsurface variability is a function of the site consisting of two stream corridors that are situated adjacent to an upland glacial hill.

Upland area

Regional surface geology generally consists of glacial till comprised of ground and end moraine deposits ranging in thickness from fifty to 200 feet (Skinner and Borman 1973). The glacial deposits in the upland portions of the site generally consist of mixed clay, silt, sand, and gravel till. Bedrock, in the upland area, is approximately sixty to 100 feet below the ground surface.

Stream corridor / lowland area

Some fill material, alluvial, and outwash deposits are present to approximately twenty-five feet below grade. Some of this material consists of fine to coarse-grained material with variable gravel and silt content. This material is interspersed with intervening fine-grained lacustrine sediments (such as silt and silty/lean clays). Bedrock is relatively shallow in the vicinity of the floodwater basin. Soil borings performed within the footprint of the basin suggest that bedrock is located twenty to sixty feet below grade.

The uppermost bedrock, beneath the glacial till, consists of undifferentiated dolomites that may be up to 750 feet thick; this unit includes the Niagara aquifer. The dolomite overlies the Maquoketa Shale and the Galena-Platteville Units, which consists of the Galena Dolomite, the Decorah Formation, and the Platteville Formation (HNTB 2002).

Surface Soils

The United States Department of Agriculture, Natural Resource Conservation Service Soil Survey map of Milwaukee and Waukesha Counties (1971) was reviewed for soil information. The soil within the project area is classified as being part of the Ozaukee-Morley-Mequon association. This soil association is located within glaciated uplands and consists of well-drained to somewhat poorly-drained soils that have a subsoil of silty clay loam that has formed in thin loess, and silty clay loam that has formed in glacial till on moraines. The major soil types are located along gently sloping areas, and they are generally found on ridges and convex side slopes of glacial moraines.

On the west side of the site, in undisturbed areas along Underwood Creek, the soils are classified as Casco loam, Fox silt loam, loamy land, Matherton silt loam, Ozaukee silt loam, and wet alluvial land. Each of the soils, with the exception of loamy land, has a loam to silt loam surface soil underlain by sand to gravel layers and range from well-drained to poorly drained. The concrete lining along Underwood Creek is about seven-inches thick and rests on about six to twelve-inches of sand and gravel fill. Some of the disturbed areas, along the banks of Underwood Creek, contain fill materials.

Surface Water

Two waterways are located adjacent to the County Grounds: Underwood Creek and the Menomonee River. Within the project site, Underwood Creek flows approximately 1.25 miles north/northeast from STH 100 to its confluence with the Menomonee

River. The confluence of Underwood Creek with the Menomonee River is located north of the project site. The Menomonee River flows southeast from the confluence and east of the project site. The portion of Underwood Creek, within the project site, was straightened and channelized between 1961 and 1969. Revetment walls were constructed along portions of the Menomonee River through the Works Progress Administration, by the Civilian Conservation Corps, during the 1930's.

Groundwater

Shallow groundwater at the project site and within the Lake Michigan Basin generally flows east toward Lake Michigan. The project site is five miles east of the western edge of the Lake Michigan Basin. The Menomonee River and Underwood Creek are primary collectors of surface water runoff and intercept shallow groundwater flowing from the site (Skinner and Borman 1973). Underwood Creek and the Menomonee River fall within the Menomonee River watershed which encompasses 134 square miles.

At the project site, groundwater primarily flows northeast towards the Menomonee River and generally follows the surface topography (Figure 18 and 19). As Underwood Creek is situated at a relatively low elevation, groundwater along the corridor is relatively close to the surface. Groundwater was observed from between two to five feet below grade along the banks of Underwood Creek, corresponding to approximately 688 feet to 694 feet MSL (Gestra 2005). Groundwater elevations observed along Underwood Creek suggest that the Creek is a recharging stream.

Groundwater occurs at two relatively distinct elevations at the project site. Perched groundwater is present on the site's hills and higher elevations. This groundwater is present relatively close to the soil surface, because it is unable to readily drain through the underlying, confining soil layer. The lower water table is located within unconsolidated glacial silt and sands and is hydrologically connected to Underwood Creek and the Menomonee River. The two distinct water tables are separated by about forty feet. Subsurface investigations, conducted over the last four years, indicate that groundwater elevations have been relatively consistent (HNTB(c) 2005).

12. Biological Environment

The Milwaukee County Grounds consists of a variety of vegetative habitats, including forest, upland thicket, old field habitat, wetland, riparian, and developed recreational areas. Underwood Creek and the Menomonee River corridors, described above, are classified by SEWRPC as primary environmental corridor.

SEWRPC compiled an inventory for their Planning Report titled: *A Comprehensive Plan for the Menomonee River Watershed*, dated October 1976. This report indicates that portions of the project site are classified as having experienced considerable disturbance and having low plant and animal diversity. The northern portions of the project, along the Underwood Creek and the Menomonee River, were classified as having mixed wildlife, likely including waterfowl, pheasant, muskrat, deer, squirrel and song birds.

Aquatic

As noted above, two water bodies are associated with project site: Underwood Creek and the Menomonee River. The project site is located in the southwest portion of the Menomonee River watershed. The Menomonee River watershed is located immediately south and west of the Milwaukee River watershed and Lake Michigan. According to the Wisconsin Administrative





Code, Underwood Creek, within the project site, is designated for special variance use. This means that Underwood Creek has been determined to be unable to support full warm-water fish communities. According to SEWRPC's *A Regional Natural Areas and Critical Species Habitat Protection and Management Plan for Southeastern Wisconsin* (1997), a variance designation indicates that the stream has undergone extreme cultural alteration or has severe physical limitations.

The DNR conducted a fish population inventory throughout the Menomonee River watershed in 1973, including the Underwood Creek subwatershed. One survey station was located on Underwood Creek, between USH 45 and the confluence with the Menomonee River. This fish community survey was likely obtained prior to the completion of all the concrete channel modifications in Milwaukee County and indicated that four species of fish were present. One of the species was characterized as pollution-intolerant (*Southern Red Belly dace*); the three remaining species were characterized as pollution-tolerant (*Creek chub, Blacknose dace* and *Common shiner*).

More recently, staff at the University of Wisconsin – Milwaukee Stream Ecology Laboratory conducted a fish survey within Underwood Creek; three sample points were located within the project reach. In 2002, the team found eleven species of fish at the confluence of Underwood Creek and the Menomonee River. At ½ mile upstream in Underwood Creek, six species of fish at were inventoried. The third sample point was located approximately one mile upstream of the confluence; the team encountered six species of fish at this sample point. The most common fish species at three sampling points were the Green Sunfish, Bluegill, and the Blacknose Dace. The abundance of fish observed at Underwood Creek's confluence with the Menomonee River (natural channel) was over twice that observed upstream in the concrete-lined section. On the other hand, the concrete-lined portion of Underwood Creek was characterized as having greater fish abundance than some sampling points, in the natural channel, further upstream. In general, the concrete-lined channel tended to have relatively lower fish abundance when compared to other reaches of Underwood Creek. An older study conducted by the DNR, associated with stream classifications (DNR, 1984) concluded that this segment of Underwood Creek is incapable of sustaining any substantial fish populations. The study's conclusion was primarily based on ecological impacts from channel modifications and urban stormwater runoff.

The nearest 1973 sampling station along the Menomonee River was at the confluence of Honey Creek with the Menomonee River. One tolerant (*Green sunfish*) and one very tolerant (*Goldfish*) species of fish were observed at the site. In May and June of 1981, the DNR reports that several municipal wastewater treatment plants were abandoned in the headwaters of the Menomonee River. Subsequent studies of the entire stretch of the Menomonee River revealed that there was a dramatic increase in the number of pollution-intolerant fish species and a reduction in the number of pollution tolerant-fish species. There were nearly twice the numbers of sportfish caught in 1984 relative to 1973.

Water Quality

The DNR, SEWRPC, and the MMSD comprise the Water Quality Initiative (WQI), charged with identifying all sources of water pollution to local water resources. The WQI published water quality testing results for the Menomonee River watershed and its tributaries. The results published in 2004, for Underwood Creek and the Menomonee River, in the vicinity of the project site, are summarized in Table 7 below:

Table 7
Water Quality Indicators - Menomonee River and Underwood Creek

Water Quality Indicators		Significance	Existing Condition		
		olgrinoanoo	Menomonee River	Underwood Creek	
1.	Dissolved Oxygen Warm Water	Indicates a waterbody's	Meets WWQS* at least	Meets WWQS between	
	Quality Standard (WWQS) (5mg/L)	ability to support	85% of the time	50% and 80% of the time	
		desirable aquatic life –			
		Consistently high			
		amounts represent			
		healthy water			
2.	Habitat	A habitat is healthy if it	Natural channel with	Concrete-lined or	
		supports a diversity of	vegetative cover, pools,	artificially straightened	
		high quality species.	and riffles	channel, lacking	
		Diversity is directly		vegetative cover and/or	
		affected by habitat		having excessive	
		deterioration		silt/sediment deposits	
3.	Nutrient Water Quality Criteria	Nutrients that are readily	Nitrogen – Meets	Nitrogen – Meets WQC at	
	(WQC)	available to aquatic	WQC** at least 85% of	least 85% of the time	
		organisms and best	the time		
		reflect the ability of the		Phosphorus – Meets WQC	
		waterbody to stimulate	Phosphorus – Meets	less than 50% of the time	
		aquatic plant or algae	WQC less that 50% of		
		growth	the time		

Source: Water Quality Initiative; consisting of MMSD, DNR, and SEWRPC

* WWQS – Warm Water Quality Standards; Wisconsin WWQS require a minimum of five mg/l (ppm) of dissolved oxygen in rivers and streams to support full fish and aquatic life.

**WQC – Water Quality Criteria; The US EPA recommended nutrient criteria for the eco-region that includes the Menomonee River is 1.59 mg/L for nitrogen and 0.08 mg/L for phosphorus.

Wetlands

Wetlands are areas where water is at, near, or above the land surface and are characterized by both hydric soils and the growth of hydrophytes (water-tolerant plants) (SEWRPC 1997). The USACE (1987) defines wetlands as areas inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support (and under normal circumstances do support) a prevalence of vegetation typically adapted for life in saturated soil conditions.

A total of twenty-two wetlands were identified in the project area during 2005 and 2006 field investigations (Figure 20). The corresponding wetland delineation reports (ESM 2005 and 2006) are available from MMSD. The wetlands were assessed for significance for the following functions and values: floral diversity, wildlife habitat, fishery habitat, floodwater/stormwater attenuation, water quality protection, shoreline protection, groundwater, and aesthetics/recreation/education. Low to high quality





FIGURE 20 Wetland Map

Environmental Assessment Milwaukee County Grounds Floodwater Management Facility and Underwood Creek Rehabilitation Project Milwaukee, Wisconsin



wetlands were identified on the Milwaukee County Grounds. A designation of "low" identifies a function of the wetland that has been considerably degraded or diminished due to past disturbance, surrounding land uses, or some other factor. The wetland still maintains this function, but its effectiveness has been diminished. A designation of "medium" indicates that a primary function of the wetland that either is secondary to a more significant function or value or has been degraded in some way as to make it less effective or significant. An example would be functions and values in a reed canary grass-infested floodplain wetland. The wetland could have a high water quality value, but the value of wildlife habitat, aesthetics or another function could be diminished due to the presence of non-native species. A designation of "high" identifies a primary function or value of a wetland and that all characteristics of the wetland that contribute to that function are present.

Overall the majority of the wetlands on the site were ranked in most categories as "medium." Seven of the twenty-one wetlands were characterized as having a high function or value. Three wetlands, W-2, W-8, and W-10, have high functions and values in five categories. Overall, the highest value of these wetlands are provided through the attenuation of floodwater/stormwater and through the protection of groundwater. Eleven of these wetlands were characterized as have low function and value in at least one of the categories. Nearly half of the project's wetlands were characterized as having low floral diversity and over half had low aesthetic, recreation, and educational value (ESM 2005). Tables 8 and 9 summarize the functional value assessments and wetland descriptions. Wetlands W-1, W-12, W-13/14, and W-14 were delineated but are not included in the discussion, because they are located outside the potential project impact area.

Table 8

Wetland Functions and Values

	Wetland Functions and Values							
Wetland No.	Floral diversity	Wildlife habitat	Fishery habitat	Flood/ stormwater attenuation	Water quality protection	Shoreline protection	Groundwater discharge/ recharge	Aesthetics, recreation, & education
W-2	High	High	N/A	High	High	N/A	High	High
W-2a	Low	Low	N/A	Low	Medium	N/A	N/A	Low
W-4	Low	Medium	N/A	Medium	Medium	N/A	Low	Low
W-4a	Low	Low	N/A	Low	Low	N/A	Low	Low
W-5	Medium	Medium	N/A	Medium	Medium	N/A	Low	Low
W-6	Medium	Medium	N/A	Medium	Medium	N/A	Low	Medium
W-7 (West)	High	High	N/A	Medium	Medium	N/A	Low	Medium
W-7	Low	Medium	N/A	Medium	Medium	N/A	Low	Low
W-7 (East)	Medium	Medium	Low	High	High	Low	Low	Low
W-7 (South)	Low	Medium	N/A	Low	Low	N/A	Low	Low
W-8	High	High	Medium	High	High	N/A	Medium	High
W-9	Low	Low	N/A	Medium	Medium	N/A	Medium	Low
W-10	High	Exceptional	N/A	High	High	N/A	High	Medium
W-10a	Medium	Medium	N/A	Medium	Medium	Medium	Low	Low
W-10b	Medium	High	N/A	High	High	High	Medium	Medium
W-10c	Low	Low	N/A	Low	Low	Medium	Low	Medium
W-10d	Low	Low	N/A	Low	Low	N/A	Low	Low
W-10e	Medium	Medium	N/A	Medium	Medium	High	High	High

NA = Not applicable

Low = a function of the wetland that has been considerably degraded or diminished due to past disturbance, surrounding land uses, or some other factor

Medium = a primary function of the wetland that either is secondary to a more significant function or value or has been degraded in some way as to make it less effective or significant

High = a primary function or value of a wetland and that all characteristics of the wetland that contribute to that function are present

Source: Ecological Services of Milwaukee (ESM) 2005 and 2006

Table 9Wetland Description and Size

Wetland Area	Description *	Size (Acres)
W-2	Floodplain forest	0.14
W-2a	Wet meadow	0.04
W-4	Floodplain forest/Wet meadow/Shrub-carr	0.13
W-4a	Wet meadow	0.18
W-5	Floodplain forest/Wet meadow/Shrub-carr	1.78
W-6	Floodplain forest/Wet meadow/Shallow marsh	0.61
W-7 (West)	Sedge meadow	0.54
W-7	Floodplain forest/Shrub-carr	0.81
W-7 (East)	Shallow open water/Floodplain forest/Shrub-carr	0.44
W-7 (South)	Floodplain forest	0.30
W-8	Floodplain forest/Wet meadow	3.65
W-9	Shallow marsh	0.24
W-10	Floodplain forest	1.25
W-10a	Wet meadow/Shrub-carr	0.13
W-10b	Floodplain forest/Wet meadow/Shrub-carr	0.67
W-10c	Floodplain forest/Shrub-carr	0.64
W-10d	Shallow marsh	0.08
W-10e	Floodplain forest/Shrub-carr/Sedge meadow	0.41
Total Wetland Acreage		12.04

* = Wetland description is from the DNR Rapid Assessment Methodology for Evaluating Wetland Functional es

Values

NA = not available

Source: Ecological Services of Milwaukee (ESM) 2005 and 2006

13. Cultural Environment

a. Land use

The existing land use in the vicinity of the project site includes residential, industrial, recreational, transportation, wetlands, commercial, and governmental / institutional uses. In general, the CP Railway embankment and tracks are located along the western, northern and eastern perimeter of the project site; the CPR tracks run approximately parallel to Underwood Creek and the Menomonee River within the project area.

From a broader perspective, the City of Wauwatosa Landfill, Mayfair Mall Shopping Center (commercial), the Milwaukee County Grounds (institutional) and single-family housing make up the dominant land uses within one-half mile of the project site. According to SEWRPC's *A Park and Open Space Plan for Wauwatosa* (1998) the predominant urban land use within the City was residential, which encompassed about 3,060 acres or thirty-six percent of the City.

The Milwaukee County Grounds is currently used for a wide range of activities, ranging from agriculture to low-intensity recreation (Tetra Tech 2002). The following would not be altered by this project unless noted.

- The Wil-O-Way center is a Milwaukee County Facility. The building and grounds are located south of Underwood Creek Parkway; senior citizens, the disabled, and children are the primary users of this facility.
- The DNR Forestry Education Center (formerly known as the Wil-O-Way woods) is a forty-two-acre southern hardwood upland area. The woods are used for passive recreation such as walking and hiking. The Center has not been built yet.
- The former Milwaukee County nursery formerly used to raise tree stock for planting throughout Milwaukee County. The former nursery is currently fenced, and public access is restricted. Many trees remain in the nursery, and they would be cut or relocated for the project. A large portion of the former nursery lies within the floodwater basin's west lobe footprint.
- Hansen Golf Course is located on the north side of the site, between the CPR tracks and Underwood Creek Parkway. An underutilized practice chipping green is located east of the former County Nursery, at the intersection of Underwood Creek Parkway and Swan Boulevard.
- Underwood Creek Parkway itself is frequently used for passive recreation such as biking, jogging, and walking; the Parkway is part of the Milwaukee County Oak Leaf Trail.
- Community Garden Plots, sponsored by the University of Wisconsin-Milwaukee Cooperative Extension Program, are located south of Swan Boulevard. The community garden plots would be relocated either on the County Grounds or elsewhere in Milwaukee County.
- Two MMSD facilities, an odor control facility and a main interceptor sewer diversion with access structure, are located on the eastern side of the project site.
- Two abandoned cemeteries are located within the vicinity of the project site. The larger cemetery is known as the "Paupers" cemetery and covers about 3.8 acres just beyond the southeastern edge of the site. The other cemetery is located in a small wooded area in the southeastern portion of the site.
- b. Social/Economic (including ethnic and cultural groups)

City of Wauwatosa

The Milwaukee County Grounds, including the reach of Underwood Creek proposed for rehabilitation, is located within the City of Wauwatosa, located on the west side of Milwaukee County. According to the 2000 Census, the total population of the City of Wauwatosa was 47,271 people. Approximately ninety-four percent of the population was White; two percent of the population was Black or African American and 1.9 percent was Asian. The median household annual income was \$54,519; approximately 97.7 percent of Wauwatosa families were above the poverty level. The median income of Wauwatosa is forty percent higher than the City of Milwaukee, thirty percent higher than Milwaukee County, and about twenty percent higher than the median income of the State of Wisconsin.

SEWRPC's Planning Report No. 26, *A Comprehensive Plan for the Menomonee River Watershed* (1973) indicates that seven major floods occurred within the Menomonee River watershed from 1897 to 1973. All seven of these flood events impacted properties downstream of the Milwaukee County Grounds. These flood events caused considerable economic losses. In addition, estimated damages in Milwaukee County from 1997, 1998, 2000 flood events were \$78 million, \$11 million, and \$6.8 million, respectively. During the last few major flood events, the majority of the damage that occurred along the Menomonee River was centered in Wauwatosa, western portions of the City of Milwaukee, and the Valley Park neighborhood. These communities are located downstream from the Milwaukee County Grounds and would benefit from this project.

Fisher Parkway Neighborhood

The neighborhood located immediately north of the project, specifically the reach of Underwood Creek proposed for rehabilitation is referred to as the Fisher Parkway neighborhood. This triangular-shaped neighborhood is located south of North Avenue and east of STH 100. According to the 2000 census, the total population of the neighborhood was approximately 360 people. There were 161 households; the average household size was 2.3 people. Approximately ninety-four percent of the population was white, 0.3 percent of the population was Black or African American and three percent was Asian. The median household annual income in the Fisher Parkway Neighborhood was \$40,000. The neighborhood experienced secondary (basement) flooding during the April 1973 flood event (SEWRPC 1976). The neighborhood is within a reach that is not expected to experience any structural damage during a one percent probability event (SEWRPC 1990, CDM 2000) and is mapped outside the one percent probability event floodplain for year 2000 land use and channel conditions (SEWRPC 1990).

Community Gardens

Presently, community gardening is one of the uses of the County Grounds. In a report entitled: *Evaluation of Community Gardens* (Jill Florence Lackey & Associates, 1998), the authors indicate that the Community Gardens have been operated at the County Grounds for over thirty years. The report states that the Milwaukee County Grounds site accommodates approximately 1,000 garden plots for over 350 families and indicates that nearly sixty percent of gardening families at MCG were low income and approximately fifty percent lived in apartments or flats. Approximately one third of the gardeners are Hmong.

c. Archaeological/Historical

Archaeological and historical investigations of the Milwaukee County Grounds have resulted in the documentation of seven archeological or burial sites within the vicinity of the project (GLARC 2005, Mead & Hunt 2006). Summary information pertaining to these sites is provided in Table 10. These sites include isolated finds of prehistoric materials (MI 026, MI 321, MI 394), a small lithic scatter (MI 508), prehistoric campsites (MI 027) and historic cemeteries (BMI 075, BMI 174). The ephemeral nature of the prehistoric sites located on the County Grounds suggests that the use of the project area by prehistoric peoples was neither intensive, nor long-term. No substantial campsites or village sites have been identified within the project boundaries. The most intensive use of the project area dates to the historic period, and is related to its development into the Milwaukee County Institutional Grounds. Vestiges of the use of the project area as the Milwaukee County Institutional Grounds are clearly visible today and include several former institution buildings and two marked cemeteries. All but one of the sites (site with small lithic scatter, MI 508) are outside the planned area of disturbance. Site MI 508 was determined to not be eligible for listing on the National Register of Historic Places (Overstreet, et.al., 2000).

Historical investigations identified five extant buildings within the project area that have historical or architectural significance. Four of these buildings comprise the Milwaukee County School of Agriculture and Domestic Economy Historic District; the fifth building is the former Milwaukee County Home for Dependant Children. All buildings are outside the planned area of disturbance. No other archaeological sites or cultural materials were identified during the archaeology survey.

Site #	Site Name	Cultural Study Unit	Site Type
Burial Code		· · · · · · · · · · · · · · · · · · ·	
MI-026	LYON CACHE	Unknown Prehistoric	Cache/pit/hearth
MI-027	UNDERWOOD CREEK CAMPSITES	Unknown Prehistoric	Campsite/village
MI-321	UNDERWOOD CREEK PARKWAY	Unknown Prehistoric	Isolated finds
MI-394	HWY 100	Unknown Prehistoric	Campsite/village
BMI-075	POTTER'S FIELD	Historic Euro- American	Cemetery/burial
BMI-174	MARKED BURIALS- MILWAUKEE COUNTY GROUNDS	Historic Euro- American	Cemetery/burial
MI-508	AGRICULTURAL SCHOOL LITHIC SCATTER	Unknown Prehistoric	Lithic scatter

Table 10 Existing Archaeological Sites

Source: Great Lakes Archeological Research Center, 2005.

The Menomonee River and Underwood Creek Parkways were also evaluated for historic significance (Mead & Hunt 2006). Contributing historic resources of the Parkways that make them eligible for the National Register include the waterway, the Parkway roads, landscape features, pedestrian and vehicular bridges, and associated buildings.

14. Other Special Resources

According to SEWRPC in their 1997 A Regional Natural Areas and Critical Species Habitat Protection and Management Plan for Southeastern Wisconsin, a critical species habitat site is located in the vicinity of the project site. Ptelea trifolieata (Hop Tree, Wafer ash, Stinking ash) is a small, deciduous tree or large shrub that is considered a special concern or rare plant species by the DNR. The Wafer ash is found on the western portion of the project in the Underwood Parkway Woods. In a subsequent review, SEWRPC identified a number of additional but relatively small Wafer ash habitats in the vicinity of Hansen Golf Course and along the northern boundary of the former County nursery (south of existing Underwood Creek Parkway. Critical species habitat was also identified on the eastern portion of the Milwaukee County Grounds, northwest of the intersection of 87th Street and West Watertown Plank Road. Correspondence with the DNR's Bureau of Endangered Resources also indicated that Wafer ash has been recorded on site.

SEWRPC indicates that isolated natural resource areas are smaller pockets of natural resource base elements and that these areas are isolated from environmental corridors by urban development or agricultural uses. SEWRPC and the DNR identified *Aster fucatus* (Forked aster) habitat in the vicinity of the project site, within an isolated natural resource area. The Forked aster is a perennial herb that prefers dry to mesic hardwoods and is often found on streamsides or slopes with dolomite near the surface. This plant is listed as threatened within Wisconsin and is protected under the State Endangered Species Law on public lands. While SEWRPC identified Forked aster habitat in the vicinity of the project site, it is outside of the planned limits of

disturbance.

The DNR also indicated that *Icterus spurious* (Orchard Oriole), a special concern species of bird in Wisconsin, had been reported on the project site. The Orchard Oriole is found in orchards, shade trees, and trees scattered along lakes and streams.

SEWRPC reported the observation of Circus cyaneus (Northern Harrier), a special concern species, at the project site.

SEWRPC classifies portions of the project area as primary environmental corridor (Figure 21), including the entire reach of Underwood Creek proposed for rehabilitation. SEWRPC defines a primary environmental corridor as an area that is at least 400 acres in size, two miles long and 200 feet wide. Primary environmental corridors include a wide variety of important natural resource and resource-related elements. The primary environmental corridor follows the Underwood Creek riparian corridor and the Menomonee River riparian corridor, along the western, northern and eastern boundaries of the project. SEWRPC also classifies the Hansen Golf Course and the forty-two-acre upland woods (DNR Forestry Education Center woods) located south of Hansen Golf Course, as primary environmental corridor.

SEWRPC identified the DNR Forestry Education Center as a natural area. SEWRPC notes that natural areas are defined as tracts of land or water which were so little modified by human activity or have sufficiently recovered from the effects of such activities. As a result, natural areas contain intact native plant and animal communities believed to be representative of the pre-European settlement landscape. These locally significant natural areas often contain excellent wildlife habitat and also provide refuge for a large number of native plant species which no longer exist in the surrounding region due to land use activities. SEWPRC indicates that natural areas have economic, functional, and cultural values that directly and indirectly affect our communities.

ENVIRONMENTAL CONSEQUENCES

15. Physical and Aquatic

The primary objective of the MCG floodwater management facility and the UC rehabilitation project directly involves manipulating aquatic resources. The aquatic impacts of the floodwater management facility relate to flooding and quantities of water; the aquatic impacts of the Underwood Creek rehabilitation center on habitat, aesthetics, and water and stream quality.

The MCG floodwater management facility is not a stand-alone project. The facility is a major component of the Menomonee River watercourse management plan. SEWRPC (2003b) notes that this watershed-wide watercourse management plan is a series of five major, interrelated projects designed to function as one system. By completing the MCG floodwater management facility, the watershed-wide system would be able to function as intended. The Menomonee River watercourse management plan is designed to eliminate damages due to direct flooding of buildings along the Menomonee River from events up to and including the one percent probability event, and the MCG floodwater management facility would be designed to divert flow from Underwood Creek and in effect lower the floodwater volume entering the Menomonee River. As noted previously in the Project Summary, the one percent probability event is defined as the event that has a one percent probability of occurring in a given year. Hydraulic modeling results indicate that a storm that dropped 4.7 inches of rain over a six hour time period, in the





FIGURE 21 Primary Environmental Corridor and Natural Areas FIGURE 21 Milwaukee County Grounds Flood Management Facility and Underwood Creek Rehabilitation Project Milwaukee, Wisconsin



Underwood Creek subwatershed, is an example of a storm that would lead to a one percent probability flow event in Underwood Creek.

While the MMSD is addressing floodwater management on a watershed-wide scope, the designs of the individual components of the system account for actual conditions along specific reaches of the Menomonee River. With respect to the MCG floodwater management facility, the most critical location for flood height reduction is along the proposed Hart Park levee. Based on modeling and the design of the Hart Park flood protection project, the most restrictive flow requirement is the one percent probability event in the Menomonee River, upstream of Honey Creek. The flow must be 8,600 cfs or less to keep water levels low enough to maintain regulatory acceptance of a one percent probability event-level of protection at Hart Park. Consequently, maintaining this flow is taken to be the primary performance criteria for the MCG facility and relates to a direct impact of the MCG facility. The facility would reduce water levels in the Menomonee River during high-flow events by temporarily storing water.

One of the direct impacts of the MCG facility is the storage of water diverted from Underwood Creek during high-flow events. Flow to the floodwater facility would also consist of direct precipitation onto the basin, surface flow from a local drainage area, and groundwater. Groundwater would enter as a fairly steady inflow that would be collected and conveyed to the basin low-level outlet and spillway in a small channel inset in the bottom of the basins (Figure 22). While flows smaller than an approximate twenty percent probability event would not result in a diversion from Underwood Creek, flow from the 356-acre direct drainage area and rainfall onto the sixty-two acre surface of the facility would introduce stormwater to the facility (Figure 23).

Since the rate of groundwater inflow would not appreciably increase during storm events, the groundwater entering the facility would not appreciably affect floodwater storage requirements. At an approximate twenty percent probability event or larger, local drainage, direct precipitation and diversion flows would all contribute to water levels within the facility.

During ninety percent of all years, the maximum water level in the basin would be 661.0 feet or less, equivalent to a maximum depth of approximately 3.0 feet or less. The probability of high water elevations of 667 feet (nine feet maximum depth) is less than four percent per year. There is less than a two percent probability of water levels reaching an elevation of 674 feet (sixteen feet maximum depth) in any given year.

The facility would reduce water levels on the Menomonee River during high-flow events by temporarily storing water. The facility would not be "closed" or disconnected from the Menomonee River, but the temporary storage of water would be caused by water entering the facility much more quickly than it would drain to the Menomonee River. Water would drain from the facility via a low-level outlet and an emergency overflow spillway constructed within a vertical wall that would be located on the north edge of the eastern lobe. This low-level outlet would be fitted with a trash rack to minimize the introduction of debris to the Menomonee River.

A berm would be constructed along the east side of the east lobe of the basin. The top of the berm would be 685 feet MSL, two feet higher than the basin's design maximum water level. The design maximum water level elevation would exceed ground elevations at the MMSD Odor Control Facility. This building is located on the east side of the east lobe of the basin and would require the construction of a floodwall. The floodwall would also extend up to 685 feet MSL to allow adequate function of the mechanical systems within the building and the floodwater management facility during high flow events. The volume of water





impounded in the basin, behind the berm and floodwall, necessitates the floodwater management facility being regulated as a dam.

Overall, the watershed-wide approach of the Menomonee River watercourse Management Plan and specifically, the MCG facility are designed to eliminate damages due to direct flooding caused by a one percent probability event. The positive impact of eliminating damages resulting from a one percent probability event may not be extended to larger flow events. The facility would partially attenuate the impacts of an event that exceeds a one percent probability event, but it would probably not provide the same level of protection as with a one percent probability event.

The facility would be constructed to pass flows that result in a diversion volumes that exceed the design capacity of the basin. Volumes of diverted water that exceed the design capacity of the facility would cause high water levels to engage a planned overflow. In this case, the facility would fill to elevation 679 feet, above which water would begin to flow through the overflow spillway and into the Menomonee River. Spillway flows would increase with increasing basin water levels, and should the water in the basin reach an elevation of 683 feet, the flow through the overflow spillway would equal the capacity of the tunnels under the 0.1 percent probability event water level conditions in Underwood Creek. At this point the facility would be acting in a "flow through" mode in which there would be no change in water levels, because the amount of water flowing into the basin would exactly match the amount flowing out through the spillway and outfall structure. This design addresses the case of a long-duration 0.1 percent probability event, occurring after the facility has filled to capacity, and represents a high level of protection.

The basin outlet and emergency spillway would have an impact on the Menomonee River as it would create a large outfall where none currently exists. Aside from a visual impact (see below), this structure would increase the flow and flow velocity in the vicinity of the structure. The increase in flow has the potential to cause erosion downstream of the structure; however, the design of the structure seeks to minimize erosion along the Menomonee River. For inundation events smaller than the one percent probability inundation event, the facility would be designed to release stored water to the Menomonee River slowly and at a non-erosive velocity. For other events and those that exceed the one percent probability event, erosion would be minimized by the placement of riprap at the outlet.

The MCG facility would reduce high water levels on the Menomonee River by capturing flows from Underwood Creek that contribute to high Menomonee River flows. The facility design was tested and found to be flexible enough to reduce Menomonee River flows for a number of potential and observed storm patterns. However, there are potential storm distributions that would cause high water levels on the Menomonee River without contributions from Underwood Creek; in fact, the large event that occurred on June 1997 contained two peaks on the Menomonee River, one coinciding with high Underwood Creek flows and a second without high Underwood Creek flows. The MCG facility would not be effective at reducing water levels during storms that create high flows on the Menomonee River when the contribution from Underwood Creek is not high. Because of data limitations, it is not known how commonly this would occur during a one percent probability event, but analyses suggest that high flows on the Menomonee River at Hart Park are generally associated with high Underwood Creek flows.

Another direct consequence of the MCG floodwater management facility is the diversion of the water from Underwood Creek in order to reduce flood elevations on the Menomonee River. This would be achieved by diverting water from Underwood Creek during high-flow events. The need to divert water from Underwood Creek to reduce flood elevations was balanced with the desire to minimize the number of diversions and to maximize the ecological quality of the rehabilitated Underwood Creek. The

critical issue is that sufficient water would need to continue to flow down the creek during a diversion. In other words, the function of the MCG floodwater management facility would not be achieved at the expense of the ecological quality of the newly-rehabilitated Underwood Creek. Beyond the economics of flooding and floodwater management, the function of the MCG facility would have positive direct and indirect impacts on the ecological function of Underwood Creek.

The direct and indirect impacts of the rehabilitation of Underwood Creek relate to habitat. The rehabilitation of Underwood Creek would improve in-stream aquatic and riparian habitat. On the other hand, the removal of the concrete-lined creek bottom and portions of the concrete sideslopes would have a negative impact on Underwood Creek's ability to convey high-flows downstream. The creek rehabilitation's impact on conveyance would be mitigated by flow diversion to the MCG floodwater management facility. Not only is the rehabilitation of Underwood Creek's rehabilitation and would reduce stresses on Underwood Creek during high-flow events. By diverting water during high-flow events, the MCG floodwater management facility would reduce flows along Underwood Creek, and therefore, the facility would reduce flooding that otherwise would occur once the concrete lining is removed.

The actual diversion of water has the potential to result in localized erosion in the immediate vicinity of the diversion structure. The diversion of water has the potential to entrain fish and sediment into the tunnel and floodwater management facility. The diversion is not expected to contribute to noise levels in the area and would sound like rushing water. The design of the diversion structure seeks to minimize erosion and fish and sediment entrainment. MMSD will evaluate the potential for scour and reinforce potentially impacted areas in the vicinity of the Underwood Creek diversion structure.

Flows in Underwood Creek would begin to divert when flow in Underwood Creek reached an approximate twenty-five percent probability event; this would impact the rehabilitated creek by diverting water (Table 4). As noted earlier in this document, the amount of water diverted would depend upon the flow in Underwood Creek. In very general terms and under most circumstances, higher flows in the rehabilitated Underwood Creek would result in a greater diversion rates. As noted earlier, water would begin to be diverted at the approximate twenty-five percent probability flow event. During the twenty percent probability event, approximately 12 percent of the peak flow in Underwood Creek would be diverted. During the ten percent probability event, approximately 31 percent of the peak flow in Underwood Creek would be diverted. For higher flow events such as the one and two percent probability events, approximately 50 - 60 percent of the peak flow would be diverted. While 55 percent of the peak flow would be diverted during the one percent probability event (4,400 cfs), approximately 3,500 cfs would remain in Underwood Creek.

Although a considerable portion of the peak flows are diverted, the actual volume of water that would be diverted is a smaller percentage of flow in the creek, because the peak flows occur for very short times (less than one hour). From a stream-function standpoint, the diversion of water during high-flow periods in Underwood Creek would reduce erosion and the likelihood of damage to riparian vegetation in the rehabilitated channel and floodplain. The function of the MCG floodwater management facility would not negatively impact the creek as the diversion structure would be constructed to only divert water during events that are greater or equal to an approximate twenty-five percent probability event and maintain downstream flows during diversions.

Visual

The existing lands anticipated to be impacted by the MCG floodwater management facility consist of a number of relic landscape features. These lands have been in use since Milwaukee County's formative years. This area contains the abandoned Milwaukee County tree nursery, abandoned railroad tracks, fences, roads, old building foundations, and utilities. The MCG floodwater management facility would impact the appearance of the Milwaukee County Grounds. The Community Gardens and the former Milwaukee County Nursery would be replaced with a large open basin. Nearly two million cubic yards of material would be excavated to form the basin and much of that material would be placed on site. The topography of the land that houses the existing community gardens and old fields, located south of Swan Boulevard and in the open space area, would be impacted by the placement of excavated fill. The grading plan for the basin and for the open space area was developed over an eighteen-month timeframe by the MMSD, Milwaukee County and a number of community stakeholders. The plan would maintain a natural appearance. The final grading plan seeks to emulate Wisconsin's natural topography, including variable elevations and slopes. The establishment of five different vegetation communities would complement the natural grading of the open space area and the basin. The variable topography would result in variable soil moisture regimes, aspects, and temperatures; this would lead to a relatively diverse suite of habitats for wildlife and vegetation. In effect, the enhanced habitats could potentially invite more biological diversity relative to the existing condition. The final grading of the open space area and the planned establishment of a prairie community would allow long views of the site. Some specific areas would also be planted with trees and shrubs to enhance the undulating terrain. Tree plantings would be used to define outdoor spaces and land uses, when possible.

At the west end of the basin, a one to two-acre shallow marsh would be created at the outlet of the tunnel stilling basin. Groundwater inflows and seepage from the tunnel would provide relatively steady sources of water to the marsh; occasional stormwater inputs from the 356-acre direct drainage area as well as infrequent diversion flows would also contribute water to the marsh. The permanent water surface, within the marsh, would be established by a rock sill, set at an elevation of 662 feet; the sill would provide up to two feet of standing water. The water would fill the marsh to the top of the sill and gradually spill over the sill and into the basin's wetland. The wetland would be located along a low-flow swale located along the southern / central portion of the basin bottom would connect the shallow marsh at the western end of the facility to the low-level outlet. This swale would have a bottom width of one to two feet and would transport water seeping into the basin and outflowing from the marsh, through the facility, and into the Menomonee River.

An overlook platform would be placed over the tunnel stilling basin (Figure 6), a service road would be placed around the basin perimeter, and the sidewalks along Swan Boulevard would be extended to the southwest of the bridge to allow visitors closer views of the floodwater basin. The service road would be extended to Swan Boulevard. The City of Wauwatosa would address signage and street pavement marking requirements.

A single bridge carrying Swan Boulevard would span the channel connecting the two lobes of the basin and be placed south of the intersection with Underwood Creek Parkway (Figure 7). The bridge would be 200 feet long and 100 feet wide. It would be supported by two piers set approximately sixty feet from each end of the bridge. The concrete bridge would have two throughlanes for each direction and would be separated by a median of variable width; the traffic lanes would be surfaced with asphalt and include curb and gutter. Sidewalks would be placed on both sides of the bridge and protected by a railing. The sidewalk and railing would be about nine inches lower than the traffic lanes in order to allow views of the basin and open space area by vehicular passengers. The sidewalks would be connected to the access drive surrounding the basin. The access drive would also pass beneath the north and south sides of the bridge.

Existing views along Swan Boulevard would change for passengers in vehicles traveling Swan Boulevard. Vehicular traffic would no longer view the community gardens but instead would view the floodwater basin and the filled and graded open space area. Some portions of the completed open space area would not be visible from Swan Boulevard. In these cases, portions of the open space area would be obstructed by the site's existing topography, especially adjacent to Swan Boulevard on the south side of the Boulevard.

A berm would be constructed along the east side of the east lobe, extending southeast from Swan Boulevard to the Pauper's cemetery; the berm would then extend south along the west side of the cemetery. The top of the berm would be set at an elevation of 685 feet MSL. The berm would be approximately five feet higher than the existing grade in the vicinity of Swan Boulevard and approximately eighteen feet higher at the cemetery. In addition to the berm, a floodwall would be constructed around the MMSD Odor Control facility. The top of the floodwall would also be set at an elevation of 685 feet MSL. The low-level outlet and overflow spillway would have a visual impact on the east and west sides of the CPR tracks, located on the east side of the basin. The outlet structure would tie into the Menomonee River at an elevation of 657.5 feet. The top of the facility would be constructed at an elevation of 685.0 feet. Thus, the structural height of the facility would be 27.5 feet. The low-level outlet and overflow spillway structure, berm and floodwall would be visible from a number of vantage points.

Structures that would be viewable along Underwood Creek, as a result of this project, include the diversion structure (Figure 3) and berm. From the riparian corridor, including the creek itself, the diversion structure would appear as a large-scale grate spanning twenty feet within a 225-foot long and forty-one-foot wide concrete structure along the east bank about 1,200 feet upstream of the USH 45 Highway Bridge.

The rehabilitation of Underwood Creek would directly impact its physical appearance. The existing view of Underwood Creek, from Underwood Creek Parkway just north of Watertown Plank Road, includes a concrete-lined channel. Downstream, several drop structures provide unappealing views from the streambank. Un-managed vegetation currently crowds the creek's banks and inhibits public access to the creek.

The concrete-lined creek bottom would be removed from the project reach, and portions of the concrete-lined sideslopes would be removed. The rehabilitated channel would consist of a floodwater conveyance corridor, bankfull channel, and an inset pilot channel. Meanders would be introduced, with the pilot and bankfull channels and even the floodwater conveyance corridor along the upstream portion of the project reach (Figures 5A, 5B). Approximately 40 percent of the project reach between USH 45 and the confluence with the Menomonee River would have all the concrete removed. The remainder of the reach would be modified by only replacing the concrete-lined channel bottom with stone. Downstream of USH 45, a berm would be constructed along 930 feet of the northern bank, along a stretch of Fisher Parkway. The berm would have an average height of 2.5 feet and would be constructed of earthen materials and be planted with vegetation. Portions of the berm along the north side of Underwood Creek would be visible from Fisher Parkway and the Underwood Creek riparian corridor, including the creek.

The floodplain terrace would be planted with natural herbaceous, shrub, and trees species. The simple removal of the concretelined channel bottom and the introduction of some variability and vegetation to the riparian corridor would improve the appearance of Underwood Creek. Construction of the Floodwater management facility and the rehabilitation of the Underwood Creek would involve considerable clearing of trees and vegetation, earth-moving, stock-piling, and other construction activities. Additionally, the construction equipment and vehicles would be visible outside the project area during ingress and egress. The site would appear as a large-scale, earth-moving, construction project for the duration of construction. Construction activities would create the potential to generate dust that would be visible around the site.

