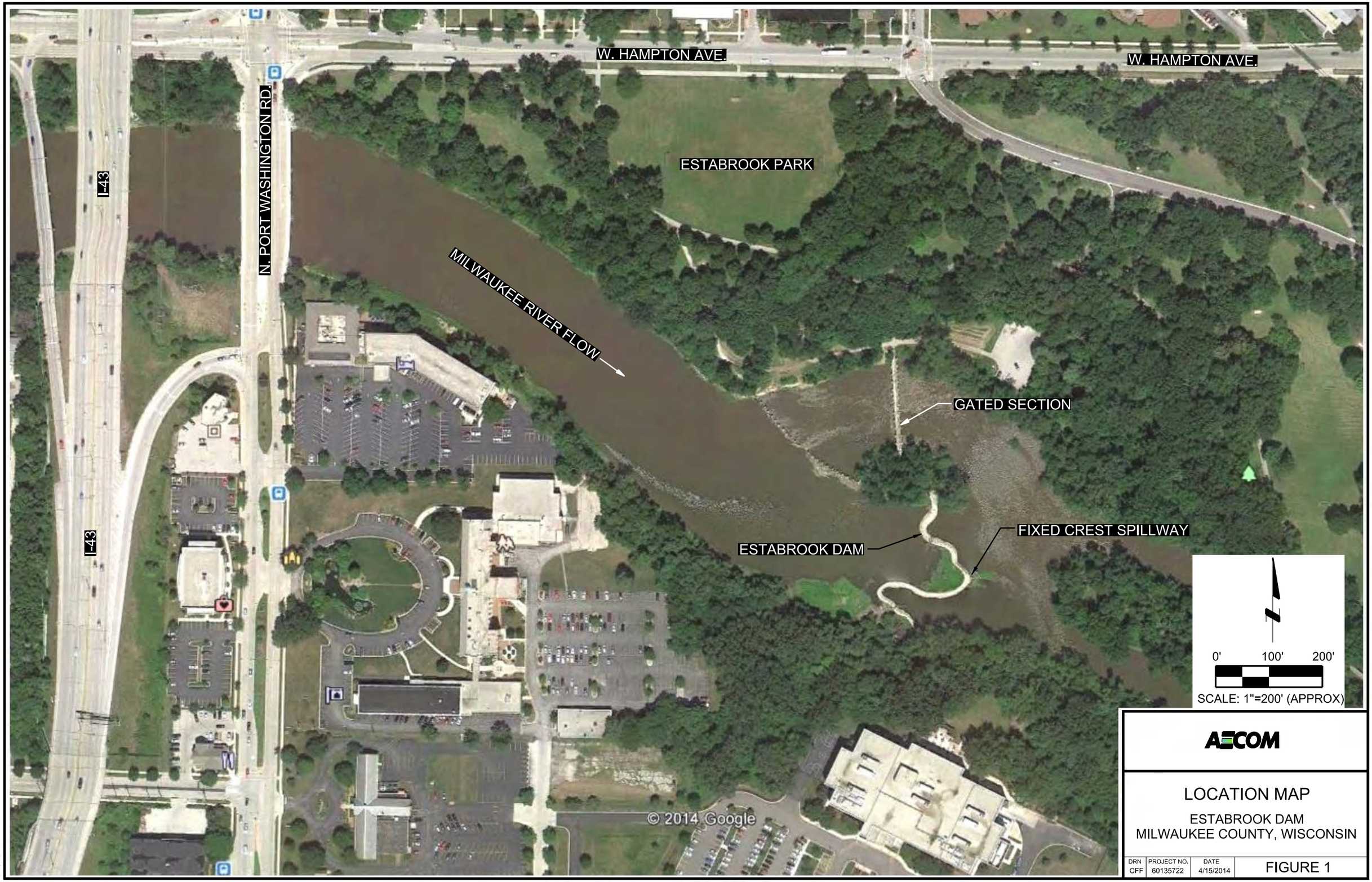
ATTACHMENT 1:

FIGURE 1 AERIAL MAP



AECOM

LOCATION MAP

ESTABROOK DAM
MILWAUKEE COUNTY, WISCONSIN

DRN	PROJECT NO.	DATE	
CFF	60135722	4/15/2014	FIGURE 1

4/11/2014
2:48:12 PM

C:\Projects\Estabrook Dam\Figure 1.dgn

ATTACHMENT 2:

ESTABROOK DAM HISTORIC INFORMATION

ESTABROOK PARK DAM

This dam is being constructed as part of a flood relief project, which has been under way since the fall of 1933, following an intense study of the flow from the area drained by the Milwaukee River, consisting of 640 square miles.

The Milwaukee River has its source about 60 miles northwest of the city of Milwaukee, and enters Lake Michigan at approximately the center of the City. Flood troubles started at the south end of Estabrook Park, and from that point to the Silver Spring Road, a distance of about 3½ miles, were a source of annoyance and damage to the built-up urban area, both within and without the City. From Silver Spring Road north for several miles damage by reason of flood occurred to the colonies of summer residences located along the river banks, and to truck gardens and green houses located on the river flats.

The cause of the trouble north of Capitol Drive was a limestone reef or outcrop about a mile long, over which the river flowed. This outcrop had an elevation of about 36 feet above lake level, and occurred approximately 7 miles upstream from the outlet, so that once the water passed beyond the obstruction there was sufficient fall for its rapid disposal. For a distance of 3 miles upstream from the outcrop there was no fall in the river bed; in fact, successive floods had gouged out the river bottom to such an extent that in this area most of the river bed was well below the top of the outcrop, thereby creating a body of still water as wide as the river and 3 miles long. In this area the river banks are only a few feet above normal water level and at flood stage the water soon rose above the banks. The area flooded was not large, but the damage was large in proportion to the area flooded, due to urban development.

As the result of successive floods, individuals, civic organizations, and delegations from the flooded district repeatedly invoked the aid of the various governmental bodies. Their petitions resulted in an exhaustive study

of the condition.

In the fall of 1933 removal of the rock outcrop was inaugurated as a CWA project, Milwaukee County working on that portion lying east of Port Washington Road bridge and extending thru Estabrook Park. The City worked on the portion west of the bridge and extending through Lincoln Park. Consolidation of City and County parks, effective January 1, 1937, made Lincoln Park a part of the County system. About a year prior to this time, however, the County's portion of the work was taken up by the CCC, which carried it on to completion. The CCC is also carrying on construction of the dam.

Residents of the homes and cottages along the river bank located there with the idea of using the river for swimming, boating, canoeing, and the like, because the river was deep enough for such sports. In Lincoln Park a bathing pavilion and beach have been in use for many years. It was therefore necessary to maintain the normal river level during stages of ordinary flow. Removal of the rock outcrop caused the water to drop to such an extent that all recreational use was eliminated, and construction of a dam was necessary to maintain water at its previous level. The dam had to be designed to take care of flood waters, and to permit the flood relief work that had been done by removal of the rock to become effective.

The dam is located at the point farthest downstream at which it may be constructed without causing damage to adjacent property. This is also the location at which the structure best fits into the landscape. Observation of flood conditions resulted in the conclusion that it would be advisable to construct a dam with gates. It was felt that the gate section was necessary by reason of economy and operation. It was further determined, as a result of these studies, that a wier or crest section should be provided, over which ice could be permitted to pass. In order to present a completed structure of

most pleasing appearance, and one that would blend with the landscape to best advantage, the landscape architects for the County suggested that the gate and crest sections of the dam be separated by a small island. The dam has been designed accordingly, with a gate section and a crest or spillway section.

The gate section of the dam is located in a channel 155 feet wide with a 3 to 1 slope on each side. This section is built of reinforced concrete with 10 vertical gates of the sliding type, each 11 feet 6 inches wide. At each end of the gate section there is a 10 foot 4 inch spillway and an abutment containing stairs leading to the operating bridge, which extends across the dam over the gates. In lowered position the gates form a spillway with top elevation of 36.30. It is desired to direct the water over the crest or curved spillway, except for a small amount, which will pass over the 10 foot 4 inch spillway at each end of the gate section.

At the entrance to the 155 foot channel containing the gates, there is to be placed a line of reinforced concrete ice guards 11 feet 6 inches on centers, in order to divert the larger blocks of floating ice away from the gates and direct this ice toward the curved spillway.

On the face of the stone spillway a fish ladder will be constructed, consisting of a series of small pools, each being a slight elevation above the other, so as to permit migratory fish to travel upstream.

9-1-39

Mr. M. W. Torkelson
Director
State Regional Planning Commission
Madison, Wisconsin.

Dear Mr. Torkelson,

This letter will acknowledge receipt of your letter of August 23, relative to work that has been done upon the Milwaukee River with respect to flood control. You asked me to review the statement submitted with your letter, and this I am gladly doing. I have looked back over our files and have reviewed especially the information submitted to the Government at the time the dam being built in Estabrook Park was designed. The following is a summary taken from this data, and covers, I believe, the points set forth in your summary:

The Milwaukee River, draining a watershed of approximately 840 square miles, has its source about 60 miles northwest of Milwaukee, in what is known as the Kettle Moraine District. The river empties into Lake Michigan at approximately the center of the City of Milwaukee.

Flood troubles experienced in Milwaukee County have taken place to the north of Lincoln Park, extending northerly to Kletzsch Park. To the north of Lincoln Park there have been two sources of trouble: That occurring in the lowlands along the river north of Silver Spring Road, where there are quite a large number of houses and cottages, some of which are used the year round - the other on Mud Creek, now known as Lincoln Creek, which empties into the Milwaukee River at Lincoln Park after flowing easterly through the northern portion of the City of Milwaukee.

The stormsewer for this portion of the City of Milwaukee empties into Lincoln Creek and, when the Milwaukee River reaches extreme flood stage, water backs up in Lincoln Creek into the stormsewer system, and has caused the City of Milwaukee considerable difficulty as a result. The difficulties north of Silver Spring Road, where a number of houses and cottages are located, comes about by reason of either floods caused by extremely heavy rainfall in the summertime, or by reason of a lesser amount of rainfall with the river congested by ice during the winter or spring.

Estabrook Park is located just to the east of Lincoln Park and both of these parks, as well as the river and the roads mentioned herein are shown upon the County map we are attaching.

Until 1933 a rock ledge about a mile long was located

across the river channel at the southern end of Lincoln Park and the northern end of Estabrook Park. This ledge extended along the river about a half mile each way from Port Washington Road Bridge. The elevation of the ledge at its highest point, just to the west of the Port Washington Road Bridge, was approximately 36 feet above datum, which is the level of the river at the point where it empties into Lake Michigan. Lincoln Park is about 7 miles upstream. Therefore, with a fall of 36 feet in approximately 7 miles, flood conditions were not experienced downstream from Lincoln Park and the difficulty from floods occurred on the upstream side of Lincoln Park. Most of the complaints came from that area north of Silver Spring Road. The rock ledge or outcrop referred to acted as a dam. For a distance of 3 miles upstream from this ledge there was no fall in the river, but successive floods gouged out the river to such an extent that in this 3 mile area the river bed, for the most part, was ~~not~~ lower in elevation than the top of the rock ledge, thereby creating , in effect, a body of still water as wide as the river and about 3 miles long. It was in this area that the river banks were only a few feet above normal water level and in flood stage the water rose above tha banks. The area flooded was not large.

In the fall of 1933 removal of the rock ledge was inaugurated as a CWA project, Milwaukee County working on that portion lying east of Port Washington Road Bridge, and the City of Milwaukee operating the portion to the west of the bridge. Lincoln Park was then a City park, but has since been turned over to Milwaukee County. Removal of the ledge to a channel width of 200 feet and to a straight grade with a depth of 6 to 7 feet below the crest of the former ledge was completed a couple of years ago, and since that time the City of Milwaukee, and now Milwaukee County has continued with cutting through of the ox bow bends in Lincoln Park, which work will probably be completed next summer, thereby straightening the channel and increasing its capacity. Consideration is being given to continuing the channel deepening as far north as Kletzsch Park.

The level of the water in Estabrook and Lincoln Parks is to be regulated by a dam now being constructed in Estabrook Park. The crest of the dam will be at elevation 36, corresponding with the crest of the rock ledge removed, so as to maintain the same water level upstream as existed in the years past, in order that the water level at cottages and homes along the river north of Silver Spring Road will be maintained as previously, and also in order to increase water recreation facilities in Lincoln Park.

The dam now being built consists of a gate section that can be manually operated so as to lower the flood waters, and a rather long serpentine crest section, over which the water will flow at normal river stage. Elevation 36 was determined upon as the elevation of the crest of the dam in order to maintain the water level in the river at the same elevation that existed before removal of the rock ledge. Elevation 38, was a 2 foot rise, was decided upon as the maximum permissable increase in head for a 14,700 foot flow over the dam. This elevation was determined as the maximum permissable by the engineers of the City of Milwaukee, in order to avoid flooding of the streets of that portion of the City of Milwaukee draining into Lincoln Creek.

Our records indicate the maximum flood recorded in the

Milwaukee River was that of August, 1924, at which time a discharge of 14,700 c.f.s. took place. There had been any number of lesser floods, ranging from about 4,000 c.f.s. to 12,000 c.f.s. The City Engineer's office of the City of Milwaukee has made a rather extensive study of past floods and probable floods and their conclusion with respect to flood volume on the Milwaukee River is as follows:

1% chance flood (1 in 100 years (computed)	23,400	c.f.s.
4% " " (1 in 25 years) (maximum on record 1924)	14,700	"
30% " " (1 in 3 years)	6,400	"
Ordinary spring and fall flow	1,000	"
Minimum dry weather flow - August 18, 1934	9	"

We are enclosing print prepared in this office on river discharges for whatever value it may be to you.

The gate section of the dam consists of 10 gates set in a channel with 155 foot width and the crest section of the dam is 562 feet long at elevation 36. Our computations are that when the water reaches elevation 38 the gate section will be able to discharge 8,970 c.f.s., and that the discharge over the spillways will be 5,960, or a total of 14,930 c.f.s.

We believe that the work now being done will quite adequately take care of the situation with respect to Mud Creek, and will very considerably help the situation north of the Silver Spring Road. However, we make no predictions with respect to the actual effect north of Silver Spring Road, inasmuch as the channel has not been cleaned out, widened, or deepened north of Lincoln Park, and the other, and possibly more important factor of ice jams occurring during the winter months. During the winter of 1937-8 difficulty was experienced north of Silver Spring Road by reason of water and ice at a time when the river gauges showed a flow of ~~45,000~~ 4000 to 5000 c.f.s., which during time when there was no ice in the river would not be considered a severe flood.

Your statement is correct that the maximum floods have caused no substantial damage below the dam being built in Estabrook Park. As to the statement that the City of Milwaukee is no longer interested in any future measures for flood control above the City limits, and that the City Councilmen are against annexing areas to the north of Milwaukee, we have no information upon this, and therefore are unable to advise you with respect thereto.

What we have set forth above is rather long and pertains to the flood conditions in Milwaukee County only. We presume you will want to condense this information, but we are giving it to you somewhat in detail. If there is anything further we can furnish from our files, or from the plans and data we have on hand, do not hesitate to call upon us.

Yours very truly,
REGIONAL PLANNING DEPARTMENT

by _____
Supervising Engineer

EAH:B

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
WASHINGTON

ADDRESS ONLY
THE DIRECTOR, NATIONAL PARK SERVICE

December 17, 1940.

Mr. E. A. Howard, Supervising Engineer,
Regional Planning Department,
Milwaukee County,
Milwaukee, Wisconsin.

My dear Mr. Howard:

I have received the photograph of the Estabrook Park Dam, which you so kindly forwarded to me and I appreciate your thoughtfulness sincerely.

The dam is a very satisfactory appearing structure and I am sure that all of us who have had some association with it can be quite proud of the completed work. I hope that next summer, when the removable crest is in place and water is flowing over it, it will be possible to obtain another photograph from the opposite shore. With a flow of water over the masonry section I am sure that it will be an extremely attractive feature.

Sincerely yours,

E. F. Preece,
Senior Engineer.

ATTACHMENT 3:

SEWRPC TECHNICAL MEMO DATED APRIL 25, 2014 DRAFT

Kistner, Amy

From: Hahn, Michael G. [MHAHN@SEWRPC.org]
Sent: Friday, April 25, 2014 12:32 PM
To: Pirrung, Don
Cc: Murray, Joshua A.; Kevin Haley (kevin.haley@milwaukeecountywi.gov); 'james.keegan@milwaukeecountywi.gov'
Subject: FW: Estabrook Dam Memo
Attachments: ESTABROOK DAM EA HYDRAULIC ANALYSIS STAFF MEMO, Revised 04-25-14 PDF (00217870).PDF

Don,

Our revised Estabrook dam hydraulic analysis memo with Alternative 4 added is attached per distribution per your agreement with Milwaukee County.

Mike

Michael G. Hahn, P.E., P.H.
Chief Environmental Engineer
Southeastern Wisconsin Regional Planning Commission
P.O. Box 1607
W239 N1812 Rockwood Drive
Waukesha, WI 53187-1607
Phone: (262) 953-3243
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E-mail: mhahn@sewrpc.org
Web site: www.sewrpc.org

SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION
W239 N1812 ROCKWOOD DRIVE • PO BOX 1607 • WAUKESHA, WI 53187-1607•
TELEPHONE (262) 547-6721
FAX (262) 547-1103

Serving the Counties of: KENOSHA MILWAUKEE OZAUKEE RACINE WALWORTH WASHINGTON WAUKESHA

SEWRPC Staff Memorandum

HYDRAULIC ANALYSES FOR ESTABROOK DAM ENVIRONMENTAL ASSESSMENT

April 8, 2014
Revised April 25, 2014

INTRODUCTION AND BACKGROUND

An interagency technical advisory group meeting to discuss issues relative to the scope of a proposed Estabrook dam environmental assessment (EA) was convened by Milwaukee County, the owner of the dam, on November 28, 2012. During that meeting, there was considerable discussion of the need to develop and evaluate alternatives relative to the future status of the Estabrook dam, and Milwaukee County staff asked that the Southeastern Wisconsin Regional Planning Commission (SEWRPC) conduct hydraulic analyses of alternatives. A final decision on the specific features of each alternative was not made at that time, but it was decided that the SEWRPC hydraulic model of the Milwaukee River would incorporate bathymetric (riverbed elevation) survey data collected for the United States Environmental Protection Agency (USEPA) Lincoln Park/Milwaukee River Channel Phases 1 and 2 projects to remediate contaminated sediment within the Milwaukee River Area of Concern (AOC) and that the SEWRPC staff would coordinate with the Wisconsin Department of Natural Resources (WDNR) and County staffs to obtain those data.

On February 25, 2013, WDNR convened a meeting of a smaller interagency group to review specifics of the EA and coordinate the various components of the EA process. At that meeting, County staff agreed to coordinate with the Cities of Glendale and Milwaukee to provide SEWRPC with storm sewer outfall information for use in assessing relative changes in Milwaukee River stages at outfalls under the various alternatives to be evaluated hydraulically.

On August 27, 2013, Milwaukee County convened an Estabrook dam EA technical work group meeting at which one of the main topics of discussion was possible specific components of the alternatives relative to the dam.

A second full interagency technical advisory group meeting to discuss issues relative to the EA was organized by Milwaukee County on February 11, 2014. One of the main objectives of that meeting was obtaining agreement on 1) the alternatives to be addressed by the SEWRPC hydraulic analysis and 2) the specific components of each alternative. Based on that discussion, and on follow up discussions between the SEWRPC staff and the WDNR and County staffs for the purpose of clarifying details, the following alternative plans were selected for inclusion in the EA and for hydraulic analysis:

1) Rehabilitate the dam

1A) Rehabilitate the dam and add provisions for fish passage from downstream to upstream

2) Abandon and remove the dam

3) Abandon and remove the dam, providing a rock ramp to facilitate fish passage and establish an impoundment

The options of doing nothing or replacing the dam with a new structure were identified, but eliminated from further consideration. The do nothing alternative was eliminated because it would not address the existing deficiencies in the structure or public safety considerations, and therefore, would not be responsive to the WDNR Administrative Order requiring action relative to the dam. The option of constructing a new dam was eliminated because of the relatively high cost.

Another full interagency technical advisory group meeting was organized by Milwaukee County on April 9, 2014. One of the main objectives of that meeting was to discuss the April 8, 2014, preliminary draft SEWRPC hydraulic analysis. Based on that discussion, an additional alternative plan was identified and selected for inclusion in the EA and for hydraulic analysis. The additional alternative plan is:

4) Remove the gated spillway portion of the dam, lower the crest of, and rehabilitate, the serpentine overflow spillway, and provide a rock ramp at the location of the gated spillway to facilitate fish passage and establish an impoundment

SOURCES OF INFORMATION

The following sources of information were used in developing the hydraulic analysis:

1. Bathymetric data from the USEPA Lincoln Park/Milwaukee River Channel Phases 1 and 2 projects to remediate contaminated sediment within the Milwaukee River AOC

2. Storm sewer outfall information for the Cities of Glendale and Milwaukee as provided by the City of Milwaukee and the WDNR. Outfall pipe locations and sizes are available for both communities. Pipe invert elevations are only available for the City of Milwaukee.

3. The November 15, 2011, “owner’s review” version of the plans for the “Estabrook Dam Rehabilitation” prepared by AECOM Technical Services for the Milwaukee County Department of Parks, Recreation & Culture.

4. Information provided to SEWRPC by the Milwaukee River Preservation Association (MRPA), with their letter of March 11, 2014. The information provided by the MRPA that is directly applicable to the SEWRPC hydraulic analysis included a.) a map and accompanying table describing MRPA field observations of changes in vegetative growth in areas along the River that were once normally submerged, but have been continuously exposed since the current drawdown of the impoundment was ordered by WDNR for safety reasons, beginning in 2008 and b.) an undated report, apparently from the mid-1930s, by L. I. Johnstone entitled “Proposed Dam, Estabrook Park, Milwaukee County.” Additional information provided by MRPA was reviewed, but, while of interest relative to aspects of the status of the dam, were not directly applicable to the hydraulic analysis for the EA.

DESCRIPTION OF DAM FOR HYDRAULIC MODELING PURPOSES

Estabrook dam consists of two spillways separated by a natural island. From left to right, looking downstream, the dam and island components consist of:

- A concrete gated spillway with 10 steel vertical lift gates set in 11.5-foot-wide by 16-foot-high bays, with each gate, when closed, resting on a concrete sill at elevation 609.4 feet above National Geodetic Vertical Datum, 1929 adjustment (NGVD 29). Also, one 10-foot-wide bay with a concrete weir having a crest elevation of 616.5 feet above NGVD 29 is located on each end of the vertical lift gate section.

- The island,

- A serpentine concrete overflow spillway with 1) an 88-foot-long stop log section having a concrete crest elevation of 613.6 feet above NGVD 29 and a top-of-stop-log elevation of 616.4 feet above NGVD 29, and 2) a 450-foot-log concrete weir with a crest elevation ranging from 616.4 to 616.6 feet above NGVD 29.

SCOPE OF HYDRAULIC ANALYSIS

The hydraulic analysis of alternatives as performed by SEWRPC was for the purpose of determining the effect of the dam alternatives on water surface profiles of the Milwaukee River main stem under normal flow conditions (defined as the long-term median and mean flows based on 100 years of record at U.S. Geological Survey continuous streamflow gage No. 04087000) and flood flows with annual probabilities of occurrence of 10-, 2-, 1- and 0.2-percent (recurrence intervals of 10, 50, 100, and 500 years). The entire reach of the River in Milwaukee County was modeled, but the focus of the analysis was on the reach extending from just downstream of the dam upstream to W. Bender Road. In this reach the 10-percent-annual-probability flood flow is 8,790 cfs. The 2-percent-annual-probability flow ranges from 12,550 to 12,900 cfs. The 1-percent-annual-probability flow ranges from 14,340 to 14,800 cfs. The 0.2-percent-annual-probability flow ranges from 18,240 to 18,810 cfs. The median flow is 240 cfs, and the mean flow is 451 cfs, for the 100-year period of record.

In addition to estimating profiles under various flow conditions, the relative changes in River stage elevation at identified storm sewer outfalls were estimated.

The hydraulic analysis was not intended to address issues related to establishment of an operational order for the dam by the WDNR.

HYDRAULIC MODELING

The hydraulic analysis of the Milwaukee River main stem was performed using the U.S. Army Corps of Engineers HEC-RAS river analysis system computer program. The hydraulic model of the River was developed by the SEWRPC staff under an ongoing floodplain mapping study being conducted for the Milwaukee County Automated Mapping and Land Information System (MCAMLIS) Steering Committee and the Milwaukee Metropolitan Sewerage District. The hydraulic model which served as the starting point for the Estabrook dam EA analysis is the effective model for Federal flood insurance and local zoning purposes as described in the September 26, 2008, Federal Emergency Management Agency (FEMA) flood insurance study (FIS) for Milwaukee County.

Existing Condition
This condition was established to represent a comparative condition representative of a situation where the dam gates were allowed to be operated in response to changing flow conditions. Under flood flow conditions, the dam gates were assumed to be fully opened, similar to the current condition under the WDNR-ordered drawdown and to the condition attainable prior to the drawdown order. Under normal flow conditions, it was assumed that the gates could be closed so that those lower flows would be conveyed primarily over the overflow spillway and the two weir bays on either end of the gated spillway. That situation would be similar to the condition attainable prior to the drawdown order. In this case the "existing" designation refers to representation of existing Milwaukee River channel conditions and the ability to fully operate the dam consistent with the existing configuration. This is considered to be the appropriate condition to which the alternatives for the dam should be compared because it is consistent with maximization of the hydraulic capacity of the dam to pass floods and with the "normal" dam operating condition prior to the drawdown order when the impoundment was maintained outside of the winter months.

The first step in development of an existing condition HEC-RAS model for comparison with the models for the dam alternative conditions considered under the EA was refinement of the FEMA FIS model to reflect bathymetric data obtained under the USEPA Lincoln Park/Milwaukee River Channel Phases 1 and 2 projects for the Milwaukee River Area of Concern. For the Phase 1 sediment removal project, which has been implemented, as-built bathymetric information was available in the project area of the west Milwaukee River oxbow at the River's confluence with Lincoln Creek. For the Phase 2 project, which has been designed but has not yet been implemented, existing condition bathymetric survey information was available. The effective FEMA model was refined by modifying existing River channel cross sections to reflect as-built, post-project Phase 1 bathymetric conditions or existing, pre-project Phase 2 conditions and, where appropriate, adding channel and overbank cross sections to the model to represent those conditions.

In addition, the representation of Estabrook dam was refined to specifically reflect the elevation of the dam sill in the gated spillway section, to include the 10-foot-wide weir section on each end of the gated spillway, and to assume that the stop logs were in place under all flow conditions analyzed.

The model was also updated to reflect the two new Milwaukee River Parkway bridges over the west Milwaukee River oxbow, which were constructed after the date of the effective model.

Limited adjustments of Manning's roughness coefficients were made in the reach of the River generally between W. Hampton Avenue and the abandoned railroad bridge upstream of Lincoln Park to reflect vegetation which has become established since the drawdown of the impoundment was ordered by WDNR in 2008. The general locations of the areas were determined from the map and table provided by the MRPA, and were field checked by the SEWRPC staff on March 14, 2014.

1 and 1A) Rehabilitated Dam (With and Without Fish Passage)
The proposed dam repair and rehabilitation, as set forth on the 2011 plans prepared by AECOM Technical Services, would maintain the hydraulic characteristics of the existing dam. Also, as agreed during the February 11, 2014, interagency technical advisory group meeting, it is assumed that any fish passage facilities for the dam could be provided in such manner that the hydraulic characteristics of the dam would not be altered. Thus, the rehabilitated dam hydraulic model and the rehabilitated dam with fish passage hydraulic models are the same as the existing condition model.

2) Dam Abandoned and Removed
To represent this condition, the entire dam structure, including the gated and overflow spillway sections and the abutments, was assumed to be removed. The model for this condition was developed by modifying the existing condition model to reflect those removals.

3) Dam Abandoned and Removed with a 5.5-Foot-High Rock Ramp Constructed
This condition was represented by adding a 5.5-foot-high rock ramp across the full width of the Milwaukee River channel at a location approximately 1,600 feet upstream of the dam site. The rock ramp would have a crest elevation of 614.8 feet above NGVD 29, and an overflow length of 250 feet perpendicular to the direction of flow. The ramp would have a three horizontal on one vertical slope on its upstream face and a hemi-circular weir configuration on the downstream face with a slope ranging from 5 percent at the center of the weir to 3 percent at the banks to provide a slope gradual enough to enable fish passage.[1] That structure was added to the hydraulic model representing the condition with the dam abandoned and removed. This alternative was developed with the intent of maintaining an impoundment level similar to that with the dam in place, while facilitating fish passage.

3A) Dam Abandoned and Removed with a Four-Foot-High Rock Ramp Constructed
This condition was represented by adding a four-foot-high rock ramp across the full width of the Milwaukee River channel at a location approximately 1,600 feet upstream of the dam site. The rock ramp would have a crest elevation of 613.3 feet above NGVD 29, and an overflow length of 230 feet perpendicular to the direction of flow. The rock ramp would have a four horizontal on one vertical slope on its upstream face and a hemi-circular weir configuration on the downstream face with a slope ranging from 3.6 percent at the center of the weir to 2.2 percent at the banks to provide a slope gradual enough to enable fish passage. That structure was added to the hydraulic model representing the condition with the dam abandoned and removed. This alternative was developed with the intent of maintaining an impoundment level, while facilitating fish passage, and would meet regulatory requirements set forth in local zoning ordinances and Chapter NR 116, "Wisconsin's Floodplain Management Program," of the *Wisconsin Administrative Code* that do not permit activities which would increase the 1-percent-annual-probability flood stage unless easements were obtained from all affected property owners and a Conditional Letter of Map Revision (CLOMR) were obtained from FEMA prior to any construction.[2]

4) Gated Spillway Portion of the Dam Abandoned and Removed, Lowered and Rehabilitated Serpentine Overflow Spillway, and a 6.3-Foot-High Rock Ramp Constructed
This condition was represented by adding a 6.3-foot-high rock ramp across the Milwaukee River channel at the location of the removed gated spillway portion of the dam and lowering and rehabilitating the serpentine overflow spillway. The rock ramp would have a crest elevation of 615.4 feet above NGVD 29, an overflow length of 200 feet perpendicular to the direction of flow, a three horizontal on one vertical slope on its upstream face, and a hemi-circular weir configuration on the downstream face with a slope ranging from 5.5 percent at the center of the weir to 3.3 percent at the banks to provide a slope gradual enough to enable fish passage. The crest elevation of the serpentine overflow spillway would be lowered to 615.4 feet above NGVD 29 to match the crest of the 6.3-foot-high rock ramp. With the exception of the lowered crest elevation, the serpentine spillway would be rehabilitated as set forth on the 2011 AECOM plans. This alternative was developed with the intent of facilitating fish passage, and maintaining an impoundment level as close as possible to that with the dam in place, while meeting regulatory requirements set forth in local zoning ordinances and Chapter NR 116, "Wisconsin's Floodplain Management Program," of the *Wisconsin Administrative Code* that do not permit activities which would increase the 1-percent-annual-probability flood stage unless easements were obtained from all affected property owners and a Conditional Letter of Map Revision (CLOMR) were obtained from FEMA prior to any construction.

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[1]*The rock ramp configurations under Alternatives 3, 3A, and 4 were established based on criteria set forth in Reconnecting Rivers: Natural Channel Design in Dam Removal and Fish Passage, 2010 by Luther P. Aadland.*

[2]*As part of a CLOMR application to FEMA it would be necessary to 1) prepare an analysis of alternatives to the proposed project, 2) obtain documentation that all affected municipalities concur with the proposed floodplain changes, 3) provide assurance that no insurable structures are affected by any changes in the 1-percent-probability flood profile, and 4) notify all property owners affected by the changes in the 1-percent-probability flood profile.*

COMPARISON OF RESULTS OF HYDRAULIC ANALYSES

Tables 1 through 5 set forth the results of the normal flow and flood flow profile computations for each of the five alternatives analyzed under normal flow conditions and the 10-, 2-, 1- and 0.2-percent-annual-probability floods. The changes in water surface elevations under the alternatives are compared to the corresponding elevations under the existing conditions model as described above. The estimated potential changes in water surface elevations in the River at storm sewer outfalls for each alternative relative to the existing condition elevation are shown in Tables 1 through 5. The storm sewer outfall locations are indicated in Exhibit 1. For the purposes of the comparisons described herein, except as noted below, the lower reach is defined as the reach between Estabrook dam and W. Hampton Avenue, the middle reach is defined as the reach between W. Hampton Avenue and the abandoned railroad bridge upstream of Lincoln Park, and the upper reach is defined as the reach between the abandoned railroad bridge upstream of Lincoln Park and W. Bender Road. The maximum water depth under normal flow conditions is defined as the difference between the median water surface elevation and the minimum channel elevation at a particular cross-section. Changes in maximum water depths are compared by River reach in Table 6. Changes in the 1-percent-annual-probability water surface elevations are compared by River reach in Table 7.

Comparison and Evaluation of River Water Surface Elevation Changes Under Alternative 1
Alternative 1 water surface elevations are shown in Table 1. As described above, the rehabilitated dam alternative is the same as the existing conditions model. Therefore there is no difference in water surface elevations as compared to existing conditions. Under normal (median) flow conditions, which assume that the Estabrook dam gates are closed, the maximum water depth of the lower reach ranges from 7.4 to 8.7 feet. The maximum depth of the middle reach ranges from 6.3 to 9.2 feet, and the maximum depth of the upper reach ranges from 2.4 to 9.1 feet.

Comparison and Evaluation of River Water Surface Elevation Changes Under Alternative 2
Alternative 2 water surface elevations are shown in Table 2. The dam removal alternative results in a decrease in water surface elevations for each analyzed flow condition relative to existing dam conditions, including at each storm sewer outfall. Under 1-percent-probability flood flow conditions, the water surface elevation in the lower reach would decrease between 0.7 and 1.5 feet as compared to existing conditions. The 1-percent-probability elevation in the middle reach would decrease between 0.5 and 0.7 foot, and the 1-percent-probability elevation in the upper reach would decrease by up to 0.5 foot. Under normal (median) flow conditions, the water surface elevation in the lower reach would decrease between 3.7 and 7.5 feet with a maximum water depth ranging between 0.7 and 2.5 feet. The normal elevation in the middle reach would decrease between 4.5 and 5.4 feet with a maximum water depth ranging between 1.6 and 4.5 feet. The normal elevation in the upper reach would decrease between 0.5 and 4.6 feet with a maximum water depth ranging between 0.8 and 4.5 feet.

Comparison and Evaluation of River Water Surface Elevation Changes Under Alternative 3
Alternative 3 water surface elevations are shown in Table 3. A 5.5-foot-high rock ramp was modeled in order to maximize the normal impoundment level upstream of the ramp while clearly meeting the definition of a dam that would not be regulated under Chapter NR 333, "Dam Design and Construction," of the *Wisconsin Administrative Code.* Chapter NR 333 exempts dams with storage capacities of more than 50 acre-feet (as would be the case for an impoundment created upstream of a 5.5-foot-high rock ramp in the River), but a structural height of six feet or less, assuming the dam is not likely to endanger life, health or property.

While the 5.5-foot-high rock ramp alternative results in a decrease in water surface elevations for the normal (mean and median) flow conditions analyzed relative to existing conditions, including at each storm sewer outfall, it results in an increase in water surface elevations under each of the flood flow conditions analyzed, including the 1-percent-probability flood.

The increases in upstream flood stages under this alternative are caused because, at a given headwater elevation, the hydraulic capacity of the rock ramp would be less than that of Estabrook dam with the vertical lift gates open.

Under 1-percent-probability flood flow conditions, the water surface elevation in the lower reach, defined for this alternative as the reach between the rock ramp and W. Hampton Avenue, would increase between 0.7 and 1.2 feet as compared to existing conditions. The 1-percent-probability elevation in the middle reach would increase between 0.6 and 0.7 foot, and the 1-percent-probability elevation in the upper reach would increase by up to 0.6 foot. Thus, this alternative would not meet regulatory requirements set forth in local zoning ordinances and Chapter NR 116 of the *Wisconsin Administrative Code* that do not permit activities which would increase the 1-percent-annual-probability flood stage unless easements were obtained from all affected property owners and a Conditional Letter of Map Revision (CLOMR) were obtained from FEMA prior to any construction.

Under normal (median) flow conditions, the water surface elevation in the lower reach would decrease 1.6 feet with a maximum water depth ranging between 5.8 and 6.8 feet. The normal elevation in the middle reach would decrease 1.6 feet with a maximum water depth ranging between 4.7 and 7.6 feet. The normal elevation in the upper reach would decrease between 0.5 and 1.6 feet with a maximum water depth ranging between 1.7 and 7.5 feet.

Comparison and Evaluation of River Water Surface Elevation Changes Under Alternative 3A
Since Alternative 3 resulted in an increase in the 1-percent-annual-probability flood flow profile upstream of the rock ramp, an additional rock ramp alternative was analyzed. A four-foot-high rock ramp was modeled in order to maximize the impoundment level upstream of the ramp while not causing an increase in the 1-percent-probability flood profile. The rock ramp slopes of this alternative were reduced as compared with Alternative 3 due to the lower height of the crest and the desire to maintain the same design “foot print” and ramp cross-section locations in order to provide water surface elevation comparisons consistent with Alternatives 1, 2, and 3. The four-foot-high rock ramp would be expected to result in a decrease in water surface elevations for each analyzed flow condition relative to existing dam conditions, including at each storm sewer outfall. Alternative 3A water surface elevations are shown in Table 4.

Under 1-percent-probability flood flow conditions, the water surface elevation in the lower reach, also defined for this alternative as the reach between the rock ramp and W. Hampton Avenue, would decrease between 0.1 and 0.2 foot as compared to existing conditions. The 1-percent-probability elevation in the middle reach would decrease 0.1 foot, and the 1-percent-probability elevation in the upper reach would decrease by up to 0.1 foot. Thus, this alternative would meet regulatory requirements set forth in local zoning ordinances and Chapter NR 116 of the *Wisconsin Administrative Code* that do not permit activities which would increase the 1-percent-annual-probability flood stage unless easements were obtained from all affected property owners and a Conditional Letter of Map Revision (CLOMR) were obtained from FEMA prior to any construction.

Under normal (median) flow conditions, the water surface elevation in the lower reach would decrease 3.1 feet with a maximum water depth ranging between 4.3 and 5.3 feet. The normal elevation in the middle reach would decrease between 2.7 and 3.1 feet with a maximum water depth ranging between 3.6 and 6.5 feet. The normal elevation in the upper reach would decrease between 0.5 and 2.7 feet with a maximum water depth ranging between 1.5 and 6.4 feet.

Comparison and Evaluation of River Water Surface Elevation Changes Under Alternative 4
This alternative was developed to increase the elevation of the impoundment water surface as compared to Alternative 3A, while not causing an increase in the 1-percent-probability flood profile by moving the location of the rock ramp to the site of the removed gated spillway portion of the dam and maintaining the serpentine overflow spillway. Since the overall width of the Milwaukee River is greater at Estabrook Dam than at the location of the rock ramp included under Alternatives 3 and 3A, utilizing both a rock ramp at the gated spillway site and the overflow spillway with a lowered crest in tandem to establish the impoundment level allows for a

greater conveyance capacity at a given headwater elevation to pass flood flows as compared to Alternatives 3 and 3A, while enabling establishment of a higher ramp crest to increase the elevation of the impoundment water surface under normal flow conditions. However, under this alternative, both the 6.3-foot-high rock ramp and the serpentine overflow spillway would meet the definition of a dam that would be regulated under Chapter NR 333.

The 6.3-foot- high rock ramp and lowered overflow spillway alternative would be expected to result in a decrease in water surface elevations upstream of the dam for the normal (mean and median) flow conditions and for the 2-, 1-, and 0.2-percent-probability flood flow conditions relative to existing dam conditions, including at each storm sewer outfall. Under the 10-percent-probability flood it would not be expected to result in hydraulically significant differences in water surface elevations. Alternative 4 water surface elevations are shown in Table 5.

Under 1-percent-probability flood flow conditions, the water surface elevation in the lower reach, would decrease between 0.2 and 0.4 foot as compared to existing conditions. The 1-percent-probability elevation in the middle reach would decrease 0.2 foot, and the 1-percent-probability elevation in the upper reach would decrease by up to 0.2 foot. Thus, this alternative would meet regulatory requirements set forth in local zoning ordinances and Chapter NR 116 of the *Wisconsin Administrative Code* that do not permit activities which would increase the 1-percent-annual-probability flood stage unless easements were be obtained from all affected property owners and a Conditional Letter of Map Revision (CLOMR) were obtained from FEMA prior to any construction.

Under normal (median) flow conditions, the water surface elevation in the lower reach would decrease 1.2 feet with a maximum water depth ranging between 6.2 and 7.5 feet. The normal elevation in the middle reach would decrease 1.2 feet with a maximum water depth ranging between 5.1 and 8.0 feet. The normal elevation in the upper reach would decrease between 0.4 and 1.2 feet with a maximum water depth ranging between 1.9 and 7.9 feet.

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ESTABROOK DAM EA HYDRAULIC ANALYSIS STAFF MEMO, REVISED 04/25/14 (00217296).DOC
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ESTABROOK DAM STORM SEWER INVENTORY TABLES (00217490).DOC
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MGH/pk
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Table 1

WATER SURFACE PROFILE COMPARISON OF EXISTING DAM CONDITIONS TO ALTERNATIVE PLAN NO. 1: REHABILITATE THE DAM

Model Reach	River Mile	Description[a]	Invert Elev NGVD29 (ft)	500-Yr Flow			100-Yr Flow			50-Yr Flow			10-Yr Flow			Median Flow			Mean Flow		
				Dam Rehab W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rehab W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rehab W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rehab W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rehab W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rehab W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)
Milwaukee River - Lower Reach	**6.827**	**Cross-Section**		621.11	621.11	0.00	619.23	619.23	0.00	618.29	618.29	0.00	616.12	616.12	0.00	609.44	609.44	0.00	609.89	609.89	0.00
	6.8275	Estabrook Park Dam																			
	6.828	Outfall MkeR-7, left		621.65	621.65	0.00	619.96	619.96	0.00	619.17	619.17	0.00	617.50	617.50	0.00	613.17	613.17	0.00	613.51	613.51	0.00
	6.829	**Cross-Section**		622.18	622.18	0.00	620.68	620.68	0.00	620.05	620.05	0.00	618.88	618.88	0.00	616.89	616.89	0.00	617.12	617.12	0.00
	6.843	**Cross-Section**		622.18	622.18	0.00	620.67	620.67	0.00	620.04	620.04	0.00	618.87	618.87	0.00	616.89	616.89	0.00	617.12	617.12	0.00
	6.866	Outfall MkeR-8, right		622.16	622.16	0.00	620.66	620.66	0.00	620.03	620.03	0.00	618.87	618.87	0.00	616.89	616.89	0.00	617.12	617.12	0.00
	6.928	**Cross-Section**		622.10	622.10	0.00	620.63	620.63	0.00	620.01	620.01	0.00	618.87	618.87	0.00	616.89	616.89	0.00	617.12	617.12	0.00
	6.941	**Cross-Section**		622.14	622.14	0.00	620.66	620.66	0.00	620.05	620.05	0.00	618.89	618.89	0.00	616.89	616.89	0.00	617.12	617.12	0.00
	6.96	**Cross-Section**		622.16	622.16	0.00	620.69	620.69	0.00	620.07	620.07	0.00	618.90	618.90	0.00	616.89	616.89	0.00	617.12	617.12	0.00
	6.963	**Cross-Section**		622.17	622.17	0.00	620.70	620.70	0.00	620.08	620.08	0.00	618.91	618.91	0.00	616.89	616.89	0.00	617.12	617.12	0.00
	6.987	**Cross-Section**		622.32	622.32	0.00	620.82	620.82	0.00	620.18	620.18	0.00	618.97	618.97	0.00	616.89	616.89	0.00	617.12	617.12	0.00
	7.087	**Cross-Section**		622.68	622.68	0.00	621.15	621.15	0.00	620.48	620.48	0.00	619.18	619.18	0.00	616.89	616.89	0.00	617.12	617.12	0.00
	7.096	Outfall MkeR-9, left	610.8	622.66	622.66	0.00	621.14	621.14	0.00	620.47	620.47	0.00	619.17	619.17	0.00	616.89	616.89	0.00	617.12	617.12	0.00
	7.098	Outfall MkeR-10, left		622.66	622.66	0.00	621.14	621.14	0.00	620.47	620.47	0.00	619.17	619.17	0.00	616.89	616.89	0.00	617.12	617.12	0.00
	7.103	**Cross-Section**		622.65	622.65	0.00	621.13	621.13	0.00	620.47	620.47	0.00	619.17	619.17	0.00	616.89	616.89	0.00	617.12	617.12	0.00
	7.104	Outfall MkeR-11, right	615.6	622.66	622.66	0.00	621.13	621.13	0.00	620.47	620.47	0.00	619.17	619.17	0.00	616.89	616.89	0.00	617.12	617.12	0.00
	7.104	Outfall MkeR-12, right		622.66	622.66	0.00	621.13	621.13	0.00	620.47	620.47	0.00	619.17	619.17	0.00	616.89	616.89	0.00	617.12	617.12	0.00
	7.11	Port Washington Road																			
	7.117	**Cross-Section**		622.72	622.72	0.00	621.19	621.19	0.00	620.52	620.52	0.00	619.21	619.21	0.00	616.89	616.89	0.00	617.12	617.12	0.00
	7.16	**Cross-Section**		622.81	622.81	0.00	621.28	621.28	0.00	620.60	620.60	0.00	619.27	619.27	0.00	616.89	616.89	0.00	617.12	617.12	0.00
	7.17	IH 43																			
	7.183	**Cross-Section**		622.95	622.95	0.00	621.41	621.41	0.00	620.72	620.72	0.00	619.35	619.35	0.00	616.90	616.90	0.00	617.13	617.13	0.00
	7.189	**Cross-Section**		622.99	622.99	0.00	621.44	621.44	0.00	620.75	620.75	0.00	619.37	619.37	0.00	616.90	616.90	0.00	617.13	617.13	0.00
	7.19	Ramp to IH 43																			
	7.199	**Cross-Section**		623.11	623.11	0.00	621.54	621.54	0.00	620.84	620.84	0.00	619.44	619.44	0.00	616.92	616.92	0.00	617.16	617.16	0.00
	7.201	Outfall MkeR-13, right		623.11	623.11	0.00	621.54	621.54	0.00	620.84	620.84	0.00	619.44	619.44	0.00	616.92	616.92	0.00	617.16	617.16	0.00
	7.241	Outfall MkeR-14, right		623.20	623.20	0.00	621.63	621.63	0.00	620.92	620.92	0.00	619.51	619.51	0.00	616.92	616.92	0.00	617.16	617.16	0.00
	7.359	**Cross-Section**		623.44	623.44	0.00	621.87	621.87	0.00	621.15	621.15	0.00	619.69	619.69	0.00	616.92	616.92	0.00	617.16	617.16	0.00
	7.519	Outfall MkeR-15, right	629.46	623.91	623.91	0.00	622.31	622.31	0.00	621.57	621.57	0.00	620.01	620.01	0.00	616.92	616.92	0.00	617.16	617.16	0.00
	7.519	**Cross-Section**		623.91	623.91	0.00	622.31	622.31	0.00	621.57	621.57	0.00	620.01	620.01	0.00	616.92	616.92	0.00	617.16	617.16	0.00
	7.526	Outfall MkeR-16, right		623.92	623.92	0.00	622.32	622.32	0.00	621.58	621.58	0.00	620.02	620.02	0.00	616.92	616.92	0.00	617.16	617.16	0.00
	7.576	Outfall MkeR-17, right	618.1	623.99	623.99	0.00	622.40	622.40	0.00	621.66	621.66	0.00	620.08	620.08	0.00	616.92	616.92	0.00	617.16	617.16	0.00
	7.633	**Cross-Section**		624.07	624.07	0.00	622.48	622.48	0.00	621.74	621.74	0.00	620.15	620.15	0.00	616.92	616.92	0.00	617.16	617.16	0.00
	7.64	Outfall MkeR-18, right		624.08	624.08	0.00	622.49	622.49	0.00	621.75	621.75	0.00	620.16	620.16	0.00	616.92	616.92	0.00	617.16	617.16	0.00
	7.654	**Cross-Section**		624.09	624.09	0.00	622.50	622.50	0.00	621.76	621.76	0.00	620.17	620.17	0.00	616.92	616.92	0.00	617.16	617.16	0.00
	7.656	Outfall MkeR-19, right		624.11	624.11	0.00	622.52	622.52	0.00	621.78	621.78	0.00	620.18	620.18	0.00	616.92	616.92	0.00	617.16	617.16	0.00
	7.66	Hampton Avenue																			
	7.669	**Cross-Section**		624.26	624.26	0.00	622.65	622.65	0.00	621.89	621.89	0.00	620.26	620.26	0.00	616.92	616.92	0.00	617.16	617.16	0.00
	7.669	Outfall MkeR-20, right		624.26	624.26	0.00	622.65	622.65	0.00	621.89	621.89	0.00	620.26	620.26	0.00	616.92	616.92	0.00	617.16	617.16	0.00
	7.706	**Cross-Section**		624.50	624.50	0.00	622.81	622.81	0.00	622.02	622.02	0.00	620.34	620.34	0.00	616.92	616.92	0.00	617.16	617.16	0.00
	7.745	**Cross-Section**		624.66	624.66	0.00	622.95	622.95	0.00	622.14	622.14	0.00	620.42	620.42	0.00	616.92	616.92	0.00	617.16	617.16	0.00

Table 1 (continued)

Model Reach	River Mile	Description[a]	Invert Elev NGVD29 (ft)	500-Yr Flow			100-Yr Flow			50-Yr Flow			10-Yr Flow			Median Flow			Mean Flow		
				Dam Rehab W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rehab W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rehab W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rehab W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rehab W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rehab W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)
Milwaukee River - Middle Reach	**7.851**	**Cross-Section**		624.86	624.86	0.00	623.13	623.13	0.00	622.30	622.30	0.00	620.53	620.53	0.00	616.92	616.92	0.00	617.16	617.16	0.00
	7.876	**Cross-Section**		624.87	624.87	0.00	623.14	623.14	0.00	622.32	622.32	0.00	620.54	620.54	0.00	616.92	616.92	0.00	617.16	617.16	0.00
	7.934	**Cross-Section**		624.90	624.90	0.00	623.17	623.17	0.00	622.35	622.35	0.00	620.57	620.57	0.00	616.92	616.92	0.00	617.16	617.16	0.00
	7.945	Outfall MkeR-21, left		624.90	624.90	0.00	623.17	623.17	0.00	622.35	622.35	0.00	620.57	620.57	0.00	616.92	616.92	0.00	617.16	617.16	0.00
	8.003	**Cross-Section**		624.90	624.90	0.00	623.18	623.18	0.00	622.36	622.36	0.00	620.58	620.58	0.00	616.92	616.92	0.00	617.16	617.16	0.00
	8.098	Outfall MkeR-22, right	613.85	624.93	624.93	0.00	623.21	623.21	0.00	622.39	622.39	0.00	620.61	620.61	0.00	616.92	616.92	0.00	617.17	617.17	0.00
	8.132	**Cross-Section**		624.94	624.94	0.00	623.22	623.22	0.00	622.40	622.40	0.00	620.62	620.62	0.00	616.92	616.92	0.00	617.17	617.17	0.00
	8.141	**Cross-Section**		624.94	624.94	0.00	623.22	623.22	0.00	622.40	622.40	0.00	620.62	620.62	0.00	616.92	616.92	0.00	617.17	617.17	0.00
	8.145	**Cross-Section**		624.94	624.94	0.00	623.22	623.22	0.00	622.41	622.41	0.00	620.63	620.63	0.00	616.92	616.92	0.00	617.17	617.17	0.00
Milwaukee River - Right Split (west oxbow)	**7.8761**	**Cross-Section**		624.83	624.83	0.00	623.09	623.09	0.00	622.27	622.27	0.00	620.49	620.49	0.00	616.92	616.92	0.00	617.16	617.16	0.00
	7.9	Milwaukee River Parkway																			
	7.9341	**Cross-Section**		624.85	624.85	0.00	623.11	623.11	0.00	622.30	622.30	0.00	620.52	620.52	0.00	616.92	616.92	0.00	617.16	617.16	0.00
	8.0031	**Cross-Section**		624.92	624.92	0.00	623.20	623.20	0.00	622.38	622.38	0.00	620.59	620.59	0.00	616.92	616.92	0.00	617.16	617.16	0.00
	8.047	Lincoln Creek Confluence		624.92	624.92	0.00	623.20	623.20	0.00	622.38	622.38	0.00	620.59	620.59	0.00	616.92	616.92	0.00	617.16	617.16	0.00
	8.1321	**Cross-Section**		624.93	624.93	0.00	623.20	623.20	0.00	622.38	622.38	0.00	620.60	620.60	0.00	616.92	616.92	0.00	617.16	617.16	0.00
	8.1411	**Cross-Section**		624.90	624.90	0.00	623.18	623.18	0.00	622.36	622.36	0.00	620.58	620.58	0.00	616.92	616.92	0.00	617.16	617.16	0.00
	8.142	Milwaukee River Parkway																			
	8.1451	**Cross-Section**		624.91	624.91	0.00	623.19	623.19	0.00	622.37	622.37	0.00	620.59	620.59	0.00	616.92	616.92	0.00	617.17	617.17	0.00
Milwaukee River - Upper Reach	**8.229**	**Cross-Section**		624.68	624.68	0.00	623.02	623.02	0.00	622.24	622.24	0.00	620.54	620.54	0.00	616.92	616.92	0.00	617.17	617.17	0.00
	8.244	Outfall MkeR-23, right	615.04	624.71	624.71	0.00	623.05	623.05	0.00	622.27	622.27	0.00	620.57	620.57	0.00	616.92	616.92	0.00	617.17	617.17	0.00
	8.341	**Cross-Section**		624.90	624.90	0.00	623.26	623.26	0.00	622.48	622.48	0.00	620.76	620.76	0.00	616.92	616.92	0.00	617.17	617.17	0.00
	8.343	Outfall MkeR-24, right		624.89	624.89	0.00	623.26	623.26	0.00	622.48	622.48	0.00	620.76	620.76	0.00	616.92	616.92	0.00	617.17	617.17	0.00
	8.357	**Cross-Section**		624.84	624.84	0.00	623.23	623.23	0.00	622.45	622.45	0.00	620.75	620.75	0.00	616.92	616.92	0.00	617.17	617.17	0.00
	8.36	Railroad Bridge																			
	8.366	Outfall MkeR-25, right	613.02	625.02	625.02	0.00	623.37	623.37	0.00	622.58	622.58	0.00	620.85	620.85	0.00	616.95	616.95	0.00	617.19	617.19	0.00
	8.375	**Cross-Section**		625.20	625.20	0.00	623.51	623.51	0.00	622.71	622.71	0.00	620.94	620.94	0.00	616.97	616.97	0.00	617.21	617.21	0.00
	8.381	**Cross-Section**		625.21	625.21	0.00	623.53	623.53	0.00	622.73	622.73	0.00	620.96	620.96	0.00	616.97	616.97	0.00	617.21	617.21	0.00
	8.389	Outfall MkeR-27, left		625.33	625.33	0.00	623.61	623.61	0.00	622.79	622.79	0.00	620.98	620.98	0.00	616.97	616.97	0.00	617.21	617.21	0.00
	8.39	Outfall MkeR-26, right	611.95	625.34	625.34	0.00	623.62	623.62	0.00	622.79	622.79	0.00	620.99	620.99	0.00	616.97	616.97	0.00	617.21	617.21	0.00
	8.394	**Cross-Section**		625.40	625.40	0.00	623.66	623.66	0.00	622.82	622.82	0.00	621.00	621.00	0.00	616.97	616.97	0.00	617.21	617.21	0.00
	8.553	Outfall MkeR-28, left		626.15	626.15	0.00	624.36	624.36	0.00	623.49	623.49	0.00	621.58	621.58	0.00	616.97	616.97	0.00	617.22	617.22	0.00
	8.574	Outfall MkeR-29, right	616.26	626.25	626.25	0.00	624.45	624.45	0.00	623.58	623.58	0.00	621.65	621.65	0.00	616.97	616.97	0.00	617.22	617.22	0.00
	8.579	**Cross-Section**		626.27	626.27	0.00	624.47	624.47	0.00	623.60	623.60	0.00	621.67	621.67	0.00	616.97	616.97	0.00	617.22	617.22	0.00
	8.66	**Cross-Section**		626.73	626.73	0.00	624.88	624.88	0.00	623.99	623.99	0.00	621.98	621.98	0.00	616.98	616.98	0.00	617.23	617.23	0.00
	8.716	**Cross-Section**		626.90	626.90	0.00	625.06	625.06	0.00	624.16	624.16	0.00	622.16	622.16	0.00	616.98	616.98	0.00	617.23	617.23	0.00
	8.73	Outfall MkeR-30, left		626.88	626.88	0.00	625.05	625.05	0.00	624.16	624.16	0.00	622.15	622.15	0.00	616.98	616.98	0.00	617.23	617.23	0.00
	8.73	**Cross-Section**		626.88	626.88	0.00	625.05	625.05	0.00	624.16	624.16	0.00	622.15	622.15	0.00	616.98	616.98	0.00	617.23	617.23	0.00
	8.732	Outfall MkeR-31, right		626.89	626.89	0.00	625.06	625.06	0.00	624.17	624.17	0.00	622.16	622.16	0.00	616.98	616.98	0.00	617.23	617.23	0.00
	8.733	Outfall MkeR-33, left		626.90	626.90	0.00	625.07	625.07	0.00	624.18	624.18	0.00	622.17	622.17	0.00	616.98	616.98	0.00	617.23	617.23	0.00
	8.734	Outfall MkeR-32, right		626.91	626.91	0.00	625.07	625.07	0.00	624.18	624.18	0.00	622.17	622.17	0.00	616.98	616.98	0.00	617.23	617.23	0.00
	8.74	Silver Spring Road																			
	8.759	**Cross-Section**		627.07	627.07	0.00	625.22	625.22	0.00	624.33	624.33	0.00	622.32	622.32	0.00	616.98	616.98	0.00	617.24	617.24	0.00
	8.783	**Cross-Section**		627.14	627.14	0.00	625.29	625.29	0.00	624.39	624.39	0.00	622.39	622.39	0.00	616.98	616.98	0.00	617.25	617.25	0.00
	8.963	**Cross-Section**		627.70	627.70	0.00	625.87	625.87	0.00	624.97	624.97	0.00	622.93	622.93	0.00	616.99	616.99	0.00	617.26	617.26	0.00
	8.966	Outfall MkeR-34, right		627.71	627.71	0.00	625.88	625.88	0.00	624.98	624.98	0.00	622.94	622.94	0.00	616.99	616.99	0.00	617.26	617.26	0.00
	9.125	**Cross-Section**		628.28	628.28	0.00	626.45	626.45	0.00	625.55	625.55	0.00	623.49	623.49	0.00	617.00	617.00	0.00	617.29	617.29	0.00
	9.13	Outfall MkeR-35, left		628.31	628.31	0.00	626.47	626.47	0.00	625.57	625.57	0.00	623.51	623.51	0.00	617.00	617.00	0.00	617.29	617.29	0.00
	9.242	Outfall MkeR-36, left		628.87	628.87	0.00	627.02	627.02	0.00	626.11	626.11	0.00	624.02	624.02	0.00	617.01	617.01	0.00	617.33	617.33	0.00
	9.244	Outfall MkeR-37, right		628.88	628.88	0.00	627.03	627.03	0.00	626.12	626.12	0.00	624.03	624.03	0.00	617.01	617.01	0.00	617.33	617.33	0.00
	9.376	Outfall MkeR-38, left		629.54	629.54	0.00	627.67	627.67	0.00	626.76	626.76	0.00	624.63	624.63	0.00	617.02	617.02	0.00	617.37	617.37	0.00

Table 1 (continued)