Topography

The existing topographic trend of the Milwaukee County Grounds site, decreasing elevation from west to east, would not be changed by the project. As discussed previously, specific topographic contours in the open-space area would be altered by the placement of fill material. In general, five to ten feet of fill would be placed in the vicinity of the east lobe and the Milwaukee County economic development area and approximately twenty to twenty-five feet of fill would be placed in the middle of the open space area. Likewise, the footprint of the basin would experience a substantial excavation; this area would be lowered and regraded.

The topography of Underwood Creek would also change with project implementation. The creek would be transformed from one single, concrete-lined channel, to a series of channels, primarily constructed of natural substrate. The rehabilitated channel would contain a floodplain terrace, bankfull channel, and a low-flow channel. The sides of the creek would become less steeply sloped relative to the existing concrete sideslopes; the creek would be "rougher" and contain more complexity and variability as a result of the use of more natural materials. The topography of the creek along its flow path would also change as a result of the removal of the drop structures within the project reach. The resulting creek bed would be more steeply sloped in order to connect the grades that were previously separated by the drop structures. Refer to the Manipulation of Terrestrial Resources section, on Page 17, for a more detailed discussion.

The topography and resulting surface water drainage patterns of the open-space area would be altered from its existing condition by the placement of excavated fill materials. The material would be placed to form undulating topography to emulate natural landscapes of Wisconsin. The resulting topography would, in effect, create areas of recharge, discharge, and surface runoff. Temporary ponding may also occur in some of the drainage ways. Overall, the open-space area would be graded such that surface water would flow northeast towards the east lobe of the floodwater basin. It would also keep drainage from crossing Swan Boulevard and from flowing onto adjacent properties located along Watertown Plank Road.

Geology

The geology of both Milwaukee County Grounds and Underwood Creek would not be impacted by project implementation.

Soils

Soils within Milwaukee County Grounds would be impacted from excavation and filling activities. Existing soil within the floodwater basin footprint would be excavated leaving newly exposed parent material. The existing topsoil at the basin and the open space area, including the community gardens, would be stockpiled and replaced in the basin and open space area. If the replaced topsoil is compacted as a result of construction activities, the replaced topsoil would be disked or otherwise aerated to facilitate revegetation and the establishment of Butler's Gartersnake habitat in the east lobe. The excavated material would be placed in the open-space area. Less than two acres of soil would be impacted within the DNR Forestry Education Center area.

Soils along the Underwood Creek corridor would be impacted by excavation and construction activities associated with creek rehabilitation.

Hazardous Materials

Hazardous material assessments (HMAs) and subsurface investigations have been completed for both Milwaukee County Grounds and Underwood Creek during the past five years (GeoTrans 2005; Geotrans and Norris & Associates, 2005; HNTB 2002; HNTB 2005c; Kapur 2001a, 2001b; K. Singh & Associates 2000a, 2000b, 2001; Seymour 2002). Areas with potential risk from soil and groundwater contamination appear to be limited in their extent but may be encountered during construction activities. The following provides a summary of potential risks (Figure 24).

Milwaukee County Grounds Floodwater Basin/Excavation Area:

- Based on the results of prior investigations, there would be minimal potential risk from hazardous materials in areas to be excavated. However, considering the magnitude of the excavation required for the basin, encountering buried ash, contaminated soils, or buried debris could be a possibility.
- Some structures would be demolished and some roads would be removed as part of this project; the abandoned railroad spur would also be removed. These types of activities could encounter impacted soils and groundwater.

Milwaukee County Grounds Fill Area:

- There are two landfills located in the vicinity of the east lobe of the basin. One landfill is registered with the DNR; this landfill is listed as containing building demolition debris and wood waste. The second landfill area is characterized as a pesticide disposal site. The exact location of the second landfill is unknown; however, these landfills appear to be located outside the project limits.
- A dumping site was noted north of the historic cemetery, BMI 174, during a site visit conducted on June 24, 2005. Several piles of soil mixed with concrete and general wastes were noted. The source of the material is unknown.
- Building debris has historically been encountered at former building footprints within the Eshweiler building complex, the former farm complex, and at the Milwaukee County building complex, all located north of Watertown Plank Road.
- Historically, coal and coal ash from the power plant may have been landfilled within the project area.
- The former Milwaukee County nursery, an existing berm located along Swan Boulevard, west of the Eshweiler buildings, and a berm located west of the former farm complex are listed as closed leaking underground storage tank (LUST) or environmental repair program (ERP) sites with the DNR. This means that soil and/or groundwater contamination has been observed at these areas, but the current levels of contamination do not require further action.
- Approximately forty-five cubic yards of petroleum-contaminated soil is known to exist in the vicinity of the maintenance building, located at the former Milwaukee County nursery. The contaminated soil was not accessible during prior remediation excavation activities due to its proximity to the building.

Underwood Creek Corridor

 Soil contamination was observed during a Phase II Environmental Site Assessment that was conducted along Underwood Creek, within the project reach. The draft Phase II report recommended that material excavated during construction be managed as a special waste in accordance with ch. NR 718. The report also indicated that additional


soil sampling along the channel bottom and on top of the banks would need to be conducted if excavations during construction would exceed the sampling depths characterized during the Phase II subsurface investigation.

A materials handling and management plan, which includes a review of potential risks and presents a contingency plan, would be prepared with construction documents for both projects. The project Health and Safety Plan would include precautions for dealing with contaminated soils.

Construction

There would be temporary construction-related impacts to the Milwaukee County Grounds and Underwood Creek projects; these impacts would be minimized by using best management practices. The actual techniques that would be employed would depend on the contract specifications prepared for this project by MMSD and the specific measures employed by the contractor performing work.

The following is a general construction timeline for the floodwater management facility and Underwood Creek rehabilitation:

- 2006 Excavation of east lobe of basin, filling in open space area, and Swan Boulevard bridge construction
- 2007 Excavation of west lobe of basin and filling in open space area
- 2008 Permenant revegetation of basin and open space area
- 2009 Construction of basin low-level outlet and emergency overflow structure and rehabilitation of Underwood Creek upstream of diversion structure
- 2010 Construction of diversion structure and rehabilitation of Underwood Creek downstream of diversion structure
- 2011 Underwood Creek rehabilitation downstream of diversion structure

Construction, associated with the rehabilitation of Underwood Creek, would primarily occur during the mid-summer, fall and early winter when flows tend to be lowest (July to December). The duration of construction would be limited by flows in Underwood Creek and the environmental regulations imposed through the permitting process. The duration of construction would also depend on the rate of progress of MMSD's construction contractor.

Construction would produce noise, dust and other particulate matter, plus vehicle emissions associated with construction of the facility and creek rehabilitation. These would be short-term and non-recurring. Dust control, groundwater dewatering discharge, and noise issues resulting from construction would be addressed in the construction specifications and would meet state and local requirements. Construction in the project area would expose land to erosion. However, this would be managed through state and local regulations.

Best Management Practices (BMPs) would follow the DNR's technical standards for erosion control and would be used to reduce impacts during and immediately following construction. BMPs typically implemented include:

- Silt fencing at boundaries of ground disturbance
- Staging and access located to minimize potential for sediment contribution
- "Opening" of stream segments (removal of concrete) to a limited maximum distance to minimize the length of stream reach susceptible to flood damage
- Installation of erosion control fabric over all completed, exposed soil surfaces

- · Removal of heavy equipment from the stream corridor at the end of each work period
- · Monitoring of the weather forecasts to modify work activities in the event of a predicted storm

For construction associated with the rehabilitation of Underwood Creek, one possible approach would be that sequential segments of Underwood Creek be disturbed and rehabilitated, rather than the entire project reach at one time. The lengths of these segments would be dictated by construction access, rehabilitation measures employed and anticipated rates of completion. A temporary cofferdam would be placed at the upstream end of the segment under construction. The cofferdam would dam up the water and allow it to be pumped via closed pipes to an outfall situated downstream of the segment. Intermediate pumps, within the segment, would be installed at low points to collect seepage and groundwater. This water would be similarly pumped to a downstream outfall. Diversion pumps would be sized to convey stream flows up to certain point. Flows that exceed the capacity of the temporary diversion pumps would overtop the cofferdam and flow through the project site. The amount of water that would be allowed to overtop the dam and flow into the site would be determined by a risk assessment (of flooding the construction site) and cost (for a pump system or a particular size).

Existing Utilities

Approximately twenty-six utilities would be relocated during the construction of the floodwater management facility. The utilities include potable water, electrical, sanitary sewer, communications, gas, and lighting. The final design of the Underwood Creek Rehabilitation project is not completed, but the rehabilitation would likely impact existing utilities in the vicinity of the project reach. Some utilities that may be impacted by Underwood Creek rehabilitation are an abandoned sanitary sewer, a high-pressure natural gas pipeline, and existing utilities located along the CPR tracks.

Groundwater

MCG Floodwater Basin

Groundwater elevations at the project site range from approximately 685 feet to approximately 670 feet MSL north of Swan Boulevard, and between approximately 675 feet to approximately 655 feet MSL south of Swan Boulevard. The general topographic elevation in the area proposed for the basin is relatively flat, at an approximate elevation of 685 ±5 feet MSL. The final basin base grade would be 660 feet. Temporary earthwork, on the basin, would likely range from approximately twenty-five feet below existing groundwater to approximately five feet above existing groundwater.

Alluvial deposits comprised of a stratified mix of silt, sand and gravel are present at elevations of 660 feet and deeper within the historic Menomonee River basin (HNTB 2002). Groundwater seepage into the basin would most likely occur at flows less than one cfs. Following the completion of the basin and the termination of dewatering activities, groundwater levels would begin to rise. The length of time that passes before groundwater begins to seep into the basin would be dependent upon the actual soil present at the site. In general, groundwater seepage into the basin is expected to occur shortly after construction is completed.

The groundwater entering the basin would gradually meander through vegetation, at the bottom of the basin, to an outfall structure at an elevation of 658 feet and/or be taken up by the basin's plant community. Construction dewatering would be necessary throughout the floodwater basin construction areas and within the open cut excavation area for the tunnel stilling basin. Construction dewatering would lower the water table to an approximate elevation of 657 ±1 feet MSL during basin construction; the amount of construction dewatering in the open cut area, at the east end of the tunnel, would be determined by the contractor.

Construction dewatering discharge would go into an appropriate City of Wauwatosa and/or Milwaukee County storm sewer, if sufficient capacity is available. Otherwise, the water could be discharged directly through piping into either Underwood Creek or the Menomonee River. Permits would be required for the disposal of water. The specific permit requirements depend on where the water is discharged.

A July 13, 2005 DNR memorandum regarding the Soils at the Milwaukee County Grounds site suggested that the trees within the DNR Forestry Education Center forest utilize shallow groundwater and plant-available soil moisture for growth. Construction dewatering associated with basin construction would not likely affect the forested area. Construction dewatering would primarily impact the permanent water table, while the perched water table likely sustains the trees. The DNR memo also indicated that the Forestry Center's soil profile is variable and that this variability adds uncertainty to predictions of how the forest would react to a drawdown in the permanent water table. Through collaboration with the DNR, a groundwater monitoring plan is being developed and would be implemented prior to the start of construction. Underwood Creek, Menomonee River, and existing water wells are unlikely to be impacted by dewatering during basin construction; these water bodies would not likely be impacted because of their distance from the project site and dewatering activities.

Post-construction groundwater elevations at the basin would be permanently lowered by an average of fifteen feet, ranging from approximately nine to twenty-three feet north of Swan Boulevard and by two to twenty-five feet south of Swan Boulevard. This was determined by comparing the June 2005 groundwater contour data with modeling data. The impact of lowering groundwater elevations could extend 260 feet up-gradient. Groundwater modeling estimates a radius of influence of about 260 feet from the point of groundwater dewatering. It is unlikely that the completed project would impact the Underwood Creek, Menomonee River systems or existing water wells, considering their distances from the basin.

MCG Tunnel

Construction dewatering at the tunnel stilling basin may result in a slight impact at the DNR Forestry Education Center. However, this impact was calculated to be on the order of a few inches or less and as noted above, a groundwater monitoring plan would be implemented prior to the start of construction. The bored section of the tunnel would be completed with an earth pressure balance tunnel boring machine (TBM). The TBM grinds subsurface material along the length of the tunnel alignment. As the TBM moves from one end of the tunnel to the other, the ground subsurface material is mechanically conveyed to the tunnel entrance. This type of TBM maintains a pressure at the face of the excavation that is equal to the hydrostatic pressure of the groundwater. The use of this type of TBM minimizes the amount of groundwater that flows into tunnel excavations and thus minimizes the amount of groundwater dewatering. While some groundwater drawdown may occur, the contractor would be limited to causing no more that one foot of groundwater drawdown.

Diversion Structure

Groundwater dewatering would be needed for the construction of the diversion structure. Dewatering would be conducted to a depth of 654 feet (three feet lower than the footing elevation of 657 feet MSL). Sheet piles or other similar methods would be placed between Underwood Creek and the construction area to segregate the surface water in Underwood Creek from the construction excavation. Groundwater was observed at elevations of 688 to 694 feet MSL during subsurface investigations in the vicinity of the diversion structure (Gestra 2005). Groundwater seeps from side-slopes were observed in the area; the presence of seeps indicates that perched groundwater is discharging along the face of the slope. The soil types within this area

are quite variable, ranging from clay to sand with gravel to a maximum depth of 669 feet MSL (end of soil boring); the soil profile observed at the Underwood Creek diversion structure location is typical of a historical floodplain depositional environment. Construction dewatering at the inlet structure would need to consider to the site's topography as the face of the slope is covered with trees. Construction dewatering would likely impact this slope considering the proximity of the slope to the diversion structure and the type of soils in the area. However, appropriate engineering construction methods would limit the radius of influence of dewatering. Sheet piling installed around the construction area would minimize impacts to area groundwater elevations during the substantial groundwater drawdown at the construction site. Construction dewatering within this area is estimated to occur over a ten to eighteen-month period. Following the completion of construction, groundwater elevations would return to normal at this location.

Underwood Creek

With the exception of the construction of the diversion structure, substantial dewatering would not likely be conducted during the rehabilitation of Underwood Creek. During heavier flow periods and flood events, the Underwood Creek bed would provide temporary storage of groundwater.

Sediment Transport

Due to the urbanized nature of the Underwood Creek watershed, the quantity of sediment transported from the land surface is relatively limited. Erosion from construction sites, urban stormwater, unstable stream banks and incising stream beds would generally be the sources with the greatest potential to introduce large quantities of sediment into the creek. Studies of sediment within the lower reach of Underwood Creek indicate that the average sediment size, deposited in the concrete-lined channel, is about 3⁄4 to one-inch in diameter and the quantity of coarse sediment moving through this reach is likely to be small. The rehabilitated channel would be designed to allow sediment, one-inch in diameter or less, to flow through the length of the stream without inducing substantial amounts of either erosion or deposition. The location and elevation of the diversion structure at Underwood Creek would minimize the potential entrainment of sediment.

Sediment transport in the river tends to be most associated with high flows, and the construction dewatering/basin dewatering flows would be small relative to even minor storm events. In general, the effects of these dewatering flows should be smaller than the effects of one small storm event.

Some sediment would be deposited within the basin. Because the Underwood Creek subwatershed basin is highly developed and the diverted flows are being drawn from high in the water column, the flows entering the basin generally should contain low levels of sediment. The sediment would deposit on basin's vegetation and may not be obvious after light rain washes the silt from the leaves. There is the potential for some mud deposits in the basin bottom after big rainfall events.

Maintenance

The floodwater management facility would be regularly maintained by MMSD. Activities such as vegetation management, clearing of the racks designed to trap garbage on the diversion structure, inspection of concrete structures, etc, would be performed to optimize the long-term performance and maintain the appearance of the facility. MMSD would also address debris that could potentially be deposited in the facility as result of an inundation event.

16. Biological (including impacts to threatened/endangered resources)

Butler's Gartersnake

The Milwaukee County Grounds floodwater management facility and the rehabilitation of Underwood Creek would affect specific habitats in the project area. Based on the Butler's Gartersnake Assessment (Casper Consulting 2005), Butler's Gartersnake habitat is present within the project site. The Butler's Gartersnake is listed as a state threatened species in Wisconsin. This species is subject to DNR regulatory jurisdiction, which currently follows guidelines from the Butler's Gartersnake Conservation Strategy. This strategy utilizes snake surveys and habitat assessments to classify the quality and extent of the available suitable snake habitat, and assigns habitat patches to a tier system, with differing regulatory requirements for addressing impacts or the need for a DNR Incidental Takings Permit. In the case of the Butler's Gartersnake, the permit authorizes the incidental taking of a snake while carrying out an approved activity. The permit is issued only after a number of requirements are met. Some of the requirements include a description of the activity and impact to snakes, steps taken to avoid and minimize impacts, a Butler's Gartersnake Conservation Plan, and public review of the application for the permit.

The project site consists of two Tier 3 habitat patches (significant conservation value) and one Tier 1 habitat patch (minimum conservation value). The MMSD is currently working with the DNR to address mitigation and long-term conservation measures for the Butler's Gartersnake on the project site. These issues are formally addressed in a Butler's Gartersnake Conservation Plan developed for the MCG floodwater management facility and Underwood Creek rehabilitation project.

Mitigation for Butler's Gartersnake habitat would be located in the east lobe of the Floodwater management facility. As noted in the Butler Gartersnake Conservation Plan, this area would be classified as Tier 3 Butler's Gartersnake habitat. The east lobe would be inundated when the diversion and floodwater management facility are engaged. The one percent probability inundation event would essentially fill the basin, including the east lobe. The Butler's Gartersnake is able to swim and would respond to basin inundation by simply swimming to higher ground. The basin is designed to drain within four days. Following the drainage from the basin, the snakes would move back into the basin.

Wafer ash

Wafer ash habitat was observed on the project site. Based on the locations of Wafer ash, mapped by SEWRPC, the project would likely impact some Wafer ash habitat, totaling approximately 3.3 acres. This impact would be relatively small and would not exceed twelve percent of the total delineated Wafer ash habitat in the project area. It also assumes that each delineated area would be completely obliterated; in reality, some areas would be preserved. The design of the floodwater management facility incorporates a variable, natural-appearing footprint and attempts to preserve a number of existing trees; however, some wafer ash habitat would be impacted by the project. The MMSD has made a number of changes to the designs and / or locations of many of the features of the floodwater management facility. The current grading plan calls for grading and contouring around many existing strands of trees. The preservation of many of the existing trees would enhance the natural appearance of the completed project.

Forked Aster

As noted earlier in this document, SEWRPC observed Forked aster in the vicinity of the project. Based on the locations of Forked aster habitat that were presented in SEWRPC's final report (2005), Forked aster plants would not be impacted by this project.

The project area, including the Underwood Creek and MCG floodwater management facility, would be impacted by construction. The project would require temporary access roads and construction staging areas to transport and store construction equipment and materials. The existing vegetation and landscape, within much of the project area, would be impacted by construction activities. Wildlife within the project sites and construction areas would be temporarily displaced during construction activities. The DNR Forestry Education Center, with approximately forty acres of forest, would provide interim habitat for wildlife displaced from woodlands elsewhere on the project site. In addition, there are approximately eighteen acres of upland woodland habitat, located between Underwood Creek and Underwood Creek Parkway, and an isolated natural resource area located south of the east basin, that would serve as interim habitat for wildlife displaced by construction. Not only would construction be limited in these interim habitats, these sites are relatively well distributed across the project site.

According to the DNR, the Orchard Oriole would not be impacted if vegetation clearing is prohibited from May 15 to June 15. The critical time to avoid disturbance of the Northern Harrier habitat is from late May to mid-July. Alternatively, a June survey could be initiated to identify the location of species present on the project site and avoid disturbance of known breeding areas. The completion of the MCG floodwater management facility and open space area would maintain and expand wildlife habitat in the vicinity of the MCG floodwater management facility and the open space area. These lands would be converted from land uses that include community gardens and a former tree nursery. The community gardens are characterized by a relatively intensive land use associated with agriculture, including annual fall soil tillage and plant residue incorporation. Likewise, the former nursery consists of long, straight gravel roads which partition the space into small blocks of closely-spaced trees and overgrown opportunistic vegetation.

The basin would replace the former nursery landscape with a number of natural plant communities. Many of the existing smaller trees within the former nursery would be reused to vegetate the project area. With respect to the floodwater management facility's basin, the DNR would design, implement, and maintain grassland and wetland vegetation communities with funding from MMSD. The details of this plan are currently being negotiated between DNR and MMSD. In the open space area, the MMSD would manage the vegetation for five years. The maintenance plans would include control of invasive species to facilitate the establishment of the natural plantings. A task force of landscape architects from the Milwaukee County Parks, DNR, and MMSD, along with extensive public involvement, determined that newly established vegetation would resemble native Wisconsin landscapes. The task force made specific recommendations for plant community areas and the species to be planted in those vegetative zones. The open-space area would change by incorporating undulating topography that would provide varying moisture regimes, aspects, and temperatures, which would result in varying habitats for wildlife and vegetation. In effect, the enhanced habitats would invite more biological diversity in comparison to the existing condition.

The completed creek rehabilitation would also result in improved aquatic and wildlife habitat along the Underwood Creek project corridor. Aquatic habitat improvement would result from the addition of in-stream substrate and complexity and the establishment of trees, shrubs and herbaceous cover, compared to the minimal habitat provided by the concrete-lined channel and opportunistic vegetation that currently exists along most of the project reach. The new vegetative cover would provide

some shade to Underwood Creek and reduce thermal impacts to the creek.

The rehabilitated streambed substrate would consist of sand, gravel and cobbles. These materials would be well-graded, meaning that all sizes of material would be represented. Over time, the flow of water would sort these materials along the stream course and across the width of the stream. For example, smaller gravels tend to accumulate in the downstream ends of the pools, while larger cobbles are moved to the riffles. This range of bed material would provide habitat to benthic macroinvertebrates; these organisms serve as a food source for fish and reptiles.

All of the existing, abrupt concrete drop structures would be removed along Underwood Creek. The slope of the stream would vary from rather flat up to a slope of nearly one percent. The gradient changes from one stream segment to another would be gradual. The rehabilitated creek's bankfull and low-flow channels would allow fish passage to upstream reaches of Underwood Creek, even during low to moderate flows. Intermittently-spaced pools would provide resting habitat along with the rehabilitated streambed that would be "roughened" by rocks of varying sizes.

Aquatic Species

The floodwater management facility would contain a low-flow channel that would convey groundwater that seeped into the basin to the Menomonee River. While the seepage of groundwater in to the basin is expected to be less than one cfs, it would likely support aquatic invertebrates, amphibians, and may support small fish.

The Underwood Creek project reach would serve as a transportation corridor for fish moving upstream to seek spawning and rearing habitat. Northern Pike have been identified as the target species for fish passage with this project, since Northern Pike are a weak-swimming fish. The use of Northern Pike's ability to swim upstream as a criterion ensures that all aquatic species of interest are able to swim upstream through the rehabilitated channel. Despite rehabilitating Underwood Creek, upstream fish passage would not be provided at high flows as high water velocities in the channel would exceed the swimming capabilities of Northern Pike (and other fish species). This would not differ from a natural stream setting, where water velocities associated with high flows would limit or prevent upstream fish migration.

Fish swimming capabilities are a function of fish length and the period of time fish are required to swim at a given speed before they have the opportunity to rest. For example, it is estimated that a one-foot long Northern Pike is able to swim for thirty seconds through water with a velocity of 1.4 feet per second (Figure 25). Using a one-foot long Pike as a basis for evaluating fish passage and assuming that the pools in the rehabilitated bankfull channel provide refuge, upstream fish passage in the rehabilitate creek would be provided for flows up to about thirty cfs. Above thirty cfs, the velocities in portions of the bankfull channel would begin to exceed the swim capabilities of a one-foot long pike. Concrete-lining removal (channel bottom only and the removal of concrete-lined channel bottom and sideslopes) and other in-stream and bank habitat features (e.g. asymmetrical pools, deeper runs, large rock, etc.) would provide additional refuge for fish and other aquatic life during high flow and velocity events. Flow duration information for Underwood Creek indicates that a flow of thirty cfs would be equaled or exceeded about ten percent of the time.

The existing concrete channel is susceptible to high thermal loading, causing water temperatures to be elevated above natural conditions during the summer months. This situation results from the general lack of shade by riparian trees; the conditions of wide, shallow sheet flow; the heat-absorption capacity of concrete, and the lack of groundwater/surface water (hyporheic)



interchange. The rehabilitated Underwood Creek channel would include a narrow low-flow channel (pilot channel) that would concentrate low flow over gravels and cobbles. Pools would allow an interchange of stream water with groundwater. Trees would grow along the margins of the bankfull channel. All of these conditions would serve to reduce water temperature relative to the existing concrete-lined channel.

The existing channel is lined with concrete; consequently, there is essentially no existing fish habitat. Removal of the concrete creek bed and the creation of a rock-lined channel with alternating pools and riffles would provide fish habitat. Thus the quantity and quality of existing habitat would be greatly improved.

Fish may be impacted, by entrainment, at the diversion structure. Fish entrainment means that fish can be drawn into the diversion structure, carried through the tunnel and discharged into the detention basin. A fish barrier or some mechanical means of preventing fish from becoming entrained in the diversion is not practical given the high magnitude of diverted flow and the rapid rate at which flows increase in the creek. Fish entrainment would be minimized, however, because water would not spill into the diversion structure until flows reach an approximate twenty-five percent probability event. Only as flows increase above this magnitude, would entrainment be possible. Statistically, this means that fish entrainment would only be possible about once every four years. Furthermore, the duration of flow diversion would likely total only four to eight hours for a given storm. Lastly, high-flow events may occur at any time (as summer thunderstorms or as rain-on-snow events), but fish may not be migrating downstream at the same times these high-flow events are occurring. Thus, the frequency, duration and timing of diversion suggest that fish entrainment would be gravity-drained and would allow the fish to swim out of the basin and into the Menomonee River.

The rehabilitated floodplain and the slope that would transition to the existing grade along Underwood Creek would consist of a spoil surface and would be revegetated with natural plantings. The objective would be to establish a hardwood forest and wetlands along the creek. The location of these plant communities would be dependent on the frequency and duration of inundation. During the establishment of this riparian corridor, exotic trees that might become established would be manually removed. Habitat would be provided along the Underwood Creek riparian corridor for the species of mammals, amphibians, reptiles and birds that utilize such conditions for forage and cover.

Impacts to wetlands

A total of twenty-two wetlands were identified on the project site during the 2005 and 2006 field investigations (Figure 20). Many wetlands on the project site would be avoided or the impacts would be minimized through design and grading modifications. Design features and locations of elements of the Milwaukee County Grounds floodwater management facility have been changed to avoid substantial impacts to four additional wetlands (W-7 west, W-7 east, W-6, and W-10). However, three wetland areas, W-5, W-7, and W-9 with a total area of 2.8 acres, would be impacted by the floodwater management facility, and 0.17 acres of wetland area, W-8, would be impacted by the berm located near the water quality pond that is designed to provide protection to downstream, residential structures located within the facility's hydraulic shadow (Table 11).

Table	11	
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Anticipated Wetland Impacts - Avoidance and Minimization

	Wetland ID	USACE Jurisdictional Wetland	Size (acre)	Impact	Size of Impact (acre)	Remaining wetland (acre)	Notes	
	2		0.14	none	0.00	0.14		
	2A		0.04	none	0.00	0.04		
	4		0.13	none	0.00	0.13		
	4A		0.18	none	0.00	0.18		
	5		1.78	Detention basin construction	1.78	0.00		
spuno.	6		0.61	None	0.00	0.61	Avoided impacts by changing grading plan	
Ū	7	Yes	0.81	Detention basin construction	0.81	0.00		
e County	7 West	Yes	0.54	None	0.00	0.54	Avoided impacts by changing grading plan	
ilwaukee	7 East	Yes	0.44	None	0.00	0.44	Avoided impacts by changing grading plan	
≥	7 South	Yes	0.30	none	0.00	0.30		
	8	Yes	3.65	Construction of berm near the water quality pond	0.17	3.48		
	9		0.24	Filling associated with development of open space area	0.24	0.00		
	Subtotal of MCG wetlands		8.86		3.00	5.86		
k	10	Yes	1.25	None	0.00	1.25	Impacts avoided by moving structure location & is outside UC disturbance limit	
Cre	10A	Yes	0.13	Underwood Creek rehabilitation	0.13	0.00	All wetlands along	
po po	10B	Yes	0.67	Underwood Creek rehabilitation	0.49	0.18	would be restored	
N N	10C	Yes	0.64	Underwood Creek rehabilitation	0.63	0.01	with rehabilitation;	
Inde	10D	Yes	0.08	Underwood Creek rehabilitation	0.03	0.05	assumes no net	
	10E	Yes	0.41	Underwood Creek rehabilitation	0.41	0.00	1035	
	Subtotal of UC wetlands		3.18		1.69	1.49		
	Total		12.04		4.69	7.35		

Wetland W-5 is characterized as a floodplain forest / wet meadow / shrub-carr wetland that covers approximately 1.78 acres. The 2005 wetland assessment determined that this wetland has a low to medium function and value. This wetland is located in the vicinity of the channel that would connect the east and west lobes of the basin, at Swan Boulevard. The construction of the basin would impact W-5.

Wetland W-7 is located on the southwestern edge of the basin and is within USACE's jurisdiction. This wetland is characterized as floodplain forest / shrubb-carr and covers 0.81 acre. The 2005 assessment determined that this wetland has low to medium function and value. This wetland would be impacted by the construction of the basin.

Wetland W-8 is characterized as a floodplain forest / wet meadow of medium to high function and value and is within USACE's jurisdiction. It is located east of the water quality pond and covers approximately 3.65 acres. The construction of a berm near the water quality pond berm would have a permanent affect on about 0.17 acres of the wetland.

Wetland W-9 is characterized as a shallow marsh that covers approximately 0.24 acre. This wetland was assessed as having a low to medium function and value. W-9 is located in the area proposed for the placement of fill and development of an upland area with variable topography and plant communities.

Some filling would occur on the Milwaukee County Economic Development area, but would not impact wetlands W-12, W-13, or W-14.

Wetlands W-10, W-10A, W-10B, W-10C, W-10D, and W-10E would be affected by implementation of the Underwood Creek project. These wetlands are characterized as a combination of floodplain forest, shallow marsh, shrub-carr, sedge meadow, and wet meadow and comprise 1.69 acres. Impacts to these wetlands are considered temporary, as they are to be restored following construction associated with creek rehabilitation. These wetlands are within USACE jurisdiction.

The MMSD and DNR have met regularly to discuss wetland as well as other impacts associated with the project. Through revised grading plans, approximately 1.6 acres of wetlands are avoided or minimized. The NR 103 analysis provides a detailed alternatives analysis of wetland avoidance and minimization measures undertaken for the project. However, unavoidable impacts to 4.69 acres of wetlands due to the Underwood Creek rehabilitation and the floodwater management facility would require mitigation according to the USACE Section 404 permit process. Through ongoing coordination with the DNR and the Corps of Engineers, wetland mitigation for impacts on the Milwaukee County Grounds and along Underwood Creek is proposed to be located within the Underwood Creek Corridor. Monitoring and management of the wetland mitigation area would be carried out in accordance to USACE guidelines. The rehabilitated creek could accommodate the required mitigation required by the USACE. Mitigation for USACE jurisdictional and non-jurisdictional wetlands impacted on the Milwaukee County Grounds through basin excavation and filling in the open space area would be restored at a ratio of 1.5 acres of restored wetland for every acre of impacted wetland. Mitigation for impacting wetland W-8 from constructing the berm by the water quality pond would be restored at a ratio of 1.5 acres of restored wetland for every impacted acre. All the wetlands impacted along Underwood Creek are under USACE jurisdiction and are considered self-mitigating. This means that wetlands impacted by the Underwood Creek Rehabilitation would be restored at a ratio of ne every one acre of impacted wetland wetland.

17. Cultural

a. Land Use (including indirect and secondary impacts)

The project would have a minimal impact on land use on the County Grounds. The construction of the floodwater management basin would displace the former Milwaukee County Nursery, tennis courts, and approximately 400 existing community gardens/agricultural plots. Milwaukee County would relocate approximately 600 other garden / agricultural plots to other locations within Milwaukee County. Approximately 300 plots would be relocated at Camp Wil-O-way, on the Milwaukee County Grounds. Relocating the gardens / agricultural plots on the vacant land, north of Camp Wil-O-way, would increase the public's use of this relatively inaccessible area. The newly relocated community gardens would also be equipped with a water supply and parking would be available at the existing Camp Wil-O-Way facility. Milwaukee County and the Milwaukee County UW-Extension would relocate an estimated remaining 600 community gardens to alternate locations in Milwaukee County in exchange for Milwaukee County Ground impacts only. The District is providing \$300,000 to relocate the 300 gardens to Camp Wil-O-Way only, 2,500 cubic yards of topsoil, and 2,000 cubic yards of tunnel rock. This agreement would be detailed in an Intergovernmental Cooperative Agreement between the MMSD, Milwaukee County, and University of Wisconsin Extension.

During early planning efforts for the floodwater management facility, there was concern regarding the permanent loss of the community gardens / agricultural plots. People of Hmong ethnicity and African Americans roughly comprise about two thirds of the growers that make use of the community garden program. There would not be a disproportionate impact to any specific ethnic and cultural groups as approximately 300 garden plots would be relocated on the Milwaukee County Grounds. The majority of the remaining displaced plots would be relocated within Milwaukee County.

Currently, the former Milwaukee County nursery facility is surrounded by a fence; the gate is normally locked and inaccessible to the general public. The community gardens were also relatively inaccessible to the general public; the majority of the area was used for growing crops. The construction of the basin would provide more public green space and a more naturally-appearing environment compared to the existing fenced nursery and garden / agricultural plots. The east half of the site proposed for the east basin is currently being used as a construction site; prior to construction, the site was used as a recreational soccer field. Overall, the MCG floodwater management facility is consistent with land use plans for the Milwaukee County Grounds (MCLUPC 1999), which assumes these lands would remain as open green space.

The open space fill area is generally located south of Swan Boulevard and north of the existing Milwaukee County Parks buildings and WE Energies facility. This area is currently used for community gardens and passive recreation. The final grading plan for the fill areas would incorporate lowland and upland areas and associated plantings. Additionally, the final grading of the open space area would include a flat area that could be developed into a soccer field with a parking area. Once the filling is completed, the public may use the open space area for passive or active recreation, depending upon Milwaukee County's future plan for this land.

The Underwood Creek rehabilitation project would have a beneficial impact on land use in the vicinity of the project reach. The rehabilitated stream would allow canoe passage during higher flows, such as spring runoff. The addition, the in-stream substrate and complexity would increase the surface "roughness" along the creek. The roughness and the subsequent decrease in water flow velocity within the rehabilitated stream, would lead to improved public safety by allowing a person to

more easily climb out of the creek in an emergency.

The MCG floodwater management facility would allow the full function of the Menomonee River watercourse management plan. The plan is designed to protect structures from damage due to direct flooding. This protection would have a positive economic impact to surrounding communities, especially downstream communities, as the City of Wauwatosa, that were directly impacted by the 1997 and 1998 flood events.

A number of land use plans were developed for the Milwaukee County Grounds in order to integrate issues important to government bodies, stakeholders, and the public. Several plans (Engberg-Anderson 1996, SEWRPC 1998, MCLUPC 1999) were evaluated through 2004. The latest plan was established in 2004; it includes the following designated areas (Figure 9): a floodwater basin, DNR Forestry, open-space, economic development, and a relocated community garden location. Figure 26 depicts the proposed natural areas and plantings.

Land use plans for Milwaukee County Grounds were developed through individual and group meetings with key stakeholders, listed below, from August through October 2003, and a public meeting was held on November 6, 2003 and coordinated by Milwaukee County, MMSD, and DNR. Approximately 125 people attended and provided feedback and ideas on land use, pedestrian and vehicle access, and grading. Key Stakeholders include:

- 1 City of Wauwatosa, Director of Community Development
- 1. Kubala Washatko Architects, Inc.
- 2. Milwaukee County Economic Development
- 3. Milwaukee County Parks
- 4. Milwaukee County Real Estate
- 5. Milwaukee County Research Park
- 6. Milwaukee Regional Medical Center
- 7. MMSD
- 8. Milwaukee County Office for Persons with Disabilities
- 9. UW Extension Urban Agriculture
- 10. DNR

Milwaukee County, MMSD, and DNR are also working on an intergovernmental cooperation agreement to manage the floodwater management facility. The MMSD would own, construct, operate, and maintain the floodwater management facility. The aesthetic condition of the facility would be overseen by the DNR through authority granted by a conservation easement. The purpose of the easement is to assure that scenic and open space values are retained in perpetuity at the facility for the benefit of the public. This includes prohibiting any changes to the floodwater management facility that may negatively impact the open space condition or disturb the five vegetation communities.

The open-space area is owned and managed by Milwaukee County. The 2004 land use plan calls for the area to remain as open-space but leaves opportunities for active recreation, such as soccer fields and tennis courts, to be located in designated areas in the future. The final distribution of active versus passive recreation uses would be determined by Milwaukee County at a later date.



The project would impact the community and surrounding residential area in a positive way by maintaining open-space at the Milwaukee County Grounds site in accordance with land use planning and public input. The floodwater basin and the open-space area would be comprised of a natural vegetative community. Look-out points from the Swan Boulevard bridge and over the tunnel stilling basin would allow visitors to closely view the basins, and the service drive loop around the basin would be accessible to visitors. However, vegetation in portions of the basin would be left to grow full-height in order to discourage visitors from walking down into and across the basin.

b. Social/Economic (including ethnic and cultural groups, and zoning if applicable)

The floodwater facility and Underwood Creek rehabilitation would not have a social impact, but would have an economic impact. The Milwaukee County Grounds floodwater management facility is anticipated to cost the MMSD approximately \$84 million and would be funded from general MMSD funds. However, as noted in the Purpose and Need section (Page 7), rainfall events occurring within the Menomonee River watershed have caused extensive flood damage over the last thirty years. The Milwaukee Metro area has experienced nearly \$100 million in flood damages over the past eight years alone. Furthermore, since 1973, damages due to flooding cost Milwaukee communities nearly \$138 million. During this time period, the region had nine flood-related Presidential-declared disasters and two Presidential emergencies. While, the project would require capital investment by the community, the more effective management of floodwaters would have a long-term positive economic impact to the Milwaukee Metropolitan Area.

The rehabilitation of Underwood Creek would cost approximately \$10 million dollars. While the primary goal of the rehabilitation project is to improve habitat quality, the project would also make Underwood Creek, from STH 100 to the confluence with the Menomonee River, safer during high-flow events.

The USACE completed an economic analysis for the Menomonee River watershed that reviewed the benefits and costs of implementing projects developed through MMSD's Menomonee River Watercourse Management Plan (USACE 2006). It was determined that the Milwaukee County Grounds floodwater facility would provide an average annual flood damage reduction benefit that is equivalent to Hart Park's benefit of \$268,630 and Western Milwaukee's benefit of \$532,000, because these latter flood management projects and the Milwaukee County Grounds floodwater facility were designed as one system and, therefore, require each other to function properly. The report also determined that implementing the floodwater facility would provide an ecosystem benefit to the area by improving the vegetation and habitat. Likewise, the benefit of removing concrete along Underwood Creek would provide an average annual flood damage reduction benefit of \$107,100, would provide aquatic ecosystem benefits, and improve the aesthetic value.

In the short-term, the construction of the floodwater management facility and the rehabilitation of Underwood Creek would provide construction jobs.

Due to the volume of water temporarily impounded, the MCG facility would be regulated as a dam. Furthermore, due to the risk to downstream structures, the facility would be assigned a high hazard rating. The temporary storage of a large volume of water creates an unavoidable risk of damage arising from uncontrolled flows following structural failure. The long-term impact of

the floodwater management facility would be the introduction of a facility that would be regulated as a dam to the Milwaukee County Grounds. While unlikely, the failure of the facility and impact to downstream structures by the failure's "hydraulic shadow" is not impossible.

c. Archaeological/Historical

Based on historic and archeological investigations conducted at the project site (GLARC 2005, Mead & Hunt 2006), the project would not adversely affect the archeological resources in the project area. The rehabilitation of Underwood Creek would have a positive affect upon the historical integrity of the Underwood Creek Parkway as the rehabilitation would allow the Creek to more closely resemble its historic appearance. However, approximately one hundred feet of a historic retaining wall lining the Menomonee River channel would be removed for constructing the low-level outlet and spillway structure. Conditions would be placed in the USACE Section 404 permitting process that require design review by the State Historical Preservation Officer and the Milwaukee County Landscape Architect in order to minimize or mitigate the effect of the spillway structure to the overall historic integrity of the Menomonee River Parkway.

18. Other Special Resources (e.g., State Natural Areas, prime agricultural lands)

The project would avoid impacts to the forty-two acre woods (DNR Forestry Education Center) and the isolated natural resource area located on the southeast side of the project area.

19. Summary of Adverse Impacts That Cannot Be Avoided (more fully discussed in 15 through 18)

Approximately 4.69 acres of wetland habitat would be impacted. Wetlands along Underwood Creek would be temporarily impacted, but restored following rehabilitation. Mitigation for all impacted wetlands is proposed within the Underwood Creek Corridor.

Approximately 17.7 acres 10.5 acres of Tier 3 Butler's Gartersnake habitat on the Milwaukee County Grounds and in the Underwood Creek corridor, respectively, would be impacted by the project. The MMSD has developed a Conservation Plan to mitigate impacts primarily through maintaining Butler Gartersnake habitat within the east lobe of the basin.

Groundwater dewatering – These impacts would be mitigated by the use of an earth pressure balance tunnel boring machine. Through collaboration with the DNR, groundwater monitoring would be started prior to the start of construction.

Construction activities associated with the floodwater management facility and the Underwood Creek rehabilitation would produce impacts from hazardous materials, noise, dust and other particulate matter, erosion, vehicle emissions and visual impacts.

There would be impacts, including visual impacts, due to removal and construction of structures, grading, revegetation, and the relocation of the Community Gardens; impacts to soil would be long-term.

There would be impacts related to the transport and filling of excavated materials off site.

DNR EVALUATION OF PROJECT SIGNIFICANCE (complete each item)

20. Environmental Effects and Their Significance -

a. Discuss which of the primary and secondary environmental effects listed in the environmental consequences section are long-term or short-term.

The floodwater facility and Underwood Creek rehabilitation would result in long-term benefits for floodwater management in the Menomonee River watershed and improved natural habitat and floodplain in the Underwood Creek corridor. The floodwater facility is a key component of downstream floodwater management measures that would reduce flooding for events up to the one percent probability event. A long-term secondary effect of the floodwater management facility and open space area is that the project would restore the existing relic landscape currently located in the vicinity of the facility and open space area.

The long-term effect of the Underwood Creek rehabilitation is expected to result in improved fish passage and improved aquatic and riparian habitat.