Model Reach	River Mile	Description[a]	Invert Elev NGVD29 (ft)	500-Yr Flow			100-Yr Flow			50-Yr Flow			10-Yr Flow			Median Flow			Mean Flow		
				Dam Rehab W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rehab W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rehab W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rehab W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rehab W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rehab W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)
Milwaukee River - Upper Reach (continued)	**9.427**	**Cross-Section**		629.79	629.79	0.00	627.92	627.92	0.00	627.00	627.00	0.00	624.86	624.86	0.00	617.03	617.03	0.00	617.39	617.39	0.00
	9.471	Outfall MkeR-40, right		629.94	629.94	0.00	628.07	628.07	0.00	627.15	627.15	0.00	625.01	625.01	0.00	617.04	617.04	0.00	617.42	617.42	0.00
	9.476	Outfall MkeR-39, left		629.95	629.95	0.00	628.09	628.09	0.00	627.17	627.17	0.00	625.03	625.03	0.00	617.04	617.04	0.00	617.42	617.42	0.00
	9.601	Outfall MkeR-41, left		630.37	630.37	0.00	628.51	628.51	0.00	627.59	627.59	0.00	625.45	625.45	0.00	617.07	617.07	0.00	617.49	617.49	0.00
	9.632	Outfall MkeR-42, right		630.47	630.47	0.00	628.61	628.61	0.00	627.69	627.69	0.00	625.55	625.55	0.00	617.08	617.08	0.00	617.51	617.51	0.00
	9.669	**Cross-Section**		630.59	630.59	0.00	628.74	628.74	0.00	627.82	627.82	0.00	625.68	625.68	0.00	617.09	617.09	0.00	617.53	617.53	0.00
	9.834	Outfall MkeR-43, right		631.35	631.35	0.00	629.73	629.73	0.00	628.96	628.96	0.00	627.04	627.04	0.00	617.25	617.25	0.00	617.86	617.86	0.00
	9.846	**Cross-Section**		631.40	631.40	0.00	629.80	629.80	0.00	629.04	629.04	0.00	627.14	627.14	0.00	617.26	617.26	0.00	617.88	617.88	0.00
	9.854	Outfall MkeR-44, left		631.46	631.46	0.00	629.86	629.86	0.00	629.10	629.10	0.00	627.19	627.19	0.00	617.27	617.27	0.00	617.89	617.89	0.00
	9.973	Outfall MkeR-45, right		632.39	632.39	0.00	630.82	630.82	0.00	630.03	630.03	0.00	627.97	627.97	0.00	617.35	617.35	0.00	618.04	618.04	0.00
	10.009	**Cross-Section**		632.67	632.67	0.00	631.11	631.11	0.00	630.31	630.31	0.00	628.20	628.20	0.00	617.38	617.38	0.00	618.08	618.08	0.00
	10.015	Outfall MkeR-46, right		632.75	632.75	0.00	631.17	631.17	0.00	630.37	630.37	0.00	628.24	628.24	0.00	617.38	617.38	0.00	618.08	618.08	0.00
	10.023	**Cross-Section**		632.85	632.85	0.00	631.26	631.26	0.00	630.44	630.44	0.00	628.30	628.30	0.00	617.39	617.39	0.00	618.09	618.09	0.00
	10.025	Outfall MkeR-48, left		632.85	632.85	0.00	631.26	631.26	0.00	630.44	630.44	0.00	628.30	628.30	0.00	617.39	617.39	0.00	618.09	618.09	0.00
	10.038	Outfall MkeR-47, right		632.82	632.82	0.00	631.23	631.23	0.00	630.42	630.42	0.00	628.28	628.28	0.00	617.40	617.40	0.00	618.10	618.10	0.00
	10.04	Bender Road																			
	10.051	**Cross-Section**		632.80	632.80	0.00	631.21	631.21	0.00	630.40	630.40	0.00	628.26	628.26	0.00	617.40	617.40	0.00	618.11	618.11	0.00
Lincoln Creek - Lower Mainstream	**0**	**Cross-Section**		624.92[b]	624.92[b]	0.00	623.20[b]	623.20[b]	0.00	622.38[b]	622.38[b]	0.00	620.59[b]	620.59[b]	0.00						
	0.03	**Cross-Section**		624.92[b]	624.92[b]	0.00	623.20[b]	623.20[b]	0.00	622.38[b]	622.38[b]	0.00	620.59[b]	620.59[b]	0.00						
	0.0303	Outfall LC-1, right		624.92[b]	624.92[b]	0.00	623.20[b]	623.20[b]	0.00	622.38[b]	622.38[b]	0.00	620.59[b]	620.59[b]	0.00						
	0.14	**Cross-Section**		624.92[b]	624.92[b]	0.00	623.20[b]	623.20[b]	0.00	622.38[b]	622.38[b]	0.00	620.59[b]	620.59[b]	0.00						
	0.16	**Cross-Section**		624.92[b]	624.92[b]	0.00	623.20[b]	623.20[b]	0.00	622.38[b]	622.38[b]	0.00	620.59[b]	620.59[b]	0.00						
	0.18	**Cross-Section**		624.92[b]	624.92[b]	0.00	623.20[b]	623.20[b]	0.00	622.38[b]	622.38[b]	0.00	620.59[b]	620.59[b]	0.00						
	0.181	Outfall LC-2, right	612.1	624.92[b]	624.92[b]	0.00	623.20[b]	623.20[b]	0.00	622.38[b]	622.38[b]	0.00	620.59[b]	620.59[b]	0.00						
	0.21	**Cross-Section**		624.92[b]	624.92[b]	0.00	623.20[b]	623.20[b]	0.00	622.38[b]	622.38[b]	0.00	620.59[b]	620.59[b]	0.00						
	0.33	**Cross-Section**		624.92[b]	624.92[b]	0.00	623.20[b]	623.20[b]	0.00	622.38[b]	622.38[b]	0.00	621.04	621.04	0.00						
	0.333	Outfall LC-3, left	614.44	624.92[b]	624.92[b]	0.00	623.20[b]	623.20[b]	0.00	622.38[b]	622.38[b]	0.00	621.07	621.07	0.00						
	0.4	**Cross-Section**		624.92[b]	624.92[b]	0.00	623.50	623.50	0.00	623.00	623.00	0.00	621.71	621.71	0.00						
	0.41	**Cross-Section**		624.92[b]	624.92[b]	0.00	623.52	623.52	0.00	623.03	623.03	0.00	621.73	621.73	0.00						
	0.41	Outfall LC-4, left	614.23	624.92[b]	624.92[b]	0.00	623.52	623.52	0.00	623.03	623.03	0.00	621.73	621.73	0.00						
	0.419	Outfall LC-5, right	616.72	624.92[b]	624.92[b]	0.00	623.62	623.62	0.00	623.03	623.03	0.00	621.73	621.73	0.00						
	0.42	N. Green Bay Avenue																			
	0.43	**Cross-Section**		625.59	625.59	0.00	623.74	623.74	0.00	623.21	623.21	0.00	621.87	621.87	0.00						
	0.44	**Cross-Section**		625.58	625.58	0.00	623.72	623.72	0.00	623.20	623.20	0.00	621.85	621.85	0.00						
	0.47	**Cross-Section**		626.18	626.18	0.00	624.18	624.18	0.00	623.60	623.60	0.00	622.12	622.12	0.00						
	0.5	**Cross-Section**		626.26	626.26	0.00	624.25	624.25	0.00	623.66	623.66	0.00	622.19	622.19	0.00						
	0.54	**Cross-Section**		626.21	626.21	0.00	624.25	624.25	0.00	623.69	623.69	0.00	622.27	622.27	0.00						
	0.6	**Cross-Section**		626.00	626.00	0.00	624.18	624.18	0.00	623.65	623.65	0.00	622.30	622.30	0.00						
	0.61	**Cross-Section**		626.12	626.12	0.00	624.31	624.31	0.00	623.78	623.78	0.00	622.40	622.40	0.00						
	0.62	**Cross-Section**		626.44	626.44	0.00	624.72	624.72	0.00	624.16	624.16	0.00	622.67	622.67	0.00						
	0.631	Outfall LC-6, left	614.76	626.51	626.51	0.00	624.76	624.76	0.00	624.20	624.20	0.00	622.70	622.70	0.00						
	0.71	**Cross-Section**		627.05	627.05	0.00	625.05	625.05	0.00	624.45	624.45	0.00	622.95	622.95	0.00						
	0.75	**Cross-Section**		627.13	627.13	0.00	625.15	625.15	0.00	624.55	624.55	0.00	623.05	623.05	0.00						
	0.79	**Cross-Section**		627.23	627.23	0.00	625.25	625.25	0.00	624.65	624.65	0.00	623.12	623.12	0.00						
	0.794	**Cross-Section**		627.25	627.25	0.00	625.28	625.28	0.00	624.67	624.67	0.00	623.15	623.15	0.00						
	0.798	Outfall LC-7, right	615.47	627.39	627.39	0.00	625.32	625.32	0.00	624.70	624.70	0.00	623.18	623.18	0.00						
	0.799	Outfall LC-8, right	615.46	627.42	627.42	0.00	625.33	625.33	0.00	624.71	624.71	0.00	623.18	623.18	0.00						
	0.803	W. Villard Avenue																			
	0.81	**Cross-Section**		627.79	627.79	0.00	625.43	625.43	0.00	624.79	624.79	0.00	623.26	623.26	0.00						
	0.82	**Cross-Section**		628.12	628.12	0.00	625.57	625.57	0.00	624.91	624.91	0.00	623.33	623.33	0.00						

[b] *Water surface elevation determined using backwater from the confluence with the Right Split (west oxbow) of the Milwaukee River.*

Table 1 (continued)

Model Reach	River Mile	Description[a]	Invert Elev NGVD29 (ft)	500-Yr Flow			100-Yr Flow			50-Yr Flow			10-Yr Flow			Median Flow			Mean Flow		
				Dam Rehab W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rehab W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rehab W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rehab W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rehab W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rehab W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)
Lincoln Creek - Lower Mainstream (continued)	0.848	Outfall LC-10, left	619.6	628.11	628.11	0.00	625.58	625.58	0.00	624.93	624.93	0.00	623.35	623.35	0.00						
	0.877	Outfall LC-9, right	619.17	628.11	628.11	0.00	625.60	625.60	0.00	624.94	624.94	0.00	623.37	623.37	0.00						
	0.909	**Cross-Section**		628.10	628.10	0.00	625.61	625.61	0.00	624.96	624.96	0.00	623.40	623.40	0.00						
	0.912	N. 24th Place Footbridge																			
	0.915	**Cross-Section**		628.22	628.22	0.00	625.64	625.64	0.00	624.98	624.98	0.00	623.42	623.42	0.00						
	0.919	Outfall LC-11, right	619.35	628.25	628.25	0.00	625.65	625.65	0.00	624.99	624.99	0.00	623.44	623.44	0.00						
	0.93	**Cross-Section**		628.34	628.34	0.00	625.69	625.69	0.00	625.03	625.03	0.00	623.48	623.48	0.00						
	0.972	Outfall LC-12, left	617.81	628.44	628.44	0.00	625.82	625.82	0.00	625.15	625.15	0.00	623.61	623.61	0.00						
	0.974	Outfall LC-13, left	617.09	628.44	628.44	0.00	625.83	625.83	0.00	625.16	625.16	0.00	623.61	623.61	0.00						
	0.987	Outfall LC-14, right	619.4	628.47	628.47	0.00	625.87	625.87	0.00	625.19	625.19	0.00	623.65	623.65	0.00						
	1.07	**Cross-Section**		628.67	628.67	0.00	626.12	626.12	0.00	625.43	625.43	0.00	623.90	623.90	0.00						
	1.12	**Cross-Section**		628.92	628.92	0.00	626.45	626.45	0.00	625.77	625.77	0.00	624.19	624.19	0.00						
	1.138	Outfall LC-15, left	616.13	629.04	629.04	0.00	626.60	626.60	0.00	625.90	625.90	0.00	624.32	624.32	0.00						
	1.141	Outfall LC-16, right	621.01	629.06	629.06	0.00	626.63	626.63	0.00	625.93	625.93	0.00	624.34	624.34	0.00						
	1.17	**Cross-Section**		629.25	629.25	0.00	626.87	626.87	0.00	626.14	626.14	0.00	624.54	624.54	0.00						

[a]*References to "left" and "right" are based on looking in the downstream direction.*

[b]*Water surface elevation determined using backwater from the confluence with the Right Split (west oxbow) of the Milwaukee River.*

ESTABROOK DAM STORM SEWER INVENTORY TABLES (00217490).DOC
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Table 2

WATER SURFACE PROFILE COMPARISON OF EXISTING DAM CONDITIONS TO ALTERNATIVE PLAN NO. 2: ABANDON AND REMOVE THE DAM

				500-Yr Flow			100-Yr Flow			50-Yr Flow			10-Yr Flow			Median Flow			Mean Flow		
Model Reach	River Mile	Description[a]	Invert Elev NGVD29 (ft)	Dam Removal W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Removal W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Removal W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference |(ft)	Dam Removal W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Removal W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Removal W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)
Milwaukee River - Lower Reach	**6.827**	**Cross-Section**		621.11	621.11	0.00	619.23	619.23	0.00	618.29	618.29	0.00	616.12	616.12	0.00	609.44	609.44	0.00	609.89	609.89	0.00
	6.8275	Estabrook Park Dam																			
	6.828	Outfall MkeR-7, left		621.11	621.65	-0.54	619.23	619.96	-0.73	618.29	619.17	-0.88	616.12	617.50	-1.38	609.44	613.17	-3.73	609.89	613.51	-3.62
	6.829	**Cross-Section**		621.11	622.18	-1.07	619.23	620.68	-1.45	618.29	620.05	-1.76	616.12	618.88	-2.76	609.44	616.89	-7.45	609.89	617.12	-7.23
	6.843	**Cross-Section**		621.11	622.18	-1.07	619.22	620.67	-1.45	618.29	620.04	-1.75	616.12	618.87	-2.75	609.95	616.89	-6.94	610.13	617.12	-6.99
	6.866	Outfall MkeR-8, right		621.09	622.16	-1.07	619.21	620.66	-1.45	618.29	620.03	-1.74	616.14	618.87	-2.73	610.08	616.89	-6.81	610.31	617.12	-6.81
	6.928	**Cross-Section**		621.04	622.10	-1.06	619.19	620.63	-1.44	618.28	620.01	-1.73	616.20	618.87	-2.67	610.43	616.89	-6.46	610.79	617.12	-6.33
	6.941	**Cross-Section**		621.09	622.14	-1.05	619.25	620.66	-1.41	618.35	620.05	-1.70	616.27	618.89	-2.62	610.45	616.89	-6.44	610.81	617.12	-6.31
	6.96	**Cross-Section**		621.12	622.16	-1.04	619.30	620.69	-1.39	618.40	620.07	-1.67	616.34	618.90	-2.56	610.47	616.89	-6.42	610.85	617.12	-6.27
	6.963	**Cross-Section**		621.13	622.17	-1.04	619.31	620.70	-1.39	618.41	620.08	-1.67	616.36	618.91	-2.55	610.48	616.89	-6.41	610.86	617.12	-6.26
	6.987	**Cross-Section**		621.32	622.32	-1.00	619.48	620.82	-1.34	618.58	620.18	-1.60	616.50	618.97	-2.47	610.53	616.89	-6.36	610.93	617.12	-6.19
	7.087	**Cross-Section**		621.79	622.68	-0.89	619.98	621.15	-1.17	619.09	620.48	-1.39	617.07	619.18	-2.11	610.75	616.89	-6.14	611.18	617.12	-5.94
	7.096	Outfall MkeR-9, left	610.8	621.77	622.66	-0.89	619.97	621.14	-1.16	619.08	620.47	-1.39	617.08	619.17	-2.10	610.77	616.89	-6.12	611.20	617.12	-5.92
	7.098	Outfall MkeR-10, left		621.77	622.66	-0.89	619.97	621.14	-1.16	619.08	620.47	-1.39	617.08	619.17	-2.10	610.77	616.89	-6.12	611.20	617.12	-5.92
	7.103	**Cross-Section**		621.76	622.65	-0.89	619.97	621.13	-1.16	619.08	620.47	-1.39	617.08	619.17	-2.09	610.78	616.89	-6.11	611.21	617.12	-5.91
	7.104	Outfall MkeR-11, right	615.6	621.77	622.66	-0.89	619.98	621.13	-1.16	619.09	620.47	-1.39	617.09	619.17	-2.09	610.78	616.89	-6.11	611.21	617.12	-5.91
	7.104	Outfall MkeR-12, right		621.77	622.66	-0.89	619.98	621.13	-1.16	619.09	620.47	-1.39	617.09	619.17	-2.09	610.78	616.89	-6.11	611.21	617.12	-5.91
	7.11	Port Washington Road																			
	7.117	**Cross-Section**		621.85	622.72	-0.87	620.05	621.19	-1.14	619.16	620.52	-1.36	617.16	619.21	-2.05	610.81	616.89	-6.08	611.24	617.12	-5.88
	7.16	**Cross-Section**		621.96	622.81	-0.85	620.18	621.28	-1.10	619.30	620.60	-1.30	617.30	619.27	-1.97	610.87	616.89	-6.02	611.32	617.12	-5.80
	7.17	IH 43																			
	7.183	**Cross-Section**		622.15	622.95	-0.80	620.37	621.41	-1.04	619.48	620.72	-1.24	617.48	619.35	-1.87	610.91	616.90	-5.99	611.37	617.13	-5.76
	7.189	**Cross-Section**		622.19	622.99	-0.80	620.41	621.44	-1.03	619.53	620.75	-1.22	617.53	619.37	-1.84	610.92	616.90	-5.98	611.38	617.13	-5.75
	7.19	Ramp to IH 43																			
	7.199	**Cross-Section**		622.32	623.11	-0.79	620.53	621.54	-1.01	619.65	620.84	-1.19	617.62	619.44	-1.82	610.94	616.92	-5.98	611.41	617.16	-5.75
	7.201	Outfall MkeR-13, right		622.33	623.11	-0.79	620.54	621.54	-1.01	619.66	620.84	-1.19	617.63	619.44	-1.82	610.94	616.92	-5.98	611.41	617.16	-5.75
	7.241	Outfall MkeR-14, right		622.43	623.20	-0.77	620.65	621.63	-0.98	619.78	620.92	-1.15	617.76	619.51	-1.75	611.01	616.92	-5.91	611.49	617.16	-5.67
	7.359	**Cross-Section**		622.74	623.44	-0.70	620.99	621.87	-0.88	620.13	621.15	-1.02	618.14	619.69	-1.55	611.20	616.92	-5.72	611.71	617.16	-5.45
	7.519	Outfall MkeR-15, right	629.46	623.30	623.91	-0.61	621.57	622.31	-0.74	620.71	621.57	-0.86	618.73	620.01	-1.28	611.41	616.92	-5.51	611.97	617.16	-5.19
	7.519	**Cross-Section**		623.30	623.91	-0.61	621.57	622.31	-0.74	620.71	621.57	-0.86	618.73	620.01	-1.28	611.41	616.92	-5.51	611.97	617.16	-5.19
	7.526	Outfall MkeR-16, right		623.31	623.92	-0.61	621.58	622.32	-0.74	620.72	621.58	-0.86	618.74	620.02	-1.27	611.41	616.92	-5.51	611.98	617.16	-5.18
	7.576	Outfall MkeR-17, right	618.1	623.40	623.99	-0.59	621.68	622.40	-0.72	620.83	621.66	-0.83	618.85	620.08	-1.23	611.45	616.92	-5.47	612.03	617.16	-5.13
	7.633	**Cross-Section**		623.50	624.07	-0.57	621.79	622.48	-0.69	620.94	621.74	-0.80	618.97	620.15	-1.18	611.49	616.92	-5.43	612.08	617.16	-5.08
	7.64	Outfall MkeR-18, right		623.51	624.08	-0.57	621.80	622.49	-0.69	620.95	621.75	-0.80	618.98	620.16	-1.18	611.49	616.92	-5.43	612.08	617.16	-5.08
	7.654	**Cross-Section**		623.52	624.09	-0.57	621.82	622.50	-0.68	620.97	621.76	-0.79	619.00	620.17	-1.17	611.50	616.92	-5.42	612.09	617.16	-5.07
	7.656	Outfall MkeR-19, right		623.55	624.11	-0.57	621.84	622.52	-0.68	620.99	621.78	-0.78	619.02	620.18	-1.16	611.50	616.92	-5.42	612.09	617.16	-5.07
	7.66	Hampton Avenue																			
	7.669	**Cross-Section**		623.72	624.26	-0.54	622.00	622.65	-0.65	621.14	621.89	-0.75	619.13	620.26	-1.13	611.53	616.92	-5.39	612.12	617.16	-5.04
	7.669	Outfall MkeR-20, right		623.72	624.26	-0.54	622.00	622.65	-0.65	621.14	621.89	-0.75	619.13	620.26	-1.13	611.53	616.92	-5.39	612.12	617.16	-5.04
	7.706	**Cross-Section**		623.96	624.50	-0.54	622.17	622.81	-0.64	621.28	622.02	-0.74	619.24	620.34	-1.10	611.54	616.92	-5.38	612.14	617.16	-5.02
	7.745	**Cross-Section**		624.14	624.66	-0.52	622.32	622.95	-0.63	621.42	622.14	-0.72	619.35	620.42	-1.07	611.55	616.92	-5.37	612.16	617.16	-5.00

Decreases in water surface elevation relative to existing dam conditions.

Table 2 (continued)

Model Reach	River Mile	Description[a]	Invert Elev NGVD29 (ft)	500-Yr Flow			100-Yr Flow			50-Yr Flow			10-Yr Flow			Median Flow			Mean Flow		
				Dam Removal W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Removal W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Removal W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference |(ft)	Dam Removal W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Removal W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Removal W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)
Milwaukee River - Middle Reach	**7.851**	**Cross-Section**		624.37	624.86	-0.49	622.53	623.13	-0.60	621.61	622.30	-0.69	619.48	620.53	-1.05	612.19	616.92	-4.73	612.81	617.16	-4.35
	7.876	**Cross-Section**		624.38	624.87	-0.49	622.54	623.14	-0.60	621.63	622.32	-0.69	619.50	620.54	-1.04	612.20	616.92	-4.72	612.83	617.16	-4.33
	7.934	**Cross-Section**		624.41	624.90	-0.49	622.59	623.17	-0.58	621.67	622.35	-0.68	619.55	620.57	-1.02	612.23	616.92	-4.69	612.86	617.16	-4.30
	7.945	Outfall MkeR-21, left		624.41	624.90	-0.49	622.59	623.17	-0.58	621.67	622.35	-0.68	619.55	620.57	-1.02	612.23	616.92	-4.69	612.86	617.16	-4.30
	8.003	**Cross-Section**		624.42	624.90	-0.48	622.60	623.18	-0.58	621.68	622.36	-0.68	619.57	620.58	-1.01	612.26	616.92	-4.66	612.89	617.16	-4.27
	8.098	Outfall MkeR-22, right	613.85	624.45	624.93	-0.48	622.63	623.21	-0.58	621.72	622.39	-0.67	619.61	620.61	-1.00	612.28	616.92	-4.64	612.92	617.17	-4.25
	8.132	**Cross-Section**		624.46	624.94	-0.48	622.64	623.22	-0.58	621.73	622.40	-0.67	619.63	620.62	-0.99	612.29	616.92	-4.63	612.93	617.17	-4.24
	8.141	**Cross-Section**		624.46	624.94	-0.48	622.65	623.22	-0.57	621.74	622.40	-0.66	619.63	620.62	-0.99	612.29	616.92	-4.63	612.94	617.17	-4.23
	8.145	**Cross-Section**		624.47	624.94	-0.47	622.65	623.22	-0.57	621.74	622.41	-0.67	619.64	620.63	-0.99	612.30	616.92	-4.62	612.94	617.17	-4.23
Milwaukee River - Right Split (west oxbow)	**7.8761**	**Cross-Section**		624.33	624.83	-0.50	622.48	623.09	-0.61	621.56	622.27	-0.71	619.43	620.49	-1.06	612.19	616.92	-4.73	612.81	617.16	-4.35
	7.9	Milwaukee River Parkway																			
	7.9341	**Cross-Section**		624.35	624.85	-0.50	622.52	623.11	-0.59	621.60	622.30	-0.70	619.48	620.52	-1.04	612.23	616.92	-4.69	612.86	617.16	-4.30
	8.0031	**Cross-Section**		624.45	624.92	-0.47	622.62	623.20	-0.58	621.71	622.38	-0.67	619.58	620.59	-1.01	612.25	616.92	-4.67	612.89	617.16	-4.27
	8.047	Lincoln Creek Confluence		624.45	624.92	-0.47	622.62	623.20	-0.58	621.71	622.38	-0.67	619.58	620.59	-1.01	612.25	616.92	-4.67	612.89	617.16	-4.27
	8.1321	**Cross-Section**		624.45	624.93	-0.48	622.63	623.20	-0.57	621.71	622.38	-0.67	619.59	620.60	-1.01	612.25	616.92	-4.67	612.89	617.16	-4.27
	8.1411	**Cross-Section**		624.42	624.90	-0.48	622.60	623.18	-0.58	621.69	622.36	-0.67	619.57	620.58	-1.01	612.26	616.92	-4.66	612.90	617.16	-4.26
	8.142	Milwaukee River Parkway																			
	8.1451	**Cross-Section**		624.43	624.91	-0.48	622.61	623.19	-0.58	621.70	622.37	-0.67	619.59	620.59	-1.00	612.29	616.92	-4.63	612.93	617.17	-4.24
Milwaukee River - Upper Reach	**8.229**	**Cross-Section**		624.18	624.68	-0.50	622.43	623.02	-0.59	621.56	622.24	-0.68	619.54	620.54	-1.00	612.34	616.92	-4.58	613.01	617.17	-4.16
	8.244	Outfall MkeR-23, right	615.04	624.21	624.71	-0.49	622.47	623.05	-0.58	621.60	622.27	-0.67	619.59	620.57	-0.98	612.35	616.92	-4.57	613.02	617.17	-4.15
	8.341	**Cross-Section**		624.44	624.90	-0.46	622.73	623.26	-0.53	621.87	622.48	-0.61	619.89	620.76	-0.87	612.38	616.92	-4.54	613.07	617.17	-4.10
	8.343	Outfall MkeR-24, right		624.43	624.89	-0.46	622.73	623.26	-0.53	621.87	622.48	-0.61	619.89	620.76	-0.87	612.38	616.92	-4.54	613.07	617.17	-4.10
	8.357	**Cross-Section**		624.38	624.84	-0.46	622.69	623.23	-0.54	621.85	622.45	-0.60	619.88	620.75	-0.87	612.38	616.92	-4.54	613.08	617.17	-4.09
	8.36	Railroad Bridge																			
	8.366	Outfall MkeR-25, right	613.02	624.58	625.02	-0.44	622.86	623.37	-0.51	622.00	622.58	-0.59	620.00	620.85	-0.85	612.40	616.95	-4.54	613.11	617.19	-4.09
	8.375	**Cross-Section**		624.78	625.20	-0.42	623.02	623.51	-0.49	622.14	622.71	-0.57	620.12	620.94	-0.82	612.42	616.97	-4.55	613.13	617.21	-4.08
	8.381	**Cross-Section**		624.80	625.21	-0.41	623.04	623.53	-0.49	622.17	622.73	-0.56	620.14	620.96	-0.82	612.42	616.97	-4.55	613.13	617.21	-4.08
	8.389	Outfall MkeR-27, left		624.92	625.33	-0.41	623.12	623.61	-0.49	622.23	622.79	-0.56	620.17	620.98	-0.81	612.43	616.97	-4.54	613.13	617.21	-4.08
	8.39	Outfall MkeR-26, right	611.95	624.93	625.34	-0.41	623.13	623.62	-0.49	622.23	622.79	-0.56	620.17	620.99	-0.81	612.43	616.97	-4.54	613.13	617.21	-4.08
	8.394	**Cross-Section**		624.99	625.40	-0.41	623.17	623.66	-0.49	622.26	622.82	-0.56	620.19	621.00	-0.81	612.43	616.97	-4.54	613.13	617.21	-4.08
	8.553	Outfall MkeR-28, left		625.82	626.15	-0.33	623.97	624.36	-0.39	623.05	623.49	-0.44	620.93	621.58	-0.65	612.64	616.97	-4.33	613.36	617.22	-3.86
	8.574	Outfall MkeR-29, right	616.26	625.92	626.25	-0.32	624.07	624.45	-0.37	623.16	623.58	-0.42	621.03	621.65	-0.63	612.67	616.97	-4.30	613.39	617.22	-3.83
	8.579	**Cross-Section**		625.95	626.27	-0.32	624.10	624.47	-0.37	623.18	623.60	-0.42	621.05	621.67	-0.62	612.68	616.97	-4.29	613.40	617.22	-3.82
	8.66	**Cross-Section**		626.44	626.73	-0.29	624.55	624.88	-0.33	623.61	623.99	-0.38	621.44	621.98	-0.54	613.07	616.98	-3.91	613.65	617.23	-3.58
	8.716	**Cross-Section**		626.62	626.90	-0.28	624.74	625.06	-0.32	623.81	624.16	-0.35	621.65	622.16	-0.51	613.43	616.98	-3.55	613.91	617.23	-3.32
	8.73	Outfall MkeR-30, left		626.61	626.88	-0.27	624.73	625.05	-0.32	623.80	624.16	-0.36	621.65	622.15	-0.50	613.50	616.98	-3.48	613.95	617.23	-3.28
	8.73	**Cross-Section**		626.61	626.88	-0.27	624.73	625.05	-0.32	623.80	624.16	-0.36	621.65	622.15	-0.50	613.50	616.98	-3.48	613.95	617.23	-3.28
	8.732	Outfall MkeR-31, right		626.62	626.89	-0.27	624.74	625.06	-0.32	623.81	624.17	-0.36	621.66	622.16	-0.50	613.54	616.98	-3.44	614.00	617.23	-3.23
	8.733	Outfall MkeR-33, left		626.63	626.90	-0.27	624.75	625.07	-0.32	623.82	624.18	-0.36	621.67	622.17	-0.50	613.56	616.98	-3.42	614.02	617.23	-3.21
	8.734	Outfall MkeR-32, right		626.64	626.91	-0.27	624.76	625.07	-0.32	623.83	624.18	-0.36	621.68	622.17	-0.50	613.58	616.98	-3.40	614.04	617.23	-3.19
	8.74	Silver Spring Road																			
	8.759	**Cross-Section**		626.80	627.07	-0.27	624.92	625.22	-0.30	623.99	624.33	-0.34	621.85	622.32	-0.47	614.10	616.98	-2.88	614.62	617.24	-2.62
	8.783	**Cross-Section**		626.87	627.14	-0.27	624.99	625.29	-0.30	624.07	624.39	-0.32	621.94	622.39	-0.45	614.18	616.98	-2.80	614.73	617.25	-2.52
	8.963	**Cross-Section**		627.48	627.70	-0.22	625.62	625.87	-0.25	624.70	624.97	-0.27	622.57	622.93	-0.36	614.30	616.99	-2.69	614.91	617.26	-2.35
	8.966	Outfall MkeR-34, right		627.49	627.71	-0.22	625.63	625.88	-0.25	624.71	624.98	-0.27	622.58	622.94	-0.36	614.30	616.99	-2.69	614.92	617.26	-2.35
	9.125	**Cross-Section**		628.09	628.28	-0.19	626.25	626.45	-0.20	625.34	625.55	-0.21	623.21	623.49	-0.28	614.53	617.00	-2.47	615.19	617.29	-2.10
	9.13	Outfall MkeR-35, left		628.12	628.31	-0.19	626.28	626.47	-0.20	625.37	625.57	-0.21	623.23	623.51	-0.28	614.54	617.00	-2.46	615.20	617.29	-2.09

Decreases in water surface elevation relative to existing dam conditions.

Table 2 (continued)

Model Reach	River Mile	Description[a]	Invert Elev NGVD29 (ft)	500-Yr Flow			100-Yr Flow			50-Yr Flow			10-Yr Flow			Median Flow			Mean Flow		
				Dam Removal W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Removal W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Removal W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference |(ft)	Dam Removal W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Removal W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Removal W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)
Milwaukee River - Upper Reach (continued)	9.242	Outfall MkeR-36, left		628.70	628.87	-0.16	626.85	627.02	-0.17	625.93	626.11	-0.18	623.79	624.02	-0.23	614.77	617.01	-2.24	615.45	617.33	-1.88
	9.244	Outfall MkeR-37, right		628.71	628.88	-0.16	626.86	627.03	-0.17	625.94	626.12	-0.18	623.80	624.03	-0.23	614.77	617.01	-2.24	615.45	617.33	-1.88
	9.376	Outfall MkeR-38, left		629.40	629.54	-0.13	627.53	627.67	-0.14	626.61	626.76	-0.14	624.45	624.63	-0.18	615.05	617.02	-1.98	615.75	617.37	-1.63
	9.427	**Cross-Section**		629.67	629.79	-0.12	627.79	627.92	-0.13	626.87	627.00	-0.13	624.70	624.86	-0.16	615.15	617.03	-1.88	615.86	617.39	-1.53
	9.471	Outfall MkeR-40, right		629.82	629.94	-0.12	627.94	628.07	-0.12	627.02	627.15	-0.12	624.86	625.01	-0.15	615.28	617.04	-1.77	615.99	617.42	-1.43
	9.476	Outfall MkeR-39, left		629.84	629.95	-0.12	627.96	628.09	-0.12	627.04	627.17	-0.12	624.88	625.03	-0.15	615.29	617.04	-1.75	616.00	617.42	-1.42
	9.601	Outfall MkeR-41, left		630.26	630.37	-0.11	628.40	628.51	-0.11	627.48	627.59	-0.11	625.33	625.45	-0.12	615.65	617.07	-1.43	616.36	617.49	-1.13
	9.632	Outfall MkeR-42, right		630.36	630.47	-0.10	628.51	628.61	-0.10	627.59	627.69	-0.10	625.44	625.55	-0.12	615.73	617.08	-1.35	616.45	617.51	-1.06
	9.669	**Cross-Section**		630.49	630.59	-0.10	628.64	628.74	-0.10	627.72	627.82	-0.10	625.57	625.68	-0.11	615.84	617.09	-1.25	616.56	617.53	-0.97
	9.834	Outfall MkeR-43, right		631.26	631.35	-0.08	629.67	629.73	-0.05	628.91	628.96	-0.04	626.99	627.04	-0.05	616.52	617.25	-0.73	617.32	617.86	-0.53
	9.846	**Cross-Section**		631.32	631.40	-0.08	629.75	629.80	-0.05	629.00	629.04	-0.04	627.09	627.14	-0.05	616.57	617.26	-0.69	617.38	617.88	-0.50
	9.854	Outfall MkeR-44, left		631.38	631.46	-0.08	629.82	629.86	-0.05	629.06	629.10	-0.04	627.14	627.19	-0.05	616.58	617.27	-0.68	617.40	617.89	-0.49
	9.973	Outfall MkeR-45, right		632.35	632.39	-0.04	630.79	630.82	-0.03	630.00	630.03	-0.03	627.92	627.97	-0.04	616.79	617.35	-0.57	617.63	618.04	-0.41
	10.009	**Cross-Section**		632.64	632.67	-0.03	631.08	631.11	-0.03	630.28	630.31	-0.03	628.16	628.20	-0.04	616.85	617.38	-0.53	617.70	618.08	-0.38
	10.015	Outfall MkeR-46, right		632.72	632.75	-0.03	631.14	631.17	-0.03	630.34	630.37	-0.03	628.20	628.24	-0.04	616.85	617.38	-0.53	617.71	618.08	-0.38
	10.023	**Cross-Section**		632.82	632.85	-0.03	631.23	631.26	-0.03	630.42	630.44	-0.02	628.26	628.30	-0.04	616.86	617.39	-0.53	617.72	618.09	-0.37
	10.025	Outfall MkeR-48, left		632.82	632.85	-0.03	631.23	631.26	-0.03	630.42	630.44	-0.02	628.26	628.30	-0.04	616.86	617.39	-0.53	617.72	618.09	-0.37
	10.038	Outfall MkeR-47, right		632.79	632.82	-0.03	631.20	631.23	-0.03	630.39	630.42	-0.03	628.24	628.28	-0.04	616.88	617.40	-0.51	617.74	618.10	-0.36
	10.04	Bender Road																			
	10.051	**Cross-Section**		632.77	632.80	-0.03	631.18	631.21	-0.03	630.37	630.40	-0.03	628.22	628.26	-0.04	616.90	617.40	-0.50	617.75	618.11	-0.36
Lincoln Creek - Lower Mainstream	**0**	**Cross-Section**		624.45[b]	624.92[b]	-0.47	622.62[b]	623.20[b]	-0.58	621.71[b]	622.38[b]	-0.67	619.58[b]	620.59[b]	-1.01						
	0.03	**Cross-Section**		624.45[b]	624.92[b]	-0.47	622.62[b]	623.20[b]	-0.58	621.71[b]	622.38[b]	-0.67	619.58[b]	620.59[b]	-1.01						
	0.0303	Outfall LC-1, right		624.45[b]	624.92[b]	-0.47	622.62[b]	623.20[b]	-0.58	621.71[b]	622.38[b]	-0.67	619.58[b]	620.59[b]	-1.01						
	0.14	**Cross-Section**		624.45[b]	624.92[b]	-0.47	622.62[b]	623.20[b]	-0.58	621.71[b]	622.38[b]	-0.67	619.86	620.59[b]	-0.73						
	0.16	**Cross-Section**		624.45[b]	624.92[b]	-0.47	622.62[b]	623.20[b]	-0.58	621.71[b]	622.38[b]	-0.67	620.07	620.59[b]	-0.52						
	0.18	**Cross-Section**		624.45[b]	624.92[b]	-0.47	622.62[b]	623.20[b]	-0.58	621.71[b]	622.38[b]	-0.67	620.27	620.59[b]	-0.32						
	0.181	Outfall LC-2, right	612.1	624.45[b]	624.92[b]	-0.47	622.62[b]	623.20[b]	-0.58	621.71[b]	622.38[b]	-0.67	620.28	620.59[b]	-0.31						
	0.21	**Cross-Section**		624.45[b]	624.92[b]	-0.47	622.62[b]	623.20[b]	-0.58	621.71[b]	622.38[b]	-0.67	620.42	620.59[b]	-0.17						
	0.33	**Cross-Section**		624.45[b]	624.92[b]	-0.47	622.67	623.20[b]	-0.53	622.22	622.38[b]	-0.16	621.04	621.04	0.00						
	0.333	Outfall LC-3, left	614.44	624.45[b]	624.92[b]	-0.47	622.71	623.20[b]	-0.49	622.25	622.38[b]	-0.13	621.07	621.07	0.00						
	0.4	**Cross-Section**		624.87	624.92[b]	-0.05	623.50	623.50	0.00	623.00	623.00	0.00	621.71	621.71	0.00						
	0.41	**Cross-Section**		624.89	624.92[b]	-0.03	623.52	623.52	0.00	623.03	623.03	0.00	621.73	621.73	0.00						
	0.41	Outfall LC-4, left	614.23	624.89	624.92[b]	-0.03	623.52	623.52	0.00	623.03	623.03	0.00	621.73	621.73	0.00						
	0.419	Outfall LC-5, right	616.72	624.89	624.92[b]	-0.03	623.62	623.62	0.00	623.03	623.03	0.00	621.73	621.73	0.00						
	0.42	N. Green Bay Avenue																			
	0.43	**Cross-Section**		625.59	625.59	0.00	623.74	623.74	0.00	623.21	623.21	0.00	621.87	621.87	0.00						
	0.44	**Cross-Section**		625.58	625.58	0.00	623.72	623.72	0.00	623.20	623.20	0.00	621.85	621.85	0.00						
	0.47	**Cross-Section**		626.18	626.18	0.00	624.18	624.18	0.00	623.60	623.60	0.00	622.12	622.12	0.00						
	0.5	**Cross-Section**		626.26	626.26	0.00	624.25	624.25	0.00	623.66	623.66	0.00	622.19	622.19	0.00						
	0.54	**Cross-Section**		626.21	626.21	0.00	624.25	624.25	0.00	623.69	623.69	0.00	622.27	622.27	0.00						
	0.6	**Cross-Section**		626.00	626.00	0.00	624.18	624.18	0.00	623.65	623.65	0.00	622.30	622.30	0.00						
	0.61	**Cross-Section**		626.12	626.12	0.00	624.31	624.31	0.00	623.78	623.78	0.00	622.40	622.40	0.00						
	0.62	**Cross-Section**		626.44	626.44	0.00	624.72	624.72	0.00	624.16	624.16	0.00	622.67	622.67	0.00						
	0.631	Outfall LC-6, left	614.76	626.51	626.51	0.00	624.76	624.76	0.00	624.20	624.20	0.00	622.70	622.70	0.00						
	0.71	**Cross-Section**		627.05	627.05	0.00	625.05	625.05	0.00	624.45	624.45	0.00	622.95	622.95	0.00						
	0.75	**Cross-Section**		627.13	627.13	0.00	625.15	625.15	0.00	624.55	624.55	0.00	623.05	623.05	0.00						
	0.79	**Cross-Section**		627.23	627.23	0.00	625.25	625.25	0.00	624.65	624.65	0.00	623.12	623.12	0.00						
	0.794	**Cross-Section**		627.25	627.25	0.00	625.28	625.28	0.00	624.67	624.67	0.00	623.15	623.15	0.00						

Decreases in water surface elevation relative to existing dam conditions.

[b] *Water surface elevation determined using backwater from the confluence with the Right Split (west oxbow) of the Milwaukee River.*

Table 2 (continued)

Model Reach	River Mile	Description[a]	Invert Elev NGVD29 (ft)	500-Yr Flow			100-Yr Flow			50-Yr Flow			10-Yr Flow			Median Flow			Mean Flow		
				Dam Removal W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Removal W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Removal W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference |(ft)	Dam Removal W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Removal W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Removal W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)
Lincoln Creek - Lower Mainstream (continued)	0.798	Outfall LC-7, right	615.47	627.39	627.39	0.00	625.32	625.32	0.00	624.70	624.70	0.00	623.18	623.18	0.00						
	0.799	Outfall LC-8, right	615.46	627.42	627.42	0.00	625.33	625.33	0.00	624.71	624.71	0.00	623.18	623.18	0.00						
	0.803	W. Villard Avenue																			
	0.81	**Cross-Section**		627.79	627.79	0.00	625.43	625.43	0.00	624.79	624.79	0.00	623.26	623.26	0.00						
	0.82	**Cross-Section**		628.12	628.12	0.00	625.57	625.57	0.00	624.91	624.91	0.00	623.33	623.33	0.00						
	0.848	Outfall LC-10, left	619.6	628.11	628.11	0.00	625.58	625.58	0.00	624.93	624.93	0.00	623.35	623.35	0.00						
	0.877	Outfall LC-9, right	619.17	628.11	628.11	0.00	625.60	625.60	0.00	624.94	624.94	0.00	623.37	623.37	0.00						
	0.909	**Cross-Section**		628.10	628.10	0.00	625.61	625.61	0.00	624.96	624.96	0.00	623.40	623.40	0.00						
	0.912	N. 24th Place Footbridge																			
	0.915	**Cross-Section**		628.22	628.22	0.00	625.64	625.64	0.00	624.98	624.98	0.00	623.42	623.42	0.00						
	0.919	Outfall LC-11, right	619.35	628.25	628.25	0.00	625.65	625.65	0.00	624.99	624.99	0.00	623.44	623.44	0.00						
	0.93	**Cross-Section**		628.34	628.34	0.00	625.69	625.69	0.00	625.03	625.03	0.00	623.48	623.48	0.00						
	0.972	Outfall LC-12, left	617.81	628.44	628.44	0.00	625.82	625.82	0.00	625.15	625.15	0.00	623.61	623.61	0.00						
	0.974	Outfall LC-13, left	617.09	628.44	628.44	0.00	625.83	625.83	0.00	625.16	625.16	0.00	623.61	623.61	0.00						
	0.987	Outfall LC-14, right	619.4	628.47	628.47	0.00	625.87	625.87	0.00	625.19	625.19	0.00	623.65	623.65	0.00						
	1.07	**Cross-Section**		628.67	628.67	0.00	626.12	626.12	0.00	625.43	625.43	0.00	623.90	623.90	0.00						
	1.12	**Cross-Section**		628.92	628.92	0.00	626.45	626.45	0.00	625.77	625.77	0.00	624.19	624.19	0.00						
	1.138	Outfall LC-15, left	616.13	629.04	629.04	0.00	626.60	626.60	0.00	625.90	625.90	0.00	624.32	624.32	0.00						
	1.141	Outfall LC-16, right	621.01	629.06	629.06	0.00	626.63	626.63	0.00	625.93	625.93	0.00	624.34	624.34	0.00						
	1.17	**Cross-Section**		629.25	629.25	0.00	626.87	626.87	0.00	626.14	626.14	0.00	624.54	624.54	0.00						

[a]*References to "left" and "right" are based on looking in the downstream direction.*

[b]*Water surface elevation determined using backwater from the confluence with the Right Split (west oxbow) of the Milwaukee River.*

ESTABROOK DAM STORM SEWER INVENTORY TABLES (00217490).DOC
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Table 3

WATER SURFACE PROFILE COMPARISON OF EXISTING DAM CONDITIONS TO ALTERNATIVE PLAN NO. 3: ABANDON AND REMOVE THE DAM AND PROVIDE A 5.5-FOOT-HIGH ROCK RAMP

Model Reach	River Mile	Description[a]	Invert Elev NGVD29 (ft)	500-Yr Flow			100-Yr Flow			50-Yr Flow			10-Yr Flow			Median Flow			Mean Flow		
				Dam Rem. w/Rock Ramp W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rem. w/Rock Ramp W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rem. w/Rock Ramp W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rem. w/Rock Ramp W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rem. w/Rock Ramp W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rem. w/Rock Ramp W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)
Milwaukee River - Lower Reach	**6.827**	**Cross-Section**		621.11	621.11	0.00	619.23	619.23	0.00	618.29	618.29	0.00	616.12	616.12	0.00	609.44	609.44	0.00	609.89	609.89	0.00
	6.8275	Estabrook Park Dam																			
	6.828	Outfall MkeR-7, left		621.11	621.65	-0.54	619.23	619.96	-0.73	618.29	619.17	-0.88	616.12	617.50	-1.38	609.44	613.17	-3.73	609.89	613.51	-3.62
	6.829	**Cross-Section**		621.11	622.18	-1.07	619.23	620.68	-1.45	618.29	620.05	-1.76	616.12	618.88	-2.76	609.44	616.89	-7.45	609.89	617.12	-7.23
	6.843	**Cross-Section**		621.11	622.18	-1.07	619.22	620.67	-1.45	618.29	620.04	-1.75	616.12	618.87	-2.75	609.95	616.89	-6.94	610.13	617.12	-6.99
	6.866	Outfall MkeR-8, right		621.09	622.16	-1.07	619.21	620.66	-1.45	618.29	620.03	-1.74	616.14	618.87	-2.73	610.08	616.89	-6.81	610.31	617.12	-6.81
	6.928	**Cross-Section**		621.04	622.10	-1.06	619.19	620.63	-1.44	618.28	620.01	-1.73	616.20	618.87	-2.67	610.43	616.89	-6.46	610.79	617.12	-6.33
	6.941	**Cross-Section - Rock Ramp**		621.08	622.14	-1.06	619.24	620.66	-1.42	618.33	620.05	-1.72	616.25	618.89	-2.64	610.45	616.89	-6.44	610.82	617.12	-6.30
	6.96	**Cross-Section - Rock Ramp**		620.70	622.16	-1.46	619.41	620.69	-1.28	619.00	620.07	-1.07	618.08	618.90	-0.82	615.10	616.89	-1.79	615.26	617.12	-1.86
	6.963	**Cross-Section**		622.91	622.17	0.74	621.85	620.70	1.15	621.28	620.08	1.20	619.93	618.91	1.02	615.30	616.89	-1.59	615.56	617.12	-1.56
	6.987	**Cross-Section**		623.03	622.32	0.71	621.95	620.82	1.13	621.35	620.18	1.17	619.97	618.97	1.00	615.30	616.89	-1.59	615.56	617.12	-1.56
	7.087	**Cross-Section**		623.34	622.68	0.66	622.19	621.15	1.04	621.57	620.48	1.09	620.12	619.18	0.94	615.30	616.89	-1.59	615.56	617.12	-1.56
	7.096	Outfall MkeR-9, left	610.8	623.32	622.66	0.66	622.18	621.14	1.04	621.56	620.47	1.08	620.12	619.17	0.95	615.30	616.89	-1.59	615.56	617.12	-1.56
	7.098	Outfall MkeR-10, left		623.32	622.66	0.66	622.18	621.14	1.04	621.56	620.47	1.08	620.12	619.17	0.95	615.30	616.89	-1.59	615.56	617.12	-1.56
	7.103	**Cross-Section**		623.31	622.65	0.66	622.17	621.13	1.04	621.55	620.47	1.08	620.12	619.17	0.95	615.30	616.89	-1.59	615.56	617.12	-1.56
	7.104	Outfall MkeR-11, right	615.6	623.31	622.66	0.66	622.17	621.13	1.04	621.55	620.47	1.08	620.12	619.17	0.95	615.30	616.89	-1.59	615.56	617.12	-1.56
	7.104	Outfall MkeR-12, right		623.31	622.66	0.66	622.17	621.13	1.04	621.55	620.47	1.08	620.12	619.17	0.95	615.30	616.89	-1.59	615.56	617.12	-1.56
	7.11	Port Washington Road																			
	7.117	**Cross-Section**		623.37	622.72	0.65	622.22	621.19	1.03	621.59	620.52	1.07	620.14	619.21	0.93	615.31	616.89	-1.58	615.57	617.12	-1.55
	7.16	**Cross-Section**		623.45	622.81	0.64	622.28	621.28	1.00	621.65	620.60	1.05	620.18	619.27	0.91	615.31	616.89	-1.58	615.57	617.12	-1.55
	7.17	IH 43																			
	7.183	**Cross-Section**		623.57	622.95	0.62	622.38	621.41	0.97	621.74	620.72	1.02	620.25	619.35	0.90	615.31	616.90	-1.59	615.57	617.13	-1.56
	7.189	**Cross-Section**		623.60	622.99	0.61	622.41	621.44	0.97	621.77	620.75	1.02	620.26	619.37	0.89	615.31	616.90	-1.59	615.57	617.13	-1.56
	7.19	Ramp to IH 43																			
	7.199	**Cross-Section**		623.71	623.11	0.60	622.50	621.54	0.96	621.85	620.84	1.01	620.33	619.44	0.89	615.32	616.92	-1.60	615.59	617.16	-1.57
	7.201	Outfall MkeR-13, right		623.71	623.11	0.60	622.50	621.54	0.96	621.85	620.84	1.01	620.33	619.44	0.89	615.32	616.92	-1.60	615.59	617.16	-1.57
	7.241	Outfall MkeR-14, right		623.78	623.20	0.59	622.57	621.63	0.94	621.91	620.92	0.99	620.38	619.51	0.87	615.32	616.92	-1.60	615.59	617.16	-1.57
	7.359	**Cross-Section**		623.99	623.44	0.55	622.75	621.87	0.88	622.08	621.15	0.93	620.51	619.69	0.82	615.32	616.92	-1.60	615.59	617.16	-1.57
	7.519	Outfall MkeR-15, right	629.46	624.40	623.91	0.49	623.09	622.31	0.78	622.39	621.57	0.82	620.74	620.01	0.73	615.33	616.92	-1.59	615.60	617.16	-1.56
	7.519	**Cross-Section**		624.40	623.91	0.49	623.09	622.31	0.78	622.39	621.57	0.82	620.74	620.01	0.73	615.33	616.92	-1.59	615.60	617.16	-1.56
	7.526	Outfall MkeR-16, right		624.41	623.92	0.49	623.10	622.32	0.78	622.40	621.58	0.82	620.75	620.02	0.73	615.33	616.92	-1.59	615.60	617.16	-1.56
	7.576	Outfall MkeR-17, right	618.1	624.47	623.99	0.47	623.16	622.40	0.76	622.45	621.66	0.79	620.80	620.08	0.72	615.33	616.92	-1.59	615.60	617.16	-1.56
	7.633	**Cross-Section**		624.53	624.07	0.46	623.22	622.48	0.74	622.51	621.74	0.77	620.85	620.15	0.70	615.33	616.92	-1.59	615.60	617.16	-1.56
	7.64	Outfall MkeR-18, right		624.54	624.08	0.46	623.23	622.49	0.74	622.52	621.75	0.77	620.85	620.16	0.70	615.33	616.92	-1.59	615.60	617.16	-1.56
	7.654	**Cross-Section**		624.55	624.09	0.46	623.24	622.50	0.74	622.53	621.76	0.77	620.86	620.17	0.69	615.33	616.92	-1.59	615.60	617.16	-1.56
	7.656	Outfall MkeR-19, right		624.57	624.11	0.46	623.26	622.52	0.74	622.54	621.78	0.77	620.87	620.18	0.69	615.33	616.92	-1.59	615.60	617.16	-1.56
	7.66	Hampton Avenue																			
	7.669	**Cross-Section**		624.70	624.26	0.44	623.36	622.65	0.71	622.64	621.89	0.75	620.94	620.26	0.68	615.33	616.92	-1.59	615.60	617.16	-1.56
	7.669	Outfall MkeR-20, right		624.70	624.26	0.44	623.36	622.65	0.71	622.64	621.89	0.75	620.94	620.26	0.68	615.33	616.92	-1.59	615.60	617.16	-1.56
	7.706	**Cross-Section**		624.94	624.50	0.44	623.51	622.81	0.70	622.76	622.02	0.74	621.01	620.34	0.67	615.33	616.92	-1.59	615.60	617.16	-1.56
	7.745	**Cross-Section**		625.08	624.66	0.42	623.63	622.95	0.68	622.86	622.14	0.72	621.08	620.42	0.66	615.33	616.92	-1.59	615.60	617.16	-1.56

Decreases in water surface elevation relative to existing dam conditions.

Increases in water surface elevation relative to existing dam conditions.

Table 3 (continued)

Model Reach	River Mile	Description[a]	Invert Elev NGVD29 (ft)	500-Yr Flow			100-Yr Flow			50-Yr Flow			10-Yr Flow			Median Flow			Mean Flow		
				Dam Rem. w/Rock Ramp W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rem. w/Rock Ramp W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rem. w/Rock Ramp W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rem. w/Rock Ramp W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rem. w/Rock Ramp W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rem. w/Rock Ramp W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)
Milwaukee River - Middle Reach	**7.851**	**Cross-Section**		625.26	624.86	0.40	623.79	623.13	0.66	623.00	622.30	0.70	621.17	620.53	0.64	615.33	616.92	-1.59	615.61	617.16	-1.55
	7.876	**Cross-Section**		625.27	624.87	0.40	623.79	623.14	0.65	623.01	622.32	0.69	621.18	620.54	0.64	615.33	616.92	-1.59	615.61	617.16	-1.55
	7.934	**Cross-Section**		625.30	624.90	0.40	623.82	623.17	0.65	623.04	622.35	0.69	621.20	620.57	0.63	615.33	616.92	-1.59	615.61	617.16	-1.55
	7.945	Outfall MkeR-21, left		625.30	624.90	0.40	623.82	623.17	0.65	623.04	622.35	0.69	621.20	620.57	0.63	615.33	616.92	-1.59	615.61	617.16	-1.55
	8.003	**Cross-Section**		625.30	624.90	0.40	623.83	623.18	0.65	623.04	622.36	0.68	621.21	620.58	0.63	615.33	616.92	-1.59	615.61	617.16	-1.55
	8.098	Outfall MkeR-22, right	613.85	625.32	624.93	0.39	623.85	623.21	0.64	623.06	622.39	0.67	621.23	620.61	0.62	615.33	616.92	-1.59	615.61	617.17	-1.56
	8.132	**Cross-Section**		625.33	624.94	0.39	623.86	623.22	0.64	623.07	622.40	0.67	621.24	620.62	0.62	615.33	616.92	-1.59	615.61	617.17	-1.56
	8.141	**Cross-Section**		625.34	624.94	0.40	623.86	623.22	0.64	623.07	622.40	0.67	621.24	620.62	0.62	615.33	616.92	-1.59	615.61	617.17	-1.56
	8.145	**Cross-Section**		625.34	624.94	0.40	623.86	623.22	0.64	623.08	622.41	0.67	621.24	620.63	0.61	615.33	616.92	-1.59	615.61	617.17	-1.56
Milwaukee River - Right Split (west oxbow)	**7.8761**	**Cross-Section**		625.24	624.83	0.41	623.75	623.09	0.66	622.96	622.27	0.69	621.14	620.49	0.65	615.33	616.92	-1.59	615.60	617.16	-1.56
	7.9	Milwaukee River Parkway																			
	7.9341	**Cross-Section**		625.26	624.85	0.41	623.78	623.11	0.67	622.99	622.30	0.69	621.16	620.52	0.64	615.33	616.92	-1.59	615.61	617.16	-1.55
	8.0031	**Cross-Section**		625.32	624.92	0.40	623.84	623.20	0.64	623.06	622.38	0.68	621.23	620.59	0.64	615.33	616.92	-1.59	615.61	617.16	-1.55
	8.047	Lincoln Creek Confluence		625.32	624.92	0.40	623.84	623.20	0.64	623.06	622.38	0.68	621.23	620.59	0.64	615.33	616.92	-1.59	615.61	617.16	-1.55
	8.1321	**Cross-Section**		625.33	624.93	0.40	623.85	623.20	0.65	623.07	622.38	0.69	621.23	620.60	0.63	615.33	616.92	-1.59	615.61	617.16	-1.55
	8.1411	**Cross-Section**		625.30	624.90	0.40	623.83	623.18	0.65	623.05	622.36	0.69	621.22	620.58	0.64	615.33	616.92	-1.59	615.61	617.16	-1.55
	8.142	Milwaukee River Parkway																			
	8.1451	**Cross-Section**		625.31	624.91	0.40	623.83	623.19	0.64	623.05	622.37	0.68	621.22	620.59	0.63	615.33	616.92	-1.59	615.61	617.17	-1.56
Milwaukee River - Upper Reach	**8.229**	**Cross-Section**		625.08	624.68	0.40	623.68	623.02	0.66	622.92	622.24	0.68	621.15	620.54	0.61	615.33	616.92	-1.59	615.61	617.17	-1.56
	8.244	Outfall MkeR-23, right	615.04	625.11	624.71	0.40	623.71	623.05	0.65	622.95	622.27	0.67	621.17	620.57	0.60	615.33	616.92	-1.59	615.61	617.17	-1.56
	8.341	**Cross-Section**		625.28	624.90	0.38	623.87	623.26	0.61	623.11	622.48	0.63	621.33	620.76	0.57	615.33	616.92	-1.59	615.62	617.17	-1.55
	8.343	Outfall MkeR-24, right		625.27	624.89	0.38	623.87	623.26	0.61	623.11	622.48	0.63	621.33	620.76	0.57	615.33	616.92	-1.59	615.62	617.17	-1.55
	8.357	**Cross-Section**		625.22	624.84	0.38	623.83	623.23	0.60	623.08	622.45	0.63	621.32	620.75	0.57	615.33	616.92	-1.59	615.62	617.17	-1.55
	8.36	Railroad Bridge																			
	8.366	Outfall MkeR-25, right	613.02	625.39	625.02	0.37	623.96	623.37	0.59	623.20	622.58	0.61	621.41	620.85	0.56	615.36	616.95	-1.59	615.65	617.19	-1.55
	8.375	**Cross-Section**		625.55	625.20	0.35	624.08	623.51	0.57	623.31	622.71	0.60	621.49	620.94	0.55	615.38	616.97	-1.59	615.67	617.21	-1.54
	8.381	**Cross-Section**		625.57	625.21	0.36	624.10	623.53	0.57	623.32	622.73	0.59	621.50	620.96	0.54	615.38	616.97	-1.59	615.67	617.21	-1.54
	8.389	Outfall MkeR-27, left		625.67	625.33	0.35	624.17	623.61	0.56	623.38	622.79	0.59	621.53	620.98	0.55	615.38	616.97	-1.59	615.67	617.21	-1.54
	8.39	Outfall MkeR-26, right	611.95	625.69	625.34	0.35	624.18	623.62	0.56	623.38	622.79	0.59	621.53	620.99	0.55	615.38	616.97	-1.59	615.67	617.21	-1.54
	8.394	**Cross-Section**		625.74	625.40	0.34	624.21	623.66	0.55	623.41	622.82	0.59	621.55	621.00	0.55	615.38	616.97	-1.59	615.67	617.21	-1.54
	8.553	Outfall MkeR-28, left		626.44	626.15	0.29	624.82	624.36	0.46	623.99	623.49	0.50	622.03	621.58	0.46	615.39	616.97	-1.58	615.69	617.22	-1.53
	8.574	Outfall MkeR-29, right	616.26	626.53	626.25	0.28	624.90	624.45	0.45	624.06	623.58	0.48	622.09	621.65	0.44	615.39	616.97	-1.58	615.69	617.22	-1.53
	8.579	**Cross-Section**		626.55	626.27	0.28	624.92	624.47	0.45	624.08	623.60	0.48	622.11	621.67	0.44	615.39	616.97	-1.58	615.69	617.22	-1.53
	8.66	**Cross-Section**		626.98	626.73	0.25	625.29	624.88	0.41	624.42	623.99	0.43	622.38	621.98	0.40	615.39	616.98	-1.59	615.71	617.23	-1.52
	8.716	**Cross-Section**		627.14	626.90	0.24	625.45	625.06	0.39	624.57	624.16	0.41	622.53	622.16	0.37	615.40	616.98	-1.58	615.72	617.23	-1.51
	8.73	Outfall MkeR-30, left		627.12	626.88	0.24	625.44	625.05	0.39	624.56	624.16	0.40	622.53	622.15	0.38	615.40	616.98	-1.58	615.72	617.23	-1.51
	8.73	**Cross-Section**		627.12	626.88	0.24	625.44	625.05	0.39	624.56	624.16	0.40	622.53	622.15	0.38	615.40	616.98	-1.58	615.72	617.23	-1.51
	8.732	Outfall MkeR-31, right		627.13	626.89	0.24	625.45	625.06	0.39	624.57	624.17	0.40	622.54	622.16	0.38	615.40	616.98	-1.58	615.72	617.23	-1.51
	8.733	Outfall MkeR-33, left		627.14	626.90	0.24	625.46	625.07	0.39	624.58	624.18	0.40	622.54	622.17	0.38	615.40	616.98	-1.58	615.72	617.23	-1.51
	8.734	Outfall MkeR-32, right		627.15	626.91	0.24	625.46	625.07	0.39	624.58	624.18	0.40	622.55	622.17	0.38	615.40	616.98	-1.58	615.73	617.23	-1.51
	8.74	Silver Spring Road																			
	8.759	**Cross-Section**		627.31	627.07	0.24	625.60	625.22	0.38	624.72	624.33	0.39	622.67	622.32	0.35	615.42	616.98	-1.56	615.76	617.24	-1.48
	8.783	**Cross-Section**		627.37	627.14	0.23	625.65	625.29	0.36	624.77	624.39	0.38	622.73	622.39	0.34	615.43	616.98	-1.55	615.78	617.25	-1.47
	8.963	**Cross-Section**		627.91	627.70	0.21	626.18	625.87	0.31	625.29	624.97	0.32	623.22	622.93	0.29	615.45	616.99	-1.54	615.84	617.26	-1.42
	8.966	Outfall MkeR-34, right		627.92	627.71	0.21	626.19	625.88	0.31	625.30	624.98	0.32	623.23	622.94	0.29	615.45	616.99	-1.54	615.84	617.26	-1.42

Decreases in water surface elevation relative to existing dam conditions.