Basin excavation, filling and grading in the open space area and the rehabilitation of Underwood Creek would affect existing topography both short-term and long-term. Short-term effects would include increased potential for erosion and sedimentation, while long-term effects would be the permanent change of existing grades and topography.

Construction would produce impacts from hazardous materials, noise, dust and other particulate matter, and vehicle emissions and visual impacts associated with construction of the facility and creek rehabilitation. These would be short-term and non-recurring.

Impacts, including visual impacts, due to removal and construction of structures, grading, revegetation, and the relocation of the Community Gardens and impacts to soil would be long-term. Impacts resulting from the transport and filling of excavated material off site would have both short and long-term impacts. These impacts depend upon where and how the excavated material is disposed.

Groundwater levels may be affected in the short-term as dewatering is required to construct the floodwater management facility and to rehabilitate Underwood Creek. Over the long-term, groundwater would permanently seep into the floodwater basin bottom, creating wetland habitat. Groundwater elevations in the vicinity of the basins would be permanently lowered by an average of fifteen feet, ranging from approximately nine to twenty-three feet north of Swan boulevard and by two to twenty-five feet south of Swan Boulevard. Groundwater modeling indicates that the impact of lowering groundwater elevations could extend 260 feet up-gradient. It is unlikely that the groundwater impacts associated with the completed project would impact the water elevations in Underwood Creek and the Menomonee River, considering their distances from the basin.

Disturbance on Milwaukee County Grounds and along Underwood Creek would impact Tier 3 Butler's Gartersnake habitat in the short-term. Long-term benefits to Butler's Gartersnake habitat are anticipated; there would be no net loss of Butler's Gartersnake habitat with conservation measures. Some additional Butler's Gartersnake habitat would also be created as a result of this project.

Excavation, filling, and creek rehabilitation activities would impact approximately 4.69 acres of wetlands on the Milwaukee County Grounds and along Underwood Creek. Long-term impacts are anticipated with the permanent loss of wetlands at the floodwater management facility and along Underwood Creek, which would be mitigated according to USACE guidelines. Wetland mitigation and management is anticipated to occur within the rehabilitated Underwood Creek corridor. Long-term benefits are also expected to result from the voluntary creation of wetlands in the bottom of the floodwater management basin. Even though the facility's primary function is to manage floodwater during high flow events, the DNR plans to design and implement a seeding plan that would encourage wetland habitat. The basin's bottom would also be a component of Tier 3 Butler's Gartersnake habitat.

The impacts to the existing vegetation in the project area would be short-term as vegetation would be re-established. Impacts to Wafer ash habitat could be long-term as Wafer ash trees would not be purposefully re-established.

The construction of the floodwater management facility and grading for the open space area would be consistent with Milwaukee County's long-term plans to maintain open space and to direct development to the County's designated Economic Development area.

The introduction of a facility that would be regulated as a dam to the Milwaukee County Grounds would be a long-term impact.

 Discuss which of the primary and secondary environmental effects listed in the environmental consequences section are effects on geographically scarce resources (e.g. historic or cultural resources, scenic and recreational resources, prime agricultural lands, threatened or endangered resources or ecologically sensitive areas).

There are several cultural and natural resources on the County Grounds site that are geographically important. Those resources include stands of trees, a Primary Environmental Corridor, an isolated natural area, a natural area, critical species habitat, Tier 3 Butler's Gartersnake habitat, wetlands, historic buildings and two cemeteries. The County Grounds area is also regarded by the public as important open space in a largely urbanized setting. Much of these resources would be avoided. However, there would be impacts to Butler's Gartersnake habitat, critical species habitat, trees and vegetation, and wetlands. These impacts have been minimized as a result of an intensive public participation process, collaboration with agencies, and an ecological restoration plan that incorporates many resources into the long-term open space plan.

The primary effect would be substantial grade changes to accommodate the basin and the placement of fill in the designated open space area. Potential dewatering effects on surrounding upland forests would be minimized by the use of an earth pressure balance tunnel boring machine and groundwater levels in the vicinity of the tunnel would be monitored. The impacts to wetlands, critical species habitat, trees and vegetation, and Tier 3 habitat for Butler's

Gartersnake are primary effects.

c. Discuss the extent to which the primary and secondary environmental effects listed in the environmental consequences section are reversible.

Grading and topographic changes for the basin and open space area are irreversible, but would be consistent with Milwaukee County's land use plans to maintain open space on a substantial portion of the Milwaukee County Grounds. An Ecological Restoration Plan for the site further compliments the long-term land use plan by establishing natural plantings on landforms that mirror native Wisconsin landscapes.

Long-term effects on groundwater elevations in the vicinity of the basins are irreversible, but no secondary impacts are expected as the zone of influence on groundwater would not affect water levels in either Underwood Creek or the Menomonee River. The short-term impact of groundwater dewatering during construction would be monitored for impacts to surrounding upland forests. Impacts to the Butler's Gartersnake habitat is reversible in that mitigation required for the construction of the floodwater management facility and the rehabilitation of the Underwood Creek corridor would result in no net loss of snake habitat.

The loss of 4.69 acres of wetlands on the Milwaukee County Grounds site and within the Underwood Creek corridor is not reversible. However, the rehabilitation of the Underwood Creek corridor would create approximately 7.7 acres of wetlands, which would compensate for wetland impacts in both the Underwood Creek corridor and on the Milwaukee County Grounds. This includes the restoration of wetlands impacted during Underwood Creek rehabilitation activities and the mitigation of MCG wetland impacts, in accordance with USACE mitigation guidelines. Additionally, the rehabilitation of Underwood Creek would lead to the creation of wetlands in excess of what would be required for USACE mitigation. Wetlands would also be created on portions of the floodwater management basin. The type(s) of wetland created would be determined by the DNR as they would design and implement a vegetation plan for the basin following construction. When appropriate during construction, the basin would temporarily be planted with an annual rye seed mix. It should be noted, however, that the primary purpose of the basin would be to function as a floodwater management facility.

The relocated community gardens would have comparable or improved amenities compared to the existing locations; the relocated plots would be provided with a water supply and parking facilities would be available at Camp Wil-O-way.

The loss of existing trees and vegetation in the project area would not be reversible. However, the completed floodwater management facility and the rehabilitated creek would be revegetated.

It was determined that the project would not result in adverse impacts to historical or archaeological resources within the Underwood Creek Parkway and within the Milwaukee County Grounds site. One hundred feet of a historic retaining wall lining the Menomonee River would be adversely impacted in order to construct the low-level outlet and spillway. The wall is a considered a contributing element to the historic significance of the Menomonee River Parkway. In order to minimize and mitigate the effect, the State Historical Preservation Officer will be included as part of the final design process of the structure.

21. Significance of Cumulative Effects

Discuss the significance of reasonably anticipated cumulative effects on the environment (and energy usage, if applicable). Consider cumulative effects from repeated projects of the same type. Would the cumulative effects be more severe or substantially change the quality of the environment? Include other activities planned or proposed in the area that would compound effects on the environment.

The MMSD has undertaken a watershed-based approach to managing floods in its planning area. Within the Menomonee River Watershed, the Milwaukee County Grounds Floodwater Management facility is an essential component of a number of floodwater management projects including the Falk Floodwall, Valley Park neighborhood, Western Milwaukee, and Lower Wauwatosa/Hart Park. Similarly, there are several flood management projects in the upper reaches of Underwood Creek to manage local flood problems, including Brookfield Flood Management Project, the Village of Elm Grove Preliminary Engineering of Flood Control Alternatives, the MMSD Underwood Creek Restoration Project at Bluemound Road, the Friends of Milwaukee's Rivers – Channel and Floodplain Restoration Study, and a USACE Section 206 Study (currently suspended). The cumulative effects of the Floodwater Management Facility, the Underwood Creek rehabilitation and other watershed-based flood management projects is expected to improve the quality of the environment and to reduce flooding. Consistent with the MMSD's Watercourse Policy, the Menomonee River watershed projects share a common goal to reduce flooding, restore stream habitat, improve water quality, protect wetlands, and enhance public access to and use of watercourses, to the maximum extent practical. Furthermore, the MMSD first looks to use non-structural flood abatement techniques, such as conservation easements, whenever practical. Structural solutions such as channel straightening and lining channels with impervious materials are considered last resort alternatives.

Existing concrete-lined reaches of Underwood Creek, located upstream of the project reach, could be rehabilitated in the future. The cumulative impacts of future creek rehabilitation along with the currently proposed rehabilitation, would postively impact the quality of the Underwood Creek riparian corridor. The cumulative effects would result in the maintenance of area watercourses and dedicated open space in more naturalized states, reduced habitat fragmentation and improved connectivity of public spaces.

A cumulative impact of rehabilitation, floodwater management projects, and facilities such as the DNR Forestry Education Center would be the requirement that public resources be expended to maintain the completed facilities. This includes the dedication of resources to maintain vegetation and minimize the establishment of invasive species. Another cumulative effect of this project, along with the future development in the Milwaukee County Economic Development area, and other development in the project area would be the abandonment or relocation of existing utilities and the installation of updated utilities in the vicinity of the project area.

The cumulative impacts of the future development of the Milwaukee County Economic Development site would include additional impacts to the appearance to the Milwaukee County Grounds site.

Future development in the Milwaukee County Economic Development area and rehabilitation of Underwood Creek upstream of the project reach could cumulatively impact wetlands. Potential future wetland impacts in the Milwaukee County Economic Development area would be regulated by DNR.

22. Significance of Risk

a. Explain the significance of any unknowns that create substantial uncertainty in predicting effects on the quality of the environment. What additional studies or analysis would eliminate or reduce these unknowns?

The purpose of the Milwaukee County Grounds floodwater management facility and Underwood Creek rehabilitation is to minimize flood damages in the Menomonee River and rehabilitate Underwood Creek to maximize natural stream and floodplain functions. The risk of the project not meeting flood management goals and objectives is minimal, because the models used to determine engineering criteria for the facility and the rehabilitated creek designs incorporate the most recent data available and undergo extensive SEWRPC and DNR review.

The construction of the basin outlet structure and installation of culverts in the vicinity of the railroad, creates the potential for impacts to the railroad. This risk is related to impacts to the existing railroad embankment and potential disruption of service. Ongoing coordination with the railroad will aid in the development of engineering solutions to minimize risks to the railroad.

The diversion of water from Underwood Creek could potentially create a safety hazard by creating an opportunity for a person or a canoe to be swept into the diversion structure during a diversion. This safety issue has been addressed by the installation of grates consisting of 12-inch diameter bars. The gaps between the 12-inch diameter bars would be 6 inches and narrow enough to prevent the entrainment of people and larger objects into the diversion structure. Since the diversion structure would not operate until the flow in Underwood Creek reaches 2,000 cfs, it would mean that the boaters are using the creek during extremely high flows already. Signs will be posted along the diversion structure to warn boaters of potential danger (similar to signs used on a dam).

Another hazard posed by the diversion tunnel and outfall structure is that people would attempt to enter the structures in normal (dry) conditions. Both the inlet to the diversion structure and the outfall structure will have bars placed at approximately 6-inch spacing to keep people from entering. There will also be standard safety railings placed around the structures to discourage people from climbing on and around them. It is not feasible to fence the structures as it would inhibit their function during flood events.

Finally, if it appears that the emergency overflow would be activated (i.e., there was an event greater than 100-year flood), water level sensors will notify MMSD operators who in turn will notify local emergency response officials. This notification will be incorporated into local emergency response plans (further discussed on page 63).

Other structures that could potentially create a safety hazard include the tunnel stilling basin and the floodwater storage basin. The purpose of tunnel stilling basin is to slow down the velocity of water before it flows into the floodwater

storage basin, and the portion of the structure that allows water to flow into the basin would be open and not fenced in. This would allow any debris carried by floodwater to flow into the basin and not be held inside the structure and potentially impede flow. Safety hazards associated with the stilling basin would be addressed through:

- A look-out platform placed on top of this structure to allow visitors a view of the basin and completed with a standard safety railing.
- A one to two-acre marsh created at the outlet of the stilling basin. A key function of the standing water in the marsh is to prevent pedestrians from entering the tunnel as they would have to wade through the marsh to enter the tunnel.
- Posted warning signs.
- Relatively brushy vegetation that would discourage visitors from entering the area.

Within the floodwater storage basin a potential exists for safety and drowning hazards, but the risk is minimized by using gentle slopes (4:1 slopes) along the floodwater basin sides to allow escape. Further, the basin bottom will be vegetated to discourage pedestrian traffic. When flood events do occur, floodwater would not enter the basin as a wall of water, but would spread over a large, flat area which should give individuals enough opportunity to leave the basin.

The effect of the floodwater management facility's construction on groundwater levels in the project area potentially creates an environmental risk. MMSD and DNR have evaluated groundwater characteristics through subsurface investigations and modeling to determine that the long-term risk of lowering groundwater elevations is limited within the vicinity of the basin; dewatering could result in lower groundwater elevations for up to 260 feet beyond the edge of the basin. Effects on the groundwater table, due to construction, are short-term. Through collaboration with the DNR, a groundwater monitoring plan would be implemented to avoid impacts to the upland DNR Forestry Education Center forest. Furthermore, the MMSD would use an earth pressure balance TBM to minimize the amount of groundwater drawdown. In effect, the groundwater monitoring plan would be limited to causing no more that one foot of groundwater drawdown. In effect, the groundwater, the monitoring of groundwater levels in wells located within and around the construction areas, and the potential to implement vadose zone sampling. The MMSD is submitting a monitoring plan to the DNR.

Because of the degree of diversion involved, the MCG facility would be regulated as a dam, and because of the risk to downstream structures the facility would be assigned a high hazard rating. Since the low level outlet and spillway would tie into the Menomonee River at elevation 657.5 ft and the edge of the facility would be at elevation 685.0 feet MSL, the structural height of the facility would be 27.5 feet. Up to the one percent probability event, all outflows would pass through the low-level outlet. When larger events occur, flows would pass over the overflow spillway, which would be designed to pass a 0.1 percent probability event applied constantly over an extended period of time (an event that would have a probability of far less than 0.1 percent per year) while maintaining water levels within the facility at 683.0 feet. If water levels were to exceed 683.0 feet for any reason, the first point to overtop the facility would be immediately west of Swan Boulevard, and this flow would travel to the Menomonee River by way of Swan Boulevard.

The temporary storage of a large volume of water creates an unavoidable risk of damage arising from uncontrolled flows following structural failure. Since the MCG facility would be largely excavated, the two areas with the highest potential for flow releases due to failure are at the low flow outlet and spillway and the berm at the east side of the eastern lobe of the basin. Although possible, the risk of failure by overtopping is extremely low in any given year as the berm and outlet structure top elevations of 685.0 feet and greater are two or more feet higher than the design maximum water level, and the low point near Swan Boulevard would engage well before water levels approach 685.0 feet.

However, there is a potential for failure by flow passing through the embankments during events with one percent and greater annual probability. Failure at the outfall location would have the most significant effect on flows along the mainstem Menomonee River, with a peak outflow at the facility of approximately 11,400 cfs. The failure would increase downstream flows; at the Harmonee Avenue Bridge the flow would increase by 5,200 cfs, along Hart Park flow would increase by about 5,000 cfs, and the flow at the U.S. 41 bridge would increase by 4,500 cfs. Water levels along the river would increase, which would increase the depth of flooding in certain locations both by direct inundation and by temporarily reducing the capacity of local drainage systems to discharge flows into the river. Model results indicate that water levels upstream of the CP Rail bridge at River Mile (RM) 6.705 (in downtown Wauwatosa) would increase by as much as 7.4 feet. In the vicinity of Hart Park (RM 5.97-6.59), the water level increases would be three feet or less and would not overtop the levee/floodwall at that location. Water levels between Hart Park and Hawley Road would increase by approximately three feet, but downstream of Hawley road the increase could be as much as six and a half feet above the one percent probability water level. Downstream of the CP Rail bridge at RM 4.24 water levels would increase by less than 3 feet.. Water levels in the vicinity of Valley Park (RM 3.712-4.057) would increase, but not by more than the three feet provided for freeboard, so that project would also not overtop during this event.

A breach at the second potential failure location, the embankment along the eastern edge of the basin, would have less effect on the flows in the Menomonee River but would cause flooding in a depression to the east of the basin bounded by the railroad embankment to the north. A failure occurring at the height of the one percent probability event could inundate that area up to an elevation of approximately 668 feet. Flows would pass over the railroad embankment and through the industrial area south of the tracks before entering the Menomonee River.

The current FEMA floodplain is based on the Flood Insurance Study modeling from 1978. Since then, numerous changes along the river, for one, the drop structure removal, have resulted in conditions that differ from those modeled in the 1978 study. SEWRPC is currently conducting a study intended to update the floodplain limits using newer river models and flow conditions, but acceptance of the revisions by DNR and FEMA will not occur for several months at a minimum.

There are approximately 289 structures located within the existing one percent probability event FEMA floodplain that are currently required to have flood insurance. Once the Milwaukee County Grounds facility is functioning, approximately 281 structures would be removed from the one percent probability event and no longer be regulatorily required to obtain insurance. However, approximately 13 structures on 12 different parcels would be located within the hydraulic shadow of the dam, or would incur some flooding during the design dam failure scenario. Of these, approximately 5 buildings are outside of the current FEMA floodplain. These properties located within the hydraulic

shadow of the dam but outside of the regulatory floodplain would be considered having a low risk of flooding, would not have a regulatory requirement to purchase flood insurance, but would be part of emergency action planning. Emergency action planning is further discussed in a succeeding paragraph.

Addresses of properties that contain a habitable structure that could potentially be affected by a design dam failure are given in Table 12. These structures were identified through a dam failure analysis completed as part of the DNR ch. 31 permit submittal.

City of	1300	W. Glenview Pl.	City of	4601	W. James St.
Wauwatosa	7700	Harwood Ave.	Milwaukee	944	N. 46th St.
	7707	Harwood Ave.		900	N. 46th St.
	7720	Harwood Ave.		123	N. 27th St.
	7734	Harwood Ave.		2615	W. Greves St.
	7603	W. State St			
	7615	W. State St			

 Table 12

 Addresses of Properties that May Be Affected by a Dam Failure

The dam failure analysis identified the need to construct a berm near the water quality pond (Figure 10). The berm acts to restrict the hydraulic shadow boundary with the effect of keeping structures outside its limits. Other areas that would potentially be affected by a dam failure include a cemetery located southeast of the Milwaukee County Grounds basin's east lobe. The cemetery (BMi 075) would be affected by standing floodwater but outside the area of floodwater flow.

An emergency action plan (EAP) is required as part of DNR's dam permitting process under ch. NR 333.07 and would include all properties located within the dam's hydraulic shadow. It is a formal document that identifies potential emergency conditions at a dam and describes procedures to be followed to eliminate the loss of life and minimize property damage. It also describes the coordination of necessary actions by the dam owner and the responsible local, state, and federal emergency organizations and provides for timely notification, warning, and evacuation in the event of an emergency at the dam (DNR, 2005). The EAP is developed in conjunction with local emergency personnel and the Milwaukee County emergency management office and is then submitted to DNR for approval. In general, the City of Wauwatosa Fire Department would coordinate an emergency response and would also include the operator, MMSD, and the Milwaukee County emergency management team. Forecasts given by the National Weather Service are monitored for rainfall events, watches, and warnings. An emergency response is generally started with communication and warnings of potential flooding. If needed, an evacuation would be enacted. Further details, coordination, and response action with respect to the Milwaukee County Grounds dam would be outlined in the EAP.

The spillway will be designed with three alarms. The first will activate when the basin is 75 percent full to notify MMSD operators. The second will activate when the basin is full, when the water surface is at elevation 679 feet. This is when the emergency overflow spillway will engage. The third alarm will activate if the water level in the basin exceeds elevation 683 feet, the maximum design elevation.

Complete documentation of the dam failure analysis is included in the Chapter 31 permit submittal.

b. Explain the environmental significance of reasonably anticipated operating problems such as malfunctions, spills, fires or other hazards (particularly those relating to health or safety). Consider reasonable detection and emergency response, and discuss the potential for these hazards.

Reasonably foreseeable operating problems would be associated with malfunction of the Underwood Creek diversion structure, outlet structure malfunction, and potential deferred basin maintenance that could reduce floodwater storage capacity. The primary environmental effect of the basin and associated structures is increased risk of damage to downstream structures along Underwood Creek and the Lower Menomonee River due to flooding. The risk of operating problems can be reduced through routine inspection and maintenance of the basin and structures as required by MMSD operating procedures and the Intergovernmental Cooperation Agreement.

There would be a risk of accidents or spills to occur during the construction and maintenance of the floodwater management facility and the rehabilitated Underwood Creek. The use of approved construction practices, an approved health and safety plan, and maintenance procedures would minimize such occurrences.

23. Significance of Precedent

Would a decision on this proposal influence future decisions or foreclose options that may additionally affect the quality of the environment? Describe any conflicts the proposal has with plans or policy of local, state or federal agencies. Explain the significance of each.

The decision to construct the floodwater management facility facilitates management of the one percent probability event in the Lower Menomonee River and allows the rehabilitation of Underwood Creek between STH 100 and its confluence with the Menomonee River. Constructing the floodwater management facility forecloses future development of the Milwaukee County Grounds in the vicinity of the basin.

Repeated diversions from Underwood Creek during high flow events would not be anticipated to have long-term negative impacts on Underwood Creek and the Menomonee River. Diversions would reduce the incidence of unnaturally high flows in affected reaches of Underwood Creek and the Menomonee River. The reduction of unnaturally high flow events would minimize flood events and resulting property and environmental damage. This would result in long-term positive impacts to Underwood Creek, the Menomonee River and downstream communities.

The rehabilitation of Underwood Creek does not force or foreclose other creek rehabilitation options upstream of STH 100. The floodwater management facility, the Ecological Restoration plan for the adjacent upland area, and grading on Milwaukee County's future economic development area are consistent with Milwaukee County's land use plan. Both the floodwater management facility and the creek rehabilitation are consistent with the MMSD's Watercourse Management Plan and Watercourse Policy which focuses on watershed-based solutions to manage peak flows and enhance habitat. The projects are consistent with the MMSD's Surface Water and Storm Water rule that implements its Watercourse Management Plan and guides flood abatement projects to include features that restore stream habitat, improve water quality, protect wetlands and enhance public access to and use of watercourses to the maximum practical extent.

24. Significance of Controversy Over Environmental Effects

Discuss the effects on the quality of the environment, including socio-economic effects, that are (or are likely to be) highly controversial, and summarize the controversy.

The Milwaukee County Grounds Floodwater Management Facility, which requires substantial grading of existing open space, was initially controversial due to public concerns over the appropriateness of locating the facility on the County Grounds and effects on land use and aesthetics. Through a series of planning studies and public outreach, the project team and SEWRPC reviewed alternatives to constructing the facility on the County Grounds. Several alternatives analyses concluded that the County Grounds site was the most cost-effective alternative to manage flooding in the Lower Menomonee River and also minimized impacts to both natural and manmade resources in the watershed. Public outreach during development of the Ecological Restoration Plan further refined the site grading and revegetation plan to avoid important cultural and natural resources, and restore the site to reflect native landforms with natural plantings.

ALTERNATIVES

25. Briefly describe the impacts of no action and of alternatives that would decrease or eliminate adverse environmental effects. (Refer to any appropriate alternatives from the applicant or anyone else.)

Watershed-scale Alternatives

The Menomonee River Watershed is comprised of the Mainstem and seven subwatersheds that drain into the Mainstem (Figure 14). Most property and structural damage caused by flooding occurs in the lower portion of the Menomonee River, as described in the Purpose and Need section. An approximate thirty-year history of analysis and floodwater management alternative development has been integrated into MMSD's watercourse management plan for the Menomonee River watershed. The 1976 SEWRPC plan developed six floodwater management alternatives including: structure floodproofing and removal, channel deepening, detention storage, dikes and floodwalls, bridge and culvert alteration or replacement, and diversion of flood flows to Lake Michigan or to the deep tunnel inline storage system. A "No action" alternative was also considered. Twenty-five sites were analyzed for constructing detention and retention storage with the assumption that all remaining natural floodplains are preserved. Eleven of the sites were further evaluated following a preliminary screening process that evaluated a site's ability to produce a considerable reduction in downstream flood damages and be economically feasible. However, the sites would not have sufficiently mitigated flooding problems occurring downstream in the lower portion of the Menomonee River. The study determined that natural storage preservation was the most cost-effective and environmentally sensitive approach for floodwater management. Several identified sites had their potential storage volume reduced by urban development after the study was completed.

A second SEWRPC study (1990) furthered the 1976 work by reevaluating detention storage and other floodwater management measures within the watershed and developed several alternatives for each subwatershed. Overall, the plan recommended preserving natural floodplains and constructing storage facilities along Dousman Ditch in the City of Brookfield and along Honey Creek in the City of Greenfield. It also recommended constructing floodwalls and dikes, a relief culvert, floodproofing and

elevating structures, channel widening and lowering, and bridge removals and replacements. The study did not identify the Milwaukee County Grounds as a potential flood storage facility.

With the adoption of the 1999 Watercourse Policy, the MMSD had developed a process for identifying floodwater management projects and for making decisions to implement the projects. As noted in the Purpose and Need discussion, the Watercourse Policy led to a Menomonee River Watercourse Management Plan. The watercourse plan followed a defined planning process to develop alternatives, test them against criteria, including public acceptance, to achieve consensus on a preferred alternative. Phase I of the watercourse plan conducted hydrologic and hydraulic analyses to determine where runoff contributes to stream flow, what the peak flow rates and flow stages are at various positions along the Menomonee River Mainstem and tributary streams, where structural damage would occur, and what effect solutions would have at the local and watershed scale.

The alternative analysis confirmed that solutions used in the upper reaches of the Menomonee River watershed have a very limiting effect on mitigating floods in the lower reaches. Therefore, the following discussion will focus on the alternative development for the lower portion of the Menomonee River Mainstem. The alternatives also incorporate runoff volumes contributed by tributaries: the Little Menomonee River, Grantosa Creek, Underwood Creek, Honey Creek, and the upper reaches of the Menomonee River Mainstem.

Thirteen alternatives were developed and evaluated over the course of the Phase I study that included the following features either alone or in combinations:

- Regional Storage develop six large storage sites in the watershed
- Local Storage develop about 100 smaller storage sites in the watershed
- Floodplain Lowering/Conveyance enlarge floodplains throughout lower Wauwatosa/Valley Park
- Regional Storage with Levees in Valley Park and Hart Park areas
- Channel Lowering in both the Menomonee River and Honey Creek
- New Development Storage to control associated runoff increase
- Acquisitions to remove structures from the floodplain
- Floodproofing structures in the floodplain
- Do Nothing which considers only annual damage payments from flooding. It is considered the baseline against which other alternatives are compared.

Collectively, the alternatives went through a screening process that compared each alternative against a set of criteria, including: regulatory approval, physical feasibility, public concerns, environmental impacts, property acquisition impacts, general risks, open space, recreational use, and restoration & enhancement. Four alternatives, plus a "Do Nothing" alternative were retained. The others were eliminated due to large storage requirements, a large number of acquisitions or required floodproofing. Table 14 summarizes the screening matrix used to compare the remaining alternatives.

Alternative 7B was selected for advanced planning, or Phase II of the watercourse plan, following stakeholder input. Floodwater management at the Milwaukee County Grounds is a key component of all alternatives except Alternative 10. Public input supported Alternative 10, but the cities of Milwaukee and Wauwatosa opposed it due to the potential effect on the neighborhood and tax base loss. Natural storage preservation and new development storage are also included in the selected alternative.

Phase II of the watercourse plan used Alternative 7B to develop project-specific information. Alternatives at the site-scale were developed for each of the floodwater management solutions.

Regional storage at Hartung Quarry was considered, but not pursued due to design and constructability issues, such as:

- Interaction of floodwater with groundwater present in adjacent bedrock,
- The site is not located at an optimal location within the Menomonee River watershed,
- The site would require a "pump-out" facility,
- Construction debris placed in the quarry would need to be excavated and disposed.

 Table 13

 Menomonee River Watershed Alternative Evaluation Matrix

	ALTERNATIVE 7	ALTERNATIVE 7B	ALTERNATIVE 9	ALTERNATIVE 10A	ALTERNATIVE 11
	STORAGE/LEVEE/ ACQUISITIONS	STORAGE/LEVEE/ ACQUISITIONS [selected alternative]	RIVER LOWERING/ STORAGE/LEVEE/ ACQUISITIONS	LEVEE/ ACQUISITIONS/ FLOODPROOFING	DO NOTHING
Capital Costs	\$120 - 129 MILLION	\$83 - \$93 MILLION	\$120 - 129 MILLION	\$60 - \$88 MILLION	\$188,205,530
					(\$1,194,057 Annual Cost)
Structural Components	1,880 acre-feet of storage at 2 sites (County Grounds 50 ft deep & Timmerman Airport)	830 acre-feet of storage at 2 sites (County Grounds 15 ft deep & Timmerman Airport)	780 acre-feet of storage at 2 sites (County Grounds & Timmerman Airport)	1,500' of 5' - 7' levee/floodwall in Valley Park	None
	Remove 1 bridge	Remove 1 bridge	River lower 4' - 8' from drop structure to upstream of Hart Park		
	Lower floodplain up to 2 feet in Hart Park reach	Lower floodplain up to 2 feet in Hart Park reach	Lower 900' of Honey Creek up to 4.5'		
	1,500' of 5' - 7' levee/ floodwall in Valley Park	1,500' of 5' - 7' levee/ floodwall in Valley Park	1,500' of 5' - 7' levee/ floodwall in Valley Park		
	6,500' of 3' - 5' levee in Hart Park	6,500' of 3' - 5' levee in Hart Park	Remove 1 bridge; replace 3 bridges; underpin 1 bridge		
Acquisitions/ Property	Acquisition of 54 residential structures	Acquisition of 60 residential structures	Acquisition of 29 residential structures	Acquisition of 83 residential structures	None
Impacts	Acquisition of 7-13 non-residential structures	Acquisition of 7-18 non-residential structures	Acquisition of 17-24 non-residential structures	Acquisition of 19-41 non-residential structures	None
	Floodproofing of 7-13 non-residential structures	Floodproofing of 12- 23 non-residential structures	Floodproofing of 8-15 non-residential structures	Floodproofing of 23- 45 non-residential structures	None
Multi-Objective Opportunities	Hart Park redevelopment and open space/floodplain restoration	Hart Park redevelopment and open space/floodplain restoration	River corridor restoration from drop structure through Hart Park	River corridor development in acquisition areas for open space and recreation	None
	County Grounds athletic fields, prairie restoration, and garden plots	Improved opportunities for County Grounds athletic fields, prairie restoration, and garden plots	County Grounds athletic fields, prairie restoration, and garden plots		
	Potential Inflow/Infiltration reduction	Potential Inflow/Infiltration reduction	Potential Inflow/ Infiltration reduction		
Constructability	Straight forward construction of components	Straight forward construction of components	River lowering presents major constructability challenges	Minimal constructability issues	Not Applicable
	Minimal failure risk during construction	Minimal failure risk during construction	Potential for environmental failures during construction		

 Table 13 (continued)

 Menomonee River Watershed Alternative Evaluation Matrix

Γ					
			ALIERNATIVE 9		ALIENNATIVE TI
	STORAGE/LEVEE/	STORAGE/LEVEE/	RIVER LOWERING/	LEVEE/	DO NOTHING
	ACQUISITIONS	ACQUISITIONS	STORAGE/LEVEE/	ACQUISITIONS/	
		[[selected alternative]		FLOODPROOFING	
Restoration and	Wetland	Wetland	Habitat enhancement of	Vegetative/habitat/	None
Enhancements	County Grounds	County Grounds	areas	enhancements of	
Linianoonionio	storage area	storage area		acquisition areas	
	Vegetative/habitat	Vegetative/habitat	Vegetative/habitat		
	enhancement of	enhancement of	enhancement of		
	open space in Hart	open space in Hart	channel and floodplain		
	Water quality	Water quality	Wetland development		
	improvements by	improvements by	and prairie restoration		
	diversion of flows	diversion of flows	in County Grounds		
	into wetland/pond at	into wetland/pond at	storage area		
	County Grounds	County Grounds	Mater multi		
			improvements by		
			diversion of flows into		
			wetland/pond at County		
			Grounds		
Impact to	Minimal impact to	Minimal impact to	Major impacts to	Minimal impact to	None
Fnvironment	environment	environment	habitat from river	environment	
			lowering		
	Loss of existing	Loss of existing	Major impacts to habitat		
	County Grounds	County Grounds	during construction		
Implementation	Changes in sediment	Changes in sediment	Specific	Community and	Long term political
issues	storage-induced flow	storage-induced flow	requirements for river	acceptance of buyout	nothing solution
	reductions	reductions	lowering	and floodproofing	nothing colution
			-	solution	
	High cost		Sustainability of		
			reconstructed channel		
	Large storage size		Environmental Impact		
			High cost		
Operation and	Considerable	Considerable	Considerable operation	Minimal: Normal	No change
Maintenance	operation &	operation &	& maintenance costs for	landscape	
Requirements	for interior drainage	for interior drainage	Park and Vallev Park	debris clean-up	
	at Hart Park and	at Hart Park and			
	Valley Park	Valley Park			
	Considerable	Considerable	Considerable operation	Maintenance of	
	maintenance costs	maintenance costs	County Grounds		
	for County Grounds	for County Grounds	dewatering pump		
	dewatering pump	dewatering pump	station		
	station	station	Domovice evicting stress		
			walls and need for		
			maintenance		
			Considerable		
			maintenance of		
		1	channel/floodplain	1	1

	Table 13 (continued)		
Menomonee River	Watershed Alternative	Evaluation	Matrix

l	_					
		ALIERNATIVE /	ALIERNATIVE /B	ALTERNATIVE 9	ALTERNATIVE TUA	ALTERNATIVE 11
		STORAGE/LEVEE/ ACQUISITIONS	STORAGE/LEVEE/ ACQUISITIONS [selected alternative]	RIVER LOWERING/ STORAGE/LEVEE/ ACQUISITIONS	LEVEE/ ACQUISITIONS/ FLOODPROOFING	DO NOTHING
Risks		Hart Park and Valley Park levee failure	Hart Park and Valley Park levee failure	Construction impacts to river	Ongoing health and safety concerns and residual flooding of roads and bridges	Ongoing health and safety concerns and residual flooding of roads and bridges
				Valley Park levee failure	Long term floodproofing performance/ integrity	Damages remain
				Successful restoration of habitat	Continued inflow/infiltration impacts from flooding	Continued inflow/ infiltration impacts from flooding
				Post construction channel stability and establishment of equilibrium		
				Actual stability and integrity during flood events		
Project Life and Sustainability		Almost unlimited life with proper maintenance	Almost unlimited life with proper maintenance	Project life dependent on adequate maintenance	Unlimited project life	Not applicable
		Proven sustainability	Proven sustainability	Sustainability unproven at this scale	No sustainability issues	
Structures Removed from Floodplain		257 - 263	247 - 258	255 - 262	225 - 247	Not applicable
Cost/Benefit		6.4 - 6.9	4.4 - 4.9	6.4 - 6.9	3.2 - 4.7	Not applicable
	1.	Each alternative includes buyouts/floodproofing components for Honey Creek and Grantosa Creek damaged structures as well as preliminary Grantosa solution costs (storage in Alternatives 7, 7b, and 9). Grantosa solution is being expanded independently.				
	2.	Alternative 10a does no	ot solve flooded structure	es for one foot of freeboard.		
	3.	All alternatives listed in this matrix include 16 non-mainstem residential acquisitions.				
	4.	Alternatives 7, 7b, 9, and 10a include the Valley Park Levee concept.				

Source: CDM 1999.

An independent analysis was completed by SEWRPC (2003b) at the request of Milwaukee County to determine what would happen to floodwater management projects already completed and under design by MMSD if the floodwater basin was not constructed at the Milwaukee County Grounds site. Foremost, the analysis determined that the success of downstream floodwater management projects, Hart Park, Lower Wauwatosa, Valley Park, Western Milwaukee, and Falk Floodwall, are contingent on floodwater storage at County Grounds. The projects are an outcome of managing at the watershed-scale and are intended to work as one system, even though they occur at separate locations. Other findings include:

- Peak flows would decrease about sixty percent along the downstream reach of Underwood Creek and between two to
 eighteen percent on the Mainstem between Lower Wauwatosa and the estuary if the entire MMSD watercourse plan was
 completed with the County Grounds storage. About 175 buildings would no longer be within the one percent probability
 event floodplain in the Cities of Milwaukee and Wauwatosa.
- If the MMSD watercourse plan was implemented without the County Grounds storage, flows would decrease one to four
 percent between Hart Park and the estuary. About 157 buildings would no longer incur flooding during the one percent
 probability event, but 101 of them would still require Federal flood insurance and be regulated as floodplain properties since
 there would not be adequate capacity from levees/floodwalls. In addition, removal of concrete lining in Underwood Creek
 would require considerable upstream mitigation.

SEWRPC also completed an analysis of alternative storage solutions that would provide the required floodwater storage in concert with downstream projects and eliminate storage at County Grounds. They determined that:

- Floodwater storage alternatives have been studied extensively on a local and watershed scale.
- Regional, sub-regional, and local storage alternatives developed to mitigate the major flooding problems are cost prohibitive due to the large number of property acquisitions and floodproofing.
- The County Grounds is the only site that is located near major runoff inputs to the lower portion of the Menomonee River and would not require substantial acquisition and floodproofing.
- Existing open lands that could effectively provide floodwater storage exist in headwater areas. However, these areas would have a limited effect on mitigating downstream problem areas and would not substantially impact the size of the floodwater management facility. In addition, the use of these areas for storage is included in the recommended watercourse management plan.
- Floodwater storage areas along Underwood Creek and upstream of the diversion structure would not reduce flood flows enough to substantially impact the size of the floodwater management facility. This includes using the former Underwood Creek channel that parallels the existing channel. Hansen Golf Course and Hoyt Park were not pursued as potential storage facilities because they are considered a valuable recreational resource.

With the conclusion of selected watershed-scale alternatives, the MMSD examined more site-specific alternatives for facility and diversion structure design.



Floodwater Management Facility

Three alternatives were considered for the design of the floodwater management facility at the County Grounds. One alternative involved the construction of two basins, connected by a pipe. The second alternative involves the construction of one basin, consisting of two lobes; the third alternative considered is the no-build alternative.

Alternative 1 - Two-basins connected by a pipe

This alternative is the construction of two distinct basins; one basin would be located west of Swan Boulevard (West Basin), the other basin would be located east of Swan Boulevard (East Basin). In this alternative, the west basin would function as a wet basin. The west basin would be constructed with a clay liner that would extend up to the elevation of high groundwater and would prevent the seepage of groundwater into the basin

Floodwater that is diverted from Underwood Creek would first enter the west basin. The two basins would be separated by a hydraulic control structure, conceptually a long-overflow weir and pipe. The hydraulic control structure would limit water to the west basin unless the volume of water diverted from Underwood Creek exceeded 370 acre/feet. In this case, the excess floodwater would flow over a weir and through a pipe, into the east basin. Because the clay liner would prevent groundwater seepage into the basin, additional water would need to be added to the west basin to sustain the wetland vegetation during prolonged dry periods. The connecting pipe would require periodic maintenance. In addition, the hydraulic control structure would prevent an additional safety issue and aesthetic consideration.

The east basin would either be constructed as a natural area or would contain active recreational areas. In general, if the east basin would be designed as a natural area, it would not be clay-lined. If the east basin would be designed to provide recreational opportunities, a clay liner would be required to prevent groundwater from entering the basin following normal rainfall events; the full development of the east basin with recreational fields would likely require underdrain systems at the recreational fields. Floodwater that entered the east basin, during very large storm events, would not completely drain by gravity.

A pump station would be constructed in the vicinity of the existing MMSD Odor Control facility to pump floodwater from the east basin into the Menomonee River. The periodic maintenance required for the pump-station would be an on-going operational expense. The use of a pump station to dewater the basin rather than allowing the water to drain by gravity would be less natural. Along the same lines, the hydraulic control structure between the two basins would require periodic maintenance. This structure would have a weir, pipe, energy dissipation area and would not appear as natural. More importantly, the pipe connecting the two basins is a constriction that could cause problems with the function of the facility. The hydraulic limitation of the pipe increases the probability that the west basin would be overtopped by high water elevations caused by high-flow events or clogging of the pipe. Water flowing through the connecting pipe would also pose a safety hazard people within the vicinity of the pipe.

There were five design options considered for Alternative 1 (two distinct basins connected by a pipe). Most of these design options displaced an existing cemetery (BMi-075) located on the east side of the east basin (Figure 27). The cemetery is located west of 87th Street, immediately south of the CPR-rail tracks and the Menomonee River; it contains an estimated 3,000 and 4,500 interments. Two of the five design options allowed for the preservation of this cemetery. However, to address the subsequent loss of storage, the required storage would be achieved by expanding the west basin into the future DNR Forestry



Education Center (Figure 28). The creation of additional storage volume by expanding into the Center would impact the flat area proposed for planting as a forest (CDM 2001).

The other design option that would allow the preservation of the existing cemetery would be to widen and deepen the east basin. The bottom of the east basin would need to be about six feet deeper and the excavation would need to be twelve feet deeper to allow for the installation of the clay liner and the placement of backfill to prevent uplift by groundwater pressures. This option would require a larger pump station for basin dewatering and considerably more construction dewatering. The increased depth of the east basin would increase the maximum elevation difference to about forty feet; this would reduce the visual appeal of the basin. This design option would carry an additional cost of \$7 to \$9 million (CDM 2001).

The second major cemetery in the vicinity of the basins, BMi 174 would not be impacted by Alternative 1. This alternative would also likely have a lesser impact on Swan Boulevard traffic compared to Alternative 2 that requires a new bridge on Swan Boulevard. This alternative, once constructed, would also be less likely to impact groundwater through long-term dewatering.

Because of hydraulic design limitations resulting from the connecting pipe between the basins, the need for a pump station, and the impact to either the cemetery (BMi-075), the DNR Forestry Education Center or to aesthetics by creating a more expensive and deeper east basin, Alternative 1 was rejected from further consideration.

Alternative 2 - Single-basin alternative

This alternative involves the construction of one basin with two lobes. The location of the east and west lobes would generally correspond to the locations of the east and west basins, described above. The lobes of the one-basin alternative would be hydraulically connected by a channel under a bridge that would be constructed at Swan Boulevard. The bridge would allow wildlife and pedestrians to readily travel from one lobe to the other. The use of a channel to connect two lobes would also lead to a more naturally-appearing facility relative to Alternative 1 which used a pipe to connect the two distinct basins.

The basin would not be clay-lined or function as a wet basin, but there would be a small amount of water at the bottom of the basin, under normal circumstances. The basin would be designed such that groundwater would slowly seep into the basin. Groundwater that seeped into the basin would slowly flow southeast along the length of the lobes and support newly established wetland vegetation. Groundwater, runoff and floodwater that entered the basin, would flow by gravity, to the outfall on the Menomonee River. Similar to the existing environment, some water would infiltrate into the soil, and some water would be transpired by vegetation.