Increases in water surface elevation relative to existing dam conditions.

Table 3 (continued)

Model Reach	River Mile	Description[a]	Invert Elev NGVD29 (ft)	500-Yr Flow			100-Yr Flow			50-Yr Flow			10-Yr Flow			Median Flow			Mean Flow		
				Dam Rem. w/Rock Ramp W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rem. w/Rock Ramp W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rem. w/Rock Ramp W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rem. w/Rock Ramp W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rem. w/Rock Ramp W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rem. w/Rock Ramp W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)
Milwaukee River - Upper Reach (continued)	**9.125**	**Cross-Section**		628.45	628.28	0.17	626.71	626.45	0.26	625.82	625.55	0.27	623.72	623.49	0.23	615.49	617.00	-1.51	615.94	617.29	-1.35
	9.13	Outfall MkeR-35, left		628.47	628.31	0.17	626.73	626.47	0.26	625.84	625.57	0.27	623.74	623.51	0.23	615.49	617.00	-1.51	615.95	617.29	-1.35
	9.242	Outfall MkeR-36, left		629.02	628.87	0.15	627.24	627.02	0.23	626.34	626.11	0.23	624.22	624.02	0.20	615.56	617.01	-1.45	616.06	617.33	-1.26
	9.244	Outfall MkeR-37, right		629.03	628.88	0.15	627.25	627.03	0.22	626.35	626.12	0.23	624.22	624.03	0.19	615.56	617.01	-1.45	616.07	617.33	-1.26
	9.376	Outfall MkeR-38, left		629.66	629.54	0.13	627.86	627.67	0.19	626.94	626.76	0.19	624.78	624.63	0.16	615.64	617.02	-1.39	616.21	617.37	-1.17
	9.427	**Cross-Section**		629.91	629.79	0.12	628.09	627.92	0.17	627.17	627.00	0.17	625.00	624.86	0.14	615.67	617.03	-1.36	616.26	617.39	-1.13
	9.471	Outfall MkeR-40, right		630.05	629.94	0.11	628.23	628.07	0.16	627.31	627.15	0.16	625.14	625.01	0.13	615.73	617.04	-1.31	616.34	617.42	-1.07
	9.476	Outfall MkeR-39, left		630.07	629.95	0.11	628.25	628.09	0.16	627.33	627.17	0.16	625.16	625.03	0.13	615.73	617.04	-1.31	616.35	617.42	-1.07
	9.601	Outfall MkeR-41, left		630.46	630.37	0.10	628.65	628.51	0.14	627.73	627.59	0.14	625.56	625.45	0.11	615.90	617.07	-1.17	616.58	617.49	-0.91
	9.632	Outfall MkeR-42, right		630.56	630.47	0.09	628.75	628.61	0.14	627.83	627.69	0.14	625.66	625.55	0.11	615.94	617.08	-1.14	616.64	617.51	-0.87
	9.669	**Cross-Section**		630.68	630.59	0.09	628.87	628.74	0.13	627.95	627.82	0.13	625.78	625.68	0.10	615.99	617.09	-1.10	616.71	617.53	-0.82
	9.834	Outfall MkeR-43, right		631.41	631.35	0.06	629.80	629.73	0.07	629.02	628.96	0.06	627.09	627.04	0.05	616.56	617.25	-0.69	617.38	617.86	-0.48
	9.846	**Cross-Section**		631.46	631.40	0.06	629.87	629.80	0.07	629.10	629.04	0.06	627.19	627.14	0.05	616.60	617.26	-0.66	617.43	617.88	-0.45
	9.854	Outfall MkeR-44, left		631.52	631.46	0.06	629.93	629.86	0.07	629.16	629.10	0.06	627.24	627.19	0.05	616.61	617.27	-0.65	617.44	617.89	-0.45
	9.973	Outfall MkeR-45, right		632.43	632.39	0.04	630.87	630.82	0.05	630.07	630.03	0.04	628.00	627.97	0.03	616.81	617.35	-0.54	617.66	618.04	-0.37
	10.009	**Cross-Section**		632.71	632.67	0.04	631.15	631.11	0.04	630.35	630.31	0.04	628.23	628.20	0.03	616.87	617.38	-0.51	617.73	618.08	-0.35
	10.015	Outfall MkeR-46, right		632.79	632.75	0.04	631.21	631.17	0.04	630.41	630.37	0.04	628.28	628.24	0.03	616.88	617.38	-0.51	617.74	618.08	-0.35
	10.023	**Cross-Section**		632.89	632.85	0.04	631.30	631.26	0.04	630.48	630.44	0.04	628.34	628.30	0.04	616.89	617.39	-0.50	617.75	618.09	-0.34
	10.025	Outfall MkeR-48, left		632.89	632.85	0.04	631.30	631.26	0.04	630.48	630.44	0.04	628.34	628.30	0.04	616.89	617.39	-0.50	617.75	618.09	-0.34
	10.038	Outfall MkeR-47, right		632.86	632.82	0.03	631.27	631.23	0.04	630.45	630.42	0.03	628.31	628.28	0.03	616.91	617.40	-0.49	617.77	618.10	-0.33
	10.04	Bender Road																			
	10.051	**Cross-Section**		632.83	632.80	0.03	631.25	631.21	0.04	630.43	630.40	0.03	628.29	628.26	0.03	616.92	617.40	-0.48	617.78	618.11	-0.33
Lincoln Creek - Lower Mainstream	**0**	**Cross-Section**		625.32[b]	624.92[b]	0.40	623.84[b]	623.20[b]	0.64	623.06[b]	622.38[b]	0.68	621.23[b]	620.59[b]	0.64						
	0.03	**Cross-Section**		625.32[b]	624.92[b]	0.40	623.84[b]	623.20[b]	0.64	623.06[b]	622.38[b]	0.68	621.23[b]	620.59[b]	0.64						
	0.0303	Outfall LC-1, right		625.32[b]	624.92[b]	0.40	623.84[b]	623.20[b]	0.64	623.06[b]	622.38[b]	0.68	621.23[b]	620.59[b]	0.64						
	0.14	**Cross-Section**		625.32[b]	624.92[b]	0.40	623.84[b]	623.20[b]	0.64	623.06[b]	622.38[b]	0.68	621.23[b]	620.59[b]	0.64						
	0.16	**Cross-Section**		625.32[b]	624.92[b]	0.40	623.84[b]	623.20[b]	0.64	623.06[b]	622.38[b]	0.68	621.23[b]	620.59[b]	0.64						
	0.18	**Cross-Section**		625.32[b]	624.92[b]	0.40	623.84[b]	623.20[b]	0.64	623.06[b]	622.38[b]	0.68	621.23[b]	620.59[b]	0.64						
	0.181	Outfall LC-2, right	612.1	625.32[b]	624.92[b]	0.40	623.84[b]	623.20[b]	0.64	623.06[b]	622.38[b]	0.68	621.23[b]	620.59[b]	0.64						
	0.21	**Cross-Section**		625.32[b]	624.92[b]	0.40	623.84[b]	623.20[b]	0.64	623.06[b]	622.38[b]	0.68	621.23[b]	620.59[b]	0.64						
	0.33	**Cross-Section**		625.32[b]	624.92[b]	0.40	623.84[b]	623.20[b]	0.64	623.06[b]	622.38[b]	0.68	621.23[b]	621.04	0.19						
	0.333	Outfall LC-3, left	614.44	625.32[b]	624.92[b]	0.40	623.84[b]	623.20[b]	0.64	623.06[b]	622.38[b]	0.68	621.23[b]	621.07	0.16						
	0.4	**Cross-Section**		625.32[b]	624.92[b]	0.40	623.84[b]	623.50	0.34	623.06[b]	623.00	0.06	621.71	621.71	0.00						
	0.41	**Cross-Section**		625.32[b]	624.92[b]	0.40	623.84[b]	623.52	0.32	623.06[b]	623.03	0.03	621.73	621.73	0.00						
	0.41	Outfall LC-4, left	614.23	625.32[b]	624.92[b]	0.40	623.84[b]	623.52	0.32	623.06[b]	623.03	0.03	621.73	621.73	0.00						
	0.419	Outfall LC-5, right	616.72	625.32[b]	624.92[b]	0.40	623.84[b]	623.62	0.32	623.06[b]	623.03	0.03	621.73	621.73	0.00						
	0.42	N. Green Bay Avenue																			
	0.43	**Cross-Section**		625.59	625.59	0.00	623.84[b]	623.74	0.10	623.21	623.21	0.00	621.87	621.87	0.00						
	0.44	**Cross-Section**		625.58	625.58	0.00	623.84[b]	623.72	0.12	623.20	623.20	0.00	621.85	621.85	0.00						
	0.47	**Cross-Section**		626.18	626.18	0.00	624.18	624.18	0.00	623.60	623.60	0.00	622.12	622.12	0.00						
	0.5	**Cross-Section**		626.26	626.26	0.00	624.25	624.25	0.00	623.66	623.66	0.00	622.19	622.19	0.00						
	0.54	**Cross-Section**		626.21	626.21	0.00	624.25	624.25	0.00	623.69	623.69	0.00	622.27	622.27	0.00						
	0.6	**Cross-Section**		626.00	626.00	0.00	624.18	624.18	0.00	623.65	623.65	0.00	622.30	622.30	0.00						
	0.61	**Cross-Section**		626.12	626.12	0.00	624.31	624.31	0.00	623.78	623.78	0.00	622.40	622.40	0.00						
	0.62	**Cross-Section**		626.44	626.44	0.00	624.72	624.72	0.00	624.16	624.16	0.00	622.67	622.67	0.00						
	0.631	Outfall LC-6, left	614.76	626.51	626.51	0.00	624.76	624.76	0.00	624.20	624.20	0.00	622.70	622.70	0.00						

Decreases in water surface elevation relative to existing dam conditions.

Increases in water surface elevation relative to existing dam conditions.

[b] *Water surface elevation determined using backwater from the confluence with the Right Split (west oxbow) of the Milwaukee River.*

Table 3 (continued)

Model Reach	River Mile	Description[a]	Invert Elev NGVD29 (ft)	500-Yr Flow			100-Yr Flow			50-Yr Flow			10-Yr Flow			Median Flow			Mean Flow		
				Dam Rem. w/Rock Ramp W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rem. w/Rock Ramp W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rem. w/Rock Ramp W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rem. w/Rock Ramp W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rem. w/Rock Ramp W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Dam Rem. w/Rock Ramp W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)
Lincoln Creek - Lower Mainstream (continued)	**0.71**	**Cross-Section**		627.05	627.05	0.00	625.05	625.05	0.00	624.45	624.45	0.00	622.95	622.95	0.00						
	0.75	**Cross-Section**		627.13	627.13	0.00	625.15	625.15	0.00	624.55	624.55	0.00	623.05	623.05	0.00						
	0.79	**Cross-Section**		627.23	627.23	0.00	625.25	625.25	0.00	624.65	624.65	0.00	623.12	623.12	0.00						
	0.794	**Cross-Section**		627.25	627.25	0.00	625.28	625.28	0.00	624.67	624.67	0.00	623.15	623.15	0.00						
	0.798	Outfall LC-7, right	615.47	627.39	627.39	0.00	625.32	625.32	0.00	624.70	624.70	0.00	623.18	623.18	0.00						
	0.799	Outfall LC-8, right	615.46	627.42	627.42	0.00	625.33	625.33	0.00	624.71	624.71	0.00	623.18	623.18	0.00						
	0.803	W. Villard Avenue																			
	0.81	**Cross-Section**		627.79	627.79	0.00	625.43	625.43	0.00	624.79	624.79	0.00	623.26	623.26	0.00						
	0.82	**Cross-Section**		628.12	628.12	0.00	625.57	625.57	0.00	624.91	624.91	0.00	623.33	623.33	0.00						
	0.848	Outfall LC-10, left	619.6	628.11	628.11	0.00	625.58	625.58	0.00	624.93	624.93	0.00	623.35	623.35	0.00						
	0.877	Outfall LC-9, right	619.17	628.11	628.11	0.00	625.60	625.60	0.00	624.94	624.94	0.00	623.37	623.37	0.00						
	0.909	**Cross-Section**		628.10	628.10	0.00	625.61	625.61	0.00	624.96	624.96	0.00	623.40	623.40	0.00						
	0.912	N. 24th Place Footbridge																			
	0.915	**Cross-Section**		628.22	628.22	0.00	625.64	625.64	0.00	624.98	624.98	0.00	623.42	623.42	0.00						
	0.919	Outfall LC-11, right	619.35	628.25	628.25	0.00	625.65	625.65	0.00	624.99	624.99	0.00	623.44	623.44	0.00						
	0.93	**Cross-Section**		628.34	628.34	0.00	625.69	625.69	0.00	625.03	625.03	0.00	623.48	623.48	0.00						
	0.972	Outfall LC-12, left	617.81	628.44	628.44	0.00	625.82	625.82	0.00	625.15	625.15	0.00	623.61	623.61	0.00						
	0.974	Outfall LC-13, left	617.09	628.44	628.44	0.00	625.83	625.83	0.00	625.16	625.16	0.00	623.61	623.61	0.00						
	0.987	Outfall LC-14, right	619.4	628.47	628.47	0.00	625.87	625.87	0.00	625.19	625.19	0.00	623.65	623.65	0.00						
	1.07	**Cross-Section**		628.67	628.67	0.00	626.12	626.12	0.00	625.43	625.43	0.00	623.90	623.90	0.00						
	1.12	**Cross-Section**		628.92	628.92	0.00	626.45	626.45	0.00	625.77	625.77	0.00	624.19	624.19	0.00						
	1.138	Outfall LC-15, left	616.13	629.04	629.04	0.00	626.60	626.60	0.00	625.90	625.90	0.00	624.32	624.32	0.00						
	1.141	Outfall LC-16, right	621.01	629.06	629.06	0.00	626.63	626.63	0.00	625.93	625.93	0.00	624.34	624.34	0.00						
	1.17	**Cross-Section**		629.25	629.25	0.00	626.87	626.87	0.00	626.14	626.14	0.00	624.54	624.54	0.00						

[a] *References to "left" and "right" are based on looking in the downstream direction.*

[b] *Water surface elevation determined using backwater from the confluence with the Right Split (west oxbow) of the Milwaukee River.*

Table 4

WATER SURFACE PROFILE COMPARISON OF EXISTING DAM CONDITIONS TO ALTERNATIVE PLAN NO. 3A: ABANDON AND REMOVE THE DAM AND PROVIDE A 4-FOOT-HIGH ROCK RAMP

				500-Yr Flow			100-Yr Flow			50-Yr Flow			10-Yr Flow			Median Flow			Mean Flow		
Model Reach	River Mile	Description[a]	Invert Elev NGVD29 (ft)	Rock Ramp Mod. W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp Mod. W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp Mod. W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp Mod. W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp Mod. W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp Mod. W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)
Milwaukee River - Lower Reach	**6.827**	**Cross-Section**		621.11	621.11	0.00	619.23	619.23	0.00	618.29	618.29	0.00	616.12	616.12	0.00	609.44	609.44	0.00	609.89	609.89	0.00
	6.8275	Estabrook Park Dam																			
	6.828	Outfall MkeR-7, left		621.11	621.65	-0.54	619.23	619.96	-0.73	618.29	619.17	-0.88	616.12	617.50	-1.38	609.44	613.17	-3.73	609.89	613.51	-3.62
	6.829	**Cross-Section**		621.11	622.18	-1.07	619.23	620.68	-1.45	618.29	620.05	-1.76	616.12	618.88	-2.76	609.44	616.89	-7.45	609.89	617.12	-7.23
	6.843	**Cross-Section**		621.11	622.18	-1.07	619.22	620.67	-1.45	618.29	620.04	-1.75	616.12	618.87	-2.75	609.95	616.89	-6.94	610.13	617.12	-6.99
	6.866	Outfall MkeR-8, right		621.09	622.16	-1.07	619.21	620.66	-1.45	618.29	620.03	-1.74	616.14	618.87	-2.73	610.08	616.89	-6.81	610.31	617.12	-6.81
	6.928	**Cross-Section**		621.04	622.10	-1.06	619.19	620.63	-1.44	618.28	620.01	-1.73	616.20	618.87	-2.67	610.43	616.89	-6.46	610.79	617.12	-6.33
	6.941	**Cross-Section - Rock Ramp**		621.09	622.14	-1.05	619.25	620.66	-1.41	618.34	620.05	-1.71	616.27	618.89	-2.62	610.46	616.89	-6.43	610.83	617.12	-6.29
	6.96	**Cross-Section - Rock Ramp**		621.02	622.16	-1.14	619.17	620.69	-1.52	618.25	620.07	-1.82	616.68	618.90	-2.22	613.62	616.89	-3.27	613.79	617.12	-3.33
	6.963	**Cross-Section**		622.03	622.17	-0.14	620.48	620.70	-0.22	619.79	620.08	-0.29	618.50	618.91	-0.41	613.83	616.89	-3.06	614.09	617.12	-3.03
	6.987	**Cross-Section**		622.18	622.32	-0.14	620.61	620.82	-0.21	619.90	620.18	-0.28	618.57	618.97	-0.40	613.83	616.89	-3.06	614.10	617.12	-3.02
	7.087	**Cross-Section**		622.56	622.68	-0.12	620.96	621.15	-0.19	620.23	620.48	-0.25	618.80	619.18	-0.38	613.83	616.89	-3.06	614.10	617.12	-3.02
	7.096	Outfall MkeR-9, left	610.8	622.54	622.66	-0.12	620.95	621.14	-0.19	620.22	620.47	-0.25	618.80	619.17	-0.37	613.83	616.89	-3.06	614.10	617.12	-3.02
	7.098	Outfall MkeR-10, left		622.54	622.66	-0.12	620.95	621.14	-0.19	620.22	620.47	-0.25	618.80	619.17	-0.37	613.83	616.89	-3.06	614.10	617.12	-3.02
	7.103	**Cross-Section**		622.53	622.65	-0.12	620.94	621.13	-0.19	620.22	620.47	-0.25	618.80	619.17	-0.37	613.83	616.89	-3.06	614.10	617.12	-3.02
	7.104	Outfall MkeR-11, right	615.6	622.54	622.66	-0.12	620.94	621.13	-0.19	620.22	620.47	-0.25	618.80	619.17	-0.37	613.83	616.89	-3.06	614.10	617.12	-3.02
	7.104	Outfall MkeR-12, right		622.54	622.66	-0.12	620.94	621.13	-0.19	620.22	620.47	-0.25	618.80	619.17	-0.37	613.83	616.89	-3.06	614.10	617.12	-3.02
	7.11	Port Washington Road																			
	7.117	**Cross-Section**		622.60	622.72	-0.12	621.00	621.19	-0.19	620.27	620.52	-0.25	618.84	619.21	-0.37	613.83	616.89	-3.06	614.10	617.12	-3.02
	7.16	**Cross-Section**		622.69	622.81	-0.12	621.09	621.28	-0.19	620.36	620.60	-0.24	618.91	619.27	-0.36	613.83	616.89	-3.06	614.11	617.12	-3.01
	7.17	IH 43																			
	7.183	**Cross-Section**		622.84	622.95	-0.11	621.23	621.41	-0.18	620.49	620.72	-0.23	619.00	619.35	-0.35	613.83	616.90	-3.07	614.11	617.13	-3.02
	7.189	**Cross-Section**		622.88	622.99	-0.11	621.27	621.44	-0.17	620.52	620.75	-0.23	619.03	619.37	-0.34	613.83	616.90	-3.07	614.11	617.13	-3.02
	7.19	Ramp to IH 43																			
	7.199	**Cross-Section**		623.00	623.11	-0.11	621.37	621.54	-0.17	620.61	620.84	-0.23	619.10	619.44	-0.34	613.84	616.92	-3.08	614.11	617.16	-3.05
	7.201	Outfall MkeR-13, right		623.00	623.11	-0.11	621.37	621.54	-0.17	620.61	620.84	-0.23	619.10	619.44	-0.34	613.84	616.92	-3.08	614.11	617.16	-3.05
	7.241	Outfall MkeR-14, right		623.09	623.20	-0.11	621.46	621.63	-0.16	620.70	620.92	-0.22	619.17	619.51	-0.33	613.84	616.92	-3.08	614.12	617.16	-3.04
	7.359	**Cross-Section**		623.34	623.44	-0.10	621.72	621.87	-0.15	620.96	621.15	-0.19	619.38	619.69	-0.31	613.84	616.92	-3.08	614.13	617.16	-3.03
	7.519	Outfall MkeR-15, right	629.46	623.82	623.91	-0.09	622.18	622.31	-0.13	621.40	621.57	-0.17	619.74	620.01	-0.27	613.85	616.92	-3.07	614.14	617.16	-3.02
	7.519	**Cross-Section**		623.82	623.91	-0.09	622.18	622.31	-0.13	621.40	621.57	-0.17	619.74	620.01	-0.27	613.85	616.92	-3.07	614.14	617.16	-3.02
	7.526	Outfall MkeR-16, right		623.83	623.92	-0.09	622.19	622.32	-0.13	621.41	621.58	-0.17	619.75	620.02	-0.27	613.85	616.92	-3.07	614.14	617.16	-3.02
	7.576	Outfall MkeR-17, right	618.1	623.91	623.99	-0.09	622.27	622.40	-0.13	621.49	621.66	-0.16	619.82	620.08	-0.26	613.85	616.92	-3.07	614.15	617.16	-3.01
	7.633	**Cross-Section**		623.99	624.07	-0.08	622.36	622.48	-0.12	621.58	621.74	-0.16	619.90	620.15	-0.25	613.85	616.92	-3.07	614.15	617.16	-3.01
	7.64	Outfall MkeR-18, right		624.00	624.08	-0.08	622.37	622.49	-0.12	621.59	621.75	-0.16	619.91	620.16	-0.25	613.85	616.92	-3.07	614.15	617.16	-3.01
	7.654	**Cross-Section**		624.01	624.09	-0.08	622.38	622.50	-0.12	621.60	621.76	-0.16	619.92	620.17	-0.25	613.86	616.92	-3.06	614.16	617.16	-3.00
	7.656	Outfall MkeR-19, right		624.03	624.11	-0.08	622.40	622.52	-0.12	621.62	621.78	-0.16	619.93	620.18	-0.25	613.86	616.92	-3.06	614.16	617.16	-3.00
	7.66	Hampton Avenue																			
	7.669	**Cross-Section**		624.18	624.26	-0.08	622.53	622.65	-0.12	621.74	621.89	-0.15	620.02	620.26	-0.24	613.86	616.92	-3.06	614.16	617.16	-3.00
	7.669	Outfall MkeR-20, right		624.18	624.26	-0.08	622.53	622.65	-0.12	621.74	621.89	-0.15	620.02	620.26	-0.24	613.86	616.92	-3.06	614.16	617.16	-3.00
	7.706	**Cross-Section**		624.42	624.50	-0.08	622.69	622.81	-0.12	621.87	622.02	-0.15	620.10	620.34	-0.24	613.86	616.92	-3.06	614.16	617.16	-3.00
	7.745	**Cross-Section**		624.59	624.66	-0.07	622.83	622.95	-0.12	621.99	622.14	-0.15	620.19	620.42	-0.23	613.86	616.92	-3.06	614.16	617.16	-3.00

Decreases in water surface elevation relative to existing dam conditions.

Table 4 (continued)

Model Reach	River Mile	Description[a]	Invert Elev NGVD29 (ft)	500-Yr Flow			100-Yr Flow			50-Yr Flow			10-Yr Flow			Median Flow			Mean Flow		
				Rock Ramp Mod. W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp Mod. W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp Mod. W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp Mod. W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp Mod. W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp Mod. W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)
Milwaukee River - Middle Reach	**7.851**	**Cross-Section**		624.79	624.86	-0.07	623.02	623.13	-0.11	622.16	622.30	-0.14	620.30	620.53	-0.23	614.23	616.92	-2.69	614.47	617.16	-2.69
	7.876	**Cross-Section**		624.80	624.87	-0.07	623.03	623.14	-0.11	622.17	622.32	-0.15	620.31	620.54	-0.23	614.23	616.92	-2.69	614.47	617.16	-2.69
	7.934	**Cross-Section**		624.83	624.90	-0.07	623.07	623.17	-0.10	622.21	622.35	-0.14	620.35	620.57	-0.22	614.23	616.92	-2.69	614.47	617.16	-2.69
	7.945	Outfall MkeR-21, left		624.83	624.90	-0.07	623.07	623.17	-0.10	622.21	622.35	-0.14	620.35	620.57	-0.22	614.23	616.92	-2.69	614.47	617.16	-2.69
	8.003	**Cross-Section**		624.83	624.90	-0.07	623.07	623.18	-0.11	622.22	622.36	-0.14	620.36	620.58	-0.22	614.23	616.92	-2.69	614.48	617.16	-2.68
	8.098	Outfall MkeR-22, right	613.85	624.86	624.93	-0.07	623.10	623.21	-0.11	622.25	622.39	-0.14	620.39	620.61	-0.22	614.24	616.92	-2.68	614.49	617.17	-2.68
	8.132	**Cross-Section**		624.87	624.94	-0.07	623.11	623.22	-0.11	622.26	622.40	-0.14	620.40	620.62	-0.22	614.24	616.92	-2.68	614.49	617.17	-2.68
	8.141	**Cross-Section**		624.87	624.94	-0.07	623.11	623.22	-0.11	622.27	622.40	-0.13	620.40	620.62	-0.22	614.24	616.92	-2.68	614.49	617.17	-2.68
	8.145	**Cross-Section**		624.87	624.94	-0.07	623.12	623.22	-0.10	622.27	622.41	-0.14	620.41	620.63	-0.22	614.24	616.92	-2.68	614.49	617.17	-2.68
Milwaukee River - Right Split (west oxbow)	**7.8761**	**Cross-Section**		624.76	624.83	-0.07	622.98	623.09	-0.11	622.12	622.27	-0.15	620.26	620.49	-0.23	614.23	616.92	-2.69	614.47	617.16	-2.69
	7.9	Milwaukee River Parkway																			
	7.9341	**Cross-Section**		624.78	624.85	-0.07	623.01	623.11	-0.10	622.15	622.30	-0.15	620.29	620.52	-0.23	614.23	616.92	-2.69	614.47	617.16	-2.69
	8.0031	**Cross-Section**		624.85	624.92	-0.07	623.10	623.20	-0.10	622.24	622.38	-0.14	620.37	620.59	-0.22	614.23	616.92	-2.69	614.47	617.16	-2.69
	8.047	Lincoln Creek Confluence		624.85	624.92	-0.07	623.10	623.20	-0.10	622.24	622.38	-0.14	620.37	620.59	-0.22	614.23	616.92	-2.69	614.47	617.16	-2.69
	8.1321	**Cross-Section**		624.86	624.93	-0.07	623.10	623.20	-0.10	622.24	622.38	-0.14	620.38	620.60	-0.22	614.23	616.92	-2.69	614.47	617.16	-2.69
	8.1411	**Cross-Section**		624.83	624.90	-0.07	623.07	623.18	-0.11	622.22	622.36	-0.14	620.36	620.58	-0.22	614.23	616.92	-2.69	614.47	617.16	-2.69
	8.142	Milwaukee River Parkway																			
	8.1451	**Cross-Section**		624.84	624.91	-0.07	623.08	623.19	-0.11	622.23	622.37	-0.14	620.37	620.59	-0.22	614.23	616.92	-2.69	614.48	617.17	-2.69
Milwaukee River - Upper Reach	**8.229**	**Cross-Section**		624.61	624.68	-0.07	622.92	623.02	-0.10	622.10	622.24	-0.14	620.32	620.54	-0.22	614.24	616.92	-2.68	614.50	617.17	-2.67
	8.244	Outfall MkeR-23, right	615.04	624.64	624.71	-0.07	622.95	623.05	-0.10	622.13	622.27	-0.14	620.35	620.57	-0.22	614.24	616.92	-2.68	614.50	617.17	-2.67
	8.341	**Cross-Section**		624.83	624.90	-0.07	623.16	623.26	-0.10	622.36	622.48	-0.12	620.56	620.76	-0.20	614.25	616.92	-2.67	614.51	617.17	-2.66
	8.343	Outfall MkeR-24, right		624.82	624.89	-0.07	623.16	623.26	-0.10	622.36	622.48	-0.12	620.56	620.76	-0.20	614.25	616.92	-2.67	614.51	617.17	-2.66
	8.357	**Cross-Section**		624.77	624.84	-0.07	623.13	623.23	-0.10	622.33	622.45	-0.12	620.55	620.75	-0.20	614.25	616.92	-2.67	614.51	617.17	-2.66
	8.36	Railroad Bridge																			
	8.366	Outfall MkeR-25, right	613.02	624.96	625.02	-0.07	623.28	623.37	-0.10	622.46	622.58	-0.12	620.65	620.85	-0.20	614.27	616.95	-2.67	614.54	617.19	-2.66
	8.375	**Cross-Section**		625.14	625.20	-0.06	623.42	623.51	-0.09	622.59	622.71	-0.12	620.75	620.94	-0.19	614.29	616.97	-2.68	614.56	617.21	-2.65
	8.381	**Cross-Section**		625.15	625.21	-0.06	623.44	623.53	-0.09	622.61	622.73	-0.12	620.77	620.96	-0.19	614.29	616.97	-2.68	614.56	617.21	-2.65
	8.389	Outfall MkeR-27, left		625.27	625.33	-0.06	623.52	623.61	-0.09	622.67	622.79	-0.12	620.80	620.98	-0.18	614.29	616.97	-2.68	614.56	617.21	-2.65
	8.39	Outfall MkeR-26, right	611.95	625.28	625.34	-0.06	623.53	623.62	-0.09	622.67	622.79	-0.12	620.80	620.99	-0.18	614.29	616.97	-2.68	614.56	617.21	-2.65
	8.394	**Cross-Section**		625.34	625.40	-0.06	623.57	623.66	-0.09	622.70	622.82	-0.12	620.82	621.00	-0.18	614.29	616.97	-2.68	614.56	617.21	-2.65
	8.553	Outfall MkeR-28, left		626.10	626.15	-0.05	624.28	624.36	-0.07	623.40	623.49	-0.09	621.42	621.58	-0.15	614.31	616.97	-2.66	614.61	617.22	-2.61
	8.574	Outfall MkeR-29, right	616.26	626.20	626.25	-0.05	624.38	624.45	-0.07	623.49	623.58	-0.09	621.50	621.65	-0.15	614.31	616.97	-2.66	614.62	617.22	-2.60
	8.579	**Cross-Section**		626.22	626.27	-0.05	624.40	624.47	-0.07	623.51	623.60	-0.09	621.52	621.67	-0.15	614.31	616.97	-2.66	614.62	617.22	-2.60
	8.66	**Cross-Section**		626.68	626.73	-0.05	624.82	624.88	-0.06	623.91	623.99	-0.08	621.85	621.98	-0.13	614.33	616.98	-2.65	614.66	617.23	-2.57
	8.716	**Cross-Section**		626.86	626.90	-0.04	625.00	625.06	-0.06	624.09	624.16	-0.07	622.04	622.16	-0.12	614.36	616.98	-2.62	614.71	617.23	-2.52
	8.73	Outfall MkeR-30, left		626.84	626.88	-0.04	624.99	625.05	-0.06	624.08	624.16	-0.08	622.03	622.15	-0.12	614.36	616.98	-2.62	614.72	617.23	-2.51
	8.73	**Cross-Section**		626.84	626.88	-0.04	624.99	625.05	-0.06	624.08	624.16	-0.08	622.03	622.15	-0.12	614.36	616.98	-2.62	614.72	617.23	-2.51
	8.732	Outfall MkeR-31, right		626.85	626.89	-0.04	625.00	625.06	-0.06	624.09	624.17	-0.08	622.04	622.16	-0.12	614.37	616.98	-2.61	614.73	617.23	-2.50
	8.733	Outfall MkeR-33, left		626.86	626.90	-0.04	625.01	625.07	-0.06	624.10	624.18	-0.08	622.05	622.17	-0.12	614.37	616.98	-2.61	614.74	617.23	-2.49
	8.734	Outfall MkeR-32, right		626.87	626.91	-0.04	625.01	625.07	-0.06	624.10	624.18	-0.08	622.05	622.17	-0.12	614.38	616.98	-2.60	614.75	617.23	-2.48
	8.74	Silver Spring Road																			
	8.759	**Cross-Section**		627.03	627.07	-0.04	625.16	625.22	-0.06	624.26	624.33	-0.07	622.21	622.32	-0.11	614.48	616.98	-2.50	614.92	617.24	-2.32
	8.783	**Cross-Section**		627.10	627.14	-0.04	625.23	625.29	-0.06	624.32	624.39	-0.07	622.28	622.39	-0.11	614.52	616.98	-2.46	614.98	617.25	-2.27
	8.963	**Cross-Section**		627.67	627.70	-0.03	625.82	625.87	-0.05	624.91	624.97	-0.06	622.84	622.93	-0.09	614.59	616.99	-2.40	615.12	617.26	-2.14
	8.966	Outfall MkeR-34, right		627.68	627.71	-0.03	625.83	625.88	-0.05	624.92	624.98	-0.06	622.85	622.94	-0.09	614.59	616.99	-2.40	615.12	617.26	-2.14
	9.125	**Cross-Section**		628.25	628.28	-0.03	626.41	626.45	-0.04	625.51	625.55	-0.04	623.42	623.49	-0.07	614.73	617.00	-2.27	615.33	617.29	-1.96
	9.13	Outfall MkeR-35, left		628.28	628.31	-0.03	626.43	626.47	-0.04	625.53	625.57	-0.04	623.44	623.51	-0.07	614.74	617.00	-2.26	615.34	617.29	-1.95
	9.242	Outfall MkeR-36, left		628.84	628.87	-0.03	626.98	627.02	-0.04	626.08	626.11	-0.04	623.96	624.02	-0.06	614.92	617.01	-2.10	615.56	617.33	-1.77
	9.244	Outfall MkeR-37, right		628.85	628.88	-0.03	626.99	627.03	-0.04	626.09	626.12	-0.04	623.97	624.03	-0.06	614.92	617.01	-2.09	615.56	617.33	-1.77

Decreases in water surface elevation relative to existing dam conditions.

Table 4 (continued)

Model Reach	River Mile	Description[a]	Invert Elev NGVD29 (ft)	500-Yr Flow			100-Yr Flow			50-Yr Flow			10-Yr Flow			Median Flow			Mean Flow		
				Rock Ramp Mod. W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp Mod. W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp Mod. W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp Mod. W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp Mod. W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp Mod. W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)
Milwaukee River - Upper Reach (continued)	9.376	Outfall MkeR-38, left		629.51	629.54	-0.02	627.64	627.67	-0.03	626.72	626.76	-0.03	624.58	624.63	-0.05	615.13	617.02	-1.90	615.82	617.37	-1.55
	9.427	**Cross-Section**		629.77	629.79	-0.02	627.89	627.92	-0.03	626.97	627.00	-0.03	624.82	624.86	-0.04	615.21	617.03	-1.82	615.92	617.39	-1.47
	9.471	Outfall MkeR-40, right		629.92	629.94	-0.02	628.04	628.07	-0.03	627.12	627.15	-0.03	624.97	625.01	-0.04	615.32	617.04	-1.72	616.04	617.42	-1.38
	9.476	Outfall MkeR-39, left		629.93	629.95	-0.02	628.06	628.09	-0.03	627.14	627.17	-0.03	624.99	625.03	-0.04	615.34	617.04	-1.70	616.05	617.42	-1.36
	9.601	Outfall MkeR-41, left		630.35	630.37	-0.02	628.49	628.51	-0.02	627.57	627.59	-0.02	625.42	625.45	-0.03	615.66	617.07	-1.41	616.39	617.49	-1.10
	9.632	Outfall MkeR-42, right		630.45	630.47	-0.02	628.59	628.61	-0.02	627.67	627.69	-0.02	625.53	625.55	-0.02	615.74	617.08	-1.34	616.48	617.51	-1.03
	9.669	**Cross-Section**		630.57	630.59	-0.02	628.72	628.74	-0.02	627.80	627.82	-0.02	625.66	625.68	-0.02	615.84	617.09	-1.25	616.58	617.53	-0.95
	9.834	Outfall MkeR-43, right		631.33	631.35	-0.02	629.72	629.73	-0.01	628.95	628.96	-0.01	627.03	627.04	-0.01	616.52	617.25	-0.73	617.33	617.86	-0.53
	9.846	**Cross-Section**		631.38	631.40	-0.02	629.79	629.80	-0.01	629.03	629.04	-0.01	627.13	627.14	-0.01	616.57	617.26	-0.69	617.38	617.88	-0.50
	9.854	Outfall MkeR-44, left		631.44	631.46	-0.02	629.85	629.86	-0.01	629.09	629.10	-0.01	627.18	627.19	-0.01	616.58	617.27	-0.68	617.40	617.89	-0.49
	9.973	Outfall MkeR-45, right		632.39	632.39	0.00	630.81	630.82	-0.01	630.02	630.03	-0.01	627.96	627.97	-0.01	616.79	617.35	-0.57	617.63	618.04	-0.41
	10.009	**Cross-Section**		632.67	632.67	0.00	631.10	631.11	-0.01	630.30	630.31	-0.01	628.19	628.20	-0.01	616.85	617.38	-0.53	617.70	618.08	-0.38
	10.015	Outfall MkeR-46, right		632.75	632.75	0.00	631.16	631.17	-0.01	630.36	630.37	-0.01	628.23	628.24	-0.01	616.85	617.38	-0.53	617.71	618.08	-0.38
	10.023	**Cross-Section**		632.85	632.85	0.00	631.25	631.26	-0.01	630.44	630.44	0.00	628.29	628.30	-0.01	616.86	617.39	-0.53	617.72	618.09	-0.37
	10.025	Outfall MkeR-48, left		632.85	632.85	0.00	631.25	631.26	-0.01	630.44	630.44	0.00	628.29	628.30	-0.01	616.86	617.39	-0.53	617.72	618.09	-0.37
	10.038	Outfall MkeR-47, right		632.82	632.82	-0.01	631.22	631.23	-0.01	630.41	630.42	-0.01	628.27	628.28	-0.01	616.88	617.40	-0.51	617.74	618.10	-0.36
	10.04	Bender Road																			
	10.051	**Cross-Section**		632.79	632.80	-0.01	631.20	631.21	-0.01	630.39	630.40	-0.01	628.25	628.26	-0.01	616.90	617.40	-0.50	617.75	618.11	-0.36
Lincoln Creek - Lower Mainstream	**0**	**Cross-Section**		624.85[b]	624.92[b]	-0.07	623.10[b]	623.20[b]	-0.10	622.24[b]	622.38[b]	-0.14	620.37[b]	620.59[b]	-0.22						
	0.03	**Cross-Section**		624.85[b]	624.92[b]	-0.07	623.10[b]	623.20[b]	-0.10	622.24[b]	622.38[b]	-0.14	620.37[b]	620.59[b]	-0.22						
	0.0303	Outfall LC-1, right		624.85[b]	624.92[b]	-0.07	623.10[b]	623.20[b]	-0.10	622.24[b]	622.38[b]	-0.14	620.37[b]	620.59[b]	-0.22						
	0.14	**Cross-Section**		624.85[b]	624.92[b]	-0.07	623.10[b]	623.20[b]	-0.10	622.24[b]	622.38[b]	-0.14	620.37[b]	620.59[b]	-0.22						
	0.16	**Cross-Section**		624.85[b]	624.92[b]	-0.07	623.10[b]	623.20[b]	-0.10	622.24[b]	622.38[b]	-0.14	620.37[b]	620.59[b]	-0.22						
	0.18	**Cross-Section**		624.85[b]	624.92[b]	-0.07	623.10[b]	623.20[b]	-0.10	622.24[b]	622.38[b]	-0.14	620.37[b]	620.59[b]	-0.22						
	0.181	Outfall LC-2, right	612.1	624.85[b]	624.92[b]	-0.07	623.10[b]	623.20[b]	-0.10	622.24[b]	622.38[b]	-0.14	620.37[b]	620.59[b]	-0.22						
	0.21	**Cross-Section**		624.85[b]	624.92[b]	-0.07	623.10[b]	623.20[b]	-0.10	622.24[b]	622.38[b]	-0.14	620.42	620.59[b]	-0.17						
	0.33	**Cross-Section**		624.85[b]	624.92[b]	-0.07	623.10[b]	623.20[b]	-0.10	622.24[b]	622.38[b]	-0.14	621.04	621.04	0.00						
	0.333	Outfall LC-3, left	614.44	624.85[b]	624.92[b]	-0.07	623.10[b]	623.20[b]	-0.10	622.24[b]	622.38[b]	-0.14	621.07	621.07	0.00						
	0.4	**Cross-Section**		624.87	624.92[b]	-0.05	623.50	623.50	0.00	623.00	623.00	0.00	621.71	621.71	0.00						
	0.41	**Cross-Section**		624.89	624.92[b]	-0.03	623.52	623.52	0.00	623.03	623.03	0.00	621.73	621.73	0.00						
	0.41	Outfall LC-4, left	614.23	624.89	624.92[b]	-0.03	623.52	623.52	0.00	623.03	623.03	0.00	621.73	621.73	0.00						
	0.419	Outfall LC-5, right	616.72	624.89	624.92[b]	-0.03	623.52	623.62	0.00	623.03	623.03	0.00	621.73	621.73	0.00						
	0.42	N. Green Bay Avenue																			
	0.43	**Cross-Section**		625.59	625.59	0.00	623.74	623.74	0.00	623.21	623.21	0.00	621.87	621.87	0.00						
	0.44	**Cross-Section**		625.58	625.58	0.00	623.72	623.72	0.00	623.20	623.20	0.00	621.85	621.85	0.00						
	0.47	**Cross-Section**		626.18	626.18	0.00	624.18	624.18	0.00	623.60	623.60	0.00	622.12	622.12	0.00						
	0.5	**Cross-Section**		626.26	626.26	0.00	624.25	624.25	0.00	623.66	623.66	0.00	622.19	622.19	0.00						
	0.54	**Cross-Section**		626.21	626.21	0.00	624.25	624.25	0.00	623.69	623.69	0.00	622.27	622.27	0.00						
	0.6	**Cross-Section**		626.00	626.00	0.00	624.18	624.18	0.00	623.65	623.65	0.00	622.30	622.30	0.00						
	0.61	**Cross-Section**		626.12	626.12	0.00	624.31	624.31	0.00	623.78	623.78	0.00	622.40	622.40	0.00						
	0.62	**Cross-Section**		626.44	626.44	0.00	624.72	624.72	0.00	624.16	624.16	0.00	622.67	622.67	0.00						
	0.631	Outfall LC-6, left	614.76	626.51	626.51	0.00	624.76	624.76	0.00	624.20	624.20	0.00	622.70	622.70	0.00						
	0.71	**Cross-Section**		627.05	627.05	0.00	625.05	625.05	0.00	624.45	624.45	0.00	622.95	622.95	0.00						
	0.75	**Cross-Section**		627.13	627.13	0.00	625.15	625.15	0.00	624.55	624.55	0.00	623.05	623.05	0.00						
	0.79	**Cross-Section**		627.23	627.23	0.00	625.25	625.25	0.00	624.65	624.65	0.00	623.12	623.12	0.00						
	0.794	**Cross-Section**		627.25	627.25	0.00	625.28	625.28	0.00	624.67	624.67	0.00	623.15	623.15	0.00						
	0.798	Outfall LC-7, right	615.47	627.39	627.39	0.00	625.32	625.32	0.00	624.70	624.70	0.00	623.18	623.18	0.00						

Decreases in water surface elevation relative to existing dam conditions.

[b] *Water surface elevation determined using backwater from the confluence with the Right Split (west oxbow) of the Milwaukee River.*

Table 4 (continued)

Model Reach	River Mile	Description[a]	Invert Elev NGVD29 (ft)	500-Yr Flow			100-Yr Flow			50-Yr Flow			10-Yr Flow			Median Flow			Mean Flow		
				Rock Ramp Mod. W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp Mod. W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp Mod. W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp Mod. W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp Mod. W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp Mod. W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)
Lincoln Creek - Lower Mainstream (continued)	0.799	Outfall LC-8, right	615.46	627.42	627.42	0.00	625.33	625.33	0.00	624.71	624.71	0.00	623.18	623.18	0.00						
	0.803	W. Villard Avenue																			
	0.81	**Cross-Section**		627.79	627.79	0.00	625.43	625.43	0.00	624.79	624.79	0.00	623.26	623.26	0.00						
	0.82	**Cross-Section**		628.12	628.12	0.00	625.57	625.57	0.00	624.91	624.91	0.00	623.33	623.33	0.00						
	0.848	Outfall LC-10, left	619.6	628.11	628.11	0.00	625.58	625.58	0.00	624.93	624.93	0.00	623.35	623.35	0.00						
	0.877	Outfall LC-9, right	619.17	628.11	628.11	0.00	625.60	625.60	0.00	624.94	624.94	0.00	623.37	623.37	0.00						
	0.909	**Cross-Section**		628.10	628.10	0.00	625.61	625.61	0.00	624.96	624.96	0.00	623.40	623.40	0.00						
	0.912	N. 24th Place Footbridge																			
	0.915	**Cross-Section**		628.22	628.22	0.00	625.64	625.64	0.00	624.98	624.98	0.00	623.42	623.42	0.00						
	0.919	Outfall LC-11, right	619.35	628.25	628.25	0.00	625.65	625.65	0.00	624.99	624.99	0.00	623.44	623.44	0.00						
	0.93	**Cross-Section**		628.34	628.34	0.00	625.69	625.69	0.00	625.03	625.03	0.00	623.48	623.48	0.00						
	0.972	Outfall LC-12, left	617.81	628.44	628.44	0.00	625.82	625.82	0.00	625.15	625.15	0.00	623.61	623.61	0.00						
	0.974	Outfall LC-13, left	617.09	628.44	628.44	0.00	625.83	625.83	0.00	625.16	625.16	0.00	623.61	623.61	0.00						
	0.987	Outfall LC-14, right	619.4	628.47	628.47	0.00	625.87	625.87	0.00	625.19	625.19	0.00	623.65	623.65	0.00						
	1.07	**Cross-Section**		628.67	628.67	0.00	626.12	626.12	0.00	625.43	625.43	0.00	623.90	623.90	0.00						
	1.12	**Cross-Section**		628.92	628.92	0.00	626.45	626.45	0.00	625.77	625.77	0.00	624.19	624.19	0.00						
	1.138	Outfall LC-15, left	616.13	629.04	629.04	0.00	626.60	626.60	0.00	625.90	625.90	0.00	624.32	624.32	0.00						
	1.141	Outfall LC-16, right	621.01	629.06	629.06	0.00	626.63	626.63	0.00	625.93	625.93	0.00	624.34	624.34	0.00						
	1.17	**Cross-Section**		629.25	629.25	0.00	626.87	626.87	0.00	626.14	626.14	0.00	624.54	624.54	0.00						

[a] *References to "left" and "right" are based on looking in the downstream direction.*

[b] *Water surface elevation determined using backwater from the confluence with the Right Split (west oxbow) of the Milwaukee River.*

ESTABROOK DAM STORM SEWER INVENTORY TABLES (00217490).DOC
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Table 5

WATER SURFACE PROFILE COMPARISON OF EXISTING DAM CONDITIONS TO ALTERNATIVE PLAN NO. 4
ABANDON AND REMOVE GATED PORTION OF DAM, LOWER AND REHABILITATE SERPENTINE OVERFLOW SPILLWAY, AND PROVIDE A 6.3-FOOT-HIGH ROCK RAMP

				500-Yr Flow			100-Yr Flow			50-Yr Flow			10-Yr Flow			Median Flow			Mean Flow		
Model Reach	River Mile	Description[a]	Invert Elev NGVD29 (ft)	Rock Ramp w/Fixed Crest at 615.4 ft NGVD29	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp w/Fixed Crest at 615.4 ft NGVD29	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp w/Fixed Crest at 615.4 ft NGVD29	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp w/Fixed Crest at 615.4 ft NGVD29	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp w/Fixed Crest at 615.4 ft NGVD29	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp w/Fixed Crest at 615.4 ft NGVD29	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)
Milwaukee River - Lower Reach	**6.827**	**Cross-Section - Rock Ramp**		621.06	621.11	-0.05	619.17	619.23	-0.06	618.23	618.29	-0.06	616.06	616.12	-0.06	609.47	609.44	0.03	609.94	609.89	0.05
	6.8275	Estabrook Park Dam																			
	6.828	Outfall MkeR-7, left		621.34	621.65	-0.31	619.72	619.96	-0.24	619.04	619.17	-0.13	617.47	617.50	-0.03	612.60	613.17	-0.57	612.92	613.51	-0.59
	6.829	**Cross-Section**		621.62	622.18	-0.56	620.27	620.68	-0.41	619.85	620.05	-0.20	618.88	618.88	0.00	615.72	616.89	-1.17	615.89	617.12	-1.23
	6.843	**Cross-Section**		621.61	622.18	-0.57	620.27	620.67	-0.40	619.85	620.04	-0.19	618.88	618.87	0.01	615.72	616.89	-1.17	615.89	617.12	-1.23
	6.866	Outfall MkeR-8, right		621.59	622.16	-0.57	620.26	620.66	-0.40	619.84	620.03	-0.19	618.88	618.87	0.01	615.72	616.89	-1.17	615.89	617.12	-1.23
	6.928	**Cross-Section**		621.54	622.10	-0.56	620.22	620.63	-0.41	619.82	620.01	-0.19	618.87	618.87	0.00	615.72	616.89	-1.17	615.89	617.12	-1.23
	6.941	**Cross-Section**		621.58	622.14	-0.56	620.26	620.66	-0.40	619.86	620.05	-0.19	618.89	618.89	0.00	615.72	616.89	-1.17	615.89	617.12	-1.23
	6.96	**Cross-Section**		621.61	622.16	-0.55	620.29	620.69	-0.40	619.88	620.07	-0.19	618.91	618.90	0.01	615.72	616.89	-1.17	615.89	617.12	-1.23
	6.963	**Cross-Section**		621.62	622.17	-0.55	620.30	620.70	-0.40	619.89	620.08	-0.19	618.91	618.91	0.00	615.72	616.89	-1.17	615.89	617.12	-1.23
	6.987	**Cross-Section**		621.79	622.32	-0.53	620.43	620.82	-0.39	620.00	620.18	-0.18	618.98	618.97	0.01	615.72	616.89	-1.17	615.89	617.12	-1.23
	7.087	**Cross-Section**		622.21	622.68	-0.47	620.81	621.15	-0.34	620.32	620.48	-0.16	619.18	619.18	0.00	615.72	616.89	-1.17	615.89	617.12	-1.23
	7.096	Outfall MkeR-9, left	610.8	622.19	622.66	-0.48	620.80	621.14	-0.34	620.31	620.47	-0.17	619.18	619.17	0.01	615.72	616.89	-1.17	615.89	617.12	-1.23
	7.098	Outfall MkeR-10, left		622.18	622.66	-0.48	620.80	621.14	-0.34	620.31	620.47	-0.17	619.18	619.17	0.01	615.72	616.89	-1.17	615.89	617.12	-1.23
	7.103	**Cross-Section**		622.17	622.65	-0.48	620.79	621.13	-0.34	620.30	620.47	-0.17	619.18	619.17	0.01	615.72	616.89	-1.17	615.89	617.12	-1.23
	7.104	Outfall MkeR-11, right	615.6	622.18	622.66	-0.48	620.79	621.13	-0.34	620.30	620.47	-0.17	619.18	619.17	0.01	615.72	616.89	-1.17	615.89	617.12	-1.23
	7.104	Outfall MkeR-12, right		622.18	622.66	-0.48	620.79	621.13	-0.34	620.30	620.47	-0.17	619.18	619.17	0.01	615.72	616.89	-1.17	615.89	617.12	-1.23
	7.11	Port Washington Road																			
	7.117	**Cross-Section**		622.25	622.72	-0.47	620.85	621.19	-0.34	620.36	620.52	-0.16	619.21	619.21	0.00	615.73	616.89	-1.16	615.89	617.12	-1.23
	7.16	**Cross-Section**		622.35	622.81	-0.46	620.95	621.28	-0.33	620.44	620.60	-0.16	619.27	619.27	0.00	615.73	616.89	-1.16	615.90	617.12	-1.22
	7.17	IH 43																			
	7.183	**Cross-Section**		622.52	622.95	-0.43	621.09	621.41	-0.32	620.57	620.72	-0.15	619.35	619.35	0.00	615.73	616.90	-1.17	615.90	617.13	-1.23
	7.189	**Cross-Section**		622.56	622.99	-0.43	621.13	621.44	-0.31	620.60	620.75	-0.15	619.38	619.37	0.01	615.73	616.90	-1.17	615.90	617.13	-1.23
	7.19	Ramp to IH 43																			
	7.199	**Cross-Section**		622.68	623.11	-0.43	621.23	621.54	-0.31	620.69	620.84	-0.15	619.45	619.44	0.01	615.75	616.92	-1.17	615.92	617.16	-1.24
	7.201	Outfall MkeR-13, right		622.68	623.11	-0.43	621.23	621.54	-0.31	620.69	620.84	-0.15	619.45	619.44	0.01	615.75	616.92	-1.17	615.92	617.16	-1.24
	7.241	Outfall MkeR-14, right		622.78	623.20	-0.42	621.33	621.63	-0.30	620.78	620.92	-0.14	619.52	619.51	0.01	615.75	616.92	-1.17	615.92	617.16	-1.24
	7.359	**Cross-Section**		623.06	623.44	-0.38	621.60	621.87	-0.27	621.02	621.15	-0.13	619.70	619.69	0.01	615.75	616.92	-1.17	615.92	617.16	-1.24
	7.519	Outfall MkeR-15, right	629.46	623.57	623.91	-0.34	622.08	622.31	-0.23	621.46	621.57	-0.11	620.01	620.01	0.00	615.75	616.92	-1.17	615.92	617.16	-1.24
	7.519	**Cross-Section**		623.57	623.91	-0.34	622.08	622.31	-0.23	621.46	621.57	-0.11	620.01	620.01	0.00	615.75	616.92	-1.17	615.92	617.16	-1.24
	7.526	Outfall MkeR-16, right		623.58	623.92	-0.34	622.09	622.32	-0.23	621.47	621.58	-0.11	620.02	620.02	0.00	615.75	616.92	-1.17	615.92	617.16	-1.24
	7.576	Outfall MkeR-17, right	618.1	623.66	623.99	-0.33	622.17	622.40	-0.23	621.55	621.66	-0.11	620.09	620.08	0.01	615.75	616.92	-1.17	615.93	617.16	-1.24
	7.633	**Cross-Section**		623.75	624.07	-0.32	622.26	622.48	-0.22	621.63	621.74	-0.11	620.16	620.15	0.01	615.75	616.92	-1.17	615.93	617.16	-1.23
	7.64	Outfall MkeR-18, right		623.76	624.08	-0.32	622.27	622.49	-0.22	621.64	621.75	-0.11	620.16	620.16	0.00	615.75	616.92	-1.17	615.93	617.16	-1.23
	7.654	**Cross-Section**		623.77	624.09	-0.32	622.28	622.50	-0.22	621.65	621.76	-0.11	620.17	620.17	0.00	615.75	616.92	-1.17	615.93	617.16	-1.23
	7.656	Outfall MkeR-19, right		623.80	624.11	-0.32	622.30	622.52	-0.22	621.67	621.78	-0.11	620.18	620.18	0.00	615.75	616.92	-1.17	615.93	617.16	-1.23
	7.66	Hampton Avenue																			
	7.669	**Cross-Section**		623.96	624.26	-0.30	622.44	622.65	-0.21	621.79	621.89	-0.10	620.26	620.26	0.00	615.75	616.92	-1.17	615.93	617.16	-1.23
	7.669	Outfall MkeR-20, right		623.96	624.26	-0.30	622.44	622.65	-0.21	621.79	621.89	-0.10	620.26	620.26	0.00	615.75	616.92	-1.17	615.93	617.16	-1.23
	7.706	**Cross-Section**		624.20	624.50	-0.30	622.60	622.81	-0.21	621.92	622.02	-0.10	620.34	620.34	0.00	615.75	616.92	-1.17	615.93	617.16	-1.23
	7.745	**Cross-Section**		624.37	624.66	-0.29	622.74	622.95	-0.21	622.04	622.14	-0.10	620.42	620.42	0.00	615.75	616.92	-1.17	615.93	617.16	-1.23

Decreases in water surface elevation relative to existing dam conditions.

Increases in water surface elevation relative to existing dam conditions.