Alternative 2 would not impact the cemeteries (BMi-075, BMi 174) on site. The basin design of Alternative 2 drains by gravity and does not require a pump station. Furthermore, when compared to the pipe proposed in Alternative 1, the channel connecting the two lobes does not constrain water moving from the west basin to the east basin, does not require as much maintenance and the channel increases the capacity of the floodwater management facility compared to the pipe. Alternative 2 was advanced into detailed design.

No-build Alternative

This alternative involves not constructing the floodwater management facility. The no-build alternative would not impact wetlands on the County Grounds, impact cemeteries, or natural resource features on the Milwaukee County Grounds. The no-
To divert water from the Menomonee River, the facility would have to be dug deeper to allow flow "by gravity" and water would have to be pumped out.



Swan Blvd

Menomon

Outflow to

Riven

By diverting water from Underwood Creek water flows downhill from Underwood Creek to Menomonee River "by gravity"

creek



Menomone

Outflow to

ooduater Flow

build alternative would likely preclude the rehabilitation of Underwood Creek, from STH 100 to the confluence with the Menomonee River and would not mitigate flooding in downtown Wauwatosa. Existing, planned and newly-constructed floodwater management projects, throughout the Menomonee River watershed, would not function as designed or meet their intended objectives. The no-build alternative would have an opportunity cost associated with it. The community would not realize the maximum return on its investment in existing, planned and newly-constructed floodwater management projects. The no-build alternative would compromise the MMSD's watershed-based Watercourse System Management Plan; the component projects are integrated and require each other (including the MCG floodwater management facility) to function properly. The no-build alternative was rejected because it does not meet the MMSD's long-term need and policy to manage flooding and reduce property damage in the lower portion of the Menomonee River.

Underwood Creek Diversion Structure

As noted in Section 2, Purpose and Need, the MMSD determined that diverting floodwater from Underwood Creek presented a greater advantage than diverting water from the Menomonee River. Thus the MMSD evaluated the best location for a diversion structure along Underwood Creek. Two alternatives were considered for the location of the diversion structure. One alternative locates the diversion structure approximately 600 feet upstream of Underwood Creek's confluence with the Menomonee River. The second alternative is to construct the diversion structure upstream of the CPR bridge.

Alternative 1 -Diversion structure at confluence with Menomonee River

This alternative would locate the diversion structure 600 feet upstream of the confluence with the Menomonee River (Figure 29). It would require a shorter length of diversion pipe to convey floodwater to the west lobe of the basin. Subsequent results of the hydraulic modeling indicated that this alternative has numerous design constraints. The evaluation determined that this diversion structure location was substantially influenced by flood stages on the Menomonee River; this reduced the hydraulic effectiveness of the diversion structure. Consequently, the size of the MCG floodwater management facility would need to be substantially larger. In addition to increasing construction costs and public safety concerns with an extremely large diversion structure, the basin(s) would need to be lowered an additional ten feet or more to account for the lower elevation of Underwood Creek at this location. This additional lowering would increase the basin footprint by approximately forty-four percent and increase the volume of excavated soil by fifty percent. The basin would not be able to drain by gravity. Alternative 1 was rejected for further consideration.

Alternative 2 -Diversion structure upstream of the CPR bridge

The alternative involves the construction of the diversion structure approximately 1,200 feet upstream of the USH 45 Highway Bridge (Figure 30). This location would require a longer diversion pipe, as water would be conveyed east, approximately 2,500 feet, from Underwood Creek to the west lobe. This location takes advantage of the higher elevation of the Underwood Creek channel bottom and floodwater flow elevation. This allows the bottom elevations of the basins to be higher and consequently facilitate gravity drainage for flood events. The diversion structure would be hidden from view, reducing the potential to create an "attractive nuisance" for the public. The increase in construction cost for the extra length of diversion pipe is more than offset by the advantages, previously described, and the reduced diversion structure size required at the Alternative 1 location. The Phase II Menomonee River Watershed Master Plan states that the estimated costs savings of constructing the diversion structure at this location, relative to Alternative 1, are about \$10 million. This alternative also allows the rehabilitation of the Underwood Creek by reducing the peak flows downstream of the diversion structure location. Alternative 2 was carried forward into detailed design.



Rehabilitation of Underwood Creek

The diversion of floodwater from Underwood Creek allowed reconsideration of alternatives to rehabilitate some its natural functions by removing the concrete lining from the creek bed. Three alternatives were considered for the rehabilitation of Underwood Creek. As noted in the Purpose and Need discussion, SEWRPC (2000) evaluated six options for the rehabilitation of Underwood Creek, from the confluence with the Menomonee River to the confluence of the South Branch of Underwood. Only one of these alternatives did not increase the potential flood hazard to structures along Underwood Creek; this SEWRPC alternative is referred to as *Rehabilitation of Underwood Creek* – Alternative 1 in this EA. The second alternative is the MMSD 2005 Alternative, referred to as Alternative 2. Alternative 3 is the no-build alternative; in this alternative the concrete lining remains in Underwood Creek.

Rehabilitation of Underwood Creek - Alternative 1

SEWRPC's range of alternatives evaluated a longer reach of Underwood Creek compared to the reach being evaluated in this EA. Also, SEWRPC's alternative analysis did not include the reduction of flows resulting from the Milwaukee County Grounds diversion. Alternative 1 for the rehabilitation of Underwood Creek calls for the lowering of the streambed up to 3.9 feet along Underwood Creek between the CPR bridge and the Serafino Square apartments (Figure 31). Overbank areas along the South Branch of Underwood Creek would be excavated to provide 280 acre-feet of additional floodwater storage. A floodwall would be constructed along the north side of the creek to protect one of the Serafino Square Apartment buildings. Flood easements would be required along about 0.9 mile of stream due to increases in flood stage elevations; but the potential flood hazard to structures would not be increased.

For this alternative, SEWRPC indicates that average velocities along the rehabilitated 2.5-mile-long reach of Underwood Creek would only be reduced to six feet per second and some velocities could be as high as sixteen feet per second, which is considered very high and would pose a safety hazard. Bank and bed stabilization, such as a combination of bio-engineering and riprap or gabion protection, would be required in some reaches with high erosion potential. There are several locations where flow velocities would approach or exceed ten feet per second during events ranging from the fifty percent probability to one percent probability events. Special erosion control treatment, perhaps involving "hard" armoring solutions are likely to be required at several locations. While Alternative 1 can be implemented without the County Grounds floodwater management facility, the cost of the alternative (\$34 million dollars) was high compared to the limited ecological benefit gained. The alternative was rejected from further consideration.

Rehabilitation of Underwood Creek - Alternative 2

Alternative 2 is the removal of concrete-lining (channel bottom only and the removal of concrete-lined channel bottom and sideslopes) for most of reach extending from STH 100 to the confluence with the Menomonee River (Figures 4, 5A, and 5B). This alternative assumes that floodwater would be diverted at the diversion structure of the MCG floodwater management facility, which would reduce the flow in the critical section of rehabilitated Underwood Creek by 4,400 cfs during the one percent probability event. Due to the diversion, Alternative 2 differs from Alternative 1 as it does not require excavation along Underwood Creek for additional floodwater storage.

Two design options were considered for Alternative 2. The two design options did differ over the upper (upstream) two-thirds of the project reach, but they impacted the lower one-third of the project. The main difference between the two options involved the width of the channel and is outlined below:

- Alternative 2, Option 1: This alternative involves complete concrete removal though the project reach. Approximately fifteen feet of CPR right-of-way would be used to widen the constrained channel. The use of the CPR right-of-way would allow the rehabilitation and revegetation of the entire cross-section of the creek. While this option would result in a rehabilitated creek with a frequently inundated floodplain, the floodplain would be situated on a sideslope of 1.5:1. This option would impact existing utilities along the railroad and require engineering solutions to address impacts to the existing railroad embankment. Considering the potential impact to the CP Railroad, Option 1 was not considered a viable option.
- Alternative 2, Option 2: This alternative would involve complete concrete removal through some portions of the reach and partial concrete removal through the remainder of the project reach. With the exception of approximately 300 feet in the vicinity of USH 45, the Underwood Creek reach from STH 100 to station 33+10, approximately 4,100 feet downstream, would be rehabilitated by complete concrete removal. The 300-foot section in the vicinity of USH 45 would be modified by replacing the concrete-lined channel bottom with stone and floodplain vegetation. The sideslopes would remain concrete-lined. The Underwood Creek reach from station 33+10 to station 10+50 would be modified by replacing the concrete in the channel bottom with stone (Figures 5A and 5B). Comparable to the existing condition, the sideslopes along this reach would be concrete-lined.

This alternative, including both Options 1 and 2, would require the construction of a berm along the north side of the rehabilitated creek. The berm would be the same for both options. It would extend approximately 930 feet from RM 0.46 to RM 0.635, along the northern portion of Underwood Creek to protect Fisher Parkway from flooding. The base of the berm would be located at elevation 680 feet MSL; the side slopes would be constructed with 3:1 side slopes and have an average height of approximately 2.5 feet. The berm would have a top width of five feet.

The decision to move forward with design for the MCG floodwater management facility supports implementation of Alternative 2. The maintenance of floodwater management objectives in the rehabilitated creek depends upon on the successful completion of the County Grounds facility. This relationship necessitates the seamless integration of activities associated with Underwood Creek rehabilitation and the MCG floodwater management facility; this includes the integration of schedules and the physical design of the diversion structures and the cross-section of the rehabilitated creek in this area. In addition, the following issues would need to be addressed in the final design of this alternative:

- Sediment Transport This issue would be considered.
- Channel Scour and Incision rock or some other means of preventing subsurface flow incision into the clay subsoil, would need to be designed.
- Channel Stability and Geomorphic Function The urban setting of Underwood Creek requires a stable channel design. The constrained setting of Underwood Creek requires that the rehabilitated channel not be permitted to migrate laterally. The rehabilitated creek would be constructed to remain immobile. The rehabilitated channel would be constructed with some variability and be revegetated to provide as much ecosystem function as possible.
- Upstream Restoration Efforts Alternative 2 would not preclude the eventual rehabilitation of Underwood Creek, upstream of the present project reach. One consideration is the eventual removal of drop structures upstream of STH 100; these structures would need to be absorbed into a constant grade. This needs to be considered in the design of Alternative 2.

• Geotechnical considerations – The geotechnical characteristics of the subsurface soil profile would impact the type and nature of the channel rehabilitation improvements. This includes: variable strength soil, shallow water table, drainage and slope stability, and soil erosion due to flow and at locations where storm drains enter the creek.

NR 103 Alternatives Analysis

Milwaukee County Grounds Floodwater Management Facility

The recommended Alternative 2 for the storage facility (a single basin consisting of two lobes) at the Milwaukee County Grounds would impact approximately 2.8 acres of wetlands through basin excavation and site filling activities.

Alternatives that Avoid Wetland Impacts

The no-build alternative, which precludes floodwater management at the Milwaukee County Grounds, along with the required diversion structure from Underwood Creek, avoids wetland impacts. However, the MMSD rejected this alternative through a rigorous watercourse planning study.

Due to direct negative economic impacts to residences and businesses, community-wide opportunity costs associated with floodplain development rules and flood insurance requirements, and safety issues associated with high flood flows, the no-build alternative is not a viable option. The Phase I and Phase II Watershed Master Plans indicate that a floodwater management facility needs to be built and it should be built at the Milwaukee County Grounds site. The Milwaukee County Grounds site is located at an optimal location within the watershed. The public would realize a greater benefit per dollar of public investment in floodwater management at the Milwaukee County Grounds; the design requirements, cost of the floodwater management facility and the volume of storage required can be optimized (minimized) at this site. While extensive planning has indicated that a floodwater management facility is needed and that the facility should be located at the Milwaukee County Grounds, the no-build alternative for the MCG floodwater management facility would result in no-impact to wetlands.

The MMSD evaluated watershed-scale floodwater management solutions in its Watercourse Management Plan for the Menomonee River. Through a detailed planning process, the MMSD ultimately evaluated thirteen alternatives within the Menomonee River watershed that considered a range of measures with the goal of eliminating structural damage resulting from the one percent probability event. The preservation of wetlands and floodplains, to conserve natural storage and values, was considered as the thirteen alternatives were evaluated.

Among the recommendation that watershed-based alternatives had to consider were preservation of existing floodplain and wetland areas to conserve their natural storage functions and values. Furthermore, the plan recommended watershed-wide stormwater management regulations to control future stormwater runoff from new development. Despite upstream improvements recommended in the watercourse plan, floodwater management alternatives still required storage solutions in the Lower Menomonee River.

Alternatives that Minimize Wetland Impacts

Alternative 1 and Alternative 2 for the MCG floodwater management facility would each impact at least three wetlands. Fewer wetlands would be impacted with Alternative 2. Alternative 1, which proposed two distinct basins, impacts six wetland areas (Wetlands: 5, 6, 7-West, 7, 7-East and 9), for a total of 4.4 acres. Because of hydraulic design limitations resulting from the

connecting pipe between the basins, the need for a pump station, and the impact to either the cemetery (BMi-075/BMi-174), the DNR Forestry Education Center or to aesthetics by creating a more expensive and deeper east basin, Alternative 1 was rejected from further consideration. Wetland minimization measures were not considered for Alternative 1.

Alternative 2 avoids Wetland 6 and an associated stand of mature trees by a grading plan revision. Over the last five years, MMSD has worked to maximize the floodwater storage capacity of the basins within design constraints that consider costs and minimize impacts to natural and cultural resources. Both Alternatives 1 and 2 were designed within the constraints of Underwood Creek Parkway and the CPR tracks on the north and east sides of the basins. The mature upland stands of trees located northwest of the basin have served as a natural constraint. In addition to uplands, existing cemeteries also constrain the basin designs.

Further design refinements of Alternative 2, the preferred alternative, reduced impacts in some specific areas. Wetland 6 (0.61 acre), which is located in the project fill area would be avoided by grading around the wetland. Impacts to Wetland 7-West (0.54 acre), which is a high quality wet-meadow, would be avoided with further revisions to the grading plan. Impacts to Wetland 7-East (0.44 acres) would also be avoided by grading plan revisions. The final grading plan takes impacts to drainage and the relationship between drainage and the long-term viability of wetlands W-6, W-7 West and W-7 East into account. The latter two wetlands are also sustained by groundwater.

Approximately ten acres of wetlands would be voluntarily created in the bottom of the basin. However, the primary function of the basin is to manage floodwater. The bottom of the east lobe of the basin would also be managed as Tier 3 Butler's Gartersnake habitat.

As noted above, impacts to 1.6 acres of wetlands in the vicinity of the basin have been avoided. Considering the cultural, natural resource, fiscal, and physical design constraints, wetland impacts are unavoidable. The remaining wetland impact of 2.8 acres is unavoidable due to consideration of other resources on the project site that were targeted for preservation during the planning process with the project stakeholders. Resources preserved on the project site include two cemeteries, a mature hardwood forest for the DNR Forestry Education Center, and several stands of trees.

Wetland W-5 is characterized as a floodplain forest / wet meadow / shrub-carr wetland that covers approximately 1.8 acres. The 2005 wetland delineation and assessment determined that this wetland has a low to medium function and value. This wetland is located in the vicinity of the channel that would connect the east and west lobes of the basin, at Swan Boulevard. The construction of the basin would impact W-5. Avoiding the excavation in W-5 is not a feasible alternative due to storage requirements for the flood management facility.

Wetland W-7 is located on the western edge of the east lobe of the basin. This wetland is characterized as floodplain forest / shrubb-carr and covers 0.8 acre. The 2005 assessment determined that this wetland has low to medium function and value. This wetland would be impacted by the construction of the basin. Avoiding the excavation in W-7 is not a feasible alternative due to storage requirements for the flood management facility.

Wetland W-9 is characterized as a shallow marsh that covers approximately 0.24 acre; this marsh was likely created about 25 years ago following the construction of a local road. This wetland was assessed as having a low to medium function and value.



W-9 is located in the area proposed for the placement of fill and the creation of an upland area with variable topography and plant communities. Wetland W-9's location on the project site makes its preservation incompatible with the creation of the upland open space area. The ground elevation of wetland W-9 and surrounding area needs to be increased by approximately twenty feet to achieve the objectives of the final grading plan. This grading plan is the foundation for the creation of the upland open space area. The plan for the upland open space area considers a number of objectives that stakeholders articulated throughout the design process. Key among those objectives was the long-term preservation of open space and future opportunities for active and passive recreation and preservation of natural and cultural resources at the Milwaukee County Grounds. The plan for the upland open space area incorporates wildlife habitat enhancement, slope stability, and drainage. In order to achieve these objectives, the plan requires that wetland W-9 be filled. The filling of wetland W-9 would enhance the appearance and function of the proposed open space area and the resulting variable upland topography and newly established vegetation would enhance wildlife habitat at the Milwaukee County Grounds.

To preserve W-9, a substantial hole would need to be created in the upland open space area. The loss of this fill area would impact nearly every one of the open space area's publicly considered design features and objectives. Another impact revolves around project expense as this material would need to be hauled offsite, potentially creating impacts at another location To leave wetland W-9 in place, the limits of filling would be pulled back approximately 800 feet at an average depth of fifteen feet and a width of approximately 600 feet. This equates to a volume of about 270,000 cubic yards; this would require about an additional 30,000 truck loads of soil leaving the site over a two year period.

The offsite transport and filling of this additional material would have environmental impacts, elsewhere. The creation of the upland open space area would also allow the onsite placement of fill produced during the excavation of the basin to minimize costs. The estimated cost to dispose of soil offsite is about six dollars per cubic yard more than onsite disposal. Thus, the preservation of the quarter-acre wetland, W-9, would increase the project cost by approximately \$1.5 million dollars for offsite disposal costs. There is no practical alternative to avoid impacting wetland W-9 without substantially altering the project, including substantially impacting aspects of the project design that were finalized through an intensive public involvement and collaboration process with stakeholders.

Diversion Structure

Wetlands are avoided at the diversion structure. The location of the inlet structure proposed in Alternative 2, the preferred alternative, would be shifted south to avoid wetland W-10.

Berm Nearby the Water Quality Pond

An alternatives analysis was completed that considered the effectiveness of a berm to protect downstream residential structures from the facility's hydraulic shadow and that minimized the berm's impact on wetland W-8, which is located east of the water quality pond. Figure 32 shows this area, including the topography and surface features. The proposed berm needs to isolate structures within the 670 feet contour, which is highlighted on the figure.

Wetland W-8 is characterized as a floodplain forest/wet meadow, is 3.65 acres in area, and has a medium to high function and value. The wetland is located in the most optimal position for placing an engineering solution for removing residential and business structures from the facility's hydraulic shadow, which makes impacts to this wetland unavoidable. The focus then turns to how to minimize the structure's impact to the wetland while considering other contributing factors such as hydrology, local



drainage, public versus private property interests, amount and quality of vegetative clearing and grubbing, effects to the navigable waterway, and the storm water management plan for the Milwaukee Regional Medical Center (MRMC) (GAS 2005).

The following alternatives were considered:

1A. Placing a berm along the west and north sides of the water quality pond and extending it further southeast (Figure 32)-

The majority of the structure would be an earthen berm with approximately 300 linear feet of sheet pile. The earthen berm would be between four feet and eight feet in height around the water quality pond and up to twelve feet high to the southeast as it crosses the wetland. The piling would continue along the berm's alignment, outside the wetland boundary, for another 280 feet and about four feet high as it extends to the 670 feet contour line. Four culverts would be placed within the berm to convey surface runoff through existing drainage ways located within the wetland. The advantages of this alternative are:

- The majority of the structure would be landscaped, lending to its ability to blend into the surroundings and be less visually obtrusive.
- The four culverts would be designed to meet the conveyance capacity of the downgradient culvert placed beneath the railway and the upgradient drainage area. Three culverts, about eighteen inches in diameter, would be placed within the two low-flow channels located within the wetland and within the drainage path originating from the water quality pond. All three drainages contribute to the navigable waterway. A fourth culvert, about three feet in diameter, would be included to convey larger flows.
- The structure would be located on Milwaukee County land.
- The structure would require clearing and grubbing in an area with lower quality vegetation compared to those encountered closer to the North 85th and 86th Streets' cul-de-sacs where higher quality mature tree stands exist.
- The structure would observe the MRMC's updated stormwater management plan (GAS 2005) recommendation of expanding and raising the existing berm located around the water quality pond.

Disadvantages to this alternative include having a permanent wetland impact of 0.17 acres and a temporary construction impact of 0.35 acres. The larger, temporary impact considers placement of silt fencing about two feet beyond the berm's footprint and room for equipment to construct the earthen berm. Once construction is completed, the local hydrology would promote restoration of the impacted area back to wetland habitat and would promote establishment of wetland habitat on the berm up to the 660 feet contour line.

1B. Placing a berm along the west and north sides of the water quality pond and extending it further southeast with sheet pile (Figure 33) –

The earthen berm would be between four feet and eight feet high around the water quality pond, and the sheet pile would be twelve feet high, ten feet wide, and about 430 feet long as it extends the berm's line to the southeast and across the wetland. This alternative impacts less wetland area (0.03 acres), but it would inhibit the mobility of wildlife through the area by acting as a barrier, would detract from the site's aesthetics by including an obtrusive, twelve-foot wall of steel, and cause water to backup on both sides of the pile. For these reasons, this alternative was not chosen.

2. Placing a berm along the west and north sides of the water quality pond and extending it in a northeasterly direction





(Figure 34) -

The earthen berm would be between four feet and eight feet high around the water quality pond, and then extend across the wetland in a northeasterly direction. Approximately 410 linear feet of sheet pile would then wrap around a nearby parking lot in a southerly to southeasterly direction to the 670 feet contour line. This alternative would affect more of the lower quality portion of the wetland and minimize the impact of further fragmentation of the forested wetland. The disadvantages of the alternative, however, are that the berm's alignment would have more of a permanent affect on the wetland (0.20 acres) compared to alternative 1A, would require removal of approximately 0.3 acres of mature trees, would be placed near and may adversely affect bridge abutments that are part of the Canadian Pacific Railway, may adversely affect drainage flowing from the east, the berm footprint would be placed over the navigable portion of the waterway, and have more of a visual impact from the sheet pile wrapping around the parking lot.

3. Placing a berm north of residences located on North 85th and 86th Streets (Figure 35) –

The 770-foot berm would wrap around the residences and the North 85th and 86th Streets cul-de-sacs and would be ten feet high near the residences in order to effectively hold back water arising from a dam failure. Placing the berm nearby the residences would have the advantage of maximizing the land area that the water could inundate before reaching the berm. However, the earthen berm would have a visual impact to home owners, as the berm would be placed adjacent to private backyards, and would have a permanent impact of 0.60 acres to the wetland. About one acre of mature trees that provide an aesthetic value and property value to the residences would need to be cleared and grubbed. The berm could also adversely affect the hydrologic connection of upland drainage to the wetland and thereby, has the potential to adversely affect an area greater that the berm's structural footprint in the wetland and may adversely affect drainage from the residences. Due to the berm's proximity to residences, the potential adverse affect on the wetland's hydrology, and the requirement of clearing a mature tree stand, this alternative was not chosen.

In order to completely avoid impacting the wetland, possible alternatives include either placing a berm upgradient of the wetland and within the residential properties or acquiring the residential properties. Neither of these was considered feasible. Acquisition or placing a berm within the residential properties disrupts an established neighborhood.

Following the consideration of all proposed alternatives, Alternative 1A was selected for the placement of a berm aimed to protecting residences from the facility's hydraulic shadow. The berm would have a temporary impact of 0.35 acres during the construction process. About 0.18 acres of the disturbed area would be restored following construction by revegetating the impacted wetland area with higher quality tree species compared to the lower quality trees that currently exist. In addition, the local hydrology would promote wetland establishment to the 660 feet contour line, which includes about four feet on both sides of the berm. This would leave about 0.17 acres of permanent impact, which would be mitigated within the Underwood Creek corridor. This upland portion of the berm would be landscaped with higher quality upland species.

Minimizing the width of the berm's crest from eight feet down to four feet was considered in an attempt to minimize the footprint of the berm within the wetland. However, the smaller crest width would fit only smaller sized construction equipment, which would make it difficult to achieve the required compaction of the newly placed soil. The reduced compaction could affect the stability of the berm and limit its function. The smaller crest would also have maintenance and access drawbacks, as a four foot crest with 2:1 side slopes makes the berm difficult to physically maintain.

Through coordination with DNR staff, it was determined that placing culverts within the berm was necessary to maintain the wetland's drainage patterns, but the culverts would not compromise the berm's purpose of protecting residences from a dam failure. The culverts would also be sized to maintain water flows through the wetland. The final design of the structure would be completed to common standard engineering practice and would be submitted to the DNR for stability analysis and design approval prior to construction. The berm would also be designed in recognition of the updated storm water management plan developed for the MCRC (GAS 2005) that recommended adding capacity to the pond by modifying the emergency overflow weir and elevating the berm.

Underwood Creek Rehabilitation

Approximately 1.7 acres of wetland would be impacted by the rehabilitation of Underwood Creek. These impacts are unavoidable considering the nature of rehabilitating an urban stream. MMSD would voluntarily create approximately 7.7 acres of wetlands by rehabilitating Underwood Creek.

Alternatives that Avoid Wetland Impacts

The no-build alternative would not impact wetlands, but is not a viable alternative considering the MMSD's long-term objective of enhancing natural resources in the MMSD planning area. Simply by the nature of being a creek, wetlands are located in the vicinity of creek rehabilitation projects. Wetlands were delineated along Underwood Creek, from STH 100 to the confluence with the Menomonee River. Wetlands 10, 10A, 10B, 10C, 10D, and 10E (1.53 acres) would be affected by the rehabilitation of Underwood Creek, under Alternative 2 (Figure 31). SEWRPC's Alternative 1 would affect these wetlands, plus wetlands that are located along Underwood Creek, upstream of STH100. Fewer wetlands would be impacted with Alternative 2, simply because this alternative would rehabilitate a shorter reach of stream. A more important distinction between the two rehabilitation alternatives is the fact that Alternative 1 calls for overbank excavation along the South Branch of Underwood Creek and they would likely be impacted by this excavation. On the other hand, Alternative 1 incorporates the reduced flows resulting from the diversion to the MCG floodwater management facility to address the increase in flood stage due to concrete removal.

Impacts to wetlands that are located adjacent to Underwood Creek would be voluntarily re-created with the rehabilitation of Underwood Creek. Alternative 2 would impact fewer wetlands than Alternative 1 due to the shorter length of stream reach that would be rehabilitated, but also because Alternative 2 does not rely on overbank excavation to address higher flood stages associated with concrete removal.

SUMMARY OF ISSUE IDENTIFICATION ACTIVITIES

26. List agencies, citizen groups and individuals contacted regarding the project (include DNR personnel and title) and summarize public contacts, completed or proposed).

Agency	Staff	Phone Number	Title
Department of Natural Resources	Sharon Gayan	414.263.8707	Basin Supervisor
Department of Natural Resources	Mike Thompson	414.263.8648	Environmental Analysis & Review Program Supervisor
Department of Natural Resources	Jennifer Jerich	262.884.2356	Water Regulations & Zoning Engineer
Department of Natural Resources	Sharon Schaver	414.263.8560	Hydrogeologist
Department of Natural Resources	Jim Ritchie	414.263.8586	Water Resources Management Specialist
Department of Natural Resources	Brent Binder	920.892.8756	Water Regulations & Zoning Engineer
Department of Natural Resources	Don Tills	414.303.4927	Natural Resources Manager
Department of Natural Resources	Robert Hay	608.267.0849	Conservation Biologist
Department of Natural Resources	Andy Galvin	608.264.8968	Conservation Biologist
Department of Natural Resources	Ted Bosch	414. 263.8623	Wastewater Engineer
Milwaukee County	Laurie Albano	414.257.5911	Landscape Architect
U.S. Army Corps of Engineers	Rebecca Gruber	262.547.6986	Project Manager
Southeast Wisconsin Regional Planning Commission	Chris Jors	262.547.6721	Staff Biologist
Wisconsin Historical Society	Sherman Banker	608.264.6507	Staff Historian

DECISION (This decision is not final until certified by the appropriate authority)

In accordance with s. 1.11, Stats., and Ch. NR 150, Adm. Code, the Department is authorized and required to determine whether it has complied with s.1.11, Stats., and Ch. NR 150, Wis. Adm. Code.

Complete either A or B below:

A. EIS Process Not Required

The attached analysis of the expected impacts of this proposal is of sufficient scope and detail to conclude that this is not a major action which would significantly affect the quality of the human environment. In my opinion, therefore, an environmental impact statement is not required prior to final action by the Department.

X

B. Major Action Requiring the Full EIS Process

The proposal is of such magnitude and complexity with such considerable and important impacts on the quality of the human environment that it constitutes a major action significantly affecting the quality of the human environment.

Date Signed ator Sidnature Michael C. Thomps 31MAYDE

Number of responses to news release or other notice:

Certified to be in compliance with WEPA		
Environmental Analysis and Liaison Program Staff	Date Signed	
Alphanel C. I/	31MAY06	

NOTICE OF APPEAL RIGHTS

If you believe that you have a right to challenge this decision, you should know that Wisconsin statutes and administrative rules establish time periods within which requests to review Department decisions must be filed.

For judicial review of a decision pursuant to sections 227.52 and 227.53, Stats., you have 30 days after the decision is mailed, or otherwise served by the Department, to file your petition with the appropriate circuit court and serve the petition on the Department. Such a petition for judicial review shall name the Department of Natural Resources as the respondent.

To request a contested case hearing pursuant to section 227.42, Stats., you have 30 days after the decision is mailed, or otherwise served by the Department, to serve a petition for hearing on the Secretary of the Department of Natural Resources. The filing of a request for a contested case hearing is not a prerequisite for judicial review and does not extend the 30-day period for filing a petition for judicial review.

Note: Not all Department decisions respecting environmental impact, such as those involving solid waste or hazardous waste facilities under sections 144.43 to 144.47 and 144.60 to 144.74, Stats., are subject to the contested case hearing provisions of section 227.42, Stats.

This notice is provided pursuant to section 227.48(2), Stats.

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APPENDIX A

Butler's Gartersnake Conservation Plan

Butler's Gartersnake Conservation Plan:

Milwaukee County Grounds Floodwater Management Facility and Underwood Creek Rehabilitation Project, Milwaukee, Wisconsin

May 8, 2006

Gary S. Casper, Ph.D. Casper Consulting PO Box 375 Slinger, WI 53086

Prepared for: HNTB Corporation 11414 West Park Place, Suite 300 Milwaukee, WI 53224



CONSERVATION PLAN FOR MILWAUKEE COUNTY GROUNDS FLOODWATER MANAGEMENT FACILITY & UNDERWOOD CREEK REHABILITATION SECTIONS 20 & 21, TOWNSHIP 7 NORTH, RANGE 21 EAST MILWAUKEE COUNTY ER PROJECT ID #05-135 MMSD Contract No. W20004D01

This Conservation Plan is approved by the Milwaukee Metropolitan Sewerage District and the Wisconsin Department of Natural Resources. Changes or revisions to this Plan shall be made by amendment approved by both parties and their successors.

Approved by the Milwaukee Metropolitan Sewerage District:

Signature

Date

Kevin L. Shafer, P.E. MMSD Executive Director Printed Name and Title

Approved by the Wisconsin Department of Natural Resources:

26-06

3/20/06

Robert Hay, Cold-blooded Species Manager Bureau of Endangered Resources

Date

Butler's Gartersnake Conservation Plan:

Milwaukee County Grounds Floodwater Management Facility and Underwood Creek Rehabilitation Project, Milwaukee, Wisconsin

1. Background

The Milwaukee County Grounds Floodwater Management Facility and the Underwood Creek Rehabilitation Project will construct a diversion tunnel from Underwood Creek to a large new flood management basin with two lobes of approximately 35 acres each, and remove the concrete lining of Underwood Creek from STH 100 to approximately 1625 feet downstream of USH 45, in Wauwatosa, Milwaukee County (Figure 1). During regulatory review, the Butler's Gartersnake, *Thamnophis butleri*, a state Threatened Species, was found within the project areas. This species is subject to Wisconsin Department of Natural Resources (WDNR) regulatory jurisdiction, which currently follows guidelines from the Butler's Gartersnake Conservation Strategy (ver. 2.3, available from http://www.dnr.state.wi.us/org/land/er/review/Butler/index.htm). The state Endangered Species Law (s. 29.604, Stats.) prohibits the taking of animal species listed as Endangered or Threatened anywhere that they occur in Wisconsin. The law does allow the WDNR, at its discretion, to authorize the taking of individuals of listed species through an Incidental Take Authorization, if the following conditions apply:

- a) The taking will not be the purpose of, but will be only incidental to, the carrying out of a lawful activity.
- b) The party requesting taking authorization will, to the maximum extent practicable, minimize and mitigate the impact caused by the taking.
- c) The taking will not appreciably reduce the likelihood of the survival or recovery of the endangered species or threatened species within the state, the whole plant-animal community of which it is a part, or the habitat that is critical to its existence.
- d) The benefit to public health, safety or welfare justifies the activity.

This Conservation Plan details the steps that will be taken to avoid, minimize, and mitigate for Butler's Gartersnakes, both before, during, and after construction. The Plan is expected to result in a net gain of Butler's Gartersnake within the project areas.

2. Butler's Gartersnake Assessments

The Milwaukee County Grounds were surveyed for Butler's Gartersnakes in 2000 (Casper, 2000), and in 2002 a snake removal was performed for the Northwest Side Relief Sewer Project

(Casper, 2002, 2003). In 2005, new surveys were conducted on the Milwaukee County Grounds and along Underwood Creek, resulting in up-to-date mapping of Butler's Gartersnake habitat (Casper, 2005). Existing Butler's Gartersnake habitat is found in three patches. Habitat assessment methods are detailed in Casper (2005).

2.1 Habitat Patch One

Habitat Patch One (Figure 2; for more detail see Casper, 2005) consists of the Underwood Creek corridor and associated uplands. Uplands are generally either good quality snake habitat with abundant grasses and forbs, or not suitable as snake habitat at all, owing to closed canopy conditions and little or no ground vegetation for providing snakes cover. The habitat quality of wetlands for snakes is variable. In the far northeast, at the confluence with the Menomonee River, there are poor quality wetlands with >75% reed canary grass (Phalaris arundinacea) dominance. South of USH 45 is a sinuous wooded wetland on the east side of the stream considered poor quality snake habitat owing to closed canopy conditions. Stormwater ponds occur on both sides of the STH 100 crossing with good quality snake habitat along the shoreline of the eastern pond, and a bit further upstream north of Watertown Plank Road are small wetlands consisting of patches of cattail (Typha sp.) and sedges (Carex sp.) considered to be good quality snake habitat. South of Watertown Plank Road a small, seasonally wet, swale with sedges and grasses (Poa sp.) may provide good quality snake habitat within a grassland surround. Throughout the stream corridor wetlands also are present along the shoreline in narrow, mostly linear, patches, and as perched seepage wetlands on some stream side slopes. Many are quite small, but some of the better, larger, good quality examples are on the east side of the stream south of USH 45. The concrete lining of the creek bed is not considered to be existing snake habitat. However, it has cracked and heaved in many spots, potentially providing retreats and denning sites for snakes. Snakes may utilize the concrete structures in this manner, and are capable of swimming across the stream, especially during flood events.

Classifying the Underwood Creek corridor Butler's Gartersnake habitat within the existing WDNR guidelines takes into account that the stream represents a connecting corridor for many discrete habitat patches. WDNR guidelines determine that habitat patches within 1000 feet of each other, where the intervening terrain is passable, are to be summed together and considered as a conglomerate habitat supporting the same population. On a stream corridor such as this, this process results in a Tier 3 *Significant Conservation Value* assignment, even though the habitat delineated is comprised of many small, discrete pieces. For example, the existing suitable snake habitat patches mapped in Figure 2 combined sum to approximately 32.9 acres, which is considered a Tier 3 *Significant Conservation Value* site regardless of habitat quality. This habitat acreage would grow even more if snake habitat assessment were extended further upstream or downstream. Figures 3-4 provide more detail of snake habitat identified along stream segments.

2.2 Habitat Patch Two

Habitat Patch Two consists of three wetlands and associated uplands north of N. Swan Road, totaling approximately 14.0 acres (Figure 5; Casper, 2005). Uplands are mostly good quality with abundant grasses and forbs in the abandoned nursery area. A recent fill in the north-central portion of Wetland 5 is heavily dominated by thistle (*Cirsium* sp.) and stinging nettle (*Urtica* sp.), with compressed gravel soils (fill), and is consequently of lower quality. Adjacent closed canopy areas are not suitable habitat and are dominated mostly by invasive hawthorn (*Crataegus* sp.), buckthorn (*Rhamnus* sp.), and ash (*Fraxinus* sp.). Wetlands 4, 4A, and 5 are dominated by dense stands of reed canary grass and cattail (>75% cover), and hence are considered poor quality Butler's Gartersnake habitat. This 14.0 acre habitat patch with good quality uplands but a poor quality wetland component falls into WDNR's Tier 1 *Minimal Conservation Value* classification, and is subject to a WDNR Broad Incidental Take Authorization with voluntary conservation measures.

2.3 Habitat Patch Three

Habitat Patch Three consists of approximately eight wetlands and associated uplands south and east of N. Swan Road, in a complex fragmentation state (Figure 6; Casper, 2005). Based on past survey results, snake numbers appear to be low throughout this region, possibly as a result of the habitat fragmentation. Isolation of habitat patches from each other is achieved in some instances by approximately 30 feet wide paved roads woven through the grounds. However, numerous opportunities for snakes to cross older paved roads exist where pavement is crumbled with age, or partially covered with gravel, and one railroad track also provides snakes a crossing with sufficient surface texture. Aside from the wider stretches of pavement, little isolation between patches is present, with the landscape providing adequate ground cover for snake movement along fence lines, through gardens, and across lawns and gravel roads. Land use history in this area is complex, with many former buildings, walkways, and roads removed or abandoned, and many buried foundations present. Some buried structures may be utilized by Butler's Gartersnakes as denning sites. Uplands are generally good quality habitat for snakes with abundant grasses and forbs in old field and garden areas. Wetland habitat quality for snakes varies from poor (i.e. wetlands 7 East, 7 South) to good (i.e. wetlands 6, 7 West). In sum, Habitat Patch Three consists of sixteen sub-patches with a combined total of approximately 34.1 acres, which falls into WDNR's Tier 3 Significant Conservation Value classification. Several Butler's Gartersnakes were observed outside of the 300 foot wetland offsets, notably in the public gardens. Therefore, the actual area utilized by Butler's Gartersnakes here is clearly larger than that delineated based on existing guidelines.

3. Avoidance Measures

The construction footprints have been minimized in Habitat Patch One (Underwood Creek) and Habitat Patch Three (Milwaukee County Grounds) to the extent practical in order to achieve the flood management objectives. In particular, in Habitat Patch One grading was re-designed to avoid

Wetland 10, and in Habitat Patch Three grading was re-designed around Wetland 6 in order to preserve a snake holding area and source population for recolonization of restored habitat.

4. Minimization Measures

Butler's Gartersnake impacts will be minimized by the following measures.

4.1 Snake Exclusion Fencing

At Milwaukee County Grounds, Snake Exclusion Fencing will be erected prior to snake emergence in spring 2006, as shown in Figure 7. It will serve the purpose of preventing snakes from moving into construction areas during the active season (approximately March 16 - November 5). Where fence openings are necessary for construction access, snake end loops will be installed as per WDNR design. This fencing will be maintained until construction finish (approximately July 2008), except the fencing around the Snake Holding Area(s) will be maintained until snakes can be released (approximately November 2010). Additional construction fencing may be placed as needed or required.

Underwood Creek construction will proceed in two phases. The first, southern, phase is from STH 100 to USH 45, and begins in 2009. Snakes will be removed before construction. Snake Exclusion Fencing will be placed as shown in Figure 8 by April 15 of the construction year, to isolate snakes within the removal area. There is no urgency to place fencing before snakes become active, because in this case active snakes would be moving out of, not into, the construction area. Snake Exclusion Fencing will be removed when construction finishes (most likely in 2010), except for around the diversion structure, which will be constructed in 2009-11. Fencing will be removed from around the diversion structure when that construction finishes (early 2011).

Phase two of Underwood Creek construction begins in 2011 from USH 45 to the confluence with the Menomonee River. Snakes will be removed before construction begins (most likely in 2010) and Snake Exclusion Fencing will be placed as shown in Figure 8 by April 15 of the construction year, to isolate snakes within the removal area. Snake Exclusion Fencing will be removed when construction finishes (early 2012). At the northeast end of this project area (Figure 1), no snake exclusion fencing is planned because work will not extend beyond the existing concrete side slopes, which act as a snake barrier.

Where construction activity will come near Snake Exclusion Fencing, an orange snow fence may be erected alongside it on the construction side, to form a highly visible fence line for equipment operators to observe. The Snake Exclusion Fencing will be inspected per WDNR guidelines, i.e. at least twice weekly on non-consecutive days or after any significant rain event (a ³/₄ inch downpour or 1.5 inches of rain in any 24-hour period), and inspectors will keep a log of inspections. Fence inspectors will be trained annually by a consulting herpetologist, who will also

make periodic spot checks for quality assurance and control. Fence repairs will be made within 24 hours of discovery. These fences will be maintained throughout the snake's entire active period (approximately March 16 - November 5) or until all construction and landscaping activities have been completed, whichever occurs first. All operators and construction personnel will be notified annually, in March, to avoid damaging this fencing, and to notify the fence inspectors immediately upon observing any damage. Fence contractors will plan and budget for annual spring major repair of the fence in order to a) maintain visual inspection ability, and b) avoid overtopping of the fence by vegetation, which snakes could climb. Weed control may be by mowing along the fence, or by use of herbicides (approximately twice annually in late May and mid-June). Snake Exclusion Fencing will be clearly shown on construction design plans.

Because of the amount and complexity of fencing involved, fencing needs will be reviewed on an annual basis in February, with the consulting herpetologist and project managers, and a fencing plan for the upcoming snake season (March 16 through November 5) will be produced with WDNR concurrence. Fencing needs are expected to change both spatially and temporally as the project progresses, with final grading progress and snake activity dates determining whether or not specific regions of fencing will continue to be maintained.