Table 5 (continued)

Model Reach	River Mile	Description[a]	Invert Elev NGVD29 (ft)	500-Yr Flow			100-Yr Flow			50-Yr Flow			10-Yr Flow			Median Flow			Mean Flow		
				Rock Ramp w/Fixed Crest at 615.4 ft NGVD29	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp w/Fixed Crest at 615.4 ft NGVD29	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp w/Fixed Crest at 615.4 ft NGVD29	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp w/Fixed Crest at 615.4 ft NGVD29	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp w/Fixed Crest at 615.4 ft NGVD29	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp w/Fixed Crest at 615.4 ft NGVD29	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)
Milwaukee River - Middle Reach	**7.851**	**Cross-Section**		624.58	624.86	-0.28	622.93	623.13	-0.20	622.21	622.30	-0.09	620.53	620.53	0.00	615.75	616.92	-1.17	615.93	617.16	-1.23
	7.876	**Cross-Section**		624.59	624.87	-0.28	622.95	623.14	-0.19	622.22	622.32	-0.10	620.54	620.54	0.00	615.75	616.92	-1.17	615.93	617.16	-1.23
	7.934	**Cross-Section**		624.63	624.90	-0.27	622.98	623.17	-0.19	622.26	622.35	-0.09	620.57	620.57	0.00	615.75	616.92	-1.17	615.93	617.16	-1.23
	7.945	Outfall MkeR-21, left		624.63	624.90	-0.27	622.98	623.17	-0.19	622.26	622.35	-0.09	620.57	620.57	0.00	615.75	616.92	-1.17	615.93	617.16	-1.23
	8.003	**Cross-Section**		624.63	624.90	-0.27	622.99	623.18	-0.19	622.27	622.36	-0.09	620.59	620.58	0.01	615.75	616.92	-1.17	615.93	617.16	-1.23
	8.098	Outfall MkeR-22, right	613.85	624.66	624.93	-0.27	623.02	623.21	-0.19	622.30	622.39	-0.09	620.61	620.61	0.00	615.75	616.92	-1.17	615.93	617.17	-1.24
	8.132	**Cross-Section**		624.67	624.94	-0.27	623.03	623.22	-0.19	622.31	622.40	-0.09	620.62	620.62	0.00	615.75	616.92	-1.17	615.93	617.17	-1.24
	8.141	**Cross-Section**		624.67	624.94	-0.27	623.03	623.22	-0.19	622.31	622.40	-0.09	620.63	620.62	0.01	615.75	616.92	-1.17	615.93	617.17	-1.24
	8.145	**Cross-Section**		624.68	624.94	-0.26	623.04	623.22	-0.18	622.31	622.41	-0.10	620.63	620.63	0.00	615.75	616.92	-1.17	615.94	617.17	-1.23
Milwaukee River - Right Split (west oxbow)	**7.8761**	**Cross-Section**		624.55	624.83	-0.28	622.89	623.09	-0.20	622.17	622.27	-0.10	620.50	620.49	0.01	615.75	616.92	-1.17	615.93	617.16	-1.23
	7.9	Milwaukee River Parkway																			
	7.9341	**Cross-Section**		624.58	624.85	-0.27	622.92	623.11	-0.19	622.20	622.30	-0.10	620.53	620.52	0.01	615.75	616.92	-1.17	615.93	617.16	-1.23
	8.0031	**Cross-Section**		624.65	624.92	-0.27	623.01	623.20	-0.19	622.29	622.38	-0.09	620.60	620.59	0.01	615.75	616.92	-1.17	615.93	617.16	-1.23
	8.047	Lincoln Creek Confluence		624.65	624.92	-0.27	623.01	623.20	-0.19	622.29	622.38	-0.09	620.60	620.59	0.01	615.75	616.92	-1.17	615.93	617.16	-1.23
	8.1321	**Cross-Section**		624.66	624.93	-0.27	623.02	623.20	-0.18	622.29	622.38	-0.09	620.60	620.60	0.00	615.75	616.92	-1.17	615.93	617.16	-1.23
	8.1411	**Cross-Section**		624.63	624.90	-0.27	622.99	623.18	-0.19	622.27	622.36	-0.09	620.59	620.58	0.01	615.75	616.92	-1.17	615.93	617.16	-1.23
	8.142	Milwaukee River Parkway																			
	8.1451	**Cross-Section**		624.64	624.91	-0.27	623.00	623.19	-0.19	622.28	622.37	-0.09	620.60	620.59	0.01	615.75	616.92	-1.17	615.93	617.17	-1.24
Milwaukee River - Upper Reach	**8.229**	**Cross-Section**		624.40	624.68	-0.28	622.83	623.02	-0.19	622.15	622.24	-0.09	620.54	620.54	0.00	615.75	616.92	-1.17	615.94	617.17	-1.23
	8.244	Outfall MkeR-23, right	615.04	624.43	624.71	-0.28	622.86	623.05	-0.19	622.18	622.27	-0.09	620.57	620.57	0.00	615.75	616.92	-1.17	615.94	617.17	-1.23
	8.341	**Cross-Section**		624.64	624.90	-0.26	623.09	623.26	-0.17	622.40	622.48	-0.08	620.77	620.76	0.01	615.75	616.92	-1.17	615.94	617.17	-1.23
	8.343	Outfall MkeR-24, right		624.63	624.89	-0.26	623.09	623.26	-0.17	622.40	622.48	-0.08	620.77	620.76	0.01	615.75	616.92	-1.17	615.94	617.17	-1.23
	8.357	**Cross-Section**		624.59	624.84	-0.25	623.05	623.23	-0.18	622.37	622.45	-0.08	620.75	620.75	0.00	615.75	616.92	-1.17	615.94	617.17	-1.23
	8.36	Railroad Bridge																			
	8.366	Outfall MkeR-25, right	613.02	624.78	625.02	-0.24	623.20	623.37	-0.17	622.50	622.59	-0.09	620.85	620.85	0.00	615.78	616.95	-1.17	615.96	617.19	-1.23
	8.375	**Cross-Section**		624.97	625.20	-0.23	623.35	623.51	-0.16	622.63	622.71	-0.08	620.94	620.94	0.00	615.80	616.97	-1.17	615.98	617.21	-1.23
	8.381	**Cross-Section**		624.99	625.21	-0.22	623.37	623.53	-0.16	622.65	622.73	-0.08	620.96	620.96	0.00	615.80	616.97	-1.17	615.98	617.21	-1.23
	8.389	Outfall MkeR-27, left		625.10	625.33	-0.23	623.45	623.61	-0.16	622.71	622.79	-0.08	620.99	620.98	0.01	615.80	616.97	-1.17	615.99	617.21	-1.22
	8.39	Outfall MkeR-26, right	611.95	625.11	625.34	-0.23	623.46	623.62	-0.16	622.71	622.79	-0.08	620.99	620.99	0.00	615.80	616.97	-1.17	615.99	617.21	-1.22
	8.394	**Cross-Section**		625.17	625.40	-0.23	623.50	623.66	-0.16	622.74	622.82	-0.08	621.01	621.00	0.01	615.80	616.97	-1.17	615.99	617.21	-1.22
	8.553	Outfall MkeR-28, left		625.96	626.15	-0.19	624.23	624.36	-0.13	623.43	623.49	-0.06	621.58	621.58	0.00	615.80	616.97	-1.17	616.00	617.22	-1.22
	8.574	Outfall MkeR-29, right	616.26	626.07	626.25	-0.18	624.33	624.45	-0.12	623.52	623.58	-0.06	621.65	621.65	0.00	615.80	616.97	-1.17	616.00	617.22	-1.22
	8.579	**Cross-Section**		626.09	626.27	-0.18	624.35	624.47	-0.12	623.54	623.60	-0.06	621.67	621.67	0.00	615.80	616.97	-1.17	616.00	617.22	-1.22
	8.66	**Cross-Section**		626.56	626.73	-0.17	624.77	624.88	-0.11	623.93	623.99	-0.06	621.99	621.98	0.01	615.81	616.98	-1.17	616.02	617.23	-1.21
	8.716	**Cross-Section**		626.74	626.90	-0.16	624.95	625.06	-0.11	624.11	624.16	-0.05	622.16	622.16	0.00	615.81	616.98	-1.17	616.03	617.23	-1.20
	8.73	Outfall MkeR-30, left		626.73	626.88	-0.15	624.94	625.05	-0.11	624.10	624.16	-0.06	622.15	622.15	0.00	615.81	616.98	-1.17	616.03	617.23	-1.20
	8.73	**Cross-Section**		626.73	626.88	-0.15	624.94	625.05	-0.11	624.10	624.16	-0.06	622.15	622.15	0.00	615.81	616.98	-1.17	616.03	617.23	-1.20
	8.732	Outfall MkeR-31, right		626.74	626.89	-0.15	624.95	625.06	-0.11	624.11	624.17	-0.06	622.16	622.16	0.00	615.81	616.98	-1.17	616.03	617.23	-1.20
	8.733	Outfall MkeR-33, left		626.75	626.90	-0.15	624.96	625.07	-0.11	624.12	624.18	-0.06	622.17	622.17	0.00	615.81	616.98	-1.17	616.03	617.23	-1.20
	8.734	Outfall MkeR-32, right		626.76	626.91	-0.15	624.96	625.07	-0.11	624.12	624.18	-0.06	622.17	622.17	0.00	615.81	616.98	-1.17	616.03	617.23	-1.20
	8.74	Silver Spring Road																			
	8.759	**Cross-Section**		626.92	627.07	-0.15	625.12	625.22	-0.10	624.28	624.33	-0.05	622.32	622.32	0.00	615.82	616.98	-1.16	616.05	617.24	-1.19
	8.783	**Cross-Section**		626.99	627.14	-0.15	625.19	625.29	-0.10	624.35	624.39	-0.04	622.39	622.39	0.00	615.83	616.98	-1.15	616.07	617.25	-1.18
	8.963	**Cross-Section**		627.58	627.70	-0.12	625.78	625.87	-0.09	624.93	624.97	-0.04	622.93	622.93	0.00	615.84	616.99	-1.15	616.11	617.26	-1.15
	8.966	Outfall MkeR-34, right		627.59	627.71	-0.12	625.79	625.88	-0.09	624.94	624.98	-0.04	622.94	622.94	0.00	615.84	616.99	-1.15	616.11	617.26	-1.15

Decreases in water surface elevation relative to existing dam conditions.

Increases in water surface elevation relative to existing dam conditions.

Table 5 (continued)

Model Reach	River Mile	Description[a]	Invert Elev NGVD29 (ft)	500-Yr Flow			100-Yr Flow			50-Yr Flow			10-Yr Flow			Median Flow			Mean Flow		
				Rock Ramp w/Fixed Crest at 615.4 ft NGVD29	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp w/Fixed Crest at 615.4 ft NGVD29	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp w/Fixed Crest at 615.4 ft NGVD29	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp w/Fixed Crest at 615.4 ft NGVD29	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp w/Fixed Crest at 615.4 ft NGVD29	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp w/Fixed Crest at 615.4 ft NGVD29	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)
Milwaukee River - Upper Reach (continued)	**9.125**	**Cross-Section**		628.17	628.28	-0.11	626.38	626.45	-0.07	625.52	625.55	-0.03	623.49	623.49	0.00	615.87	617.00	-1.13	616.19	617.29	-1.10
	9.13	Outfall MkeR-35, left		628.20	628.31	-0.11	626.40	626.47	-0.07	625.54	625.57	-0.03	623.51	623.51	0.00	615.87	617.00	-1.13	616.19	617.29	-1.10
	9.242	Outfall MkeR-36, left		628.77	628.87	-0.09	626.96	627.02	-0.06	626.09	626.11	-0.02	624.02	624.02	0.00	615.91	617.01	-1.10	616.29	617.33	-1.04
	9.244	Outfall MkeR-37, right		628.78	628.88	-0.09	626.97	627.03	-0.06	626.10	626.12	-0.02	624.03	624.03	0.00	615.91	617.01	-1.10	616.29	617.33	-1.04
	9.376	Outfall MkeR-38, left		629.46	629.54	-0.08	627.63	627.67	-0.04	626.73	626.76	-0.03	624.63	624.63	0.00	615.96	617.02	-1.06	616.40	617.37	-0.98
	9.427	**Cross-Section**		629.72	629.79	-0.07	627.88	627.92	-0.04	626.98	627.00	-0.02	624.86	624.86	0.00	615.98	617.03	-1.05	616.44	617.39	-0.95
	9.471	Outfall MkeR-40, right		629.87	629.94	-0.07	628.03	628.07	-0.04	627.13	627.15	-0.02	625.01	625.01	0.00	616.02	617.04	-1.02	616.51	617.42	-0.91
	9.476	Outfall MkeR-39, left		629.88	629.95	-0.07	628.05	628.09	-0.04	627.15	627.17	-0.02	625.03	625.03	0.00	616.02	617.04	-1.02	616.51	617.42	-0.90
	9.601	Outfall MkeR-41, left		630.30	630.37	-0.06	628.47	628.51	-0.04	627.57	627.59	-0.02	625.46	625.45	0.01	616.13	617.07	-0.94	616.71	617.49	-0.78
	9.632	Outfall MkeR-42, right		630.41	630.47	-0.06	628.57	628.61	-0.04	627.67	627.69	-0.02	625.56	625.55	0.01	616.16	617.08	-0.92	616.75	617.51	-0.76
	9.669	**Cross-Section**		630.53	630.59	-0.06	628.70	628.74	-0.04	627.80	627.82	-0.02	625.69	625.68	0.01	616.19	617.09	-0.90	616.81	617.53	-0.72
	9.834	Outfall MkeR-43, right		631.30	631.35	-0.04	629.71	629.73	-0.02	628.95	628.96	-0.01	627.04	627.04	0.00	616.65	617.25	-0.60	617.43	617.86	-0.43
	9.846	**Cross-Section**		631.36	631.40	-0.04	629.78	629.80	-0.02	629.03	629.04	-0.01	627.14	627.14	0.00	616.68	617.26	-0.58	617.47	617.88	-0.41
	9.854	Outfall MkeR-44, left		631.42	631.46	-0.04	629.84	629.86	-0.02	629.09	629.10	-0.01	627.19	627.19	0.00	616.69	617.27	-0.57	617.48	617.89	-0.41
	9.973	Outfall MkeR-45, right		632.37	632.39	-0.02	630.81	630.82	-0.01	630.03	630.03	0.00	627.97	627.97	0.00	616.87	617.35	-0.49	617.70	618.04	-0.33
	10.009	**Cross-Section**		632.65	632.67	-0.02	631.10	631.11	-0.01	630.31	630.31	0.00	628.20	628.20	0.00	616.92	617.38	-0.46	617.77	618.08	-0.31
	10.015	Outfall MkeR-46, right		632.73	632.75	-0.02	631.16	631.17	-0.01	630.37	630.37	0.00	628.24	628.24	0.00	616.93	617.38	-0.46	617.77	618.08	-0.31
	10.023	**Cross-Section**		632.84	632.85	-0.01	631.25	631.26	-0.01	630.44	630.44	0.00	628.30	628.30	0.00	616.94	617.39	-0.45	617.78	618.09	-0.31
	10.025	Outfall MkeR-48, left		632.84	632.85	-0.01	631.25	631.26	-0.01	630.44	630.44	0.00	628.30	628.30	0.00	616.94	617.39	-0.45	617.78	618.09	-0.31
	10.038	Outfall MkeR-47, right		632.81	632.82	-0.01	631.22	631.23	-0.01	630.41	630.42	-0.01	628.28	628.28	0.00	616.96	617.40	-0.44	617.80	618.10	-0.30
	10.04	Bender Road																			
	10.051	**Cross-Section**		632.78	632.80	-0.02	631.20	631.21	-0.01	630.39	630.40	-0.01	628.26	628.26	0.00	616.97	617.40	-0.43	617.81	618.11	-0.30
Lincoln Creek - Lower Mainstream	**0**	**Cross-Section**		624.65[b]	624.92[b]	-0.27	623.10[b]	623.20[b]	-0.10	622.29[b]	622.38[b]	-0.09	620.60[b]	620.59[b]	0.01						
	0.03	**Cross-Section**		624.65[b]	624.92[b]	-0.27	623.10[b]	623.20[b]	-0.10	622.29[b]	622.38[b]	-0.09	620.60[b]	620.59[b]	0.01						
	0.0303	Outfall LC-1, right		624.65[b]	624.92[b]	-0.27	623.10[b]	623.20[b]	-0.10	622.29[b]	622.38[b]	-0.09	620.60[b]	620.59[b]	0.01						
	0.14	**Cross-Section**		624.65[b]	624.92[b]	-0.27	623.10[b]	623.20[b]	-0.10	622.29[b]	622.38[b]	-0.09	620.60[b]	620.59[b]	0.01						
	0.16	**Cross-Section**		624.65[b]	624.92[b]	-0.27	623.10[b]	623.20[b]	-0.10	622.29[b]	622.38[b]	-0.09	620.60[b]	620.59[b]	0.01						
	0.18	**Cross-Section**		624.65[b]	624.92[b]	-0.27	623.10[b]	623.20[b]	-0.10	622.29[b]	622.38[b]	-0.09	620.60[b]	620.59[b]	0.01						
	0.181	Outfall LC-2, right	612.1	624.65[b]	624.92[b]	-0.27	623.10[b]	623.20[b]	-0.10	622.29[b]	622.38[b]	-0.09	620.60[b]	620.59[b]	0.01						
	0.21	**Cross-Section**		624.65[b]	624.92[b]	-0.27	623.10[b]	623.20[b]	-0.10	622.29[b]	622.38[b]	-0.09	620.60[b]	620.59[b]	0.01						
	0.33	**Cross-Section**		624.65[b]	624.92[b]	-0.27	623.10[b]	623.20[b]	-0.10	622.29[b]	622.38[b]	-0.09	621.04	621.04	0.00						
	0.333	Outfall LC-3, left	614.44	624.65[b]	624.92[b]	-0.27	623.10[b]	623.20[b]	-0.10	622.29[b]	622.38[b]	-0.09	621.07	621.07	0.00						
	0.4	**Cross-Section**		624.87	624.92[b]	-0.05	623.50	623.50	0.00	623.00	623.00	0.00	621.71	621.71	0.00						
	0.41	**Cross-Section**		624.89	624.92[b]	-0.03	623.52	623.52	0.00	623.03	623.03	0.00	621.73	621.73	0.00						
	0.41	Outfall LC-4, left	614.23	624.89	624.92[b]	-0.03	623.52	623.52	0.00	623.03	623.03	0.00	621.73	621.73	0.00						
	0.419	Outfall LC-5, right	616.72	624.89	624.92[b]	-0.03	623.52	623.62	0.00	623.03	623.03	0.00	621.73	621.73	0.00						
	0.42	N. Green Bay Avenue																			
	0.43	**Cross-Section**		625.59	625.59	0.00	623.74	623.74	0.00	623.21	623.21	0.00	621.87	621.87	0.00						
	0.44	**Cross-Section**		625.58	625.58	0.00	623.72	623.72	0.00	623.20	623.20	0.00	621.85	621.85	0.00						
	0.47	**Cross-Section**		626.18	626.18	0.00	624.18	624.18	0.00	623.60	623.60	0.00	622.12	622.12	0.00						
	0.5	**Cross-Section**		626.26	626.26	0.00	624.25	624.25	0.00	623.66	623.66	0.00	622.19	622.19	0.00						
	0.54	**Cross-Section**		626.21	626.21	0.00	624.25	624.25	0.00	623.69	623.69	0.00	622.27	622.27	0.00						
	0.6	**Cross-Section**		626.00	626.00	0.00	624.18	624.18	0.00	623.65	623.65	0.00	622.30	622.30	0.00						
	0.61	**Cross-Section**		626.12	626.12	0.00	624.31	624.31	0.00	623.78	623.78	0.00	622.40	622.40	0.00						
	0.62	**Cross-Section**		626.44	626.44	0.00	624.72	624.72	0.00	624.16	624.16	0.00	622.67	622.67	0.00						
	0.631	Outfall LC-6, left	614.76	626.51	626.51	0.00	624.76	624.76	0.00	624.20	624.20	0.00	622.70	622.70	0.00						

Decreases in water surface elevation relative to existing dam conditions.

Increases in water surface elevation relative to existing dam conditions.

[b] *Water surface elevation determined using backwater from the confluence with the Right Split (west oxbow) of the Milwaukee River.*

Table 5 (continued)

Model Reach	River Mile	Description[a]	Invert Elev NGVD29 (ft)	500-Yr Flow			100-Yr Flow			50-Yr Flow			10-Yr Flow			Median Flow			Mean Flow		
				Rock Ramp w/Fixed Crest at 615.4 ft NGVD29	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp w/Fixed Crest at 615.4 ft NGVD29	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp w/Fixed Crest at 615.4 ft NGVD29	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp w/Fixed Crest at 615.4 ft NGVD29	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp w/Fixed Crest at 615.4 ft NGVD29	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Rock Ramp w/Fixed Crest at 615.4 ft NGVD29	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)
Lincoln Creek - Lower Mainstream (continued)	**0.71**	**Cross-Section**		627.05	627.05	0.00	625.05	625.05	0.00	624.45	624.45	0.00	622.95	622.95	0.00						
	0.75	**Cross-Section**		627.13	627.13	0.00	625.15	625.15	0.00	624.55	624.55	0.00	623.05	623.05	0.00						
	0.79	**Cross-Section**		627.23	627.23	0.00	625.25	625.25	0.00	624.65	624.65	0.00	623.12	623.12	0.00						
	0.794	**Cross-Section**		627.25	627.25	0.00	625.28	625.28	0.00	624.67	624.67	0.00	623.15	623.15	0.00						
	0.798	Outfall LC-7, right	615.47	627.39	627.39	0.00	625.32	625.32	0.00	624.70	624.70	0.00	623.18	623.18	0.00						
	0.799	Outfall LC-8, right	615.46	627.42	627.42	0.00	625.33	625.33	0.00	624.71	624.71	0.00	623.18	623.18	0.00						
	0.803	W. Villard Avenue																			
	0.81	**Cross-Section**		627.79	627.79	0.00	625.43	625.43	0.00	624.79	624.79	0.00	623.26	623.26	0.00						
	0.82	**Cross-Section**		628.12	628.12	0.00	625.57	625.57	0.00	624.91	624.91	0.00	623.33	623.33	0.00						
	0.848	Outfall LC-10, left	619.6	628.11	628.11	0.00	625.58	625.58	0.00	624.93	624.93	0.00	623.35	623.35	0.00						
	0.877	Outfall LC-9, right	619.17	628.11	628.11	0.00	625.60	625.60	0.00	624.94	624.94	0.00	623.37	623.37	0.00						
	0.909	**Cross-Section**		628.10	628.10	0.00	625.61	625.61	0.00	624.96	624.96	0.00	623.40	623.40	0.00						
	0.912	N. 24th Place Footbridge																			
	0.915	**Cross-Section**		628.22	628.22	0.00	625.64	625.64	0.00	624.98	624.98	0.00	623.42	623.42	0.00						
	0.919	Outfall LC-11, right	619.35	628.25	628.25	0.00	625.65	625.65	0.00	624.99	624.99	0.00	623.44	623.44	0.00						
	0.93	**Cross-Section**		628.34	628.34	0.00	625.69	625.69	0.00	625.03	625.03	0.00	623.48	623.48	0.00						
	0.972	Outfall LC-12, left	617.81	628.44	628.44	0.00	625.82	625.82	0.00	625.15	625.15	0.00	623.61	623.61	0.00						
	0.974	Outfall LC-13, left	617.09	628.44	628.44	0.00	625.83	625.83	0.00	625.16	625.16	0.00	623.61	623.61	0.00						
	0.987	Outfall LC-14, right	619.4	628.47	628.47	0.00	625.87	625.87	0.00	625.19	625.19	0.00	623.65	623.65	0.00						
	1.07	**Cross-Section**		628.67	628.67	0.00	626.12	626.12	0.00	625.43	625.43	0.00	623.90	623.90	0.00						
	1.12	**Cross-Section**		628.92	628.92	0.00	626.45	626.45	0.00	625.77	625.77	0.00	624.19	624.19	0.00						
	1.138	Outfall LC-15, left	616.13	629.04	629.04	0.00	626.60	626.60	0.00	625.90	625.90	0.00	624.32	624.32	0.00						
	1.141	Outfall LC-16, right	621.01	629.06	629.06	0.00	626.63	626.63	0.00	625.93	625.93	0.00	624.34	624.34	0.00						
	1.17	**Cross-Section**		629.25	629.25	0.00	626.87	626.87	0.00	626.14	626.14	0.00	624.54	624.54	0.00						

[a] *References to "left" and "right" are based on looking in the downstream direction.*

[b] *Water surface elevation determined using backwater from the confluence with the Right Split (west oxbow) of the Milwaukee River.*

Table 6

MAXIMUM WATER DEPTH UNDER MEDIAN FLOW CONDITIONS

Condition Alternative	Lower Reach (Estabrook dam or Rock Ramp to W. Hampton Avenue) (feet)	Middle Reach (W. Hampton Avenue to abandoned railroad bridge upstream of Lincoln Park) (feet)	Upper Reach (Abandoned Railroad Bridge Upstream of Lincoln Park to W. Bender Road) (feet)	W. Silver Spring Drive to W. Bender Road (subreach of Upper Reach) (feet)
Existing Condition	7.4 to 8.7	6.3 to 9.2	2.4 to 9.1	2.4 to 5.0
Alternatives 1 and 1A Rehabilitated Dam (with and without fish passage)	7.4 to 8.7	6.3 to 9.2	2.4 to 9.1	2.4 to 5.0
Alternative 2 Dam Abandoned and Removed	0.7 to 2.5	1.6 to 4.5	0.8 to 4.5	1.5 to 2.1
Alternative 3 Dam Abandoned and Removed with a 5.5-Foot-High Rock Ramp Constructed	5.8 to 6.8	4.7 to 7.6	1.7 to 7.5	1.7 to 3.4
Alternative 3A Dam Abandoned and Removed with a Four-Foot-High Rock Ramp Constructed	4.3 to 5.3	3.6 to 6.5	1.5 to 6.4	1.5 to 2.5
Alternative 4 Gated Portion of Dam Abandoned and Removed with a 6.3-Foot-High Rock Ramp Constructed and Lowered and Rehabilitated Overflow Spillway	6.2 to 7.5	5.1 to 8.0	1.9 to 7.9	1.9 to 3.8

Source: SEWRPC.

Table 7

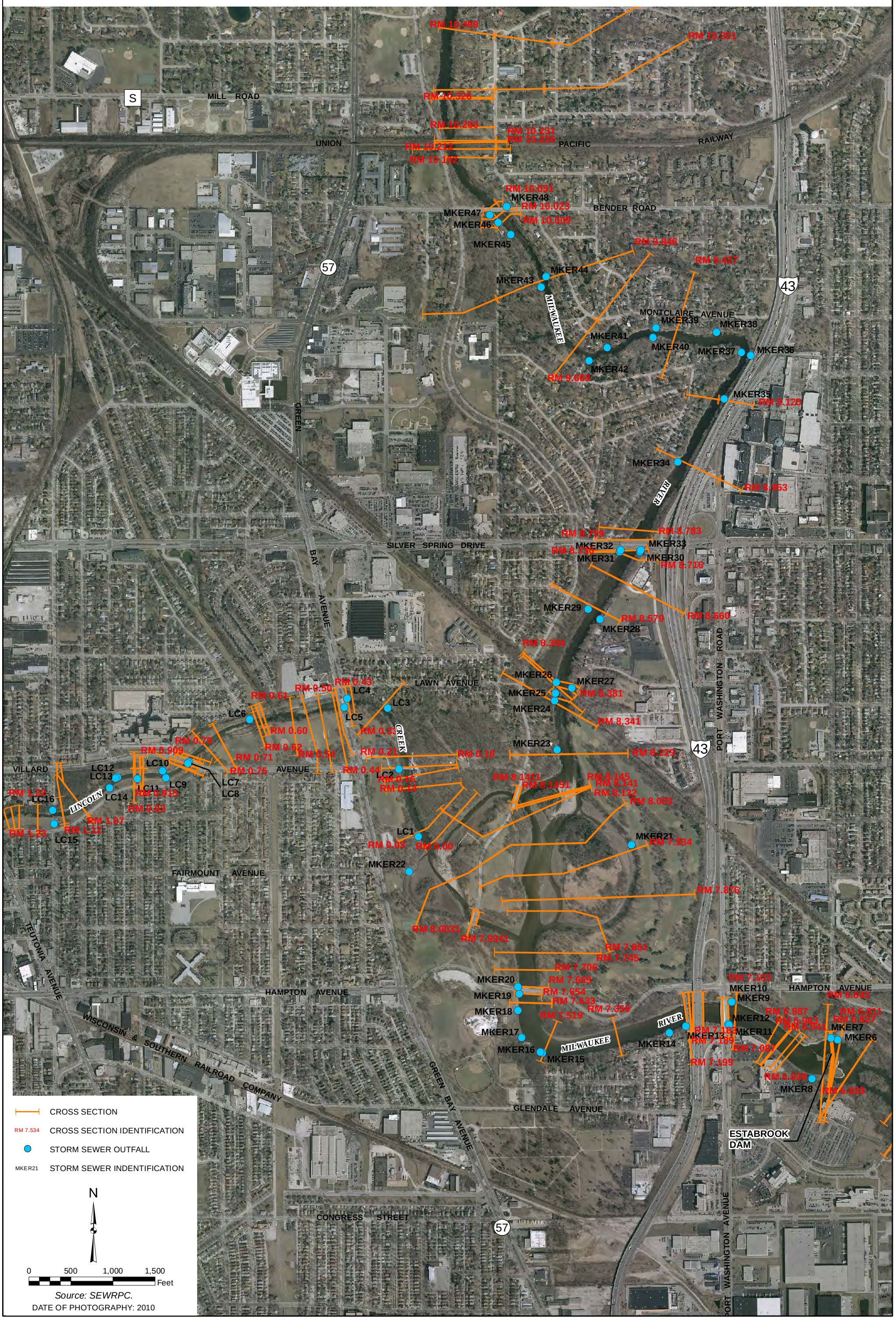
CHANGES IN ONE-PERCENT-ANNUAL-PROBABILITY WATER SURFACE ELEVATIONS AS COMPARED TO EXISTING CONDITIONS

Condition Alternative	Lower Reach (Estabrook dam or Rock Ramp to W. Hampton Avenue) (feet)	Middle Reach (W. Hampton Avenue to abandoned railroad bridge upstream of Lincoln Park) (feet)	Upper Reach (Abandoned Railroad Bridge Upstream of Lincoln Park to W. Bender Road) (feet)	W. Silver Spring Drive to W. Bender Road (subreach of Upper Reach) (feet)
Alternatives 1 and 1A Rehabilitated Dam (with and without fish passage)	0	0	0	0
Alternative 2 Dam Abandoned and Removed	-0.7 to -1.5	-0.5 to -0.7	0 to -0.5	0 to -0.3
Alternative 3 Dam Abandoned and Removed with a 5.5-Foot-High Rock Ramp Constructed	0.7 to 1.2	0.6 to 0.7	0 to 0.6	0 to 0.4
Alternative 3A Dam Abandoned and Removed with a Four-Foot-High Rock Ramp Constructed	-0.1 to -0.2	-0.1	0 to -0.1	0 to -0.1
Alternative 4 Gated Portion of Dam Abandoned and Removed with a 6.3-Foot-High Rock Ramp Constructed and Low-ered and Rehabilitated Overflow Spillway	-0.2 to -0.4	-0.2	0 to -0.2	0 to -0.1

Source: SEWRPC.