4.2 Snake Removals

Butler's Gartersnakes will be removed from construction footprints before construction begins, to minimize mortality, and to enhance the chances that local snakes will remain available to re-colonize restored habitat at the project end. At the Milwaukee County Grounds, snakes will be removed in 2006, and snake removal areas will be surrounded by Temporary Snake Removal Fencing by approximately March 16, 2006, to isolate and concentrate snakes as much as possible (Figure 7). At Underwood Creek no additional fencing is planned, since the narrow project corridor potentially has hibernating sites throughout, and lends itself to complete sampling. Snakes at Underwood Creek will be removed in 2008 (USH 45 to STH 100) and in 2010 (USH 45 to confluence). Snakes will be captured by cover object, funnel trap and visual search methods from approximately April 1 through no later than July 15, 2006 at the Milwaukee County Grounds. However, more aggressive sampling in specific areas of the east basin may be required to complete capture by June 15, such that construction in critical areas is not delayed. All snakes captured will be identified to species, and the following additional data taken: date, capture method, capture location, snout-vent length, weight, sex (if possible by external exam), pregnancy status (females only), and general health. Snakes that are large enough will be permanently marked by a ventral scale clip code unique to their year of capture and general location (MCG East Lobe, MCG West Lobe, South UC Reach, North UC Reach). The conclusion of snake removal surveys will be determined by WDNR concurrence with the consulting herpetologist and based upon ongoing capture results.

4.3 Snake Holding Program

All Butler's Gartersnakes removed from the construction footprints (Milwaukee County Grounds and Underwood Creek) will be placed into a Snake Holding Area centered on Wetland 6 (Figure 7), during snake removal surveys scheduled for 2006, 2008, and 2010 (in 2010 snakes may be placed into restored Milwaukee County Grounds habitat instead of the holding area, depending on habitat restoration progress). The Snake Holding Area was demonstrated to be supporting Butler's Gartersnakes during the assessments, and will be fenced in with Snake Exclusion Fencing by March 16, 2006, and subject to the inspection and maintenance regime detailed in Section 4.1. The number of snakes placed into this area will be logged and the consulting herpetologist will provide snake numbers to WDNR at least every other week. Should WDNR determine that the Wetland 6 Snake Holding Area may be receiving too many snakes, any additional snakes captured from construction areas will be either entered into a captive holding program and maintained in aquaria with proper care and feeding until the project end, or released into Wetland 7W, which will then be maintained as a second Snake Holding Area subject to the same maintenance and monitoring conditions as the Wetland 6 Holding Area.

In order to provide some quality assurance, snake holding areas will be surveyed for snakes in 2007, and again at the soonest opportunity prior to allowing snake dispersal into restored habitats. This latter survey will most likely be scheduled for 2011, but must be run between April 15 and July 15. The Milwaukee Metropolitan Sewerage District (MMSD) may, at its option, survey more frequently to improve quality assurance data (such as annually), and WDNR may require up to annual surveying if additional data are considered necessary for evaluating the survival of the penned snakes.

Snake surveys within the Snake Holding Area will be accomplished by standard cover object methods. An array of appropriate cover objects will be placed at least two weeks prior to starting surveys, and 12-15 surveys will be run between April 15 and July 15 on non-consecutive days. Surveys will follow standard weather and time of day constraints. All snakes captured will be identified to species, and the following additional data taken: date, capture method, specific capture location (cover object number), snout-vent length, weight, sex (if possible by external exam), pregnancy status (females only), general health, and scale clip code. Survey data will be summarized to compare a) snake numbers, b) age classes, c) weight / length ratios, and d) the percent of adult females that are pregnant, with identical metrics for snakes previously put into the pen. Any conclusions drawn should be statistically supported. MMSD will consider reasonable remedies to any problems noted on a case by case basis.

Snakes are expected to be contained within the Snake Holding Area(s) for up to 5 years, until habitat in the new Milwaukee County Grounds Habitat Preserve Area is sufficiently established. Fences will then be removed to allow snakes to disperse. If considered necessary, snakes may be captured from the Snake Holding Area(s) and moved into the newly established habitat areas.

5. Mitigation Measures

Technical note: Figures and area calculations presented in this plan may differ slightly from final engineering design plans. This is a result of different standards and margins of error for habitat mapping vs. engineering design. Differences are insignificant for habitat analyses, and the final engineering design plans represent the most accurate and precise specifications.

The WDNR has a *no net loss* policy in place for Tier 3 Butler's Gartersnake sites (*op cit.*). This applies to the extent of suitable Butler's Gartersnake habitat area prior to the construction start, and requires an equal or greater amount of suitable habitat to be available at the project finish. This Plan will meet this policy objective through habitat restoration, and monitoring of assisted snake reoccupation, in both of the affected Tier 3 Butler's Gartersnake Habitat Patches.

5.1 Habitat Restoration: Milwaukee County Grounds

Prior to construction this project area included portions of an approximately 34.1 acre Tier 3 Habitat Patch (Figure 6). The amount of this habitat falling within the Milwaukee County Grounds project area, and expecting to be impacted, totals approximately 16.7 acres (Figure 9). After construction of the flood management basin, the project area will have approximately 38.1 acres of suitable habitat designated as a Preserve Area as shown in Figure 10. All graded areas within the Preserve Area boundaries will be seeded and restored to suitable Butler's Gartersnake habitat as detailed in the restoration plan (Appendix A). In order to avoid snake mortality, any bioengineered side slope erosion control fabrics used in the restoration plan will have specifications that stipulate biodegradable materials, and weave openings no smaller than 0.5 inches. The bottom of the basin is designed to be wetland, with slopes in grassland and savanna. The Preserve Area will be managed for suitable Butler's Gartersnake habitat in perpetuity through a Conservation Easement developed in cooperation with WDNR (Appendix C). This managed Preserve Area meets and exceeds the no net loss guidelines for snake habitat mitigation. This Preserve Area is to be protected and managed in perpetuity through a conservation easement with the WDNR in order to preserve the suitability of the habitat for the Butler's Gartersnake following the initial restoration of the site, as identified in this Conservation Plan.

The management of the Preserve Area will be subject to existing WDNR Butler's Gartersnake Management Guidelines. The Management Guidance calls for periodic maintenance needed to maintain wetland, grassland, prairie or savanna ecosystems. Thus, periodic control of excessive growth of woody shrubs and trees must be performed. General maintenance and control of woody vegetation is implemented through a variety of measures including:

- Selective brush/tree cutting
- Burning
- Mowing/Haying
 - Grazing

Variances from these guidelines may occasionally be necessary for weed control, especially during vegetation establishment. In the event that the site manager determines that a variance is needed,

the WDNR Bureau of Endangered Resources will be consulted for a variance approval before proceeding. Variance requests will include detailed reasoning as to why the desired control cannot be achieved under the established guidelines, and will detail methods for the management protocol being proposed. The management proposed must be consistent with the overall long term maintenance and enhancement of habitat quality for the Butler's Gartersnake. Any incidental take likely to occur with the proposed management will be evaluated on a case by case basis.

It is important to note that more suitable Butler's Gartersnake habitat is expected to be available after project completion than just the managed Preserve Area. The extent of the area that will actually be maintained as suitable Butler's Gartersnake habitat is difficult to predict, being subject to landowner discretion. However, approximately 17.4 acres of existing suitable Butler's Gartersnake habitat will not be impacted by the project (Figures 9, 10). After project completion, approximately 104 acres of potentially suitable Butler's Gartersnake habitat is expected to be available both within and without the project area excluding the Preserve Area (Figure 11), and management of this acreage will be at the discretion of the landowners (WDNR, Milwaukee County, railroad, and private parties). A managed habitat scenario for this additional acreage is shown in Figure 11. Should this be realized, approximately 77 acres of suitable habitat would be available to the Butler's Gartersnake in additional to the 38.1 acre Preserve Area. Clearly, even if the potential habitat outside the managed Preserve Area is only 50% realized, the project will convey excellent long term value to the Butler's Gartersnake.

5.2 Habitat Restoration: Underwood Creek

Prior to construction this project area included portions of a Tier 3 Habitat Patch (Figures 2-4). The amount of existing suitable Butler's Gartersnake habitat falling within the project area totals approximately 10.5 acres (Figure 12). After restoration of the stream corridor, the project area will be seeded and planted into plant community treatments as shown in Table 1, Figures 13-14, and as detailed in the restoration plan (Appendix B). In order to avoid snake mortality, any erosion control fabrics used in the restoration plan will have specifications that stipulate biodegradable materials, and weave openings no smaller than 0.5 inches.

The concrete treatments and stone stream bed are not expected to contribute to Butler's Gartersnake habitat at any time. The remaining treatments will all provide suitable snake habitat as soon as ground cover establishes. The shrub and tree plantings, however, may over time become non-suitable through natural succession (>10 years), unless managed to prevent canopy closure. Shrub densities are planned at one every 8 feet, and tree densities one every 24 feet. The purpose of these plantings is to absorb flood energy and reduce scouring. The shrub and tree plantings, for the most part, are narrow strips approximately 25 feet in width at the shoreline. Tree strips become somewhat wider at the high velocity points. There will consequently be an abundance of edge effect in most of these areas, which are normally used by Butler's Gartersnakes for temporary shelter. Additionally, the thinner ground cover deeper into shrub groves, where light does not penetrate as well, is conducive to crayfish burrows, because roots density is reduced making burrowing easier.

Crayfish burrow density normally increases where either shading or ponding reduces root densities and thereby burrowing resistance.

Table 1: Underwood Creek Restoration Treatments				
Treatment	Suitable Habitat?	Approximate Acreage		
Existing Concrete	No	2.49		
Floodplain Seeding	Yes	2.88		
Grass Seed Mix	Yes	0.76		
New Concrete	No	0.48		
Rootstock Planting	Yes	0.15		
Shrub Planting	Initially	2.08		
Side Slope Seeding	Yes	2.24		
Stone (stream bed)	No	4.12		
Tree Planting	Initially	2.71		
Vegetated Geocell	Yes	0.38		
total		18.28		
total Habit	6.41			
total Non-habit	7.08			
total Habitat + Initially Suitab	11.20			

While the interior areas of the larger shrub clumps and tree groves may become non-suitable as snake habitat in time, the overall habitat suitability as envisioned by the restoration plan will provide an approximately equal acreage of suitable Butler's Gartersnake habitat to that being impacted by the project. A managed Preserve Area, approximately as shown in Figure 15, will be created. None of the Preserve Area is intended to include railroad right of way. The management of the Preserve Area will be subject to WDNR Butler's Gartersnake Management Guidelines (see Section 5.6.2 below). This Preserve Area is expected to provide at least 11 acres of suitable Butler's Gartersnake habitat over the first decade post-restoration. The long term extent and permanence of the habitat suitability will be determined by the management of the property. This Preserve Area is to be protected and managed in perpetuity through a conservation easement with the WDNR, or other similar deed restricting document, in order to preserve the suitability of the habitat for the Butler's Gartersnake following the initial restoration of the site, as identified in this Conservation Plan.

5.3 Butler's Gartersnake Recovery: Milwaukee County Grounds Preserve Area

After vegetation in the Milwaukee County Grounds Preserve Area is sufficiently established (approximately 5-6 years after construction begins), snakes will be allowed to move back into the restored habitat from the Snake Holding Area(s) through natural dispersal by removing the fencing barriers. The Snake Holding Area(s) will be connected to the Milwaukee County Grounds Preserve Area via suitable habitat providing sufficient ground cover for shelter from predators, and without

any barriers to snake movement. Some Butler's Gartersnakes are also expected to re-occupy the new Preserve Area through natural dispersal from populations along the southwestern and northeastern borders of the project area, that were not extirpated during the project. Assurance of recovery will be demonstrated through a monitoring program, described in Section 5.5.

5.4 Butler's Gartersnake Recovery: Underwood Creek Habitat Preserve Area

Butler's Gartersnakes are expected to re-occupy the new Underwood Creek Preserve Area through natural dispersal along the stream corridor, from populations upstream or downstream of the project area that were not affected by the project. Assurance of recovery will be demonstrated through a monitoring program, described in Section 5.5.

5.5 Butler's Gartersnake Monitoring and Quality Assurance

Monitoring will begin when snakes are released from the Snake Holding Area (probably during the start of the third growing season following seeding). Monitoring will be conducted annually for 3 years, then in Year 5 and again in Year 7. Monitoring will be conducted by standard cover object methods, with WDNR concurrence. The monitoring will be sufficient to determine whether snakes are reproducing, and to determine relative abundance. Results will be assessed after each monitoring year for project success.

If snakes are shown not to be recovering in either Preserve Area (Milwaukee County Grounds or Underwood Creek), then WDNR may require, at its discretion, that translocation of snakes be performed from another area into one or both Preserve Areas. MMSD agrees to perform a translocation, with up to 3 years of translocating up to 100 snakes each year per Preserve Area, under the following conditions:

- a) The monitoring of the Preserve Area in question clearly demonstrates that snakes are in a non-viable condition seven growing seasons after construction ends.
- b) WDNR demonstrates that there is suitable Butler's Gartersnake habitat established within the Preserve Area being considered for a translocation, with all necessary critical habitat components, including but not limited to denning sites, food resources, and cover, in order to have a reasonable likelihood of success of the translocation.
- c) WDNR identifies a source population that can easily and without extraordinary effort supply the necessary number of snakes for translocation, and that this source population be within 10 miles of the Milwaukee County Grounds and within the same watershed (Menomonee River), and that this source population is not likely to introduce undesirable genetics, disease, or parasites into any existing remnant Butler's Gartersnake population at the receiving site. Given these biological considerations, the only likely source population will be upstream from this project along the Menomonee and Little Menomonee rivers.
- d) If a translocation occurs, MMSD agrees to monitor the translocated snakes twice, at one and three years after the final release, by standard cover object methods.
- e) MMSD may, at its option, decide to purchase development rights to another Butler's Gartersnake Tier 3 site of equivalent size and quality, with a management commitment, rather than proceed with

any required translocation. This option can only be exercised if the site under consideration, 1) is mostly or entirely under private ownership, 2) is within 10 miles of the Milwaukee County Grounds and within the same watershed (Menomonee River), 3) demonstrably supports a viable population of Butler's Gartersnakes, 4) is currently at risk of losing Butler's Gartersnake habitat to development, and 5) will have an acceptable management plan established in perpetuity (with or without MMSD participation).

5.6 Long-term Habitat Management of the Milwaukee County Grounds and Underwood Creek Butler's Gartersnake Preserves

The Milwaukee County Grounds and Underwood Creek Butler's Gartersnake preserve areas are identified in Sections 5.1 and 5.2, respectively, and in Figures 10 and 15, respectively. Long-term management of these sites will begin the year following the completion of the restoration plans for these sites (Appendices A and B, respectively). The restoration plans involve the initial seeding and planting followed by four to six years of management to establish the vegetation. An estimated schedule for the initial vegetation establishment is identified in Section 6.

The MMSD agrees to fund all annual Butler's Gartersnake habitat management on these two Tier 3 snake preserve areas, both the initial management and long-term management as identified in:

- 1. For the Milwaukee County Grounds Butler's Gartersnake Habitat Preserve an Intergovernmental Cooperative Agreement between the WDNR, MMSD and Milwaukee County.
- 2. For the Underwood Creek Butler's Gartersnake Habitat Preserve long-term habitat management of suitable habitat within this preserve is covered by language under 5.6.2 (below). No Intergovernmental Cooperative Agreement is required for this preserve area.

5.6.1 Milwaukee County Grounds Long-term Habitat Management

The long-term management requirements listed below will be implemented annually starting in the seventh year following the initial seeding and planting of the Milwaukee County Grounds. Long-term management will follow options 1, 2, or 3 below. Options 4 and/or 5 may be used in addition to options 1, 2, or 3 as needed.

- Mowing/Haying: Mow the entire protected upland habitat once during the snake's inactive period (November 6 through March 15) every year.
- 2. Burning:
 - a. Burn all upland habitat between November 6 and March 15 every year without restrictions, or

- b. If burning is to control particular ground layer vegetation in addition to controlling woody vegetation, burning can be done between March 16 and November 5 as follows: Burn only 25% of the upland snake habitat in any year. Burning using this approach requires that all upland habitat be burned once every 4 years (4 times 25%). This method may also be applied to the wetland grassland habitat on site.
- 3. Grazing:

Light-to-moderate grazing (<1.0 head per acre) may be used in rotations among habitat patches, with no more than 33% of the available habitat on the site grazed in any one year. Grazing must be discontinued as soon as 50% of the grasses and forbs in a grazed patch are cropped to 8 inches in height. If rotational grazing is used as a management tool, it must be done such that all available upland snake habitat is grazed once every three years.

- 4. Selective Brush/Tree-Cutting: Selective cutting (e.g. chain sawing, hand cutting) may be done without restriction. If tree removal is done using heavy equipment, it must be done during the snake's inactive period (November 6 through March 15).
- 5. Herbiciding:

To the maximum extent possible, herbiciding should occur during the snake's inactive period (November 6- March 15). Herbicides used at this time of year to cut stems of brush or trees should be applied immediately (within 2-5 minutes) after stems are cut, using a dab applicator or brush. Where active season (March 16 – November 5) herbiciding is necessary to control exotic or noxious weeds, spot treat, preferably with a low persistence/short half-life herbicide (e.g. glyphosate), using wick, sponge, or hand-held spray application instead of broadcast spraying.

5.6.2 Underwood Creek Long-term Habitat Management

Long-term management of the Underwood Creek Butler's Gartersnake Habitat Preserve Area will begin after wetland management is complete. This is seven years after construction completion; or 2017 for the USH 45 to STH 100 area, and 2019 for the Underwood Creek USH 45 to its confluence with the Menomonee River area. The long-term management will follow the management requirements listed below.

All the areas identified for initial planting to open canopy conditions, which include all the areas identified for planting floodplain seeding, grass seed mix, rootstock plantings, side slope seeding and vegetated geocell, based on Figures 13 and 14 of this plan, will be managed annually by mowing once per year during the Butler's Gartersnake inactive period (November 6 through March 15), in order to prevent the encroachment of woody vegetation into these areas.

MMSD will fund and be responsible for implementing the perpetual long-term management of the Underwood Creek Butler's Gartersnake Habitat Preserve Area, and estimates an annual
appropriation of \$1500 (2006 dollars) for the long-term maintenance activity. MMSD reserves the right to contract this work to a service provider.

5.6.3 Flood Berm Addendum

A flood prevention berm on the far east end of the project area was added to the project, and impacts to Butler's Gartersnakes are treated here. Figure 16 illustrates the position of the berm, which will be constructed partially through a wetland. The extent of existing snake habitat was revised based on new wetland delineations in this area, adding approximately 1.0 acre to Habitat Patch Three (Note: this habitat extent revision is not shown in the rest of this plan). The new snake habitat extent includes portions of a wooded swamp wetland. Most of the snake habitat impacted by construction of the berm is upland. To avoid take, snakes will be excluded from impacted upland areas by placement of Snake Exclusion Fencing, as shown in Figure 16, before spring snake emergence (approximately March 15, 2008).

Avoidance of take within the portion of the berm construction area that lies within an existing wetland will be accomplished by a destructive snake removal. This area, shown in Figure 16, is approximately 7637 sq ft in area. All small trees and shrubs will be hand cut and brush removed from the removal area while ground is frozen (before March 16, 2008). The removal area will then be surrounded by Snake Exclusion Fencing by March 16, 2008, effectively trapping any hibernating snakes inside a pen. Snake cover objects will be placed within this pen in April 2008, and snakes will be removed by surveying cover objects in April and May, 2008. Surveys will cease when WDNR concurs that removal rates have reached the removal cut-off threshold. Construction will then commence.

6. Estimated Project Time Lines (subject to annual review)

- 2006 erect Milwaukee County Grounds Snake Exclusion Fencing and Temporary Snake Fencing (March)
 - before grading begins erect remaining construction fencing in each basin
 - maintain snake fencing as per annual plan (March 1- Nov 5)
 - conduct Milwaukee County Grounds snake removals in both east and west lobes (April mid-July)
 - remove Temporary Snake Removal Fencing (July)
 - begin Milwaukee County Grounds construction

2007 - maintain snake fencing as per annual plan (March 1- Nov 5)

- continue Milwaukee County Grounds construction
- survey snakes in Snake Holding Area (April mid-July)

- 2008 maintain snake fencing as per annual plan (March 1- Nov 5)
 - finish Milwaukee County Grounds construction and remove fencing
 - initial seeding and planting of Milwaukee County Grounds
 - erect Underwood Creek USH 45 to STH 100 Snake Exclusion Fencing (by April 15)
 - conduct Underwood Creek USH 45 to STH 100 snake removals (April mid-July)
 - berm construction: snake fencing and removal
 - (- may survey snakes in Snake Holding Area (April mid-July))
- 2009 maintain snake fencing as per annual plan (March 1- Nov 5)
 - vegetation management of Milwaukee County Grounds
 - begin tunnel and emergency overflow construction activities
 - begin construction Underwood Creek USH 45 to STH 100
 - initial seeding and planting of Underwood Creek USH 45 to STH 100
 - (- may survey snakes in Snake Holding Area (April mid-July))
- 2010 maintain snake fencing as per annual plan (March 1- Nov 5)
 - vegetation management of Milwaukee County Grounds
 - finish construction of Underwood Creek USH 45 to STH 100
 - vegetation management of Underwood Creek USH 45 to STH 100

- remove Underwood Creek USH 45 to STH 100 Snake Exclusion Fencing, except for around diversion structure

- diversion structure construction (Underwood Creek)
- continue tunnel and emergency overflow construction
- remove Snake Exclusion Fencing from around diversion structure when construction finished
- erect Underwood Creek USH 45 to confluence Snake Exclusion Fencing by April 15
- remove snakes from Underwood Creek USH 45 to confluence (April mid-July)
- begin construction Underwood Creek USH 45 to confluence
- survey snakes in Snake Holding Area (April mid-July)
- remove Snake Holding Area Fencing in November (assuming revegetation on schedule)
- 2011 maintain snake fencing as per annual plan (March 1- Nov 5; final year)
 - vegetation management of Milwaukee County Grounds
 - allow snakes from Snake Holding Area to disperse into Milwaukee County Grounds Preserve Area
 - Year 1 snake monitoring Milwaukee County Grounds Preserve Area (April mid-July)
 - vegetation management of Underwood Creek USH 45 to STH 100
 - finalize tunnel and emergency overflow construction and site restoration
 - finish construction Underwood Creek USH 45 to confluence
 - remove Underwood Creek USH 45 to confluence Snake Exclusion Fencing
 - initial seeding and planting of Underwood Creek USH 45 to confluence
- 2012 vegetation management of Milwaukee County Grounds
 - open basins for floods
 - Year 2 snake monitoring Milwaukee County Grounds Preserve Area (April mid-July)
 - vegetation management of Underwood Creek USH 45 to STH 100
 - vegetation management of Underwood Creek USH 45 to confluence
 - Year 1 snake monitoring Underwood Creek USH 45 to STH 100 (April mid-July)

	Butler's Gartersnake Conservation Plan, Milwaukee County Grounds, Casper Consulting, May 8, 2006
2013	- vegetation management of Milwaukee County Grounds
	- Year 3 snake monitoring Milwaukee County Grounds Preserve Area (April - mid-July)
	- vegetation management of Underwood Creek USH 45 to STH 100
	- vegetation management of Underwood Creek USH 45 to confluence
	- Year 2 snake monitoring Underwood Creek USH 45 to STH 100 (April - mid-July)
2014	- vegetation management of Milwaukee County Grounds transferred
	- vegetation management of Underwood Creek USH 45 to STH 100
	- Year 3 snake monitoring Underwood Creek USH 45 to STH 100 (April - mid-July)
	- vegetation management of Underwood Creek USH 45 to confluence
	- Year 1 snake monitoring Underwood Creek USH 45 to confluence (April - mid-July)
2015	Vera 5 en de manitaria e Milanda e Consta Crean de Deserve Ana (Anvil mid Inte)
2015	- Year 5 snake monitoring Milwaukee County Grounds Preserve Area (April - mid-July)
	- vegetation management of Underwood Creek USH 45 to confluence
	- Year 2 snake monitoring Underwood Creek USH 45 to confluence (April - mid-July)
2016	- vegetation management of Underwood Creek USH 45 to confluence
	- Year 3 snake monitoring Underwood Creek USH 45 to confluence (April - mid-July)
	- Year 5 snake monitoring Underwood Creek USH 45 to STH 100 (April - mid-July)
2017	- Year 7 snake monitoring Milwaukee County Grounds Preserve Area (April - mid-July)
	- vegetation management of Underwood Creek USH 45 to STH 100 transferred
2018	- Year 7 snake monitoring Underwood Creek USH 45 to STH 100 (April - mid-July)
	- Year 5 snake monitoring Underwood Creek USH 45 to confluence (April - mid-July)
2019	- vegetation management of Underwood Creek USH 45 to confluence transferred
2020	- Year 7 snake monitoring Underwood Creek USH 45 to confluence (April - mid-July)

7. Literature Cited

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- Casper, G.S. 2002. Northwest Side Relief Sewer Project Butler's Gartersnake Conservation Plan: Phase 1 Pre-Construction (Milwaukee County Grounds). Technical report to Milwaukee Metropolitan Sewerage District, Milwaukee, Wisconsin. March 14, 2002.
- Casper, G.S. 2003. 2002 Report Northwest Side Relief Sewer Project Butler's Gartersnake Conservation Plan: Phase 1 Pre-Construction (Milwaukee County Grounds). Technical report to Milwaukee Metropolitan Sewerage District, Milwaukee, Wisconsin. February 9, 2003.
- Casper, G.S. 2005. Butler's Gartersnake Habitat Assessment: Proposed Milwaukee County Grounds Flood Management Project, Milwaukee, Wisconsin. Technical report to HNTB Corporation 11414 West Park Place, Suite 300, Milwaukee, WI 53224. July 21, 2005. 17 pp.

8. Figures

Figure 1:	General Project Area: Milwaukee County Grounds
Figure 2:	Butler's Gartersnake Habitat Patch One, Underwood Creek
Figure 3:	Butler's Gartersnake Habitat Patch One, Underwood Creek Eastern Portion
Figure 4:	Butler's Gartersnake Habitat Patch One, Underwood Creek Western Portion
Figure 5:	Butler's Gartersnake Habitat Patch Two, Nursery Area
Figure 6:	Butler's Gartersnake Habitat Patch Three, Milwaukee County Grounds
Figure 7:	Fencing Plan: Milwaukee County Grounds
Figure 8:	Fencing Plan: Underwood Creek
Figure 9:	Habitat Impact: Milwaukee County Grounds
Figure 10:	Butler's Gartersnake Preserve Area: Milwaukee County Grounds
Figure 11:	Habitat Scenarios: Milwaukee County Grounds
Figure 12:	Habitat Impact: Underwood Creek
Figure 13:	Restoration Plan: Underwood Creek West
Figure 14:	Restoration Plan: Underwood Creek East
Figure 15:	Underwood Creek Preserve Area
Figure 16:	Flood Berm Addendum

9. Appendices

Appendix A:	Restoration Plan for Milwaukee County Grounds
Appendix B:	Restoration Plan for Underwood Creek
Appendix C:	Conservation Easement





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Berm Design Estimated Temporary Impact to BGS Habitat (1.0 acre) BGS Habitat Patch Three (approx. 35.1 acres) Additional Wetlands

Casper Consulting, 24 Feb 2006

Appendix A

Restoration Plan for Milwaukee County Grounds















MERAGE DISTRICT DODWATER MANAGEMENT FACILITY CONTRACT ITING DETAILS	PLANTING DETAIL AR TILLING BASIN MARSH 1" = 40'	
DRAWING ND.: LS-7 SHEET: 33 DATE: SEP.2005 CONTRACT: W20004C01 MMSD FILE: XXXdgn	OUND H AREA (PRELIMINARY REVIEW)	

Appendix B

Restoration Plan for Underwood Creek

	PLANT DATA TABLE															
MINIMUM SIZE																
				MATURE	AVERAGE SIZE		ROOT ZONE	BALL	/POT	ROOT	PLANT HOLE	BRACE OR GUY	FERTILIZER UNITS	RODENT	MULCH RING	PLANT
SYMBOL	COMMON NAME	SCIENTIFIC NAME	TYPE	HEIGHT	WHEN PLANTED	MODE	DIA.	DEPTH	SPREAD	DIA.	DEPTH	REQUIRED	REQUIRED	PROTECTION DIA.	DETAIL	BED
				(FT.)	(CAL. OR HT.)		(IN.)	(IN.)	(IN.)	(IN.)	(IN.)			(IN.)		
GA	GREEN ASH	Fraxinus pennsylvanic	1	75'	1-1/4" CAL.	B&B	18″	14″		42″	14″	BRACE	3	44″	yes	no
RB	RIVER BIRCH	Betula nigra	1	50'	1-1/4" CAL.	B&B	18″	14″		42″	14″	BRACE	3	44″	yes	no
RM	RED MAPLE	Acer rubrum	1	75'	1″ CAL.	B&B	16″	12″		40″	12″	BRACE	3	42″	yes	no
SM	SILVER MAPLE	Acer saccharinum	1	75'	1″ CAL.	B&B	16″	12″		40″	12″	BRACE		42″	yes	no
AE	AMERICAN ELM	Ulmus americana	1	75'	1-1/4″ CAL.	B&B	18″	14″		42″	14″	BRACE	3	44″	yes	no
SWO	SWAMP WHITE OAK	Quercus bicolor	1	75'	1-1/4″ CAL.	B&B	18″	14″		42″	14″	BRACE	3	44″	yes	no
BB	BUTTON BUSH	Cephalanthus occident	2	8'	3′ HT.	CG				38″	11″	NO	2	n/a	yes	no
SA	STEEPLEBUSH	Spiraea alba	3	6'	2′ HT.	CG				35″	9″	NO	2	n/a	yes	no
CN	COMMON NINEBARK	Physocarpus opulifoli	3	8'	2' HT.	CG				35″	9″	NO	2	n/a	yes	no
RD	RED OSIER DOGWOOD	Cornus stolonifera	2	8'	3' HT.	CG				38″	11″	NO	2	n/a	yes	no
SD	SILKY DOGWOOD	Cornus amomum	3	8'	3' HT.	CG				38″	11″	NO	2	n/a	yes	12

<u>NOTES</u>

- REFER TO CONSTRUCTION DETAIL SHEET FOR DETAILS RELATIVE TO PLANT SPACING AND LAYOUT OF PLANTING BEDS.
- 2. TREES AND SHRUBS INDICATED ON PLANTING PLAN ARE TO BE RANDOMLY PLACED IN PLANTING BEDS PER SPACING PROVIDED ON CONSTRUCTION DETAIL SHEET.

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4 5	REUSE OF DOCUMENTS	VERIFY SCALES	DSGN	This Design Prepared For MMSD By:						лл с (MILWAUKEE METROPOLITAN SEWERAG
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E: 2 Dited	SERVICE AND IS NOT TO BE USED.IN WHOLE OR IN PART. FOR ANY OTHER PROJECT WITHOUT THE WRITTEN	0" 1" IF NOT ONE INCH ON	СНК	In Association With:							SITE
	METROPOLITAN SEWERAGE DISTRICT.	SCALES ACCORDINGLY.	APVD		REV. NO.	DATE	REVISION DESCRIPTION	BY	APVD	Improving Water Quality	GEOMORPHIC AND VEGETATION PLAN

(PRELIMINARY	REVIEW)
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GE DISTRICT	DRAWING NO.:	GV-1
	SHEET:	29
N AND FLOOD MANAGEMENT	DATE:	NOV 7, 2005
	CONTRACT:	W21005D01
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╒┎	METROPOLITAN SEWERAGE DISTRICT.	SCALES ACCORDINGLY.			REV. NO.	DATE	REVISION DESCRIPTION	BY	APVD	Improving Water Quality	CEOMORTHIC AND VEGET

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TATION POOL SEQUENCE

MMSD	UNDERWOOD	CREEK	REHABILIT	ATION	AND FLOOD	MANA	GEME	NT PRO	DJECT			
		RI	FFLE / PO	OL DEF	INITION							
POOL	BASEL	. I NE	MAIN CHANNEL			RIFFLE	RIFFLE / POOL CONTROL ELEVATION (FT NAVGD)					
AND	STATION	OFFSET	STATION OFFSET INCREM		INCREMENTAL	RIFFLE	PC	DOL	RIFFLE			
POINT NO.	(FT)	(FT)	(FT)	(FT)	DISTANCE(FT)	A	В	C	D			
1 A	0.000	0.000	00+00	0.0		0.0						
					0.0							
1B	0.000	0.000	00+00	0.0			0.0					
					0.0							
10	0.000	0.000	00+00	0.0				0.0				
40	0.000	0.000	00,100	0.0	0.0				0.0			
U	0.000	0.000	00+00	0.0	0.0				0.0			
24	0.000	0.000	00+00	0.0	0.0	0.0						
24	0.000	0.000	00100	0.0	0.0	0.0						
28	0.000	0.000	00+00	0.0	0.0		0.0					
		0.000	00.00		0.0							
20	0.000	0.000	00+00	0.0				0.0				
					0.0							
2D	0.000	0.000	00+00	0.0					0.0			
					0.0							
3A	0.000	0.000	00+00	0.0		0.0						
					0.0							
3B	0.000	0.000	00+00	0.0			0.0					
					0.0							
30	0.000	0.000	00+00	0.0				0.0				
75	0.000	0.000	00.100		0.0							
3D	0.000	0.000	00+00	0.0	0.0				0.0			
4.4	0.000	0.000	00,100	0.0	0.0	0.0						
44	0.000	0.000	00+00	0.0	0.0	0.0						
4B	0.000	0.000	00+00	0.0	0.0		0.0					
עד		0.000	00,00	+	0.0		+ •••					
4C	0.000	0.000	00+00	0.0				0.0				
					0.0				1			
4D	0.000	0.000	00+00	0.0					0.0			
					0.0							

	UNDERWOOD CREEK STORMWATER OUTLETS							
NO.	STATION	STREAM BANK	DESCRIPTION	PROBABLE TREATMENT METHOD				
1	14+60	RIGHT BANK	8 FT TUNNEL	PROBABLY NO CHANGES AT TUNNEL, THOUGH OUTFA				
2	14+60	RIGHT BANK	36 IN CMP	COMBINED WITH CULVERT 1: PROBABLY NO CHANG				
3	19+00	LEFT BANK	18 IN CMP	CONCRETE OUTFALL				
4	19+90	LEFT BANK	24 IN CMP	CONCRETE OUTFALL				
5	20+00	LEFT BANK	12 IN CMP	CONCRETE OUTFALL				
6	24+00	LEFT BANK	6 IN PVC	CONCRETE OUTFALL				
7	29+00	LEFT BANK	8 FT BY 4 FT CONCRETE BOX	CONCRETE OUTFALL; GIVEN THE SIZE OF THIS OU				
8	29+00	LEFT BANK	12 IN CMP	COMBINED WITH CULVERT 7: CONCRETE OUTFALL				
9	37+60	LEFT BANK	36 IN CMP	BIOENGINEERED OUTFALL				
10	42+80	LEFT BANK	15 IN CONCRETE	BIOENGINEERED OUTFALL				
11	48+80	LEFT BANK	90 IN CONCRETE	POTENTIALLY NO CHANGES, DEPENDING ON CURREN				
12	51+30	RIGHT BANK	15 IN CONCRETE	COMBINED WITH CULVERT 13: CONCRETE OR ROCK				
13		RIGHT BANK	69 IN CONCRETE	CONCRETE OR ROCK AND BIOENGINEERED OUTFALL				
14	64+30	LEFT BANK	24 IN CONCRETE	BIOENGINEERED OUTFALL				
15	68+60	RIGHT BANK	36 IN CMP	BIOENGINEERED OUTFALL				
16	72+80	RIGHT BANK	42 IN CONCRETE	CONCRETE OR ROCK AND BIOENGINEERED OUTFALL				

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SCALE:

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1	REUSE OF DOCUMENTS	VERIFY SCALES	DSGN	This Design Prepared For MMSD By:						L UUL
	THIS DOCUMENT AND THE IDEAS AND DESIGNS INCORPORATED HEREIN IS AN INSTRUMENT OF PROFESSIONAL SERVICE AND IS NOT TO BE WEED IN	BAR IS ONE INCH ON ORIGINAL DRAWING	DR	TETRA TECH						
	WHOLE OR IN PART, FOR ANY OTHER PROJECT WITHOUT THE WRITTEN	IF NOT ONE INCH ON THIS SHEET. ADJUST	СНК	In Association With:						Preserving
	METROPOLITAN SEWERAGE DISTRICT.	SCALES ACCORDINGLY.	APVD	INNID	REV. NO.	DATE	REVISION DESCRIPTION	BY	APVD	Improvin



DRAWING NO.: GV-15 SHEET: 43 DATE: NOV 7, 2005 CONTRACT: W21005D01 MMSD FILE: XXX-XXX.DGN

(PRELIMINARY REVIEW)



Appendix C

Conservation Easement

CONSERVATION EASEMENT GRANTED TO THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES BY MILWAUKEE COUNTY AND BY THE MILWAUKEE METROPOLITAN SEWERAGE DISTRICT

THIS CONSERVATION EASEMENT ("Conservation Easement") is made as of this <u>day</u> of March, 2006, by and between Milwaukee County ("County") and the Milwaukee Metropolitan Sewerage District ("District"), and the Wisconsin Department of Natural Resources, ("DNR").

WHEREAS, the County was the owner in fee simple of certain real estate in the City of Wauwatosa, Milwaukee County, Wisconsin, as more particularly described in **Exhibit A**, which real estate the County has conveyed to the District for purposes of establishing a floodwater detention basin ("Basin Site"); and

WHEREAS, the District, as purchaser of the Basin Site, intends to construct, operate and maintain the Milwaukee County Grounds Floodwater Management Facility ("Floodwater Management Facility"), on said site, which usage the County and the DNR agree is incorporated into, consistent with and complementary of this Conservation Easement; and

WHEREAS, the County, the District, and the DNR recognize that the Basin Site possesses scenic, open space and habitat values of great importance to the County, the District, the DNR and the people of the State of Wisconsin; and

WHEREAS, the District and the DNR intend to restore, manage and protect the east lobe of the Floodwater Management Facility Basin Site for the long-term protection of the Butler's Gartersnake; and

WHEREAS, the goals of this Conservation Easement are to ensure that DNR has an adequate property interest that vests DNR with sufficient authority to perform its oversight/advisory role in the District's maintenance of the Floodwater Management Facility; and

WHEREAS, the County, the District, and the DNR desire, intend and have the common purpose of retaining the Basin Site as open space for the scenic enjoyment of the general public and pursuant to general governmental conservation policies by placing perpetual restrictions on the use of the Basin Site and granting affirmative rights to the DNR to monitor and enforce such restrictions in order to preserve the lands; and

WHEREAS, the common law of the State of Wisconsin and the Uniform Conservation Easement Act, Section 700.40 of the Wisconsin Statutes, provides for the creation and conveyance of conservation easements which impose restrictions or affirmative obligations on lands for conservation purposes; and

WHEREAS, the DNR is eligible to be a qualified holder of a conservation easement pursuant to Section 700.40;

WHEREAS, the DNR agrees by accepting this grant to honor the intentions of the County and the District stated herein and to preserve and protect the Basin Site for the benefit of the public; and

WHEREAS, the County, the District, and the DNR have entered into an Intergovernmental Cooperation Agreement concerning management of the Floodwater Management Facility, a copy of which is attached hereto as **Exhibit B**;

NOW THEREFORE, in consideration of the payment of the sum of One and 00/100 Dollars (\$1.00), the mutual covenants, terms, conditions, and restrictions contained herein, and other good and valuable consideration the receipt and sufficiency of which are hereby acknowledged, and pursuant to the laws of the State of Wisconsin, including the Uniform Conservation Easement Act, Section 700.40, the District, on behalf of its successors and assigns, hereby voluntarily grants and conveys to DNR, its successors and assigns, this Conservation Easement in perpetuity over the Basin Site of the nature and character and to the extent hereinafter set forth.

1. **Purpose.** It is the purpose of this Conservation Easement to assure that the scenic and open space values of the Basin Site, consistent with its use as a Floodwater Management Facility, will be retained and to prevent any use of the Basin Site that will significantly impair or interfere with such scenic and open space values, and, to the extent hereafter provided, to prevent use or development of the Basin Site for any purpose other than as a

Floodwater Management Facility that would conflict with the maintenance of the Basin Site in its open space condition. The Basin Site is included in a plan to prevent future flooding risks and therefore shall be used only for a Floodwater Management Facility, for scenic and open-space purposes, for habitat for the Butler's Gartersnake, passive recreation and for education. The County and the District intend that this Conservation Easement will confine the use of the Basin Site to activities not inconsistent with these purposes.

2. **Uses**.

- 2.1. **Prohibited Uses**. In furtherance of the foregoing, the District makes the following covenants, on behalf of themselves, their successors and assigns, which covenants shall run with and bind the Basin Site in perpetuity, and shall be enforceable with respect to the Basin Site by DNR against the District, its successors and assigns and against any outside agency or person. Without prior express written consent from DNR, any activity on or use of the Basin Site inconsistent with the Floodwater Management Facility or the open space and scenic purposes of this Conservation Easement is prohibited. Without limiting the generality of the foregoing, the following activities and uses are expressly prohibited:
 - A. Use of the Basin Site for commercial or industrial use, including use by easement or other right of access or passage across or upon the Basin Site in conjunction with commercial activity, including commercial ("for fee") recreational use.
 - B. Except as provided in sec. 2.2., below, the placement or construction of any structures or other improvements of any kind (including, without limitation, roads and parking lots), with the exception of temporary research and monitoring equipment, such as snake cover boards.
 - C. Except as provided in sec. 2.2.F., below, any disturbance of vegetation (including the creation or maintenance of sports fields or lawns), with the

exception of research and monitoring activities, including snake cover boards.

- D. Any exploration or exploitation of mineral resources by subsurface or surface means, except work performed by the District in the performance of its statutory or regulatory assigned duties and responsibilities.
- E. Any use or activity that causes or is likely to cause soil degradation, erosion, or significant pollution of any surface or subsurface waters. The best available management practices shall be employed to reduce to the maximum extent practicable soil erosion during and after construction of permitted roads and structures.
- F. Except as provided in sec. 2.2. C., below, the placement of signs on the Basin Site.
- G. The use of the Basin Site for commercial agricultural purposes.
- 2.2 **Permitted Uses.** The following uses are permitted:
 - A. Construction, operation, and maintenance of the Floodwater Management Facility;
 - B. Access or service roads, which may be laid out and maintained in support of permitted uses of the Basin Site, such as maintenance or operations;
 - C. Interpretive signs, trails, observation platforms and boardwalks, which may be constructed on the perimeter with the approval of the DNR or which state the name and purpose of the Floodwater Management Facility or post the Floodwater Management Facility to control unauthorized entry or use;
 - D. Temporary use for new construction or replacement of District facilities adjacent to the Basin Site;

- E. Locating District facilities under the Basin Site or at the inlet or outlet of the Floodwater Management Facility.
- F. Vegetation may be planted, managed or removed in order to construct and maintain permitted roads and to comply with the goals of the Basin Site's Revegetation and Plant Management Plan, hereafter "Basin Site Revegetation Plan," and the Butler's Gartersnake Conservation Plan for the Milwaukee County Grounds Floodwater Management Facility and Underwood Creek Rehabilitation Project, hereafter "Butler's Gartersnake Conservation Plan," as approved by DNR. Native vegetation may be restored pursuant to and in accordance with the "Basin Site Revegetation Plan" and the portion of the "Butler's Gartersnake Conservation Plan" pertaining to the Basin Site; maintenance of legal access to the Basin Site may be provided; and nature trails and nature observation positions may be established.
- G. Research and monitoring activities may be conducted as permitted by DNR, which may include placement of temporary equipment or signage.
- 3. **Rights of the DNR.** To accomplish the Purpose of this Conservation Easement, the following rights are conveyed to DNR:
 - 3.1. To enter upon the Basin Site at reasonable times in order to monitor compliance with and otherwise enforce the terms of this Conservation Easement in accordance with Section 6, provided that, except in cases where DNR determines that immediate entry is required to prevent, terminate, or mitigate a violation of this Conservation Easement, such entry shall be upon prior reasonable notice to the District. The DNR shall not unreasonably interfere with the District's use and quiet enjoyment of the Basin Site;
 - 3.2. To prevent any activity on or use of the Basin Site that is inconsistent with the Purpose of this Conservation Easement and to require the restoration of such areas or features of the Basin Site that may be damaged by any inconsistent activity

or use, as provided in Section 6.

- 3.3. To monitor compliance with and otherwise enforce the provisions of the "Basin Site Revegetation Plan" and the "Butler's Gartersnake Conservation Plan.".
- 4. **Reserved Rights**. The District reserves to itself and its successors and assigns, all rights accruing from its ownership of the Basin Site, including the right to engage in, or permit or invite others to engage in, all uses of the Basin Site not expressly prohibited herein and not inconsistent with the Purpose of this Conservation Easement.

5. Notice and Approval.

5.1Notice of Intention to Undertake Certain Permitted **Actions**. The purpose of requiring the District to notify DNR prior to undertaking certain permitted activities, as provided in this instrument, is to afford DNR an adequate opportunity to monitor the activities in question to ensure that they are designed and carried out in a manner that is not inconsistent with the Purpose of this Conservation Easement, the "Basin Site Revegetation Plan," and the "Butler's Gartersnake Conservation Plan" (where applicable). Other than activities related to construction, operation, and maintenance of the Floodwater Management Facility, the District shall notify DNR in writing not less than fourteen (14) calendar days prior to the date the District intends to undertake any other permitted activity. The notice shall describe the nature, scope, design, location, timetable, and any other material aspect of the proposed activity in sufficient detail to permit DNR to make an informed judgment as to its consistency with the Purpose of this Conservation Easement and the "Basin Site Revegetation Plan." Any requests for variance from the Basin Site Revegetation Plan or the portion of the Butler's Gartersnake Conservation Plan pertaining to the Basin Site will explain in detail why the desired control cannot be achieved under the established plans, and will detail methods for the management protocol being proposed.

- 5.2 **DNR's Approval**. Where DNR's approval is required, as set forth in this instrument, DNR shall grant or withhold its approval in writing within fourteen (14) calendar days of receipt of the District's written request. DNR's approval may be withheld only upon a reasonable determination by DNR that the action as proposed is inconsistent with the express Purpose of this Conservation Easement.
- 6. **DNR's Remedies**. These provisions apply only to remedies sought against the District for actual or threatened violations of this Conservation Easement. These provisions do not apply and are not a condition precedent to any action by DNR against outside agencies or persons.
 - 6.1 **Notice of Violation; Corrective Action**. If DNR determines that the District is in violation or threatens to violate the terms of this Conservation Easement, it shall give written notice to the District of such determination and demand corrective action sufficient to cure or prevent the violation and, where the violation involves injury to the Basin Site resulting from any use or activity inconsistent with the purpose of this Conservation Easement, to restore the portion of the Basin Site so injured to its prior condition in accordance with a plan approved by DNR.
 - 6.2 **Injunctive Relief**. If the District fails to cure the violation within 30 days after receipt of notice thereof from DNR, or under circumstances where the violation cannot reasonably be cured within a 30 day period, fails to begin curing such violation within such other time period, or fails to continue diligently to cure such violation until finally cured, DNR may bring an action at law or in equity in a court of competent jurisdiction to enforce the terms of this Conservation Easement, to enjoin the violation and to require the restoration of the Basin Site to the condition that existed prior to any such injury.
 - 6.3 **Emergency Enforcement**. If DNR, in its sole discretion, determines that circumstances require immediate action to prevent or mitigate significant damage to the Basin Site, it may: 1) pursue its remedies under this Section 6 without

prior notice to the District and without waiting for the period provided for cure to expire; or 2) independently or by contract take remedial or corrective action. All costs incurred by the DNR shall be subject to reimbursement by the District.

- 6.4 **Scope of Relief**. DNR's rights under this Section 6 apply equally in the event of either actual or threatened violations of the terms of this Conservation Easement. The County and the District agree that DNR's remedies at law for any violation of the terms of this Conservation Easement are inadequate and that DNR shall be entitled to the injunctive relief described in Paragraph 6.2, both prohibitive and mandatory, in addition to such other relief to which it may be entitled, including specific performance of the terms of this Conservation Easement, without the necessity of proving either actual damages or the inadequacy of otherwise available legal remedies. DNR's remedies described in this Section 6 shall be cumulative and shall be in addition to all remedies now or hereafter existing at law or in equity.
- 6.5 **Forbearance**. Forbearance by DNR to exercise its rights under this Conservation Easement in the event of any breach of any term of this Conservation Easement by the District shall not be deemed or construed to be a waiver by DNR of such term or of any subsequent breach of the same or any other term of this Conservation Easement or of any of DNR's rights under this Conservation Easement. No delay or omission by DNR in the exercise of any right or remedy upon any breach by the District shall impair such right or remedy or be construed as a waiver.
- 6.6 **Extraordinary and Unforeseen Events**. In recognition that the Floodwater Management Facility is intended to capture flood flows from Underwood Creek, nothing contained in this Conservation Easement shall be construed to entitle DNR to bring any action against the District for any injury to or change in the Basin Site resulting from extraordinary and unforeseen events, such as fire, flood caused by a storm greater than the 1% probability storm, tornado, and earth movement, or from any prudent action taken by the District under emergency conditions to prevent, abate, or mitigate

significant injury to the Basin Site resulting from such events. Should such an extraordinary and unforeseen event occur, the District agrees to negotiate to agreement with the DNR as to the timeliness and cost-effectiveness of any trash and debris clean-up and re-vegetation, with the goal of maintaining the natural aesthetics of the Basin Site.

7. Costs, Liabilities, and Environmental Compliance.

- 7.1 **Costs, Legal Requirements, and Liabilities**. The District retains all responsibilities and shall bear all costs and liabilities of any kind related to the ownership, operation, upkeep, maintenance, and habitat management of the Basin Site, including all management protocols contained in the "Basin Site Revegetation Plan" and that portion of the "Butler's Gartersnake Conservation Plan" pertaining to the Basin Site. The District remains solely responsible for obtaining any applicable governmental permits and approvals for any construction or other activity or use permitted by this Conservation Easement, and all such construction or other activity or use shall be undertaken in accordance with all applicable federal, state, and local laws, regulations, and requirements.
- 7.2 **Representations and Warranties**. The County has represented and warranted to the District and the District, in reliance upon such representations and warranties, represents and warrants to DNR that, after reasonable investigation and to the best of its knowledge:
 - A. Except as divulged by the County in **Exhibit C**, no substance defined, listed, or otherwise classified pursuant to any federal, state, or local law, regulation, or requirement as hazardous, toxic, polluting, or otherwise contaminating to the air, water, or soil, or in any way harmful or threatening to human health or the environment exists or has been released, generated, treated, stored, used, disposed of, deposited, abandoned, or transported in, on, from, or across the Basin Site;

- B. Except as divulged by the County in **Exhibit C**, there are not now any underground petroleum product storage tanks, as defined in sec. 101.143(1)(i), Stats. 2001-2002, located on the Basin Site, whether presently in service or closed, abandoned, or decommissioned, and no underground petroleum product storage tanks have been removed from the Basin Site in a manner not in compliance with applicable federal, state, and local laws, regulations, and requirements;
- C. There is no pending or threatened litigation in any way affecting, involving, or relating to the Basin Site; and
- D. No civil or criminal proceedings or investigations have been instigated at any time or are now pending, and no notices, claims, demands, or orders have been received, arising out of any violation or alleged violation of, or failure to comply with, any federal, state, or local law, regulation, or requirement applicable to the Basin Site or its use, nor do there exist any facts or circumstances that the County or the District might reasonably expect to form the basis for any such investigations, notices, claims, demands, proceedings, or orders.
- 7.3 **Remediation**. If, at any time there occurs, or has occurred, a release in, on, or about the Basin Site of any substance now or hereafter defined, listed, or otherwise classified pursuant to any federal, state, or local law, regulation, or requirement as hazardous, toxic, polluting, or otherwise contaminating to the air, water, or soil, or in any way harmful or threatening to human health or the environment, the District agrees to take all steps necessary to assure its containment and remediation, including any cleanup that may be required, unless the release was caused by DNR, in which case DNR shall be responsible therefor.
- 7.4 **Control**. Nothing in this Conservation Easement shall be construed as giving rise, in the absence of a judicial decree, to any right or ability in DNR to exercise physical or managerial control over the day-to-day operations of the Basin Site, or any of the District's activities on the Basin Site, or otherwise

to become an operator with respect to the Basin Site within the meaning of The Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended ("CERCLA"), or similar laws imposing legal liability on the owner or operator of the Basin Site.

8. **Notices**. Any notice, demand, request, consent, approval, or communication that any party desires or is required to give to the other shall be in writing and either served personally or shall be given by certified or registered mail, and any notice so sent shall be deemed to have been given on the date that the same is deposited in the United States mail, postage prepaid. Notices shall be addressed to:

(i) the County at Milwaukee County Corporation Counsel, Room 303, Milwaukee County Courthouse, 901 North 9th Street, Milwaukee, Wisconsin 53233 (with a copy to County Executive's Office, Room 306, Milwaukee County Courthouse, 901 North 9th Street, Milwaukee, Wisconsin 53233, and a copy to Department of Parks, Recreation and Culture, 9480 West Watertown Plank Road, Wauwatosa, Wisconsin 53226, Attn: Director, or such other successor agency or department that supervises park matters for the County);

(ii) the District at 260 West Seeboth Street, Milwaukee, Wisconsin 53204-1446, Attn: Executive Director;

(iii) the Wisconsin Department of Natural Resources Bureau of Forestry Services, 101 South Webster Street, Madison, WI 53707, Attn: Bureau Director (with a copy to the Department of Natural Resources at its Southeast Region Headquarters, 2300 North Dr. Martin Luther King Drive, Milwaukee, Wisconsin 53212, Attn: Southeast Regional Director, and a copy to the Department of Natural Resources Bureau of Legal Services, Attn: Bureau Director, 101 South Webster Street, Madison, WI 53707), and a copy to Wisconsin Department of Natural Resources Bureau of Endangered Resources, Attn: Bureau Director, 101 South Webster Street, Madison, WI 53707-7921. (iv) at such other address as any party may from time to time specify in writing in lieu thereof;

(v) notice provided pursuant to this provision is deemed satisfied upon receipt of the notice by the first named addressee designated for each party.

It is further agreed that each party hereto will promptly furnish to the other parties hereto a copy of any notice it may receive from any third person that may affect the rights of any party hereunder.

9. **Recordation**. DNR shall record this instrument in the office of the Register of Deeds for Milwaukee County, Wisconsin, and may rerecord it at any time as may be required to preserve its rights in this Conservation Easement.

10. General Provisions.

- 10.1 **Controlling Law**. The interpretation and performance of this Conservation Easement shall be governed by the laws of the State of Wisconsin.
- 10.2 **Liberal Construction**. Any general rule of construction to the contrary notwithstanding, this Conservation Easement shall be liberally construed in favor of the grant to effect the Purpose of this Conservation Easement and the policy and purpose of the Wisconsin Conservation Easement Act. If any provision in this instrument is found to be ambiguous, an interpretation consistent with the Purpose of this Conservation Easement that would render the provision valid shall be favored over any interpretation that would render it invalid.
- 10.3 **Severability**. If any provision of this Conservation Easement, or the application thereof to any person or circumstance, is found to be invalid, the remainder of the provisions of this Conservation Easement, or the application of such provision to persons or circumstances other than those as to which it is found to be invalid, as the case may be, shall not be affected thereby.

- 10.4 **Entire Agreement**. This instrument sets forth the entire agreement of the parties with respect to this Conservation Easement and supersedes all prior discussions, negotiations, understandings, or agreements relating to this Conservation Easement, all of which are merged herein.
- 10.5 **No Forfeiture**. Nothing contained herein will result in a forfeiture or reversion of the County's or the District's title in any respect.
- 10.6 **Successors**. The covenants, terms, conditions, and restrictions of this Conservation Easement shall be binding upon, and inure to the benefit of, the parties hereto and their respective successors and assigns and shall continue as a servitude running in perpetuity with the Basin Site. The terms "County" or "District" and "DNR" wherever used herein, and any pronouns used in place thereof include, the County or the District and their successors and assigns, and DNR and its successors and assigns.
- 10.7 **Termination of Rights and Obligations**. A party's rights and obligations under this Conservation Easement terminate upon transfer of the party's interest in this Conservation Easement or the Basin Site, except that liability for acts or omissions occurring prior to transfer shall survive transfer.
- 10.8 **Captions**. The captions in this instrument have been inserted solely for convenience of reference and are not a part of this instrument and shall have no effect upon construction or interpretation.
- 10.9 **Counterparts**. The parties may execute this instrument in two or more counterparts, which shall, in the aggregate, be signed by both parties; each counterpart shall be deemed an original instrument as against any party who has signed it. In the event of any disparity between the counterparts produced, the recorded counterpart shall be controlling.
- 11. **Amendment**. If circumstances arise under which an amendment to or modification of this Conservation Easement would be appropriate, the County, the District, and DNR may jointly amend

this Conservation Easement by a written instrument recorded in the office of the Milwaukee County Register of Deeds, provided that any such amendment shall not diminish the goals, purposes or conservation benefits of this Conservation Easement, affect its perpetual duration or affect the qualification of this Conservation Easement or the status of DNR.

TO HAVE AND HOLD the above-described Conservation Easement together with all and singular the appurtenances and privileges belonging or in any way pertaining thereto, either in law or in equity, either in possession or expectancy for the Basin Site use, benefit, and behalf of DNR, its successors and assigns, forever.

IN WITNESS WHEREOF the County and the District have set the hand of their duly authorized officers on the day and year first above written.

GRANTOR: MILWAUKEE METROPOLITAN SEWERAGE DISTRICT

Approved as to form:

	By:		
	J	Kevin L. Shafer, P.E.	
District Division of Legal S	Executive Director		
STATE OF WISCONSIN)		
)SS		
MILWAUKEE COUNTY)		

On the ____ day of _____, 2006, the above and foregoing document was acknowledged by the above named Executive Director of the Milwaukee Metropolitan Sewerage District, known to be to be such officer, and who acknowledged that he executed the foregoing instrument on the District's behalf for the purpose aforesaid and by his authority as such officer.

> Notary Public, State of Wisconsin My commission (is)(expires) _____

ACKNOWLEDGMENT AND ACQUIESCENCE

MILWAUKEE COUNTY, WISCONSIN, A municipal body corporate

By: ____

Scott K. Walker

Countersigned:

BY:

Mark Ryan, County Clerk

Approved as to form:

Milwaukee County Corporation Counsel

Reviewed for Risk Management Purposes by:

Milwaukee County Risk Manager

STATE OF WISCONSIN

MILWAUKEE COUNTY

Personally came before me this __ day of _____, 2006, the above-named Scott K. Walker, County Executive for Milwaukee County, Wisconsin, and acknowledged that he executed the foregoing instrument.

)SS

(Type or print name) Notary Public, State of Wisconsin My commission (is)(expires)_____

15

STATE OF WISCONSIN

MILWAUKEE COUNTY

Personally came before me this __ day of _____, 2006, the above-named Mark Ryan, County Clerk for Milwaukee County, Wisconsin, and acknowledged that he executed the foregoing instrument.

)SS

(Type or print name) Notary Public, State of Wisconsin My commission (is)(expires)_____

ACCEPTANCE

The Wisconsin Department of Natural Resources, a department of the State of Wisconsin, by a resolution of Natural Resources Board adopted at a duly convened meeting on the ____ day of _____, 2006, hereby accepts this Grant of Conservation Easement.

> WISCONSIN DEPARTMENT OF NATURAL RESOURCES

By:

(NO SEAL)

P. Scott Hassett, Secretary

Approved as to form:

DNR Bureau of Legal Services

STATE OF WISCONSIN

) SS.

DANE COUNTY

On the ____ day of _____, 2006, the above and foregoing document was acknowledged by P. Scott Hassett, the Secretary of the Wisconsin Department of Natural Resources, known to be to be such officer, and who acknowledged that he executed the foregoing instrument on the Department's behalf for the purpose aforesaid and by his authority as such officer.

____, Member

State Bar of Wisconsin

This document was drafted by: James H. Petersen State Bar No. 01014389 Senior Staff Attorney Division of Legal Services Milwaukee Metropolitan Sewerage District 260 West Seeboth Street Milwaukee, Wisconsin 53204

CONSERV. EASE. EXHIBIT A LEGAL DESCRIPTION OF THE CONSERVATION EASEMENT GRANTED BY MILWAUKEE COUNTY and THE MILWAUKEE METROPOLITAN SEWERAGE DISTRICT, as Grantors,

ТО

WISCONSIN DEPARTMENT OF NATURAL RESOURCES, as Grantee

LEGAL DESCRIPTION OF THE Basin Site

[as provided in the Milwaukee Metropolitan Sewerage District Project ID W20004 – Acquisition Plat for Milwaukee County Grounds Basin Project, as amended.]

SPECIMEN COPY ONLY

.....

ICA Exhibit A Page 18 of 18

CONSERV. EASE. EXHIBIT B

[Copy of Executed Intergovernmental Cooperation Agreement will be this exhibit]

INTERGOVERNMENTAL COOPERATION AGREEMENT BETWEEN THE COUNTY OF MILWAUKEE, THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES, AND THE MILWAUKEE METROPOLITAN SEWERAGE DISTRICT CONCERNING MANAGEMENT OF THE MILWAUKEE COUNTY GROUNDS FLOODWATER MANAGEMENT FACILITY

The County of Milwaukee, a municipal body corporate, organized and operating pursuant to ch. 59, Wisconsin Statutes, hereafter "County," the Milwaukee Metropolitan Sewerage District, a municipal body corporate, organized and operating pursuant to secs. 200.21 through 200.65, Stats., hereafter "District," and the Wisconsin Department of Natural Resources, an agency of the State of Wisconsin, created pursuant to sec. 15.34, Stats., and operating pursuant to chs. 23 and 281, Stats., hereafter "DNR," enter into this Intergovernmental Cooperation Agreement, pursuant to sec. 66.0301, Stats., effective the latest date of signature appearing below, to provide for management of the Milwaukee County Grounds Floodwater Management Facility:

WHEREAS, the Menomonee River floods lands within the City of Milwaukee, the City of Wauwatosa, and the Milwaukee County Grounds and various parklands under the jurisdiction of Milwaukee County; and

WHEREAS, the District has taken jurisdiction of the Menomonee River for the purpose of planning, designing, constructing, operating, and maintaining a floodwater management system so as to ameliorate or reduce flood damage to historically inundated land and buildings; and

WHEREAS, the District has determined that in order to effectively manage flood waters on the Menomonee River, it is also necessary to manage flood waters emanating from Underwood Creek if the District is to be successful in removing properties from the floodplain of the 1% probability flood; and

Page 1 of 7

Intergovernmental Cooperation Agreement Between Milwaukee County, DNR, and Milwaukee Metropolitan Sewerage District Concerning Management at the Milwaukee County Grounds Floodwater Management Facility (March, 2006)

WHEREAS, the District has determined it is necessary to construct a floodwater management facility consisting of a basin covering approximately 91 acres at the Milwaukee County Grounds, together with adjacent land to be used for floodwater management, to be known as the Milwaukee County Grounds Floodwater Management Facility, hereafter "Floodwater Management Facility;" and

WHEREAS, the County Board, in Resolution 03-323, approved the preliminary plan for the Floodwater Management Facility and requested that the District explore ways to reduce costs and obtain approval of the DNR on final design; and

WHEREAS, the County Board, in Resolution 03-130(a)(a), accepted an offer from DNR to purchase land adjacent to the Floodwater Management Facility for a Forestry Education Center contingent upon: 1) the land being used for public recreation, conservancy, and educational uses; and 2) DNR agree to an oversight/advisory role in the maintenance of the Floodwater Management Facility by the District; and

WHEREAS, the Floodwater Management Facility will require annual and recurrence interval maintenance; and

WHEREAS, the County, the District, and the DNR have agreed that the appropriate level of oversight of the District's maintenance of the Floodwater Management Facility can be achieved through a "conservation easement" for the land upon which the District will establish its Floodwater Management Facility, with said easement running in favor of the DNR and providing the DNR with rights to require maintenance of the facility; and

WHEREAS, a separate intergovernmental cooperation agreement, pursuant to sec. 66.0301, Stats., entitled "Intergovernmental Cooperation Agreement Between Milwaukee County and the Milwaukee Metropolitan Sewerage District Concerning Construction of the Milwaukee County Grounds Floodwater Management Facility," addresses

Page 2 of 7

Intergovernmental Cooperation Agreement Between Milwaukee County, DNR, and Milwaukee Metropolitan Sewerage District Concerning Management at the Milwaukee County Grounds Floodwater Management Facility (March, 2006)

the acquisition of lands and the construction of facilities affected by the management provisions contained herein;

NOW, THEREFORE, in light of the above and foregoing declarations, the County, the District, and DNR enter into this Intergovernmental Cooperation Agreement, setting forth their respective duties and responsibilities with regard to management of the Floodwater Management Facility:

- 1. MILWAUKEE COUNTY GROUNDS FLOODWATER MANAGEMENT FACILITY ELEMENTS. The parties agree that the Floodwater Management Facility will, assuming issuance of all necessary permits, entail construction of: an intake structure at Underwood Creek, an intake conveyance facility of length of approximately 3200 linear feet, a basin inlet structure, a 91 ± acre detention basin, a bridge over Swan Boulevard, an outlet structure to the Menomonee River, discharge piping, and a pump station, if necessary. The District will change the specific elements described above if required to do so by federal or state regulations or approvals.
- 2. CONSTRUCTION AND OPERATION OF THE FLOODWATER MANAGEMENT FACILITY; RESPONSIBILITIES. The District will own the Floodwater Management Facility. Construction, operation, and maintenance of the Floodwater Management Facility, and any obligation assigned to the District under section 3 or section 4, infra, will be funded by the District.
- 3. MANAGEMENT OF FLOODWATER MANAGEMENT FACILITY AESTHETICS, INCLUDING TRASH AND DEBRIS REMOVAL; RESPONSIBILITIES. (A) DNR agrees to oversee the aesthetic condition of the Floodwater Management Facility through the authority granted in the "conservation easement," including trash and debris removal, in a manner compatible with the floodwater detention, scenic, and openspace purposes of the facility. In regard to its oversight of

Page 3 of 7

the aesthetic condition of the Floodwater Management Facility, DNR agrees to:

> (i) Review and consult with the District regarding specifications for any contracts prior to bidding in the event Floodwater Management Facility clean-up services are to be provided pursuant to contract;

(ii) Monitor the aesthetic condition of the Floodwater Management Facility on a periodic basis and after flood events, and inform the District of trash and debris issues that warrant action; and

(iii) On a case by case basis, negotiate to agreement with the District as to the timeliness and cost-effectiveness of any trash and debris clean-up issue, with the goal of maintaining the natural aesthetics of the basin.

(B) The District agrees to perform the following activities as its responsibility:

(i) Ensure the aesthetic condition of the Floodwater Management Facility is monitored on a regular basis and after storm events;

(ii) Maintain the Floodwater Management Facility, including trash and debris removal, in a manner compatible with the floodwater detention, scenic, and open-space purposes of the facility in a timely manner;

(iii) On a case by case basis, negotiate to agreement with the DNR as to the timeliness and cost-effectiveness of any trash and debris clean-up issue, with the goal of maintaining the natural aesthetics of the basin; and

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Intergovernmental Cooperation Agreement Between Milwaukee County, DNR, and Milwaukee Metropolitan Sewerage District Concerning Management at the Milwaukee County Grounds Floodwater Management Facility (March, 2006)

(iv) Respond to contacts from the public and the DNR indicating that removal of debris or trash from the facility is needed.

- 4. ESTABLISHMENT AND MANAGEMENT OF PLANT COMMUNITIES AT THE FLOODWATER MANAGEMENT FACILITY; RESPONSIBILITIES. The District and DNR agree to negotiate to agreement concerning re-vegetation guidelines in the Basin Site's Revegetation and Plant Management Plan for the Floodwater Management Facility identifying plant community options and maintenance requirements.
- 5. **NOTICES.** Whenever in this Agreement it shall be required or permitted that notice be given by any party hereto to the other, such notice shall be given by certified or registered mail, and any notice so sent shall be deemed to have been given on the date that the same is deposited in the United States mail, postage prepaid. Notices shall be addressed to:

(i) the County at Milwaukee County Corporation Counsel, Room 303, Milwaukee County Courthouse, 901 North 9th Street, Milwaukee, Wisconsin 53233 (with a copy to County Executive's Office, Room 306, Milwaukee County Courthouse, 901 North 9th Street, Milwaukee, Wisconsin 53233, and a copy to Department of Parks, Recreation and Culture, 9480 West Watertown Plank Road, Wauwatosa, Wisconsin 53226, Attn: Director, or such other successor agency or department that supervises park matters for the County);

(ii) the District at 260 West Seeboth Street, Milwaukee, Wisconsin 53204-1446, Attn: Executive Director;

(iii) the Wisconsin Department of Natural Resources Bureau of Forestry Services, 101 South Webster Street, Madison, WI 53707, Attn: Bureau Director (with a copy to the Department of Natural Resources at its Southeast Region Headquarters,

Intergovernmental Cooperation Agreement Between Milwaukee County, DNR, and Milwaukee Metropolitan Sewerage District Concerning Management at the Milwaukee County Grounds Floodwater Management Facility (March, 2006)

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2300 North Dr. Martin Luther King Drive, Milwaukee, Wisconsin 53212, Attn: Southeast Regional Director, and a copy to the Department of Natural Resources Bureau of Legal Services, Attn: Bureau Director, 101 South Webster Street, Madison, WI 53707), or

(iv) at such other address as any party may from time to time specify in writing in lieu thereof; and

(v) notice provided pursuant to this provision is deemed satisfied upon receipt of the notice by the first named addressee designated for each party.

It is further agreed that each party hereto will promptly furnish to the other parties hereto a copy of any notice it may receive from any third person that may affect the rights of any party hereunder.

6. **EXECUTION OF THIS AGREEMENT**. The County, the District, and the DNR mutually agree that the execution of this document by the officials who sign this document constitutes a certification that the signatory has been appropriately authorized by the respective governing board to execute this document.

[Signatures on next page]

Intergovernmental Cooperation Agreement Between Milwaukee County, DNR, and Milwaukee Metropolitan Sewerage District Concerning Management at the Milwaukee County Grounds Floodwater Management Facility (March, 2006)

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WHEREFORE, the authorized representatives of the parties to this Intergovernmental Cooperation Agreement affix their signatures, being duly authorized to do so.

COUNTY OF MILWAUKEE

By:____

Scott Walker County Executive

Date: _____

Countersigned:

Mark Ryan County Clerk

Approved as to form:

Milwaukee County Corporation Counsel

Reviewed by Milwaukee County Risk Management

By:_____Date:_____

MILWAUKEE METROPOLITAN SEWERAGE DISTRICT

By:____

Kevin L. Shafer, P.E. Executive Director

Date: _____

Approved as to form:

District Division of Legal Services

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

By:____

P. Scott Hassett Secretary

Date:_____

Approved as to form:

By:_____ DNR Bureau of Legal Services

Intergovernmental Cooperation Agreement Between Milwaukee County, DNR, and Milwaukee Metropolitan Sewerage District Concerning Management at the Milwaukee County Grounds Floodwater Management Facility (March, 2006)

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CONSERV. EASE. EXHIBIT C

.....

[Listing of all applicable Phase I and Phase II environmental studies performed to date]

MILWAUKEE COUNTY GROUNDS PREVIOUS ENVIRONMENTAL ASSESSMENT AND ANALYSIS

- 1. <u>Phase I Environmental Site Assessment, Milwaukee County Grounds Parcels B.</u> <u>C, and D</u>. K. Singh & Associates, November 2000
- <u>Phase II Environmental Site Assessment, Milwaukee County Grounds Parcels B.</u>
 C, and D. K Singh & Associates, November 2000
- 3. <u>Feasibility Study and Environmental Analysis for the Milwaukee County Grounds</u>, Wisconsin Department of Natural Resources, Draft January 2001. (Records indicate that we have this report, need to track down.)
- 4. <u>Environmental Assessment for the Milwaukee County Grounds Detention Basin</u> <u>Project, Menomonee River</u>, Tetra Tech, Draft March 2001 (includes Wetlands Delineation Findings)
- 5. <u>Phase I Environmental Site Assessment, Milwaukee County Grounds, (Draft and Final)</u>. Seymour Environmental Services, Inc., January 2002

APPENDIX B

A Citizen Guide to the Role of the Wisconsin Environmental Policy Act

A CITIZEN GUIDE TO THE ROLE OF THE WISCONSIN ENVIRONMENTAL POLICY ACT

IN DNR DECISION-MAKING

INTRODUCTION

The Department of Natural Resources (DNR) has prepared this brief "Guide" to provide interested citizens such as yourself an overview of the role the Wisconsin Environmental Policy Act (WEPA) plays in agency decision-making. We hope this information will help you participate more effectively in Department decision-making activities.

We begin with a general explanation of what the Environmental Policy Act is and who it applies to. We continue with a more specific discussion of the role of the law in DNR decision-making. We close with some specific suggestions on how to effectively participate in a particular Department decision-making process.

WHAT IS THE WISCONSIN ENVIRONMENTAL POLICY ACT?

The Wisconsin Environmental Policy Act is a state law designed to encourage environmentally sensitive decision-making by state agencies.

Signed into law in 1972, WEPA spells out the state's environmental policy and requires the DNR and other state agencies to consider the environmental effects of their actions to the extent possible under their other statutory authorities. It also establishes the principle that broad citizen participation should be part of environmental decision-making. WEPA imposes procedural and analytical responsibilities on the DNR and other agencies but does not provide authority to protect the environment.

WEPA applies only to the actions of state agencies. It does not apply to local governments or private parties unless their actions involve state agency regulation or funding.

WEPA requires the DNR and other state agencies to gather relevant environmental information and use it in their decision-making. Agencies must also look at appropriate alternatives to the particular course of action they are proposing. If the action is a "major action significantly affecting the quality of the human environment", the law requires agencies to consult with other agencies about possible environmental impacts, prepare and circulate an environmental impact statement (EIS), and hold a public hearing.

The WEPA process has evolved substantially since its inception. Because WEPA lacks procedural guidance, much of the current process has been developed in response to various legal decisions. For example, environmental assessments (EA's) are a creation of the courts, having arisen out of a perceived need for agencies to document their decision's not to do EIS's. EA's are similar to EIS's in both content and process. They both describe the proposal and the affected environment and they both analyze the environmental impacts and possible alternatives. And, both EA's and EIS's are publicly noticed. The primary difference is the requirement for a formal administrative hearing on an EIS.

The Environmental Analysis and Review Program is responsible for overall coordination of WEPA implementation within DNR. The Department's procedures for implementing WEPA are described in detail in Chapter NR 150 of the Wisconsin Administrative Code.

A key part

of NR 150 is the Action Type List. Here, all DNR actions are placed into one of four categories involving various levels of environmental analysis and public involvement. The DNR uses the Type List to determine the minimum review process appropriate for a particular proposed Department action.

Persons interested in obtaining a copy of NR 150 may do so by calling 608-267-7536.

WEPA AND DNR DECISION-MAKING

In the course of implementing WEPA, the DNR has observed that citizens may not be aware of the wide variety of Department decision-making authorities. Some decisions, such as whether to issue a permit for an air pollution source, are very quantitative in nature and limited in scope. Other decisions, such as whether to buy and develop a new wildlife area, allow DNR to use a great deal of discretion. In addition, the role WEPA plays in these different kinds of decision-making circumstances may not have been clearly explained.

The following discussion addresses common public misunderstandings about the role of WEPA in DNR decision-making:

Common Public Point of View:

The DNR regulates everything related to the environment and can decide to do whatever it wants

What the Law Says:

The DNR has substantial authorities to regulate environmental pollution and alterations to

waterways. However, the standards the DNR can apply in exercising these authorities are defined in the various regulatory statutes and related Administrative Rules. For many DNR permit programs, these standards do not include social or economic concerns. Nor do these standards allow the Department to substitute an alternative to what is proposed. An important result of the lack of DNR discretion in making decisions on environmental permits is this:

The Department does not have the legal authority to direct a project proponent to a particular site or to assure that the "best" site is selected for a project. This lack of authority applies to landfills, incinerators, shopping malls, residential developments, factories and most other types of human development.

In simplest terms, the DNR has limited authority for deciding the appropriate use(s) of land. This responsibility, to the extent it has been established at all, resides with other units of government, typically local municipalities.

Common Public Point of View:

Public opinion should be used in all DNR decision-making circumstances

What the Law Says:

We agree, however, the law limits DNR's ability to factor public opinion into every decision it makes.

Many DNR decisions, particularly on regulatory matters, must, by law, be based entirely on a technical analysis of whether or not the proposed activity would meet the applicable standards established in the laws and Administrative Rules. In these decision-making circumstances, public opinion is not one of the factors that the DNR can consider.

In contrast to the situation with DNR regulatory decisions, non-technical public input is very important and relevant to many other types of Department decisions. These include decisions relating to development of Administrative Rules, fish and wildlife habitat and species management, recreation management, forestry and land acquisition.

Common Public Point of View:

WEPA documents, and EIS's in particular, determine the outcome in DNR decision-making

What the Law Says:

The public often seems to believe a particular problem would be solved if only the DNR would prepare an EIS. These "particular problems" are usually some type of unwanted project being proposed for the neighborhood - a landfill, a shopping mall, or an industrial facility, for example.

In reality, WEPA provides an informational process - EIS's (and EA's) disclose impacts and look at alternatives. They don't stop projects; they don't approve projects; they don't modify projects. They inform. The influence this informational function has on a Department decision is directly related to the amount of discretion DNR has in making that decision.

To quote from a recent court case, "WEPA does not mandate particular results or particular decisions in individual cases but simply exists to ensure that adverse environmental effects of a particular project are identified and evaluated during the planning stages. The act does not prohibit unwise decisions, only uninformed ones."

Common Public Point of View:

Without an EIS, the DNR's environmental review is incomplete or inadequate

What the Law Says:

This perception results in much unproductive debate and litigation. As indicated above, preparation of an EIS does not give the DNR any additional authority to deny or condition a permit. In many regulatory circumstances, an EIS would neither add anything of value to the DNR review taking place under the substantive environmental laws nor result in a different decision. In addition, for many situations potentially involving an EIS the DNR currently prepares an Environmental Assessment (EA). As discussed above, EA's are similar to EIS's in both content and process.

In the more than twenty years since WEPA became law, the DNR's experience has consistently reinforced the following conclusion:

Involvement early in project development is the most effective way to stimulate environmentally sensitive planning and avoid or minimize adverse environmental effects. Preparing EA's or EIS's late in the project planning and design process is usually ineffective in achieving meaningful environmental protection.

Common Public Point of View:

Any DNR regulatory decision on a major project needs an EIS

What the Law Says:

Oftentimes, the DNR has a minor regulatory involvement in a large, environmentally significant or controversial proposal. Recent examples include a cross-state pipeline and a large residential development.

These kinds of controversial proposals typically involve disagreements over the appropriate use

of land, concerns about social or economic impacts, or other issues for which DNR lacks authority. It makes little sense for the DNR to prepare an EIS in these situations when doing so would not stop the project or otherwise result in a different Department decision. Because many of the private and local governmental decisions affecting these projects have already been made, it is usually too late for the information which would be presented in the EIS to be used in making these critical decisions.

EFFECTIVE CITIZEN INVOLVEMENT IN DNR DECISION-MAKING

After reading this far, you may be asking yourself, "How can I effectively participate in a DNR decision-making process?" An essential first step is gaining a basic understanding of all that is involved in the particular DNR decision-making process you are interested in, including how WEPA fits in. By spending time with this "Guide" you've already made a good start toward achieving that goal. But, there may well be more you will want to do. The DNR suggests you consider focusing your efforts on the following:

- Learn the criteria and standards associated with the DNR decision(s) of interest. It is very important to determine how public input will be considered (or not considered) in a decision. It is also essential to know the most effective time(s) in the process to provide your input.
- Determine whether a WEPA review (EA or EIS) would make a meaningful difference in the decision-making process. The key here is usually how much discretion DNR has to consider all of the potential impacts of a proposal as well as public opinion on the alternatives to the proposal.
- Determine whether other governmental entities (federal, state and local agencies), in addition to the DNR, will have an action related to the proposal in question, as is often the case. If other units of government are involved, you will want to become familiar with their decision-making processes and standards also.
- Address your concerns to the governmental body in the best position to deal with them. For example, many facility siting and related land use issues are primarily handled by a local municipality. Most environmental pollution issues such as proposed discharges to the air and water are the responsibility of DNR.
- Encourage your local municipalities to adopt ordinances that make use of the WEPA process, and your local officials to coordinate their decisions with those of the Department.

APPENDIX C

Responses to Public Comments

Appendix C Response to Public Comments

Introduction

More than 50 individuals and organizations provided written and oral comments on the *Milwaukee County Grounds Floodwater Management Facility and Underwood Creek Rehabilitation Projects draft Environmental Assessment* (EA). Members of the public provided comments on the draft EA to the Department of Natural Resources (DNR) during a public information meeting conducted in the City of Wauwatosa on May 1, 2006. Public comments generally provided substantive information, constructive criticism, or questions regarding the content of the draft EA. Some comments were related to DNR review procedures or expressed personal opinions about the proposed project. All written comments postmarked by May 18, 2006 and the information obtained during the public information meeting were considered in the development of this final EA.

All members of the public who submitted comments that specifically addressed issues or questions about the draft EA have been listed in Table 1 below and the topics or questions that they addressed are also listed. These comments are not reproduced due to production problems (scanning difficulties, being handwritten, etc), however, they are available for review at the DNR¹. Public comments that expressed a personal opinion about the project and whether it should be approved or not, without addressing the draft EA, were read and acknowledged, but the names of those commenters are not included in this final EA.

During the review of the comments on the draft EA, DNR staff pulled questions or statements from the written and oral comments and they have been reproduced below. DNR staff have responded to each of the questions or statements. In some instances, the comments received prompted DNR staff to perform additional analyses for particular issues. In these cases, the results of that additional analysis are usually in the text of the final EA and a reference for that analysis is provided in this Response to Public Comments section. In other circumstances, further investigation by staff into the arguments being made by a particular commenter led staff to the conclusion that its original assumptions and analyses are more fully described in this Response to Public Comments section.

Many comments were extremely useful in pointing out omissions, typos, or errors in staff's analyses that have been corrected in the final EA. Because of the press of time it was not possible to respond in writing to each question or comment received. It is our hope that the questions and statements covered in the following section are representative of the major concerns and issues that the public believed needed to be addressed in the final EA.

¹ Contact: Mike Thompson, Supervisor, DNR Southeast Region Environmental Analysis Team (414) 263-8648 or at <u>michaelthompson@dnr.state.wi.us</u>.

The questions and statements along with staff responses have been grouped according to the issues covered by the chapters of the Final EA. For example, comments and staff responses related to affected endangered resources are found under the chapter 12 Biological Environment heading.

DNR staff have given careful consideration to all of the comments received and have attempted to reflect as many of the comments as possible in the text of the final EA as well as in this Response to Public Comments section. DNR also considered previous public involvement activities. We appreciate all of the time, effort, and careful thought on the part of all of the commenters who read the draft EA and provided input that was so valuable in producing the final EA.

Table 1 Summary of Public Commenters and the Topics Addressed

Name	Comment
Rosemary Kraemer	I believe the entire county grounds -all 285 acres should be preserved as a state forest or a conservancy under City of Wauwatosa law.
	No development, no reservoirs or retention basins. Flooding can be controlled by stopping the concrete wasteland brought on by
	development n. of Wauwatosa along the River!! Development that ruins wetlands is not progress!
Joseph Weigel	My family objects to the county grounds detention basins program. We've lived in the general area for over 50 years. 1. The detention basins are highly dangerous, especially to children. They slope downward into water. One of these days, a child is going to drown in
	one of those detention basins and there will be a great uproar. Putting up an ugly fence around them isn't going to help things or
	protect the children. 2. You already have ugly water detention ponds on the public grounds just east of Hwy. 100. The county
	grounds in George Hansen Park have been eroded over the last number of years by freeway, commercial development, athletic fields,
	and other projects. We keep taking land out of public usage and do not replace it. 3. The detention ponds already in place seem to full
	almost all of the time; so any claim that they are "occasional and temporary" is bologna. 4. The Menomonee River has already been
	paved, unpaved, bridged and harmed in many ways. Let's not make it worse. Also, to destroy or eliminate wetlands is a horrible
	mistake. The wetlands are more important in flood control and water control than are the basins. The people at DNR will be directly
	responsible for the children who drown at these water detention centers.
Donald Schrauth	Regarding: County Grounds Detention Basins. How absolutely ridiculous! No way, no how, not on my watch, should be the mantra!
	Dear Mrs. Jerich: If you have the power to stop this insanity, please do so, and you may use my name. Do they really need to screw
	everything up!?- Please stop them!
Wilma Boese	There should never be an ignoring (by contractors et al) of wetlands whether located in rural or urban areas. The value of wetlands
	must be recognized for its cleansing of run-off from contaminated lands, offering refuge to wildlife, and an invaluable resource for
	educating students of the unique ecosystems of wetlands. The best thing that can happen to New Orleans and other devastated gulf
	lands in USA is to help nature heal itself by encouraging restoration of wetlands along our coasts. They are vital to our environment
T 1	here in the Midwest as well.
Janet Anderson	1 I heard something about the land being protected lands by being in a "I'rust." If that is true, then there is no question – there is to
	be NO development. On this, I would like to have more specific information on the Trust issue.
	2 If the fand is not being field in Trust, then I vote for MinniviAL development, specifically use more fandscaping ideas to control the success minutes as I have had to do so an individual homeosymer. And to me that means
	the excess rainwater, as I have had to do as an individual nomeowner. And to me, that means:
	• removing the ~1 mile of concrete as recommended
	• NOT adding more concrete, therefore, eliminating the huge cost to pour lots of expensive concrete which also creates even
	<u>more</u> impervious material on this open greenspace

Janet Anderson	Having the minimal requirements for detention ponds though
(continued)	• it would be a much better idea NOT to develop it but create some sort of more useful as well as easthetically pleasing
(continued)	• It would be a much better idea NOT to develop it, but create some soft of more useful as well as aesthetically pleasing
	modification of the rand – i.e. instead of two big noises in the ground, plant some plants, perhaps create some sort of botanical
	garden that is not only pleasing to the eye, but also adds plant root systems to further provide absorption of rainwater and its
	occasional excesses
	• AND – very important to me – I am VERY VERY WERY much against setting aside – actually, dedicating good open
	greenspace for dogs to run around in their own big private litter box. This is <u>definitely</u> a waste of land, in general, and this
	county land, in particular.
Mary Kamp	I would like us to push further toward finding a better, less drastic, less nature-offending solution for flood control at the County
	Grounds. It is a "let out your belt to cure obesity" solution. To enforce this extreme measure without moving to enforce flood control
	on businesses, municipalities and individuals seems both foolish and unfair. The County Grounds are Milwaukee's last wild place.
	Please look for a less ruinous flood control plan. Thanks for soliciting opinions.
Jim "Luigi" Schmidt	Talked about partnership involved and planning efforts, explained why he supports projects and changes to the project.
Vicki Pietz	I don't want our wetlands & wildwoods touched by other objects that don't belong to you. Protect animals, nature, and open space
James Leming	Appreciated clarification of project scope, wants off leash dog park with walking trails. Mosquito problem.
Cheri Briscoe	Concerned about ecological impacts, glad about the concrete removal in the stream. Left info about a park in Hawaii which is similar
	to this project.
	Explained that we should work to make the area a park, not a 91-acre hole. Green space important to eco-preservation.
	Concerned about large ponds/basin size, prefers smaller ponds
Tracy Justham	People can't make or replace wetlands.
Marty Weigel	Protect as much area as possible for public use - trails. Wants bike trails, supports canoeing and kayaking in the river, removal of
	concrete is a big plus for paddlers and will bring additional opportunities.
Pat Mundy	Oppose giving any more county land - held in trust for people of Milwaukee. County. Opposed to a land use change.
	Questioned the water quality benefits of the project, thought will hurt public health.
Penny McCanles	What assurance do we have that taking the concrete out of Underwood Creek will be a benefit? In 1969, I was part of a grassroots
	movement that protested concreting the creek. We were over ridden by the MMSD. Wants to make sure the cost impacts are a benefit
	for the flood project. Dave Fowler and Tom Sear expanded upon concrete removal topic.
David Musil	User of land for 30 years, concerned about a road near pond and the loss of salamander. Wants less grass grooming. Aware of snakes,
	increased American woodcock breeding due to loss of habitat in other areas, has observed 12 of the 24 Wisconsin sparrow species
	within the County Grounds, many other great birds go through the area as well.
Cheryl Nenn	Basin is not ideal, prefers local alternatives and preservation of the area
	Concerned about wetlands, generally mitigated wetlands do not replace quality of existing wetlands.

Cheryl Nenn (continued)	Use native plants for revegetation
	Follow through with trail and amenity ideas - create the recreational facilities.
	Decrease the potential fish entrapment.
	The ecological benefit of removing the concrete is negated by the tunnel.
	What are the thermal water quality impacts on the Menomonee River and the sediment impacts? Should follow this up with
	monitoring.
	Concerned about Butler's Garter snake, look at what happened to them at Havenwoods.
Gay Leigh Mundy-	We do not want this basin in Wauwatosa! Concerned about the future, once land is gone, it's gone for good. Land held in Trust,
Calhoun	doesn't want a land use change. Glad the people have chance to speak.
	Concerned about health impacts of hazardous wastes, toxics in water.
	The project will not work - how well constructed will it be?
Mary-Ellen Smith	Wants to walk dogs off leash. Starting a petition to off-leash in park, wants space set aside for dog walkers into current project.
David Marsek	Speak on MMSD statements. Grew up in area, concerned about green space going away. Why isn't Honey Creek part of this project?
	Where does fish come from?
	Will water flow into ponds - how does it affect deep tunnel.
	How many trees removed with Underwood Creek? Use native species, save trees that can be moved. Concerned about tree impacts of
	the concrete removal.
Lynn Broaddus	Why no EIS?
	Pleased with changes, even if don't support the project. Requested that all public comments be copied and included in public record for
	DNR, MMSD public comments shared with DNR. Will submit written comments.
	Had two projects with significant permit compliance issues (deep tunnel & Hart Park). Wants MMSD funds available for a DNR
	compliance inspector during construction.
	Wants maintenance plan for basins (remediate contaminants, algae, etc.) to be open for public comment.
	What happens if by-passing material gets into basin?
	Concerned about safety of children, walkers, and paddlers.
Thomas Byrnes	Will Fisher Parkway be under construction or closed? Can evergreen trees be planted along creek?
	Concerned about wildlife and tree impacts during construction.
Peter Gaveras	I am concerned about losing more of our local forests and wetlands.
	Looks good on paper, but concerned how it will be done. Limit time of construction. Concerned about noise, potential damage to
	Eshweiler buildings.
	Very concerned about the cleanup of any project on the County Grounds. Who is responsible for debris and garbage clean up that
	ends up in the basins? Who is responsible for long term maintenance and upkeep? Someone must be responsible.

Peter Gaveras	Wants an EIS to be done.
(continued)	Natural plantings after 5 years - then what happens?
	Concerned about ground water impacts and runoff.
	Who is responsible for the cost of the extra runoff from impervious area? What is responsibility of those creating problems?
Dorothy Ann Phinney	Concern for wildlife during construction - the project at Hart Park has divided a lovely area to an earth pile - not a living thing can
	exist during construction.
	Concerned about general construction impacts.
	Concerned about ecosystem and food chain impacts.
Rosemary Wehnes	Requests an EIS due to high cost.
	Wants to know about the benefits to the watershed.
	Would like something between local and regional alternatives.
Christine Zapf	EIS needs to be done.
	County Grounds is for nature and observation of birds. Keep it wild.
Lori Delfosse	Absolutely oppose any development of the County Grounds. Land is sacred. Dog walker.
	Preserve the wildlife and the natural grasslands, trees, plants.
	Does trust project will function. The proposed diversion is unnatural and its stability and maintenance is a concern.
Richard Steyre	It's a done deal, we are too late. Land use changes, we wanted a park.
	What will be done to control mosquitoes considering the threat of West Nile virus?
Gail Epping Overholt	Consider removing concrete from all of Underwood Creek.
Don & Char Galligan	We use the County Grounds everyday to let our dog run free with the other dogs. We want to continue.
	Cannot afford new fees either.
Richard Kraus	Have provisions been made for pedestrians along Swan Blvd. in the bridge area?
Margaret McGuire	Why isn't an environmental study a requirement for this project?
Barbara Lund	Most interested in dog walking area - safe from cars & truck
Phil Bielfeld	
Sandra Able	As a concerned neighbor, I am opposed to this. It will ruin the scenic County Grounds.
Margaret McGuire	I am so sorry all this is happening. I hope you can deliver a natural habitat.
Joanne Schoemacker	Please no development on the County Grounds - no paved pathways in the state forest area - leave as is - why the added expense of a
	forestry education center
Roger Hildebrand	
Sharon Bertrand	We in our Wauwatosa neighborhood prefer keeping the entire area green. No more business in these areas!
Bruce & Evelyn Boucher	

Deb Strzelecki	If flooding is such a concern, why all the buildings & parking lots going in. Leave space alone!
Susan Westergren	Please incorporate an off leash dog park in the plan for the open space.
David Grill	Only if a dog park setting is going to be developed after project is finished.
Laura Merten-Grill	I understand the need for this project, but three years is a long time to wait to get our dog walking/gardening area back. Please consider
	providing an off-leash dog area nearby.
Richard Swearingen	Save the County Grounds!
Tom Schoenecker	We need open space. No economic development area - no basins - leave all land natural - do not do anything to the woods by Wil-O-
	Way - don't waste our money.
James Lob	Sent questions to Tom Chapman via e-mail.
Marilyn Laymas	I hope you didn't do away with the dog park.
Belle Bergner	What is the cost benefit analysis? We should know whether the environmental benefit of the whole project overrides the cost.
	Why isn't an EIS being done?
	I am concerned that the wetland impact will not be mitigated adequately.
	Soil erosion into Lake Michigan is a major problem. WDNR should make sure maximum soil erosion mitigation is put in place.
	Isn't planting native habitat along stream corridors, installing rain barrels, rain gardens, and green roofs on public and private property
	a cheaper alternative?
	I am in favor or restoring the natural streams and increasing wetland areas, but the construction of a 17' tunnel and new ponds is not
	clear to me that it will have a great environmental benefit or one that is better than removing more concretized river channel.
William Moore	I understand that the snake habitat will have a 3 year "downtime" before the snakes are reintroduced. I hope that plans are included to
	make sure that there are sufficient crayfish borrows and food for the crayfish before they are reintroduced.
	I am glad that as much cement as possible is being removed from the creek and that additional wetland is being created. My fear is that
	man may not be able to create as high quality a wetland as has occurred naturally.
	I hope as many internal roads will be destroyed as possible, but leaving walking/bike paths.
	I would have preferred buying up lowland downstream and green space upstream to changing the natural landscape, but returning
	land to nature is good, too.
Erika Voss	Why was these no environmental impact study?
	The cost of this project (close to 90 million dollars) for floods that may occur every 25, 50, 100 years seems quite excessive. I think we
	should forget the basins for now. Let's fix Underwood Creek - remove the concrete & forget the basins for now.
	Leave land wild - not overly developed.
	How much benefit would we see from removal of all concrete from Underwood Creek?
Ron Grimm	It is my understanding that there will be service vehicle "trails" around the basins. I'm hoping there will be recreational trails for
	walkers, bikers, etc and possibly some "rest areas" to sit and relax. Keep up the informative meetings.

Barbara A. Eichenseer	I love being able to have my dog off leash in a beautiful environment. I certainly hope this open space will continue to allow people and
	dogs to socialize. The natural setting of this area is conducive to solitude and peace, for both species.
Barbara G. St. George	Demo saw mill and other education facilities: Do not put on County Grounds - so little is left! IF there is real use, support for saw mill
	(NOT from the industry) put it at Havenwoods. The area is considered rather unsafe for solo or small group hikers. There are already
	facilities and staff there for busloads of students - just add to it. Don't trample the little left at County.
	Leave it natural with maybe walking path, area for off-leash dogs. I have 3 legal, licensed, spayed/neutered CATS. But there is a need
	for a large area where individuals and families can frolic with their dogs. This is legitimate, wholesome recreation. (Maybe 2 sections –
	Big dogs and little ones.)
Frank, Margaret, Mike	Thank you for all your fine work towards abating the flood risk in our area. In the two serious floods in the past decade, we sustained a
Norris	loss of over \$20,000 in damages. What you are doing has a profound impact on our lives and future use of our property. We thank you
	for involving us in the development of this project and wish you the best of luck in bringing it to a swift and successful completion.
William Moore	I am concerned that the forestry center is going to extol the virtues of forestry. It is improper to advance a monetary, profit-making
	industry on government land, and should be reassessed.
	A city should not have the opportunity to develop county land. Land held by a government entity should be held and preserved for the
	commonwealth. Land is often donated for preservation and there should be no change to that promise, a disincentive to future land
	gifts.
James Lob	How does the basin project affect the flood waters of the Menomonee River other than the levee system being constructed in the Hart
	Park area?
	What happens to the remaining Underwood Creek flood waters after the retention ponds are filled in the initial four hours?
	A recent Milwaukee Journal Sentinel article states the retention ponds will fill with storm water and "waste" from sewer discharges. If
	that statement is accurate, will this lead to contamination of the ponds?
	The proposed cost of this project was \$70 million in 2001. What is the reason for the coast increase [The recent MJS article stated the
	final design will be \$84 million for the flood management project]?
	In the Journal Sentinel article the district spokesman, Bill Graffin, states the \$84 million project will protect 175 homes downstream.
	Does he mean the homes downstream of Hart Park? What about the flooding of the homes north of the area where the basements and
	adjacent roads were flooded due to the effect of the bermed roadbeds of Mayfair, Burleigh, and North Ave.?
	Estimates of commercial and domestic damage to homes and businesses from the 1997 '98 flooding were around \$11 million. The
	district is addressing this \$11 million with an \$84 million expenditure to protect 175 homes. This calculates to \$480,000 per home.
	Basement floor drain check valves to prevent backflow flooding of basements are available at most hardware stores priced

Cheri Briscoe	I am uncomfortable with the prospect of a huge 91 acre detention pond on the County Grounds. I would have preferred more regional
	or sub-regional strategy that included incorporation of smaller, low-lying areas along both Underwood Creek and the Menomonee
	River, which could be designed to store floodwater as well as provide improved wildlife habitat, aesthetics, and recreational
	opportunities for local residents.
	This approach [a regional or sub-regional strategy] would also have distributed the true "costs", and inconvenience of flood
	management to the entire causative region as opposed to placing a disproportionate cost on local residents around the County
	Grounds.
	In addition, this option also permanently changes one of our valuable public green spaces in Milwaukee County which many of us
	fought to preserve several years ago.
	The Environmental Assessment for this project states that the detention basins would fill up with water in 4 hours and that water
	would take 4 days to drain via a low-level outlet to the Menomonee River following a one percent probability event (essentially an
	extreme storm with a one percent probability of happening in any year - or a "100 year" flood). Furthermore, high flows greater than
	the one percent probability event would be passed with an <i>emergency overflow spillway</i> located within the same outfall/spillway
	structure. Presumably during such situations, water will exit the basins much more quickly to minimize back-waters and upstream
	flooding. Since these basins are being built essentially to address "extreme storms", one should seriously question whether the projected
	price tag is warranted for this slow down of water.
	I support the need for an Environmental Impact Statement (EIS) for this project to identify whether the benefits of this project warrant
	the \$84 million costs. Even though the Wisconsin Department of Natural Resources has decided that MMSD does not need to prepare
	an EIS, I am concerned that the costs and benefits of this project have still not been adequately addressed. However, if this project
	continues to go forward as seems apparent, I urge the responsible public agencies to ensure that the following issues are addressed: [see
	11 items]
	I support the need for an Environmental Impact Statement (EIS) for this project to identify whether the benefits of this project warrant
	the \$84 million costs. Even though the Wisconsin Department of Natural Resources has decided that MMSD does not need to prepare
	an EIS, I am concerned that the costs and benefits of this project have still not been adequately addressed. However, if this project
	continues to go forward as seems apparent, I urge the responsible public agencies to ensure that the following issues are addressed: [see
	11 items]
	Wetland impacts are minimized to the greatest extent possible, and wetland mitigation should take place on-site or in the Underwood
	Creek watershed, where it can provide benefit for local flood management, wildlife, and human populations, as opposed to off-site
	mitigation that does none of the above.
	The use of rip rap is minimized to the greatest extent possible, instead relying on bioengineering and the incorporation of native plants
	and natural stabilization materials such as coir matting, bio-logs, etc.
	Landscaping on the site uses native plants as described in the "Landscape and Ecological Plan for the Milwaukee County Grounds" by
	HNTB.

Cheri Briscoe	And furthermore, that landscaping projects, trails, and amenities (e.g. soccer fields, tennis courts, etc.) described in that report
(continued)	["Landscape and Ecological Plan for the Milwaukee County Grounds" by HNTB] are carried out to completion and adequately funded
	to re-create and improve upon what is lost.
	Fish entrapment is minimized as a result of the design of the detention basins, the diversion tunnel/structure from Underwood Creek
	to the basins, and the spillway from the basins to the Menomonee River. In addition, effects on fish of drawdown of Underwood Creek
	during storm events exceeding the 25% probability events should also be assessed.
	Ecological benefits of the project should exceed the costs. Although the Great Waters Group does concede that certain components of
	this project, in particular, the removal of concrete lining along a portion of Underwood Creek are positive, we remain concerned that
	the positive water quality and wildlife habitat impacts of concrete removal will be negated by other components such as the creation of
	an underground concrete-lined tunnel having a 17-foot inner diameter to connect water from the diversion structure at Underwood
	Creek to the detention basins.
	An adequate maintenance plan for the detention basin area should be created by MMSD. This plan should be accessible to the public
	and should deal with how public concerns will be addressed, when the basins will be dredged, what will be done to remediate upstream
	sewage overflows that contaminate the basins in the future, what will be done to address effects of stormwater runoff, algae, etc.
	MMSD states that this project allows for "development of an upland open space area" as if there is not an existing open space that has
	been used by local residents for generations. This is not a "new" amenity - it is a solution to "save" MMSD and taxpayer's money by not
	shipping fill off-site, and having to naturalize an "unnatural" topography as a result.
	Agencies should ensure that MMSD provides adequate funds to Milwaukee County Parks for planting and future maintenance of the
	uplands portion of the site, which includes pruning, invasive plant species removal, and other land management activities.
	Agencies should ensure that MMSD complies with storm water management regulations during construction, and that they provide
	funds in the form of bonds or other suitable vehicle to help the DNR with oversight and enforcement of this massive construction
	project. These funds would also serve as a "security deposit" so that any violations could be suitably remediated by DNR staff if
	necessary as quickly as possible or after the project is terminated. If there are no violations, money could be returned at the end of
	construction.
	Water quality impacts from the constructed detention basin should be examined and regulated if possible via WPDES discharge
	permit. Potential impacts to water quality could include thermal impacts, as well as flushes of sediment and other contaminants.
	Without some sort of regulatory authority or permit, it will be very difficult for the DNR or citizens to require any changes in the
	future to ameliorate water quality concerns. Likewise, DNR should require regular water quality monitoring by MMSD to ensure that
	there are no water quality problems associated with this flood management basin of extraordinary size.

Cheri Briscoe	Agencies should insure that safety impacts from these detention basins are minimized. The Environmental Assessment states that
(continued)	because of the degree of water diversion involved, the Milwaukee County Grounds facility would be regulated as a dam and assigned a
	high hazard rating due to the potential effects on downstream structures should it fail. It goes on to state that should the basins fail,
	that flood waters could flow over Swan Blvd to the Menomonee River directly, and or breach the embankment on the eastern side of
	the basins, which would be addressed through beam construction. DNR should ensure that these basins are protective of downstream
	structures and communities, as well as assure that there is a plan to educate the public to minimize potential safety concerns (e.g.
	drowning) as well as effects on recreational users such as paddlers.
	DNR should ensure that these basins are protective of downstream structures and communities, as well as assure that there is a plan to
	educate the public to minimize potential safety concerns (e.g. drowning) as well as effects on recreational users such as paddlers.
	Agencies should ensure that there is a plan (and funding contingencies) to deal with downstream erosion and scour caused in the
	future by diverted water entering the Menomonee River from the emergency and low-flow spillways.
	Impacts on the Butler's Garter Snake and its habitat should be minimized, and habitat destroyed should be mitigated for on-site.
	Comments on Hoomaluhia Botanical Garden in Kaneohe on Oahu, Hawaii. Flood protection by U.S. Army Corps of Engineers. Urges
	to take a look at what they along with the city and county hundreds of volunteers did.
	The importance of green space is to protect our ecology and to give people an opportunity to be partners in husbanding our Earth.
	This 91 acres that so many people fought to preserve for that purpose must be maintained by the MMSD, the DNR and Milwaukee
	County Board in a way that the public still has access and can still enjoy that wonderful island of green which is surrounded by urban
	development.

Following is the question and response section. We attempted to list the commenter(s) that raised the question or made a statement. Due to the large volume of comments, we may have inadvertently attributed the question or statement to the wrong commenter or not to all of the commenters that had similar concerns.

Chapter 2 Purpose and Need

Explain who is responsible for creating the flooding problem and their responsibility for sharing project costs.-(Peter Gaveras) Explain who should be responsible for paying to address flooding problem.-(Peter Gaveras)

The development patterns and amount of imperviousness within the watershed are responsible for much of the flooding in the watershed. Residents within that watershed share responsibility for the activities and land use patterns that can contribute to increases in stormwater runoff. The activities and land use patterns that are have the greatest impact are those that reduce the size of natural stormwater storage (wetlands, marshes, wet meadows), natural land cover (forest and prairies) and increase impervious surfaces (parking lots, streets, and roofs) within the watershed. These activities will increase the amount of stormwater that flows into our watercourse by decreasing infiltration into the groundwater. The increased stormwater runoff then contributes to increasing the floodwater elevations which can lead to out of bank flooding. The Milwaukee Metropolitan Sewerage District (MMSD) funds watercourse projects within Milwaukee County out of a Capitol budget which is paid by all residents within Milwaukee County. Residents outside the MMSD fund those projects that are located within the watershed(s) in which their community resides.

Chapter 3 Authorities and Approvals

The DNR's environmental review is incomplete or inadequate without an Environmental Impact Statement (EIS). – (Christine Zapf)

The Wisconsin Environmental Policy Act (WEPA) is a state law designed to encourage environmentally sensitive and informed decision-making by state agencies. WEPA requires the DNR to gather relevant environmental information and consider it in decision making. The DNR has conducted an Environmental Assessment (EA) for this project. This initial environmental analysis is developed to determine the need for a full EIS. There was a public information meeting for the draft EA on May 1, 2006 in the City of Wauwatosa to both disclose project activity and to gather pertinent public comments on the proposal. The EA, in addition to being a disclosure document, is also a screening document to determine if the proposed action is of an environmentally significant nature having significant impacts requiring a full EIS. In reviewing all issues associated with this proposal the Department has made a preliminary determination that no EIS is required.

Why isn't an Environmental Impact Statement (EIS) being done? An EIS should be required for any DNR regulatory decision on a large and expensive project. – (Lynn

Broaddus, Peter Gaveras, Rosemary Wehnes, Margaret McGuire, Marilyn Laymas, Belle Bergner, and Cheri Briscoe)

As discussed above, DNR has completed an EA which evaluates projects on an individual manner and evaluates the specific impacts of the proposal. The WEPA decision (EA v. EIS) is not based solely on the costs or size of the proposal, rather it is based on the significance of the issues associated with the specific proposal. The preparation of an EIS does not give the DNR any additional authority to deny or condition a permit. DNR authorities to regulate environmental pollution and alterations to waterways are defined in various regulatory statutes and related Administrative Rules. Appendix B Citizen's Guide to WEPA has been added to the final EA and provides more information about the Wisconsin Environmental Policy Act.

Chapter 5 Proposed Physical Changes-Manipulation of Aquatic Resources

Explain why Honey Creek is not part of the project. – (David Marsek)

Honey Creek has been studied separately by the MMSD. It is not included in this project, because the focus of this project is at the confluence of Underwood Creek and the Menomonee River, before high flows enter the downtown Wauwatosa area. Other improvements were implemented for Honey Creek watershed last year as part of the MMSD's long term plan for flood management in Milwaukee County.

Are there local examples of other diversion tunnels? How reliable are diversion tunnels and what maintenance do they require? – (Lori Delfosse)

Diversion tunnels are common locally in the sewer system and for flood management. The MMSD has high flow diversion structures on Lincoln Creek that bypass high floodwater flows around bridges. They work on the same principle as the proposed Underwood Creek diversion in that during high flows, the water spills over a wall (or weir) and into a pipe or tunnel. Normal water flow is maintained in the creek. While the proposed diversion tunnel for flood flows is longer than many existing examples locally, it operates under the same engineering principles.

The design and operation of diversion tunnels has been well studied and documented. Standard and nationally accepted engineering standards are used in their design.

The biggest maintenance concern will be the removal of debris that accumulates in the tunnel. The MMSD will perform this maintenance after each diversion.

Describe how many trees will be removed near Underwood Creek? – (David Marsek)

Design for Underwood Creek is not yet final, so the actual number of impacted trees in the Underwood Creek Parkway is not established. However, 492 trees (4 inch diameter or greater) were surveyed, because they could potentially be impacted during construction. Of these 369 are Green Ash *Fraxinus pennsylvanica*, 39 American Elm *Ulmus americana*, and 51 Hawthorne *Crataegus spp*. These three tree types make up 93% of the trees that could be impacted. There is also several tree species of note. There is one Bur Oak (4 inch diameter trunk) and two Black Cherry trees (8 and 9 inch trunk diameters). The MMSD will also be planting native shrubs and trees within the project boundaries as part of the project construction.

The MMSD works very closely with the Milwaukee County and the construction and design contractors to minimize damage to trees. There are numerous trees on the project site, and MMSD has agreed to minimize the impact to trees within the project area. The MMSD has hired a certified arborist to undertake a tree survey for all trees with a trunk diameter of 4 inches or greater. The arborist puts a numbered tag and identifies each tree by species, condition, and location, and these values are used to determine a monetary value for each tree which can then be used to compensate Milwaukee County if the trees need to be removed for the project.

The project design should minimize rip rap and utilize native plants, coir matting, biologs and other stabilization methods where possible. – (Cherie Briscoe, Cheryl Nenn)

The use of rip rap was limited to the basin outlet and emergency spillway. This structure would have an impact on the Menomonee River as it would create a large outfall where none currently exists. Aside from a visual impact, this structure would increase the flow and flow velocity in the near vicinity. The increase in flow has the potential to cause erosion downstream of the structure; however, the design of the structure seeks to minimize erosion along the Menomonee River. For inundation events less than than the one percent probability (100-year) flood event, the facility would be designed to release stored water to the Menomonee River slowly and at a non-erosive velocity. For other events and those that exceed the one percent probability event, erosion would be minimized by the placement of riprap at the outlet (refer to page 37 of the EA). The revegetation plan for the area consists of mostly native plant species.

The rehabilitated streambed of Underwood Creek would consist of sand, gravel, and cobbles. These materials would be well-graded, meaning that all sizes of material would be represented. Over time, the flow of water would sort these materials along the stream course and across the width of the stream. For example, smaller gravels tend to accumulate in the downstream ends of the pools, while larger cobbles are moved to the riffles. This range of bed material would provide habitat to benthic macroinvertebrates; these organisms serve as a food source for fish and reptiles (refer to page 49 of the EA). In general, the Underwood Creek bank and bed stabilization would use a combination of bio-engineering and rock protection in recognition of sediment transport, channel scour and incision, channel stability, and geomorphic function (refer to page 76 - 77 of the EA). Intermittently-spaced pools would provide resting habitat along with the rehabilitated streambed that would be "roughened" by rocks of varying sizes. Only native herbaceous, shrub, and trees species would be used to revegetate the creek.

Consider a design that plants evergreen trees along the creek.-(Thomas Byrnes)

Evergeens were not included as part of the Underwood Creek revegetation plan, which focuses on using mostly native species, plants that can tolerate varying soil moisture levels and shade, and plants that provide optimal habitat for fish, migratory birds, and Butler's Gartersnakes. Private property owners may plant evergreens on their property.

Chapter 8 Proposed Physical Changes-Other Changes

What measures will be taken to assure proper design, quality control, construction oversight, and budget control? –(Lynn Broaddus, Cheri Briscoe, Cheryl Nenn)

The City of Wauwatosa, Milwaukee County, and WDNR have been involved in the project scoping and design. The public involvement process has resulted in design improvements in how the diversion functions, the excavation plan, and the planting plan.

The DNR Chapter 30 permit for work in waterways and Section 401 Clean Water Act Water Quality Certification for wetland impacts will include conditions for MMSD to follow. The conditions will require erosion control, wetland protection, waste material disposal and habitat protection. The MMSD must provide DNR with construction sequencing prior to beginning work and provide follow up data within a week of work completion to demonstrate permit compliance. The permit and its conditions must be communicated to employees, consultants and contractors who will be working on the project.

The DNR will conduct permit compliance inspections throughout the construction period. The MMSD will hire a separate firm whose main responsibility is to review permit compliance. This firm will work with the full time resident engineer and the WDNR to review dust control, runoff, erosion control, protective fencing, and other permit requirements.

Budget control will largely be performed by the MMSD resident engineer. That person will ensure that the Contractor performs the required work within the scope of the project as it was bid. As with any large construction project involving excavation, there are potentially differing site conditions from what is expected. These changes will be managed by the resident engineer if they are encountered.

For the long term, the MMSD, Milwaukee County and DNR have agreed upon a Conservation Easement for the Milwaukee County Grounds, in which all parties agree on the unique open space and habitat values the site provides in the community. The goal of the easement is to assure that DNR has authority to oversee and advise the MMSD on the maintenance of the floodwater facility for the long term management of the site for floods, open space and Butler Gartersnake habitat.

What assurance is there that the proposed recreational trails, landscaping, native vegetation management, and other commitments will be fully funded and implemented? –(Cheryl Nenn, Peter Gaveras, and Sheri Briscoe)

A Conservation Easement, which includes an intergovernmental cooperation agreement (ICA), is being established between the MMSD, WDNR, and Milwaukee County in order to manage the floodwater facility and open-space area. The MMSD would own, construct, operate, and maintain the floodwater management facility and construct and maintain the open space area for the five years following construction. Milwaukee County would own the open space area and maintain it following the initial five years. The WDNR does own and maintain the State Forest area. The aesthetic condition of the floodwater facility would be overseen by the WDNR through authority granted by the Conservation Easement. The easement's purpose is to assure that scenic and open space values are retained in perpetuity at the floodwater facility for the benefit of the public. This includes prohibiting any changes to the floodwater management facility that may negatively impact the open space condition or disturb the vegetative communities (refer to page 54 of the EA). Future recreational programming and planning, by Milwaukee County, would determine the level of active and passive recreation in the open space area.

MMSD is committed to implement and provide funds for implementation and maintenance as outlined in the Conservation Easement and ICA.

Chapter 11 Affected Environment-Physical Environment

What happens to the remaining Underwood Creek flood waters after the retention ponds are filled in the initial four hours? –(James Lob)

For floods up to the one percent probability (100-year) flood event, the period of flooding from Underwood Creek is only a few hours. If the basins reach capacity during that time, the remaining flow in Underwood Creek will be conveyed downstream within the creek channel to the Menomonee River. The Underwood Creek and Menomonee River flows will be sufficiently low to not pose a threat to the downstream community unless the flood exceeds the one percent probability (100-year) flood event.

How does the basin project affect the flood waters of the Menomonee River other than the levee system being constructed in the Hart Park area? –(James Lob)

The basin, when operating, will lower flows and elevations throughout the entire downstream Menomonee River. While most discussion of this project has focused on Hart Park, the project is designed to benefit the entire downstream community. Flood elevation reductions of approximately 3 feet will occur in the western Milwaukee area and 0.5 feet in the Menomonee Valley area. Improvements currently being constructed in the Menomonee Valley have anticipated the reduction in flow and elevation from the Milwaukee County Grounds basin.

Identify structures that will be affected by the project. –(James Lob)

Construction of the floodwater facility would not affect residential or other structures. After the floodwater facility is operational and the rest of the watercourse improvements are made, residential structures would be outside of the FEMA floodplain. MMSD estimates that 13 commercial/industrial structures would be in the hydraulic shadow created by the dam structure on the east basin lobe. Approximately 5 of the structures are outside the current FEMA floodplain. The structures would not be required to have flood insurance, since they are considered a low risk for flooding. However the structures would be part of the emergency action planning. Pages 62 - 63 of the EA provide a detailed discussion of structures that would be removed from the existing one percent probability FEMA floodplain.

Will the project affect homes that were flooded due to elevated Mayfair Road, Burleigh, and North Avenue roadways? –(James Lob)

The project is designed to protect property owners along the Menomonee River who are currently in the floodplain. The project addresses flooding from water that overtops the banks of a creek or river and floods nearby structures. Local governments are responsible for design and maintenance of local streets, catch basin, or stormsewer maintenance to address local stormwater drainage.

How does the project affect the Deep Tunnel? –(David Marsek)

The deep tunnel project stores wastewater during periods of heavy rains. The Northwest Side Relief Sewer tunnel that was constructed under the Milwaukee County Grounds site is part of the overall deep tunnel system. It is located approximately 120 feet below the Milwaukee County Grounds. While the Milwaukee County Grounds Basin and Northwest Side Relief Sewer happen to be in the same area, they serve different functions and are independent of each other. The basin stores floodwater from Underwood Creek while the Northwest Side Relief Sewer stores sewerage from the sanitary sewers.

How will the project affect groundwater? –(Peter Gaveras)

Refer to page 26 and Figures 18 & 19 of the EA for discussions of existing groundwater conditions and pages 44 - 46 for proposed impacts.

Groundwater levels may be affected in the short-term as dewatering is required to construct the floodwater management facility and to rehabilitate Underwood Creek. Over the long-term, groundwater would permanently seep into the floodwater basin bottom, creating wetland habitat. Groundwater elevations in the vicinity of the basins would be permanently lowered by an average of fifteen feet, ranging from approximately nine to twenty-three feet west of Swan boulevard and by two to twenty-five feet east of Swan Boulevard. Groundwater modeling indicates that the impact of lowering groundwater elevations could extend 260 feet up-gradient. It is unlikely that the groundwater impacts associated with the completed project would impact the water elevations in Underwood Creek and the Menomonee River, considering their distances from the basin.

Construction dewatering associated with basin construction would not likely affect the WDNR Forestry Education Center forest. Dewatering would primarily impact the permanent water table and is less likely to impact the perched water table that may sustain the trees. This was evaluated through soil sampling and the observed root depths of the trees appear to utilize shallow groundwater and plant-available soil moisture for growth. Through collaboration with the WDNR, a groundwater monitoring plan is being developed and would be implemented prior to the start of construction.

Will the low flow and emergency overflow structures cause future downstream erosion and scour problems in the Menomonee River? If so, how would problems be addressed?–(Cheri Briscoe, Cheryl Nenn)

The effect of the basin outlet on the Menomonee River is discussed on page 37 of the EA. When the low flow discharges from the basin to the Menomonee River, the total flow in the river will increase by about 10%. The increase will not result in appreciably more downstream erosion. If an emergency overflow occurs, it would mean that the area is experiencing a greater than 100-year flood event. Such a flood would already have a significant potential to cause erosion along the river.

Describe the physical safety hazards that may be presented by the Underwood Creek diversion tunnel and the outfall structure (dam) to the Menomonee River. Describe the hazard communication and protective measures that will be put in place. –(Lynn Broaddus, Cheri Briscoe, Cheryl Nenn)

The main hazard posed by the diversion tunnel and outfall structure is that people would attempt to enter the structures in normal (dry) conditions. Both the inlet to the diversion structure and emergency overflow structure will have bars placed at approximately 6-inch spacing to keep people from entering. There will also be standard safety railings placed around the structures to discourage people from climbing on and around them. It is not feasible to fence the structures as it would inhibit their function during flood events.

A second potential hazard could occur during flood events when the structures are operating. For the diversion structure, the main concern would be for someone who is boating on Underwood Creek. Since the diversion structure would not operate until the flow in Underwood Creek reaches 2,000 cfs, it would mean that the boaters are using the creek during extremely high flows already. Signs will be posted along the diversion structure to warn boaters of potential danger (similar to signs used on a dam).

Finally, if it appears that the emergency overflow would be activated (i.e., there was an event greater than 100-year flood), water level sensors will notify MMSD operators who in turn will notify local emergency response officials. This notification will be incorporated into local emergency response plans.

Describe potential physical safety and drowning hazards that may be presented by the basins and the measures taken to address these concerns. –(Joseph Weigel)

While a potential exists for safety and drowning hazards, the risk is minimized by using gentle slopes (4:1 slopes) along the floodwater basin sides to allow escape. Further, the basin bottom will be vegetated to discourage pedestrian traffic. When flood events do occur, floodwater would not enter the basin as a wall of water, but would spread over a large, flat area which should give individuals enough opportunity to leave the basin.

Water enters the floodwater basin via a tunnel stilling basin (refer to Figure 6 of the EA). The purpose of this structure is to slow down the velocity of water before it flows into the floodwater storage basin. A look-out platform would be placed on top of this structure to allow visitors a view of the basin and would be completed with a standard safety railing. However, the portion of the structure that allows water to flow into the basin would be open and not fenced in. This would allow any debris carried by the floodwater to flow into the basin and not held inside the structure and potentially impede flow. A one to two-acre marsh would be created at the outlet of the stilling basin. A key function of the standing water in the marsh is to prevent pedestrians from entering the tunnel as they would have to wade through the marsh to enter the tunnel. In addition, warning signs will be posted at the tunnel, and the relatively brushy vegetation will discourage visitors from entering the tunnel area.

Describe the water quality benefits of the project. What happens if sanitary sewer overflow enters the diversion tunnel and basins? –(James Lob, Pat Mundy, and Cheryl Nenn)

The project is primarily for floodwater storage. It is not designed to have any impact, positive or negative, on water quality. In general, the water quality within the basin that is discharged back to the river will be the same as the water quality within the river.

Whenever there are extreme flood events, there can be overflows within the local sanitary sewer system. Historically, these have occurred within Elm Grove and Brookfield upstream of the proposed project (as they do in several communities). When these overflows occur, they do impact the overall water quality within Underwood Creek and the Menomonee River. The volume of these overflows make less than one tenth of one percent of the total river flow and so they are heavily diluted.

During extreme wet weather events, there is significant debris washed down creeks and rivers. The debris will mostly be screened at the diversion structure. Some debris will pass through the diversion structure and will accumulate in the basin. The MMSD will remove this debris after each event.

Will the Department of Natural Resources require a Water Pollution Discharge Elimination Permit (WPDES) or monitoring for the basins? –(Cheri Briscoe)

DNR will require NR 216, Wisconsin Administrative Code, construction site stormwater discharge and possibly ch. 283, Wisconsin Statutes, pit trench dewatering WPDES permits during construction. DNR has no WPDES regulatory authority for basin operation and will not require monitoring.

Describe the proposed basin maintenance activities and indicate how citizens may comment on the proposed activities. –(Lynn Broaddus, Cherie Briscoe)

The long term basin vegetation will be maintained by DNR with funding by MMSD. MMSD will provide cleanup of the basin after a flood event that uses the facility. Routine inspections of the basin including the inlet structure and outlet structure will be performed by MMSD. Citizens can call MMSD (414) 272-5100 during normal business hours to comment on the basin maintenance activities.

Analyze potential thermal variations between the basins and the Menomonee River. Discuss potential impacts. –(Cherie Briscoe, Cheryl Nenn)

The anticipated thermal impact of discharging basin water into the Menomonee River is expected to be minimal, as the discharge rate was designed to be 10% of the Menomonee River flow. In addition, the floodwater is designed to be stored a maximum of four days for a one percent probability event, with decreasing storage times for smaller rain events. The water temperature should not appreciably change during this time.

Chapter 12 Affected Environment-Biological Environment

Describe existing mosquito issues, including West Nile virus, in the project area. Describe potential project impacts and management strategies. –(James Leming, Richard Steyre)

Any lowland or wetland is considered potential habitat for mosquitoes, since mosquitoes rely on water to complete a portion of their life cycle. The Milwaukee County Grounds and Underwood Creek project areas have mosquito habitat in the existing lowlands and wetlands. However, the lowlands, wetlands, uplands, and the creek provide habitat to birds, mammals, insects, frogs, and fish that prey on mosquitoes.

The floodwater facility and creek rehabilitation have been designed to include lowlands, wetlands, and uplands with varying vegetation that would provide habitats for natural predators of mosquitoes. The stilling basin located on the west side of floodwater basin's west lobe is the only location where standing water is to occur by design, but the immediate surroundings would provide habitat for predators through varying vegetation and open space. Therefore, the management and maintenance plan for the facility does not include active strategies, such as spraying, for the control of mosquitoes. No significant impact is expected.

West Nile is carried and transmitted to humans thru the bite of a female mosquito. The virus has been known to affect birds, horses, and humans. The Centers for Disease Control and Prevention (CDC) indicate that less than 1% of people bitten by infected mosquitoes develop West Nile meningitis or encephalitis and that four out of five infected people do not know they were exposed. Several mosquito species carry and transmit the virus but in differing efficiencies. The *Culex pipiens* mosquito has been well documented to carry and transmit the virus to humans efficiently, however this species preferred breeding habitat is not wetlands or low lands: it is containers filled with water. The habitat provided by the Milwaukee County Grounds floodwater facility and the Underwood Creek rehabilitation project will not result in a significant increase in the preferred habitat for the *Culex pipiens* mosquito. The species which is currently being produced by the Milwaukee County Grounds and the Underwood Creek Rehabilitation project is a species called *Aedes vexans* which is not efficient at transmitting the virus.

Describe existing Butlers' Gartersnake issues in the project area. Describe measures to minimize impacts. –(Cheryl Nenn, Cherie Briscoe, and William Moore)

Page 47 of the Environmental Assessment provides a discussion on the existing habitat on the project site. The project team conducted a survey of the entire County Grounds project site and the Underwood Creek corridor between STH 100 and its confluence with the Menomonee River (Casper, 2005). Butler Gartersnake habitat is present both in the County Grounds as well as along the Underwood Creek Corridor. Approximately 16.7 acres of a 34-acre Tier 3 habitat would be affected by the Floodwater Management Facility. Approximately 10.5 acres of Tier 3 habitat within the Underwood Creek project area would be impacted by rehabilitation activities. The MMSD has submitted a Conservation Plan to the DNR, which outlines the long term management of snake habitat at the Floodwater Management Facility and in Underwood Creek. The east lobe of the facility will be managed in perpetuity as Butler Gartersnake habitat, resulting in approximately 38 acres of habitat. The MMSD has committed to managing the habitat through a Conservation Easement with DNR and Milwaukee County.

In Underwood Creek, approximately 11 acres of habitat is expected to be restored through the rehabilitation of the creek corridor. As described in the Conservation Plan, MMSD will fund, and be responsible for managing habitat in the Underwood Creek corridor.

Describe existing avian resources and issues in the project area. Describe potential impacts and management strategies. –(Christine Zapf)

Existing avian resources of special concern are described on page 35 of the EA, including the *Icterus spurious* (Orchard Oriole) and *Circus cyaneus* (Northern Harrier). Potential impacts and management strategies are described on page 48 of the EA. Management strategies include prohibiting vegetation clearing during the breeding season from May 15 to June 15.

Describe existing herptile resources and issues in the project area. Describe potential impacts and management strategies. –(David Musil)

A herpetologist surveyed the project area in 2000 and 2005. Herptiles that were observed include Butler's Gartersnake, Common Gartersnake, Eastern American Toad, Northern Green Frog, and the Snapping Turtle. The Butler's Gartersnake is listed as a State Threatened species. There will be a short-term impact to the herptiles as construction will disrupt their habitat. A conservation plan was developed to outline how the project would avoid, minimize, and mitigate its impact to the Butler's Gartersnake and its habitat. It is expected that the acreage of habitat will increase when the project is complete and the vegetation is fully established

Describe the impacts on local forests and wetlands. –(Lori Delfosse)

Overall, impacts to forests are anticipated to be minimal. This includes forty acres of forest located within the WDNR property and west of the floodwater basin (formally known as the Wil-O-Way woods), eighteen acres of forest located between Underwood Creek and Underwood Creek Parkway, and a woodland habitat located south of the eastern portion of the basin.

Several tree stands around the floodwater basin, identified through the public involvement process, would be avoided. Nursery stock trees located within the former Milwaukee County Nursery would be cut as that area would be excavated to form the west lobe of the floodwater basin. Some of the smaller nursery trees, however, would be re-used to vegetate the project area. More discussion of project impacts on local forests is included on pages 32, 45, 47, and 48.

Wetland impacts are discussed on pages 50 - 52 of the EA. Excavation, filling, and Underwood Creek rehabilitation activities would impact approximately 4.69 acres of wetlands on the Milwaukee County Grounds and along Underwood Creek. Wetland mitigation and management, according to U.S. Army Corps of Engineers (USACE) guidelines, is planned for the rehabilitated Underwood Creek corridor with an anticipated 7.7 acres of wetlands to be reestablished. It is anticipated that the establishment of wetland and wet meadow habitat in the bottom of the basin after project completion and vegetation establishment will also increase wetland habitat.

Describe efforts to protect wildlife and habitat. -(Peter Gaveras, Margaret McGuire)

The existing wildlife habitat would endure a short-term impact during construction, and wildlife would be temporarily displaced. The WDNR Forestry Education Center, with approximately forty acres of forest, would provide interim habitat for wildlife displaced from woodlands elsewhere on the project site. In addition, there are approximately eighteen acres of upland woodland habitat, located between Underwood Creek and Underwood Creek Parkway, and an isolated natural resource area located south of the east lobe of the basin, that would serve as interim habitat for wildlife displaced by

construction. Not only would construction be limited in these interim habitats, these sites are relatively well distributed across the project site. Refer to page 48 of the EA.

Describe the existing fisheries resources in the Menomonee River basin. –(David Marsek)

Refer to pages 26 - 27 and pages 49 - 50 in the EA for a discussion of existing fish resources and project impacts.

In 2002, staff at the University of Wisconsin – Milwaukee Stream Ecology Laboratory conducted a fish survey within the project reach. Eleven species of fish at the confluence of Underwood Creek and the Menomonee River were found. At ½-mile upstream in Underwood Creek, six species of fish at were inventoried. A third sample point was located approximately one mile upstream of the confluence where six species of fish observed. The most common fish species were the Green Sunfish, Bluegill, and the Blacknose Dace. The abundance of fish observed at Underwood Creek's confluence with the Menomonee River (natural channel) was over twice that observed in the concrete-lined section.

The existing concrete channel is susceptible to high thermal loading, causing water temperatures to be elevated above natural conditions during the summer months. This situation results from the general lack of shade by riparian trees; the conditions of wide, shallow sheet flow; the heat-absorption capacity of concrete; and the lack of groundwater/surface water interchange. The rehabilitated Underwood Creek channel would include a narrow low-flow channel that would concentrate low flow over gravels and cobbles. Pools would allow an interchange of stream water with groundwater. Trees would grow along the margins of the bankfull channel. All of these conditions would serve to reduce water temperature relative to the existing concrete-lined channel. Removal of the concrete creek bed and the creation of a rock-lined channel with alternating pools and riffles would provide fish habitat. Thus, the quantity and quality of existing habitat would be greatly improved.

Assess the fish entrapment and measures to minimize fish entrapment. –(Cheri Briscoe, Cheryl Nenn)

Please refer to pages 49-50 of the EA for a more detailed discussion about fish entrapment. There is a risk of fish entrapment to occur during large storm events. The likelihood of that occurring is low, based on the following:

• The weir elevation in the diversion structure along the Underwood Creek bank would be 6 feet above the bottom of the low-flow channel, meaning that there would be a 6 foot water column in the creek before water would begin diverting into the floodwater facility. Normally, fish shelter themselves in the bottom of creeks during high flows. Therefore, the potential for fish entrapment is low, because fish would be more likely sheltering themselves at the bottom of the creek bed versus swimming at the highest water level in the creek. • The frequency of entrapment is expected to be low as diversions are anticipated to occur when flows reach a probability of 25% (4-year) flood event. The frequency of entrapment may be further reduced since a diversion would likely occur only four to eight hours for a given flood, or fish may not be migrating during an event.

A fish barrier is not practical given the large volume of water being diverted and the rapid rate at which flows increase in the creek. Should fish become entrained, they would be carried into the basin, which drains via a low-flow channel and allows fish to swim out of the basin and into the Menomonee River.

Assess the impacts of storm events exceeding 25% probability to Underwood Creek fisheries. (Cheri Briscoe, Cheryl Nenn)

A discussion of project impacts on fish is given on pages 49 - 50 of the EA. The Underwood Creek project reach would serve as a transportation corridor for fish moving upstream to seek spawning and rearing habitat. Northern Pike have been identified as the target species for fish passage with this project, since Northern Pike are a weak-swimming fish. The use of Northern Pike's ability to swim upstream as a criterion ensures that most aquatic species of interest are able to swim upstream through the rehabilitated channel.

Concrete-lining removal (channel bottom only and the removal of concrete-lined channel bottom and sideslopes) and other in-stream and bank habitat features (e.g. asymmetrical pools, deeper runs, large rock, etc.) would provide additional refuge for fish and other aquatic life during high flow and velocity events. Using a one-foot long Northern Pike as a basis for evaluating fish passage and assuming that the pools in the rehabilitated bankfull channel provide refuge, upstream fish passage in the rehabilitated creek would be provided for flows up to about thirty cubic feet per second (cfs). Above thirty cfs, the velocities in portions of the bankfull channel would begin to exceed the swim capabilities of a one-foot long pike. Flow duration information for Underwood Creek indicates that a flow of thirty cfs would be equaled or exceeded only about ten percent of the time. Upstream fish passage would not be provided at high flows as high water velocities in the channel would exceed the swimming capabilities of Northern Pike (and other fish species). This would not differ from a natural stream setting, where water velocities associated with high flows would limit or prevent upstream fish migration.

There would be no diversion and no anticipated impacts to fisheries up to the approximately 5-year storm event in Underwood Creek. Between the 5-year (25%) event and 10-year (10%) event, there is very little diversion of floodwater (the top few inches of an estimated 6-foot water column) and no impact is anticipated to fisheries. Diverted floodwater volumes increase as larger (but less frequent) events occur. As noted in a previous response, fish tend to shelter themselves in the creek bottom during high flows. However, there is a risk during high flows that fish will be entrained in the diversion structure. Should fish become entrained, they would be carried into the stilling basin and the floodwater basin . For such events, the water will drain from the basin over a period of a few days. The water drains through the low level outlet and into the Menomonee River. Fish would tend to follow the relatively slow current through the basin towards the low level out. The relatively slow velocity through the outlet would allow the fish to migrate back into the Menomonee River. In summary, very few fish are expected to be washed into the basin and those that are could migrate back out. Still, it is acknowledged that there could be some fish mortality in these 25 to 100-year events, including fish remaining in the stilling basin as floodwater drains through the low level outlet. These impacts to individual fish should not affect the overall fish population.

Chapter 13 Affected Environment-Cultural Environment

Will the project include recreational trail and canoe launch facilities? –(Ron Grimm, Cheryl Nenn, and Marty Weigel)

A discussion on land use is on pages 31 - 32 and 53 - 55 of the Environmental Assessment. An intergovernmental cooperation agreement to manage the floodwater facility is being established between the MMSD, WDNR, and Milwaukee County. The MMSD would own, construct, operate, and maintain the floodwater management facility. Milwaukee County would own and maintain the open-space area. The WDNR does own and maintain the State Forest area. The easement's purpose is to assure that scenic and open space values are retained in perpetuity at the floodwater facility for the benefit of the public. This includes prohibiting any changes to the facility that may negatively impact the open space condition or disturb the vegetation communities (refer to page 54 of the EA).

A service road, that will be available for public pedestrian and bicycle access, would be placed around the perimeter of the floodwater basin. Future recreational programming and planning, including trails, for the open space area would be determined by Milwaukee County. Likewise, the WDNR would plan recreation for the hardwood forest. There are no canoe launch facilities planned for Underwood Creek or the Menomonee River.

Describe pedestrian facilities on Swan Boulevard Bridge. –(Richard Kraus)

A discussion of the bridge is given on page 39 of the EA. Sidewalks would be placed on both sides of the bridge and protected by a railing. The sidewalk and railing would be about nine inches lower than the traffic lanes in order to allow views of the basin and open space area by vehicular passengers. The sidewalks would be connected to the access road surrounding the basin. The access road would also pass beneath the north and south sides of the bridge.

Describe the current use of the project area for dog walking.-(Barbara A. Eichenseer, Barbara G. St. George, Don and Char Galligan)

The project area is informally used for dog walking. Currently, there is no area formally designated for dog walking on Milwaukee County Grounds by Milwaukee County Parks.

Where can dogs be walked during project construction? –(Laura Merton-Gill)

Milwaukee County has areas designated for dog walking. Refer to the Milwaukee County Parks website (http://www.county.milwaukee.gov/display/router.asp?docid=7720) for a listing of parks and parkways that are open to dog walking or call 414.257.6100 for a brochure. Dog walking within the project active construction site is strictly prohibited.

Will dog walking be allowed in the project area in the future?.-(Barbara A. Eichenseer, Barbara G. St. George, Mary-Ellen Smith, Barbara Lund, David Grill, Don & Char Galligan, James Leming, Lori Delfosse, and Janet Anderson)

Milwaukee County has a policy for dog walking, and they determine parks and parkways that are open for dog walking. DNR Forestry Center planning will evaluate if on-leash dog walking can be compatible with educational programs. Off-leash dog walking will not be allowed on DNR land. MMSD will work with DNR and Milwaukee County to establish appropriate regulations for dog walking on the Flood Management Facility.

Who will be responsible for garbage and debris cleanup? –(Peter Gaveras)

Activities such as vegetation management, clearing of racks designed to trap garbage on the diversion and outlet structures, inspections, etc. would be performed for the floodwater facility by the MMSD in order to optimize the long-term performance and maintain the appearance of the facility. MMSD would also address debris that could potentially be deposited in the facility as a result of an inundation event (page 46 of the EA). The maintenance of the open-space area and state forest would be performed by Milwaukee County and WDNR, respectively. These responsibilities are outlined in an intergovernmental cooperative agreement established among MMSD, Milwaukee County, and WDNR.

Chapter 14 Affected Environment-Other Special Resources

Describe temporary and permanent construction impacts that may affect Fisher Parkway. (Thomas Byrnes)

There will be no permanent construction impacts to Fisher Parkway. Temporary access for construction equipment may be required, but the location and duration of access is undetermined at this time.

How will construction impacts be minimized?-(Dorothy Ann Phinney, Peter Gaveras, Thomas Byrnes, Belle Bergner)

A discussion of the construction schedule and impacts is given on pages 43 and 44 of the EA. In general, construction would proceed in accordance to WDNR and City of Wauwatosa permits that regulate stormwater discharges during construction, dewatering, erosion control, hauling routes, traffic control, working hours, and noise (required permits are given on page 16 of the EA). Construction equipment will operate

approximately 200 feet away from the Eschweiler buildings to minimize vibrations. Disturbance from hauling will be limited to Swan Boulevard, as this is the only road to be used for construction access.

How will DNR enforce permit compliance? Will DNR require bonding? Will there be a third party inspector? –(Lynn Broaddus, Cherie Briscoe)

The DNR will conduct routine permit compliance inspections throughout the construction period. DNR will not require bonding. The MMSD will hire a separate firm whose main responsibility is to review permit compliance. This firm will work with the full time resident engineer and the WDNR to review dust control, runoff, erosion control, protective fencing, and other permit requirements.

Chapter 15 Environmental Consequences-Physical and Aquatic

How can you quantify that removing the concrete from Underwood Creek will provide any benefit? -(Penny McCanles)

Benefits to removing concrete within Underwood Creek are discussed on pages 11 - 13 in the EA. Design alternatives for removing concrete are discussed on pages 75 and 76 of the EA. The diversion of water from Underwood Creek during high-flow events to the floodwater facility creates an opportunity to rehabilitate and modify Underwood Creek from STH 100 downstream to its confluence with the Menomonee River, approximately 6,600 linear feet. The creek is currently lined with concrete, and removing concrete without the diversion of flows to the floodwater facility would result in increased flow elevations and local flooding along Underwood Creek. The existing project reach has little to no ecological function and is very "flashy," characterized by relatively high peak flows and velocities during rainfall events in the Underwood Creek subwatershed.

The rehabilitation of Underwood Creek would create better watercourse aesthetics by allowing the public to experience Underwood Creek in a more natural condition, improve habitat for resident and migratory fish populations, and reduce the risk of drowning during high flow events while maintaining the appropriate water level for floodwater management.

To accomplish this, the watercourse rehabilitation effort would:

- Alter the channel bottom profile to eliminate concrete drop structures and alter the horizontal channel alignment to incorporate main channel meanders (where space allows) and associated riffles and pools,
- Replace portions of the concrete channel lining with bioengineered cross-sections that promote aquatic and upland habitat, and
- Develop a more naturally functioning floodplain (where space allows) that would experience relatively frequent inundation and allow the re-establishment of adjoining wetland areas and habitat.
These rehabilitation efforts would be accomplished while providing an appropriate level of flood management along Underwood Creek for the one-percent probability (100-year) flood event.

Is the ecological benefit of removing concrete from Underwood Creek offset by the ecological impact of the diversion tunnel? -(Sheri Briscoe, Cheryl Nenn, and Penny McCanles)

The diversion of water from Underwood Creek by itself is not necessarily a negative ecological impact. Normally, diversions from streams are not a benefit to the stream. The natural variation in flows from low to high are an important aspect in overall stream function. In the case of Underwood Creek, the development of the watershed has resulted in un-naturally high flows that impair the Creek's ecological function. The diversions do not occur until there is a great amount of flow in the Creek. At this point, the diversion will actually help protect the downstream ecological function by limiting the amount of severe erosion along the creek channel bottom and side slopes.

Chapter 17 Environmental Consequences-Cultural

How was the county land acquired? Are there limitations on it use? –(William Moore, Gay Leigh Mundy-Calhoun, Janet Anderson)

The northeast quadrant of the Milwaukee County Grounds has been publicly owned for approximately 150 years for use as a public "poor farm". A 1989 land use plan had reserved a portion of the quadrant for future Milwaukee Regional Medical Center expansion, but it was later determined that the medical facility had sufficient land reserves in other areas and no longer needed land in the northeast quadrant. In addition, the County sold its power plant located north of Watertown Plank Road to Wisconsin Electric Power Company in 1995.

In 1999, the Milwaukee County Board passed resolution 99-460 relating to land use planning of the entire Milwaukee County Grounds, which was based on a consensus of stakeholders, general public, and surrounding community. The resolution stated that no development should be in the area north and west of Swan Boulevard, that land east of the Eschweiler complex should not incur office, residential or commercial development, and that discussions with MMSD regarding the floodwater storage facility within the Northeast quadrant continue.

In 2004, Resolution 03-323 was passed that authorized the placement of a floodwater storage facility at the Milwaukee County Grounds. An Intergovernmental Cooperation Agreement (ICA) between Milwaukee County and MMSD addresses the acquisition of land for the floodwater facility. A conservation easement established between Milwaukee County, MMSD, and WDNR limits the floodwater management facility to retain scenic, open space, and habitat values in perpetuity for the benefit of the public.

In April 2005, a resolution requesting the approval of the Ecological Restoration Plan for the Northeast quadrant of the Milwaukee County Grounds was passed. Refer to pages 15 and 54 of the EA.

Is the county land development a disincentive to future land gifts? –(William Moore)

The Ecological Restoration plan for the County Grounds, which is supported by Milwaukee County, balances the interests of all stakeholders. Individuals consider many personal factors when making charitable gifts.

Would the county land have greater ecological and cultural benefit if it was utilized as a park? –(Cherie Briscoe, Catherine Porter)

The current configuration of the Floodwater Management Facility and the surrounding open space are the culmination of extensive land use planning efforts over the last seven years. The majority of the County Grounds are not currently managed for any specific use and the planning efforts have resulted in a cohesive long-term plan that balances a variety of interests and needs. The planning efforts incorporated the input from a broad range of stakeholders including Milwaukee County, DNR, the MMSD and many various interest groups. The design of the facility is consistent with Milwaukee County's plan to preserve the majority of the County Grounds for open space and the future DNR Forestry Education Center. The facility itself will result in a net gain of Butler Gartersnake habitat as well as upland and wetland habitat to be used for a variety of wildlife in the area. The surrounding open space will be available for passive recreation and any future programming determined by Milwaukee County.

What is the benefit achieved for the cost of constructing the project for flood protection for a narrow range of storm events. That is, the construction is very costly and the basins appear to be used infrequently and there would still be impacts for storms greater than the 100-year flood event. – (Cheri Briscoe, Belle Bergner, and Rosemary Wehnes)

The basin is designed to be used infrequently because it is only during major flood events (such as the 1997 and 1998 events) that diversions are needed to protect downstream property owners along the Menomonee River. Since 1973, Milwaukee County experienced \$138 million in property damage and four fatalities. The system is designed to operate for a wide range of floods between 10-year and 100-year events.

It is common practice and a standard in the community and thoughout the nation to design for floods up to a 100-year event. Addressing floods of greater magnitude become prohibitively expensive.

Estimates of commercial and domestic damage to homes and businesses from the 1997 and 1998 flooding were around \$11million. The project will cost \$84 million to protect 175 homes at approximately \$480,000 per home. Explain the cost effectiveness of the project.-(James Lob, Cheryl Nenn)

Refer to page 7 of the EA for a detailed discussion of the impacts of flooding in the Menomonee River watershed. Since 1973, Milwaukee County experienced \$138 million in property damage and four fatalities. During this time period, the region had nine flood-related Presidential-declared disasters and two Presidential emergencies. Review of meteorological data, from 1990 to 2003, further substantiates the need for floodwater management in the Milwaukee area. During this time, Milwaukee County experienced 112 severe thunderstorm watches and eighty severe thunderstorm warnings.

Pages 62 - 63 of the EA provides further discussion of structures removed from the floodplain. There are approximately 289 residential and commercial structures located within the existing one percent probability event FEMA floodplain that are currently required to have flood insurance. Once the Milwaukee County Grounds facility is functioning, and other related Menomonee River projects are complete, all structures would be removed from the one percent probability event and no longer be required by regulation to obtain insurance. It has been the MMSD policy to protect structures within the floodplain. Acquisition and demolition of private structures is not considered the preferred solution.

Through its Watercourse policy, the MMSD adopted a watershed-based approach to floodwater management. The policy guides the MMSD to provide floodwater management solutions that can also rehabilitate natural stream functions, improve water quality and reflect public input that also includes cost-effectiveness.

The proposed cost for this project was \$70 million in 2001. A recent newspaper article described the current cost estimate at \$84 million. Explain the cost increase. –(James Lob)

Within the past five years of stakeholder input there have been changes that have had a minor increase in costs. Most of the increase in costs are related to annual inflation rates of about 3% per year.

Compare the initial and long term costs of the proposed single large basin alternative and multiple small basins dispersed through the region. -(Cheri Briscoe, Cheryl Nenn, and Rosemary Wehnes)

An alternatives analysis, that describes the development of thirteen different watershedscaled solutions to provide effective and practical solutions for flood abatement in the Lower Menomonee River, can be found on pages 65 through 71 in the EA. Previous analyses (<u>Phase I Watercourse System Management Plan – Menomonee River</u>. Camp, Dresser, & McKee, August 2000.) compared alternatives that focused on providing flood management through:

- Regional Storage This alternative would include developing six large storage sites in the watershed. About 325 structures would need to be acquired to construct the regional storage facilities, which is more than the 275 that currently need flood protection. The construction cost was estimated at about \$421million. This alternative was not considered feasible, due to the high construction costs and large required storage volume.
- Local Storage This alternative would include developing about 100 smaller storage sites in the watershed. This alternative was not considered feasible, because more than 5,000 structures would need to be displaced in order to construct the facilities and would cost about \$1,850 million to construct. Local storage is most effective when applied to individual developments and becomes less cost-effective for resolving existing regional flooding.
- Subregional Storage This alternative would include developing a combination of regional and local storage. 323 structures would be displaced for constructing the storage facilities. Estimated implementation cost was approximately \$321million. This alternative was not considered feasible due to the number of affected properties.

The Milwaukee County Grounds floodwater management facility is part of an alternative that includes other flood management solutions, including floodplain lowering, floodwalls, natural storage, and local stormwater runoff controls. It is not a stand alone project. It was also designed to work together with floodwater management projects located downstream of the Menomonee River Mainstem and Underwood Creek confluence, including the Falk Floodwall, Valley Park neighborhood, Western Milwaukee, and Hart Park. These projects use a combination of floodplain lowering, flood walls & levees, bridge removal, property acquisition, and structure floodproofing. However, these projects require upstream storage or detention to further reduce flood flows, peak water surface elevations, and to remove structures from the floodplain. These projects are intended to work as one system and require each other to function properly, even though they are to be constructed at separate locations.

Do local residents near the County Grounds experience a disproportionate cost for the regional flood control benefits of the proposed single large basin? -(Cheryl Nenn and Mary Kamps)

The MMSD funds watercourse projects within Milwaukee County out of its capitol budget which is paid by all ratepayers within Milwaukee County. Ratepayers outside the MMSD fund those projects that are located with the watershed(s) in which their community resides. The Milwaukee County Grounds Floodwater Management Facility and Underwood Creek Rehabilitation will minimize the number and magnitude of flooding problems in the area and will keep the Milwaukee County property as open green space. Local residents are not expected to experience disproportionate economic or other permanent impacts. There will be temporary localized construction impacts.

Will the project impact cemeteries or historic buildings? –(anonymous)

Pages 33-34 of the EA discuss archeological and historical resources in the project area. One site determined not eligible for listing on the National Register of Historic Places (Overstreet, et.al., 2000) is within the planned area of disturbance. Construction of the outlet and emergency overflow structures will require removal of about 100 feet of a WPA-era revetment wall along the south bank of the Menomonee River. The wall is considered eligible for the National Register of Historic Places. The MMSD has entered into a Memorandum of Agreement with the U.S. Army of Corps of Engineers and the State Historic Preservation Officer to coordinate design of the structures with the SHPO's office to assure that the structures complement the existing wall to greatest possible extent. All buildings and cemeteries are outside the planned area of disturbance.

Chapter 18 Environmental Consequences-Other Special Resources

Describe the aesthetic changes of the existing public green space. –(Cherie Briscoe, Catherine Porter, and Erika Voss)

A discussion of visual impacts to the project area is given on pages 39 - 41 of the EA. The existing lands anticipated to be impacted by the floodwater management facility consist of a number of relic landscape features, including the former Milwaukee County tree nursery, abandoned railroad tracks, fences, roads, old building foundations, and utilities. The community gardens and the former Milwaukee County Nursery would be replaced with a large open basin. Nearly two million cubic yards of material would be excavated to form the basin and much of that material would be placed in the open space area. The topography of the land used for the former community gardens and old fields, located south of Swan Boulevard and in the open space area, would be impacted by the placement of excavated fill. The grading plan for the basin and for the open space area was designed to maintain a natural appearance with topographic undulations that emulate Wisconsin's natural topography, including variable elevations and slopes. The establishment of five different vegetation communities would complement the grading of the open space area and the basin. The variable topography would result in variable soil moisture regimes, aspects, and temperatures; this would lead to a relatively diverse suite of habitats for wildlife and vegetation. The final grading of the open space area and the planned establishment of a prairie community would allow long views of the site. Some specific areas would also be planted with trees and shrubs to enhance the undulating terrain. Tree plantings would be used to define outdoor spaces and land uses, when possible.

The existing view of Underwood Creek includes a concrete-lined channel with several drop structures. Un-managed vegetation currently crowds the creek's banks and inhibits public access. The concrete-lined creek bottom would be removed from the project reach along with portions of the concrete-lined sideslopes. The rehabilitated channel would consist of a floodwater conveyance corridor, bankfull channel, and a low-flow channel. Meanders would be introduced, with the low-flow and bankfull channels and even the

floodwater conveyance corridor along the upstream portion of the project reach (refer to Figures 5A and 5B if the EA). Downstream of USH 45, a berm would be constructed along 930 feet of the northern bank and along a stretch of Fisher Parkway. The berm would have an average height of 2.5 feet and would be constructed of earthen materials and planted. Portions of the berm along the north side of Underwood Creek would be visible from Fisher Parkway and the Underwood Creek riparian corridor, including the creek. The creek would be revegetated with native herbaceous, shrub, and trees species.

Explain the purpose and need for a Forestry Education Center. Consider if it is appropriate to use government facilities to promote private industry. Assess the costbenefit of the proposed Forestry Education Center compared to open space. –(William Moore, Joanne Schoenecker, Deb Strzelecki, and Sharon Bertrand)

The Forestry Education Center will serve as an education resource, outdoor learning, and recreational open space facility for urbanized southeastern Wisconsin. The facility will offer visitors an opportunity to attend educational programs, use interactive displays, attend in-the-wood demonstrations, participate in passive outdoor recreation and learn about the value and benefits of Wisconsin's forests. The Forestry Education Center will showcase the social, ecological and economic benefits of sustainable forestry and habitat management practices which benefit a wide variety of conservation and business interests throughout Wisconsin. The DNR conducted a Forestry Education feasibility study and a market niche analysis. Both studies indicate a need for the Forestry Center. If you would like additional information, please contact Don Tills, DNR (414) 303-4927 donald.tills@dnr.state.wi.us.

Chapter 20 DNR Evaluation of Project Significance-Environmental Effects and Their Significance

Describe short term construction impacts on wildlife. – (Dorothy Ann Phinney, Thomas Byrnes)

Wildlife habitat would be temporarily disrupted during construction in the basin, openspace areas, and along Underwood Creek. It is expected that wildlife would move to the State Forest, Menomonee River, an isolated natural resource area located south of the east basin, and the upland woodlands and upstream reaches of Underwood Creek. Not only would construction be limited in these interim habitats, these sites are relatively well distributed across the project site. Refer to page 48 of the EA.

Chapter 25 Alternatives-Impacts of No Action and Alternatives that Decrease or Eliminate Adverse Environmental Effects

Consider a regional or sub-regional alternative that incorporates smaller, low-lying basins along both Underwood Creek and the Menomonee River, which could be designed to store floodwater as well as provide improved wildlife habitat, aesthetics, and recreational opportunities for local residents. - (Cheri Briscoe, Cheryl Nenn, William Moore, Mary Kamps, and Rosemary Wehnes) An alternatives analysis, that describes the development of thirteen different watershedscaled solutions to flood abatement for the Lower Menomonee River, can be found on pages 65 through 71 in the Environmental Assessment (EA). The main concern expressed by stakeholders regarding the local storage options was in regard to the need to acquire hundreds of residential homes.

Providing flood abatement on a local, sub-regional, and regional scale has long been studied for the Menomonee River. SEWRPC published a study in 1976 that reviewed several alternatives and recommended natural storage preservation. Since 1976, much of the natural storage areas had been developed. Following the 1997 and 1998 floods, MMSD determined where runoff contributes to stream flow, peak flow rates and stages at various locations along the river, and which structures would be damaged. With this information thirteen alternatives were developed to solve flooding issues along the Menomonee River. The alternatives included providing about one hundred storage sites at the local scale, a sub-regional storage scheme where there were several storage sites, a regional storage scheme that included storing floodwater at Milwaukee County Grounds and Timmerman Field, and a combination of the above.

Each of the alternatives was screened with several criteria, including: regulatory approval, physical feasibility, public concerns, environmental impacts, property acquisition impacts, general risks, open space, recreational use, constructability, and cost. Six public meetings and six community workshops were held in 1999 to discuss the alternatives with the public. Milwaukee County sponsored a public meeting in 2003, Wauwatosa Tomorrow sponsored a forum in 2000, and a Town Hall meeting was held in 2000 to facilitate public discussions. Stakeholder meetings, small group meetings (neighborhood groups, Wauwatosa Kickers, and environmental groups), and newsletters (distribution of 24,000) were also held. The alternative that included building a floodwater storage facility at the Milwaukee County Grounds site was selected through the above process.

Consider an alternative using native plantings along existing stream banks, installing rain barrels, rain gardens, and green roofs on public and private property.-(Belle Bergner and Janet Anderson)

These items were included in the watershed-based alternatives analysis and in the selected alternative (refer to Table 1 on page 9 of the EA). The idea behind these solutions is to provide storage at the property scale, and they are effective for the two-year storm. Developed areas can reduce their current stormwater runoff volumes by incorporating these items. However, they are not the sole answer. The selected alternatives uses a combination of property storage, preservation of natural lands and wetlands, detention basins, levees, floodwalls, and floodplain lowering in order to remove structures from the floodplain.

Consider an alternative removing the concrete from Underwood Creek with no new storage basin. - (Erika Voss, Gail Epping Overholt, and Janet Anderson)

Several studies by SEWRPC and MMSD evaluated the alternative of removing concrete from Underwood Creek without providing storage at Milwaukee County Grounds and with providing storage in the upper reaches of Underwood Creek. SEWRPC's analysis concluded that removing concrete from Underwood Creek, without other mitigation measures, increases the one percent probability event flood stages throughout the stream reach. Increasing the flood stage (or height of water flowing through the creek) impacts several structures located along the perimeter of the creek. Further analysis of concrete removal along with other mitigation measures such as overbank lowering, adding retention area, and streambank stabilization still did not avoid the flood hazard to structures along Underwood Creek. Furthermore, adjacent recreational fields along the stream reach would experience increased flooding.

When the diversion for the Floodwater Management Facility was proposed, there was a new opportunity to rehabilitate the Underwood Creek channel by removing the concrete and still meet flood abatement objectives in the Menomonee River watershed. MMSD and WDNR then developed objectives in order for the channel modifications to be compatible with overall watershed improvements and to support the development, with regulatory approval, of the Floodwater Management Facility. Refer to pages 12 and 75 - 77 of the EA.

Consider an alternative using basement floor drain check valves to prevent backflow flooding of basements.-(James Lob)

When the Menomonee River has flooded, structures have been damaged by street flooding, entry of water through doors and windows in structures, as well as basement backups. Basement check valves may protect some basements from some flooding. They would not address the main source of flooding, which is simply the overall land flow of water in and around residential and commercial structures.

Flooding also provides a major safety concern for the community, which would not be addressed by check valves in basements.

Describe existing wetlands, efforts to minimize wetland impacts, and wetland mitigation. – (Cheri Briscoe, Belle Bergner, William Moore, Cheryl Nenn, and Wilma Boese)

Existing wetlands are discussed on pages 28 - 31 and illustrated on Figure 20 of the EA, and wetland impacts, avoidance, minimization, and mitigation are discussed on pages 50 - 52 and 77 - 82.

A total of twenty-two wetlands were identified in the project area during 2005 and 2006 field investigations. They cover approximately 12 acres in total area and are described as

a combination of shrub-carr, wet meadow, sedge meadow, floodplain forest, and shallow marsh.

Many wetlands on the project site are avoided or the impacts minimized through design and grading modifications. Excavation, filling, and Underwood Creek rehabilitation activities would impact approximately 3 acres of wetlands on the Milwaukee County Grounds and 1.69 acres along Underwood Creek, which would be mitigated according to U.S. Army Corps of Engineers (USACE) permitting requirements. The rehabilitation of the Underwood Creek corridor would establish approximately 7.7 acres of wetlands. The rehabilitation in the creek corridor would mitigate wetland impacts from Underwood Creek construction activities and on the County Grounds, in accordance with USACE mitigation guidelines. Long-term benefits are also expected to result from the voluntary establishment of wetlands in the bottom of the floodwater management basin. Even though the facility's primary function is to manage floodwater during high flow events, the WDNR plans to design and implement a seeding plan that would encourage wetland habitat. Comments on the Draft Environmental Assessment submitted by Friends of Milwaukee's Rivers

Friends of Milwaukee's Rivers DRAFT Position Statement Re: MMSD Floodwater Detention Basins at the Milwaukee County Grounds Date: April 26, 2006

Background:

The Milwaukee County Grounds is a 1,000 acre property owned by Milwaukee County located entirely within the City of Wauwatosa. While a large portion of the County Grounds has been developed, the County Grounds still contain approximately 235 acres of large undeveloped tracts of open space featuring a rolling topography with forests, open fields, and the confluence of Underwood Creek with the Menomonee River, as well as historically designated institutional buildings (Eschweiler Builders), a 19th century cemetery, and important wildlife habitat, especially for birds and the State threatened Butler Garter Snake.

Friends of Milwaukee's Rivers has been advocating for the protection of the County Grounds since our inception in 1995. The County Grounds has faced various threats during the last decade, including proposals to sell off all or portions of the land to private developers. Although citizens have been unable to save the entire County Grounds, and portions of the land have been designated for economic development and for playing fields for Wisconsin Lutheran College, citizen efforts have been vital to the preservation of a 65 acre State Forest on the site and to obtaining some legal protections in the form of conservation easements for the remaining natural areas of the property and City of Wauwatosa zoning designation as "conservancy" during summer 2004.

Now the County Grounds faces a new threat. The Milwaukee Metropolitan Sewerage District (MMSD) has applied to the Wisconsin Department of Natural Resources for permits to construct a flood-control project on the grounds. The project includes the creation of a 91-acre floodwater detention basin by excavating about 2 million cubic yards of material (about enough to fill the Mayfair Mall), a floodwater diversion structure at Underwood Creek, an underground tunnel, and an outlet/spillway structure to divert water from the basin back to the Menomonee River. This project includes destruction of 4.69 acres of wetlands, and considerable effects to the hydrology, habitat, and ecological functioning of both the Menomonee River and Underwood Creek. In addition, over 50 additional acres will be impacted by grading and fill activities, as soil from the basins will be now be dumped on the uplands instead of being trucked off site as originally planned. The project also includes removal of concrete and rehabilitation of a portion of Underwood Creek, from USH 100 to its confluence with the Menomonee River, and the construction of a bridge to carry Swan Boulevard over the basin.

Position:

FMR has stated from the beginning that we felt that the County Grounds option, which was considered as part of a Menomonee River watershed-wide flood management strategy, is not the best way to manage floodwaters caused by increasing development and storm water runoff. Although we understand that flooding is a serious concern that needs to be managed, FMR has advocated for a more regional or sub-regional strategy that included incorporation of smaller, low-lying areas along both Underwood Creek and the Menomonee River, which could be designed to store floodwater as well as provide improved wildlife habitat, aesthetics, and recreational opportunities for local residents. This approach would also have distributed the true

"costs" and inconvenience of flood management to the entire causative region as opposed to placing a disproportionate cost on local residents around the County Grounds. In addition, this option also permanently changes one of our last great public spaces in Milwaukee County. However, these regional and more "environmentally sustainable" alternatives were discounted because they would be more costly to build and maintain over the long term—essentially one large basin would be easier to manage and maintain than many smaller basins.

FMR has also not been convinced that these basins will significantly minimize future flooding events similar to the 1997-1998 storms that devastated portions of the Milwaukee area, and feel that at best such basins would serve as "speed bumps" or delay the inevitable flooding that would occur under such extreme rain events. The Environmental Assessment for this project states that the detention basins would fill up with water in 4 hours and that water would take 4 days to drain via a low-level outlet to the Menomonee River following a one percent probability event (essentially an extreme storm with a one percent probability of happening in any year – or a "100 year" flood). Furthermore, high flows greater than the one percent probability event would be passed with an *emergency overflow* spillway located within the same outfall/spillway structure. Presumably during such situations, water will exit the basins much more quickly to minimize back-waters and upstream flooding. Since these basins are being built essentially to address "extreme storms", it begs the question of whether the projected \$84 million price tag is warranted for this slow down of water, and to address approximately \$100 million in flood damage during the last 8 years as stated in the Environmental Assessment (EA).

FMR has advocated for an Environmental Impact Statement (EIS) from the early days of this project to identify whether the benefits of this project warrant the costs, and even though the Wisconsin Department of Natural Resources has decided that MMSD does not need to prepare an EIS, FMR feels that the costs and benefits of this project have still not been adequately addressed. However, if this project continues to go forward as seems apparent, FMR urges the public and the responsible public agencies to ensure that the following issues are addressed:

- Wetland impacts are minimized to the greatest extent possible, and wetland mitigation should take place on-site or in the Underwood Creek watershed, where it can provide benefit for local flood management, wildlife, and human populations, as opposed to offsite mitigation that does none of the above.
- The use of rip rap is minimized to the greatest extent possible, instead relying on bioengineering and the incorporation of native plants and natural stabilization materials such as coir matting, biologs, etc.
- Landscaping on the site uses native plants as described in the "Landscape and Ecological Plan for the Milwaukee County Grounds" by HNTB, and furthermore, that landscaping projects, trails, and amenities (e.g. soccer fields, tennis courts, etc.) described in that report are carried out to completion and adequately funded to re-create and improve upon what is lost.
- Fish entrapment is minimized as a result of the design of the detention basins, the diversion tunnel/structure from Underwood Creek to the basins, and the spillway from the basins to the Menomonee River. In addition, effects on fish of drawdown of Underwood Creek during storm events exceeding the 25% probability events should also be assessed.
- Ecological benefits of the project should exceed the costs. Although FMR does concede that certain components of this project, in particular, the removal of concrete lining along

a portion of Underwood Creek are positive, we remain concerned that the positive water quality and wildlife habitat impacts of concrete removal will be negated by other components such as the creation of an underground concrete-lined tunnel having a 17foot inner diameter to connect water from the diversion structure at Underwood Creek to the detention basins.

- An adequate maintenance plan for the detention basin area should be created by MMSD. This plan should be accessible to the public and should deal with how public concerns will be addressed, when the basins will be dredged, what will be done to remediate upstream sewage overflows that contaminate the basins in the future, what will be done to address effects of stormwater runoff, algae, etc.
- Agencies should ensure that MMSD provides adequate funds to Milwaukee County Parks for planting and future maintenance of the uplands portion of the site, which includes pruning, invasive plant species removal, and other land management activities. MMSD states that this project allows for "development of an upland open space area" as if there is not an existing open space that has been used by local residents for generations. This is not a "new" amenity—it is a solution to "save" MMSD and taxpayers money by not shipping fill off-site, and having to naturalize an "unnatural" topography as a result.
- Agencies should ensure that MMSD complies with storm water management regulations during construction, and that they provide funds in the form of bonds or other suitable vehicle to help the DNR with oversight and enforcement of this massive construction project. These funds would also serve as a "security deposit" so that any violations could be suitably remediated by DNR staff if necessary as quickly as possible or after the project is terminated. If there are no violations, money could be returned at the end of construction.
- Water quality impacts from the constructed detention basin should be examined and
 regulated if possible via a WPDES discharge permit. Potential impacts to water quality
 could include thermal impacts, as well as flushes of sediment and other contaminants.
 Without some sort of regulatory authority or permit, it will be very difficult for the DNR
 or citizens to require any changes in the future to ameliorate water quality concerns.
 Likewise, DNR should require regular water quality monitoring by MMSD to ensure that
 there are no water quality problems associated with this flood management basin of
 extraordinary size.
- Agencies should insure that safety impacts from these detention basins are minimized. The Environmental Assessment states that because of the degree of water diversion involved, the Milwaukee County Grounds facility would be regulated as a dam and assigned a high hazard rating due to the potential effects on downstream structures should it fail. It goes on to state that should the basins fail, that flood waters could flow over Swan Blvd to the Menomonee River directly, and or breach the embankment on the eastern side of the basins, which would be addressed through berm construction. DNR should ensure that these basins are protective of downstream structures and communities, as well as assure that there is a plan to educate the public to minimize potential safety concerns (e.g. drownings) as well as effects on recreational users such as paddlers.
- Agencies should ensure that there is a plan (and funding contingencies) to deal with downstream erosion and scour caused in the future by diverted water entering the Menomonee River from the emergency and low-flow spillways.
- Impacts on the Butler's Garter Snake and its habitat should be minimized, and habitat destroyed should be mitigated for on-site.

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Comments on the Draft Environmental Assessment submitted by Sierra Club



GREAT WATERS GROUP

John Muir Chapter www.wisconsin.sierraclub.org/gwg/ Cheri Briscoe, Chairperson, 2016 E. Windsor Place, Milwaukee, WI 53202 Phone:414-390-0159 Email cherib@wi rr.com

May 3, 2006

Jennifer Jerich DNR Sturtevant Service Center 9531 Rayne Rd. Suite IV Sturtevant, WI 53177

Reference #: IP-SE-2005-41-821-827,857,882,883

Dear Ms. Jerich,

While the Great Waters Group of the Sierra Club has not supported the plans to convert 91 acres of County Grounds land into a huge detention basin, we understand that the decision has been made and plans are underway to excavate for the detention basin and to move the excavated soil to another part of the County Grounds. We support the plans for redeveloping the higher land into a naturally landscaped open space for birds, animals, insects, snakes, etc. and humans. We are particularly pleased that the County Parks Department and the Department of Natural Resources will be working together to provide natural landscaping for this space. We urge you to think ahead about the disruption to the current residents (animals etc.) of the land and that you implement ways for them to escape to safe places before your equipment destroys their homes.

We continue to support the need for an Environmental impact Statement (EIS) for this project to identify whether the benefits warrant the \$84 million cost.

The HNTB presentation indicated that there will be public access also to the detention basin area. We urge you to not renege on this plan and also to landscape it so that it becomes a place of beauty that people will want to come to for contemplation of our natural resources and our obligation to be stewards of our ecosystem.

Speaking of stewardship, we commend you for your plans to remove the concrete from a mile of the Underwood Creek in this basin area and to return it to a more natural flow system with an accompanying riparian area which will, hopefully, encourage the return of fish to that creek as well. May we humans never again try to line our Wisconsin waterways in concrete.

We were pleased to learn that the County Grounds facility will be regulated as a dam due the quantity of water that could be released in the event of a structure failure during a large storm event.

We would also urge the responsible agencies to ensure that the following issues be addressed:

- Wetland impacts must be minimized and wetland mitigation should take place onsite or in the Underwood Creek watershed
- Landscaping on site should use native plants and the planned trails must be carried out to recreate and improve upon what is being changed.
- Adequate funds should be provided to the Milwaukee County Parks Department for planting and future maintenance of the uplands portion
- MMSD must comply with storm water management regulations during construction.
- Impacts on the Butler's Garter Snake should be minimized.
- The use of rip rap should be minimized.
- Fish entrapment should be minimized.
- Water quality impacts from the constructed detention basin should be examined and regulated, if possible via a WPDES discharge permit.
- DNR should require regular water quality monitoring by MMSD to ensure that there are no water quality problems associated with this basin.
- · An adequate maintenance plan for the detention basin area should be created.

Sincerely,

Cheri Buscoe

Cheri Briscoe, Chairperson Jim Kerler, Conservation Chair Dale Olen, Water Chair