Exhibit 1

MILWAUKEE RIVER FROM ESTABROOK DAM THROUGH W. BENDER ROAD



Source: SEWRPC.

DATE OF PHOTOGRAPHY: 2010

ATTACHMENT 4:

SEWRPC EMAIL DATED APRIL 29, 2014 REGARDING ESTABROOK DAM MODELING WITH THE GATES CLOSED AND STOP LOGS IN PLACE

Kistner, Amy

From: Hahn, Michael G. [MHAHN@SEWRPC.org]
Sent: Tuesday, April 29, 2014 9:50 AM
To: Pirrung, Don
Cc: Kevin Haley (kevin.haley@milwaukeecountywi.gov); Murray, Joshua A.
Subject: Estabrook dam hydraulic analysis
Attachments: Estabrook Dam Existing Condition Comparison (00217908).XLS

Don,

We have completed the hydraulic analysis of the Estabrook dam under flood conditions with all slide gates closed and the stop logs in place as requested by you and the County staff. The results of that analysis are attached.

Please let me know if you have any questions.

Mike

Michael G. Hahn, P.E., P.H.
Chief Environmental Engineer
Southeastern Wisconsin Regional Planning Commission
P.O. Box 1607
W239 N1812 Rockwood Drive
Waukesha, WI 53187-1607
Phone: (262) 953-3243
Fax: (262) 547-1103
E-mail: mhahn@sewrpc.org
Web site: www.sewrpc.org

Water Surface Profile Comparison of Existing Dam Conditions to Condition Assuming Gates are Closed During Flood Flow Events

				500-Yr Flow			100-Yr Flow			50-Yr Flow			10-Yr Flow		
Model Reach	River Mile	Description[a]	Invert Elev NGVD29 (ft)	Gates Closed W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Gates Closed W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Gates Closed W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Gates Closed W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)
Milwaukee River - Lower Reach	**6.827**	**Cross-Section**		621.11	621.11	0.00	619.23	619.23	0.00	618.29	618.29	0.00	616.12	616.12	0.00
	6.8275	Estabrook Park Dam													
	6.828	Outfall MkeR-7, left		622.08	621.65	0.44	620.72	619.96	0.77	620.01	619.17	0.84	618.35	617.50	0.85
	6.829	**Cross-Section**		623.05	622.18	0.87	622.21	620.68	1.53	621.72	620.05	1.67	620.57	618.88	1.69
	6.843	**Cross-Section**		623.04	622.18	0.86	622.21	620.67	1.54	621.72	620.04	1.68	620.56	618.87	1.69
	6.866	Outfall MkeR-8, right		623.02	622.16	0.86	622.20	620.66	1.54	621.71	620.03	1.68	620.56	618.87	1.69
	6.928	**Cross-Section**		622.97	622.10	0.87	622.16	620.63	1.53	621.68	620.01	1.67	620.55	618.87	1.68
	6.941	**Cross-Section**		623.00	622.14	0.86	622.18	620.66	1.52	621.70	620.05	1.65	620.56	618.89	1.67
	6.96	**Cross-Section**		623.02	622.16	0.86	622.20	620.69	1.51	621.71	620.07	1.64	620.57	618.90	1.67
	6.963	**Cross-Section**		623.02	622.17	0.85	622.20	620.70	1.50	621.72	620.08	1.64	620.57	618.91	1.66
	6.987	**Cross-Section**		623.14	622.32	0.82	622.29	620.82	1.47	621.79	620.18	1.61	620.61	618.97	1.64
	7.087	**Cross-Section**		623.44	622.68	0.76	622.51	621.15	1.36	621.98	620.48	1.50	620.74	619.18	1.56
	7.096	Outfall MkeR-9, left	610.8	623.42	622.66	0.76	622.50	621.14	1.36	621.97	620.47	1.50	620.73	619.17	1.56
	7.098	Outfall MkeR-10, left		623.42	622.66	0.76	622.50	621.14	1.36	621.97	620.47	1.50	620.73	619.17	1.56
	7.103	**Cross-Section**		623.41	622.65	0.76	622.49	621.13	1.36	621.97	620.47	1.50	620.73	619.17	1.56
	7.104	Outfall MkeR-11, right	615.6	623.41	622.66	0.76	622.49	621.13	1.36	621.97	620.47	1.50	620.73	619.17	1.56
	7.104	Outfall MkeR-12, right		623.41	622.66	0.76	622.49	621.13	1.36	621.97	620.47	1.50	620.73	619.17	1.56
	7.11	Port Washington Road													
	7.117	**Cross-Section**		623.47	622.72	0.75	622.53	621.19	1.34	622.00	620.52	1.48	620.75	619.21	1.54
	7.16	**Cross-Section**		623.54	622.81	0.73	622.59	621.28	1.31	622.05	620.60	1.45	620.79	619.27	1.52
	7.17	IH 43													
	7.183	**Cross-Section**		623.66	622.95	0.71	622.69	621.41	1.28	622.14	620.72	1.42	620.84	619.35	1.49
	7.189	**Cross-Section**		623.69	622.99	0.70	622.71	621.44	1.27	622.16	620.75	1.41	620.85	619.37	1.48
	7.19	Ramp to IH 43													
	7.199	**Cross-Section**		623.80	623.11	0.69	622.81	621.54	1.27	622.25	620.84	1.41	620.92	619.44	1.48
	7.201	Outfall MkeR-13, right		623.80	623.11	0.69	622.81	621.54	1.27	622.25	620.84	1.41	620.92	619.44	1.48
	7.241	Outfall MkeR-14, right		623.87	623.20	0.68	622.87	621.63	1.24	622.30	620.92	1.38	620.96	619.51	1.45
	7.359	**Cross-Section**		624.08	623.44	0.64	623.03	621.87	1.16	622.45	621.15	1.30	621.06	619.69	1.37
	7.519	Outfall MkeR-15, right	629.46	624.48	623.91	0.57	623.35	622.31	1.04	622.73	621.57	1.16	621.26	620.01	1.25
	7.519	**Cross-Section**		624.48	623.91	0.57	623.35	622.31	1.04	622.73	621.57	1.16	621.26	620.01	1.25
	7.526	Outfall MkeR-16, right		624.49	623.92	0.57	623.36	622.32	1.04	622.74	621.58	1.16	621.27	620.02	1.25
	7.576	Outfall MkeR-17, right	618.1	624.54	623.99	0.55	623.41	622.40	1.01	622.79	621.66	1.13	621.31	620.08	1.23
	7.633	**Cross-Section**		624.60	624.07	0.53	623.47	622.48	0.99	622.84	621.74	1.10	621.35	620.15	1.20
	7.64	Outfall MkeR-18, right		624.61	624.08	0.53	623.47	622.49	0.99	622.84	621.75	1.10	621.35	620.16	1.20
	7.654	**Cross-Section**		624.62	624.09	0.53	623.48	622.50	0.98	622.85	621.76	1.09	621.36	620.17	1.19
	7.656	Outfall MkeR-19, right		624.64	624.11	0.53	623.50	622.52	0.98	622.86	621.78	1.09	621.37	620.18	1.19
	7.66	Hampton Avenue													
	7.669	**Cross-Section**		624.77	624.26	0.51	623.60	622.65	0.95	622.95	621.89	1.06	621.42	620.26	1.16
	7.669	Outfall MkeR-20, right		624.77	624.26	0.51	623.60	622.65	0.95	622.95	621.89	1.06	621.42	620.26	1.16
	7.706	**Cross-Section**		625.01	624.50	0.51	623.75	622.81	0.94	623.07	622.02	1.05	621.49	620.34	1.15
	7.745	**Cross-Section**		625.15	624.66	0.49	623.86	622.95	0.91	623.17	622.14	1.03	621.55	620.42	1.13
Milwaukee River - Middle Reach	**7.851**	**Cross-Section**		625.33	624.86	0.47	624.01	623.13	0.88	623.30	622.30	1.00	621.63	620.53	1.10
	7.876	**Cross-Section**		625.34	624.87	0.47	624.02	623.14	0.88	623.31	622.32	0.99	621.64	620.54	1.10
	7.934	**Cross-Section**		625.36	624.90	0.46	624.04	623.17	0.87	623.33	622.35	0.98	621.66	620.57	1.09
	7.945	Outfall MkeR-21, left		625.36	624.90	0.46	624.04	623.17	0.87	623.33	622.35	0.98	621.66	620.57	1.09
	8.003	**Cross-Section**		625.37	624.90	0.47	624.05	623.18	0.87	623.33	622.36	0.97	621.67	620.58	1.09
	8.098	Outfall MkeR-22, right	613.85	625.39	624.93	0.46	624.06	623.21	0.86	623.35	622.39	0.96	621.68	620.61	1.08
	8.132	**Cross-Section**		625.40	624.94	0.46	624.07	623.22	0.85	623.36	622.40	0.96	621.69	620.62	1.07
	8.141	**Cross-Section**		625.40	624.94	0.46	624.08	623.22	0.86	623.36	622.40	0.96	621.69	620.62	1.07
	8.145	**Cross-Section**		625.40	624.94	0.46	624.08	623.22	0.86	623.37	622.41	0.96	621.69	620.63	1.06
Milwaukee River - Right Split (west oxbow)	**7.8761**	**Cross-Section**		625.31	624.83	0.48	623.98	623.09	0.89	623.26	622.27	0.99	621.60	620.49	1.11
	7.9	Milwaukee River Parkway													
	7.9341	**Cross-Section**		625.32	624.85	0.47	624.00	623.11	0.89	623.28	622.30	0.98	621.62	620.52	1.10
	8.0031	**Cross-Section**		625.39	624.92	0.47	624.06	623.20	0.86	623.36	622.38	0.98	621.68	620.59	1.09
	8.047	Lincoln Creek Confluence		625.39	624.92	0.47	624.06	623.20	0.86	623.36	622.38	0.98	621.68	620.59	1.09
	8.1321	**Cross-Section**		625.39	624.93	0.46	624.07	623.20	0.87	623.36	622.38	0.98	621.69	620.60	1.09
	8.1411	**Cross-Section**		625.37	624.90	0.47	624.05	623.18	0.87	623.34	622.36	0.98	621.67	620.58	1.09
	8.142	Milwaukee River Parkway													
	8.1451	**Cross-Section**		625.37	624.91	0.46	624.05	623.19	0.86	623.35	622.37	0.98	621.68	620.59	1.09
Milwaukee River - Upper Reach	**8.229**	**Cross-Section**		625.15	624.68	0.47	623.90	623.02	0.88	623.21	622.24	0.97	621.61	620.54	1.07
	8.244	Outfall MkeR-23, right	615.04	625.18	624.71	0.47	623.92	623.05	0.87	623.23	622.27	0.96	621.63	620.57	1.06
	8.341	**Cross-Section**		625.34	624.90	0.44	624.08	623.26	0.82	623.38	622.48	0.90	621.76	620.76	1.00
	8.343	Outfall MkeR-24, right		625.33	624.89	0.44	624.08	623.26	0.82	623.38	622.48	0.90	621.76	620.76	1.00
	8.357	**Cross-Section**		625.28	624.84	0.44	624.04	623.23	0.81	623.36	622.45	0.91	621.74	620.75	0.99
	8.36	Railroad Bridge													
	8.366	Outfall MkeR-25, right	613.02	625.45	625.02	0.42	624.16	623.37	0.79	623.47	622.58	0.88	621.82	620.85	0.97
	8.375	**Cross-Section**		625.61	625.20	0.41	624.28	623.51	0.77	623.57	622.71	0.86	621.90	620.94	0.96
	8.381	**Cross-Section**		625.62	625.21	0.41	624.30	623.53	0.77	623.58	622.73	0.85	621.91	620.96	0.95
	8.389	Outfall MkeR-27, left		625.73	625.33	0.40	624.37	623.61	0.76	623.64	622.79	0.85	621.94	620.98	0.96
	8.39	Outfall MkeR-26, right	611.95	625.74	625.34	0.40	624.38	623.62	0.76	623.64	622.79	0.85	621.94	620.99	0.96
	8.394	**Cross-Section**		625.80	625.40	0.40	624.41	623.66	0.75	623.67	622.82	0.85	621.96	621.00	0.96
	8.553	Outfall MkeR-28, left		626.49	626.15	0.34	624.99	624.36	0.64	624.20	623.49	0.71	622.38	621.58	0.81
	8.574	Outfall MkeR-29, right	616.26	626.58	626.25	0.33	625.07	624.45	0.62	624.27	623.58	0.69	622.44	621.65	0.78
	8.579	**Cross-Section**		626.60	626.27	0.33	625.09	624.47	0.62	624.29	623.60	0.69	622.45	621.67	0.78
	8.66	**Cross-Section**		627.02	626.73	0.29	625.44	624.88	0.56	624.62	623.99	0.63	622.70	621.98	0.72
	8.716	**Cross-Section**		627.18	626.90	0.28	625.59	625.06	0.53	624.76	624.16	0.60	622.83	622.16	0.67
	8.73	Outfall MkeR-30, left		627.16	626.88	0.28	625.58	625.05	0.53	624.75	624.16	0.59	622.83	622.15	0.68
	8.73	**Cross-Section**		627.16	626.88	0.28	625.58	625.05	0.53	624.75	624.16	0.59	622.83	622.15	0.68
	8.732	Outfall MkeR-31, right		627.17	626.89	0.28	625.59	625.06	0.53	624.76	624.17	0.59	622.84	622.16	0.68
	8.733	Outfall MkeR-33, left		627.18	626.90	0.28	625.60	625.07	0.53	624.77	624.18	0.59	622.84	622.17	0.68
	8.734	Outfall MkeR-32, right		627.19	626.91	0.28	625.60	625.07	0.53	624.77	624.18	0.59	622.85	622.17	0.67
	8.74	Silver Spring Road													
	8.759	**Cross-Section**		627.35	627.07	0.28	625.73	625.22	0.51	624.90	624.33	0.57	622.96	622.32	0.64
	8.783	**Cross-Section**		627.41	627.14	0.27	625.79	625.29	0.50	624.95	624.39	0.56	623.01	622.39	0.62
	8.963	**Cross-Section**		627.94	627.70	0.24	626.29	625.87	0.42	625.44	624.97	0.47	623.45	622.93	0.52
	8.966	Outfall MkeR-34, right		627.95	627.71	0.24	626.30	625.88	0.42	625.45	624.98	0.47	623.46	622.94	0.52
	9.125	**Cross-Section**		628.48	628.28	0.20	626.81	626.45	0.36	625.95	625.55	0.40	623.92	623.49	0.43
	9.13	Outfall MkeR-35, left		628.50	628.31	0.20	626.83	626.47	0.36	625.97	625.57	0.40	623.94	623.51	0.43
	9.242	Outfall MkeR-36, left		629.04	628.87	0.18	627.33	627.02	0.31	626.45	626.11	0.34	624.38	624.02	0.36
	9.244	Outfall MkeR-37, right		629.05	628.88	0.18	627.34	627.03	0.31	626.46	626.12	0.34	624.39	624.03	0.36
	9.376	Outfall MkeR-38, left		629.69	629.54	0.15	627.93	627.67	0.26	627.03	626.76	0.28	624.92	624.63	0.29
	9.427	**Cross-Section**		629.93	629.79	0.14	628.16	627.92	0.24	627.25	627.00	0.25	625.12	624.86	0.26
	9.471	Outfall MkeR-40, right		630.07	629.94	0.13	628.30	628.07	0.23	627.39	627.15	0.24	625.26	625.01	0.25
	9.476	Outfall MkeR-39, left		630.09	629.95	0.13	628.31	628.09	0.23	627.40	627.17	0.24	625.27	625.03	0.25
	9.601	Outfall MkeR-41, left		630.48	630.37	0.12	628.71	628.51	0.20	627.80	627.59	0.21	625.66	625.45	0.21
	9.632	Outfall MkeR-42, right		630.58	630.47	0.11	628.80	628.61	0.19	627.89	627.69	0.20	625.76	625.55	0.20
	9.669	**Cross-Section**		630.70	630.59	0.11	628.92	628.74	0.18	628.01	627.82	0.19	625.87	625.68	0.19
	9.834	Outfall MkeR-43, right		631.42	631.35	0.07	629.83	629.73	0.11	629.05	628.96	0.10	627.14	627.04	0.10
	9.846	**Cross-Section**		631.47	631.40	0.07	629.90	629.80	0.10	629.13	629.04	0.09	627.23	627.14	0.09
	9.854	Outfall MkeR-44, left		631.53	631.46	0.07	629.96	629.86	0.10	629.19	629.10	0.09	627.28	627.19	0.09
	9.973	Outfall MkeR-45, right		632.44	632.39	0.05	630.89	630.82	0.07	630.10	630.03	0.07	628.03	627.97	0.07
	10.009	**Cross-Section**		632.71	632.67	0.04	631.17	631.11	0.06	630.37	630.31	0.06	628.26	628.20	0.06
	10.015	Outfall MkeR-46, right		632.79	632.75	0.04	631.23	631.17	0.06	630.43	630.37	0.06	628.31	628.24	0.06
	10.023	**Cross-Section**		632.89	632.85	0.04	631.32	631.26	0.06	630.50	630.44	0.06	628.37	628.30	0.07
	10.025	Outfall MkeR-48, left		632.89	632.85	0.04	631.32	631.26	0.06	630.50	630.44	0.06	628.37	628.30	0.07
	10.038	Outfall MkeR-47, right		632.86	632.82	0.04	631.29	631.23	0.05	630.47	630.42	0.05	628.34	628.28	0.06
	10.04	Bender Road													
	10.051	**Cross-Section**		632.84	632.80	0.04	631.26	631.21	0.05	630.45	630.40	0.05	628.32	628.26	0.06
Lincoln Creek - Lower Mainstream	**0**	**Cross-Section**		625.39[b]	624.92[b]	0.47	624.06[b]	623.20[b]	0.86	623.36[b]	622.38[b]	0.98	621.68[b]	620.59[b]	1.09
	0.03	**Cross-Section**		625.39[b]	624.92[b]	0.47	624.06[b]	623.20[b]	0.86	623.36[b]	622.38[b]	0.98	621.68[b]	620.59[b]	1.09
	0.0303	Outfall LC-1, right		625.39[b]	624.92[b]	0.47	624.06[b]	623.20[b]	0.86	623.36[b]	622.38[b]	0.98	621.68[b]	620.59[b]	1.09
	0.14	**Cross-Section**		625.39[b]	624.92[b]	0.47	624.06[b]	623.20[b]	0.86	623.36[b]	622.38[b]	0.98	621.68[b]	620.59[b]	1.09
	0.16	**Cross-Section**		625.39[b]	624.92[b]	0.47	624.06[b]	623.20[b]	0.86	623.36[b]	622.38[b]	0.98	621.68[b]	620.59[b]	1.09
	0.18	**Cross-Section**		625.39[b]	624.92[b]	0.47	624.06[b]	623.20[b]	0.86	623.36[b]	622.38[b]	0.98	621.68[b]	620.59[b]	1.09
	0.181	Outfall LC-2, right	612.1	625.39[b]	624.92[b]	0.47	624.06[b]	623.20[b]	0.86	623.36[b]	622.38[b]	0.98	621.68[b]	620.59[b]	1.09
	0.21	**Cross-Section**		625.39[b]	624.92[b]	0.47	624.06[b]	623.20[b]	0.86	623.36[b]	622.38[b]	0.98	621.68[b]	620.59[b]	1.09

Water Surface Profile Comparison of Existing Dam Conditions to Condition Assuming Gates are Closed During Flood Flow Events

				500-Yr Flow			100-Yr Flow			50-Yr Flow			10-Yr Flow		
Model Reach	River Mile	Description[a]	Invert Elev NGVD29 (ft)	Gates Closed W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Gates Closed W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Gates Closed W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)	Gates Closed W.S. Elev (NGVD29, ft)	Exist. Cond. W. S. Elev (NGVD29, ft)	Difference (ft)
	0.33	**Cross-Section**		625.39[b]	624.92[b]	0.47	624.06[b]	623.20[b]	0.86	623.36[b]	622.38[b]	0.98	621.68[b]	621.04	0.64
	0.333	Outfall LC-3, left	614.44	625.39[b]	624.92[b]	0.47	624.06[b]	623.20[b]	0.86	623.36[b]	622.38[b]	0.98	621.68[b]	621.07	0.61
	0.4	**Cross-Section**		625.39[b]	624.92[b]	0.47	624.06[b]	623.50	0.56	623.36[b]	623.00	0.36	621.71	621.71	0.00
	0.41	**Cross-Section**		625.39[b]	624.92[b]	0.47	624.06[b]	623.52	0.54	623.36[b]	623.03	0.33	621.73	621.73	0.00
	0.41	Outfall LC-4, left	614.23	625.39[b]	624.92[b]	0.47	624.06[b]	623.52	0.54	623.36[b]	623.03	0.33	621.73	621.73	0.00
	0.419	Outfall LC-5, right	616.72	625.39[b]	624.92[b]	0.47	624.06[b]	623.62	0.44	623.36[b]	623.03	0.33	621.73	621.73	0.00
	0.42	N. Green Bay Avenue													
	0.43	**Cross-Section**		625.59	625.59	0.00	624.06[b]	623.74	0.32	623.36[b]	623.21	0.15	621.87	621.87	0.00
	0.44	**Cross-Section**		625.58	625.58	0.00	624.06[b]	623.72	0.34	623.36[b]	623.20	0.16	621.85	621.85	0.00
	0.47	**Cross-Section**		626.18	626.18	0.00	624.18	624.18	0.00	623.60	623.60	0.00	622.12	622.12	0.00
	0.5	**Cross-Section**		626.26	626.26	0.00	624.25	624.25	0.00	623.66	623.66	0.00	622.19	622.19	0.00
	0.54	**Cross-Section**		626.21	626.21	0.00	624.25	624.25	0.00	623.69	623.69	0.00	622.27	622.27	0.00
	0.6	**Cross-Section**		626.00	626.00	0.00	624.18	624.18	0.00	623.65	623.65	0.00	622.30	622.30	0.00
	0.61	**Cross-Section**		626.12	626.12	0.00	624.31	624.31	0.00	623.78	623.78	0.00	622.40	622.40	0.00
	0.62	**Cross-Section**		626.44	626.44	0.00	624.72	624.72	0.00	624.16	624.16	0.00	622.67	622.67	0.00
	0.631	Outfall LC-6, left	614.76	626.51	626.51	0.00	624.76	624.76	0.00	624.20	624.20	0.00	622.70	622.70	0.00
	0.71	**Cross-Section**		627.05	627.05	0.00	625.05	625.05	0.00	624.45	624.45	0.00	622.95	622.95	0.00
	0.75	**Cross-Section**		627.13	627.13	0.00	625.15	625.15	0.00	624.55	624.55	0.00	623.05	623.05	0.00
	0.79	**Cross-Section**		627.23	627.23	0.00	625.25	625.25	0.00	624.65	624.65	0.00	623.12	623.12	0.00
	0.794	**Cross-Section**		627.25	627.25	0.00	625.28	625.28	0.00	624.67	624.67	0.00	623.15	623.15	0.00
	0.798	Outfall LC-7, right	615.47	627.39	627.39	0.00	625.32	625.32	0.00	624.70	624.70	0.00	623.18	623.18	0.00
	0.799	Outfall LC-8, right	615.46	627.42	627.42	0.00	625.33	625.33	0.00	624.71	624.71	0.00	623.18	623.18	0.00
	0.803	W. Villard Avenue													
	0.81	**Cross-Section**		627.79	627.79	0.00	625.43	625.43	0.00	624.79	624.79	0.00	623.26	623.26	0.00
	0.82	**Cross-Section**		628.12	628.12	0.00	625.57	625.57	0.00	624.91	624.91	0.00	623.33	623.33	0.00
	0.848	Outfall LC-10, left	619.6	628.11	628.11	0.00	625.58	625.58	0.00	624.93	624.93	0.00	623.35	623.35	0.00
	0.877	Outfall LC-9, right	619.17	628.11	628.11	0.00	625.60	625.60	0.00	624.94	624.94	0.00	623.37	623.37	0.00
	0.909	**Cross-Section**		628.10	628.10	0.00	625.61	625.61	0.00	624.96	624.96	0.00	623.40	623.40	0.00
	0.912	N. 24th Place Footbridge													
	0.915	**Cross-Section**		628.22	628.22	0.00	625.64	625.64	0.00	624.98	624.98	0.00	623.42	623.42	0.00
	0.919	Outfall LC-11, right	619.35	628.25	628.25	0.00	625.65	625.65	0.00	624.99	624.99	0.00	623.44	623.44	0.00
	0.93	**Cross-Section**		628.34	628.34	0.00	625.69	625.69	0.00	625.03	625.03	0.00	623.48	623.48	0.00
	0.972	Outfall LC-12, left	617.81	628.44	628.44	0.00	625.82	625.82	0.00	625.15	625.15	0.00	623.61	623.61	0.00
	0.974	Outfall LC-13, left	617.09	628.44	628.44	0.00	625.83	625.83	0.00	625.16	625.16	0.00	623.61	623.61	0.00
	0.987	Outfall LC-14, right	619.4	628.47	628.47	0.00	625.87	625.87	0.00	625.19	625.19	0.00	623.65	623.65	0.00
	1.07	**Cross-Section**		628.67	628.67	0.00	626.12	626.12	0.00	625.43	625.43	0.00	623.90	623.90	0.00
	1.12	**Cross-Section**		628.92	628.92	0.00	626.45	626.45	0.00	625.77	625.77	0.00	624.19	624.19	0.00
	1.138	Outfall LC-15, left	616.13	629.04	629.04	0.00	626.60	626.60	0.00	625.90	625.90	0.00	624.32	624.32	0.00
	1.141	Outfall LC-16, right	621.01	629.06	629.06	0.00	626.63	626.63	0.00	625.93	625.93	0.00	624.34	624.34	0.00
	1.17	**Cross-Section**		629.25	629.25	0.00	626.87	626.87	0.00	626.14	626.14	0.00	624.54	624.54	0.00

[a] *References to "left" and "right" are based on looking in the downstream direction.*

[b] *Water surface elevation determined using backwater from the confluence with the Right Split (west oxbow) of the Milwaukee River*

Increases in water surface elevation relative to existing dam conditions.

ATTACHMENT 5:

EXCERPTS FROM LINCOLN PARK/MILWAUKEE COUNTY RIVER CHANNEL SEDIMENTS PHASE II PRE-FINAL REMEDIAL DESIGN REPORT DATED JANUARY 2014, PREPARED BY EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

Source: ArcGIS Online Map Service 2012.

Total PCB data from CH2M Hill 2011, Phase II Remedial Investigation.

EA Engineering, Science, and Technology, Inc.	LINCOLN PARK / MILWAUKEE RIVER CHANNEL SEDIMENTS SITE PHASE II FS / RD GLENDALE, MILWAUKEE COUNTY, WISCONSIN	CONTAMINATED ZONES AND DEPOSITS

PROJECT MGR.	DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE	PROJECT NO.	FILE NAME	DRAWING NO.	FIGURE
MC	RF	RF	JB	JAN 2014	AS SHOWN	6256105	--	--	2

2.3.1.2 Zone 3

Deposit 3b-1: The maximum reported total PCB concentration in this deposit is 1.6 mg/kg and the maximum reported total PAH concentration is 37 mg/kg. LNAPL was detected in this deposit. The estimated *in-situ* volume of sediments for disposal in this deposit is 1,108 cy of Non-TSCA regulated materials, over an area of approximately 0.4 acre. Contamination extends to an average depth of 1.0 ft bss.

2.3.1.3 Zone 4

Deposit 4-1: The maximum reported total PCB concentration in this deposit is 1.5 mg/kg and the maximum reported total PAH concentration is 117 mg/kg. The estimated *in-situ* volume of sediments for disposal in this deposit is 449 cy of Non-TSCA regulated materials, over an area of approximately 0.1 acre with an average depth of 0.86 ft bss.

Deposit 4-2: The maximum reported total PCB concentration in this deposit is 1.9 mg/kg and the maximum reported total PAH concentration is 33 mg/kg. The estimated *in-situ* volume of sediments for disposal in this deposit is 694 cy of Non-TSCA regulated materials, over an area of approximately 0.2 acre with an average depth of 1.1 ft bss.

Deposit 4-3: The maximum reported total PCB concentration in this deposit is 3.7 mg/kg and the maximum reported total PAH concentration is 115 mg/kg. The estimated *in-situ* volume of sediments for disposal in this deposit is 309 cy of Non-TSCA regulated materials, over an area of approximately 0.1 acre with an average depth of 0.46 ft bss.

2.3.1.4 Zone 5

Deposit 5-1 – The maximum reported total PCB concentration in this deposit is 230 mg/kg and the maximum reported total PAH concentration is 469 mg/kg. The estimated in-situ volume of sediments for disposal 9,488 cy, and 242 cy of Non-TSCA and TSCA regulated materials, respectively. The deposit covers an area of approximately 1.4 acres and with an average bottom depth of the deposit of 2.2 ft bss.

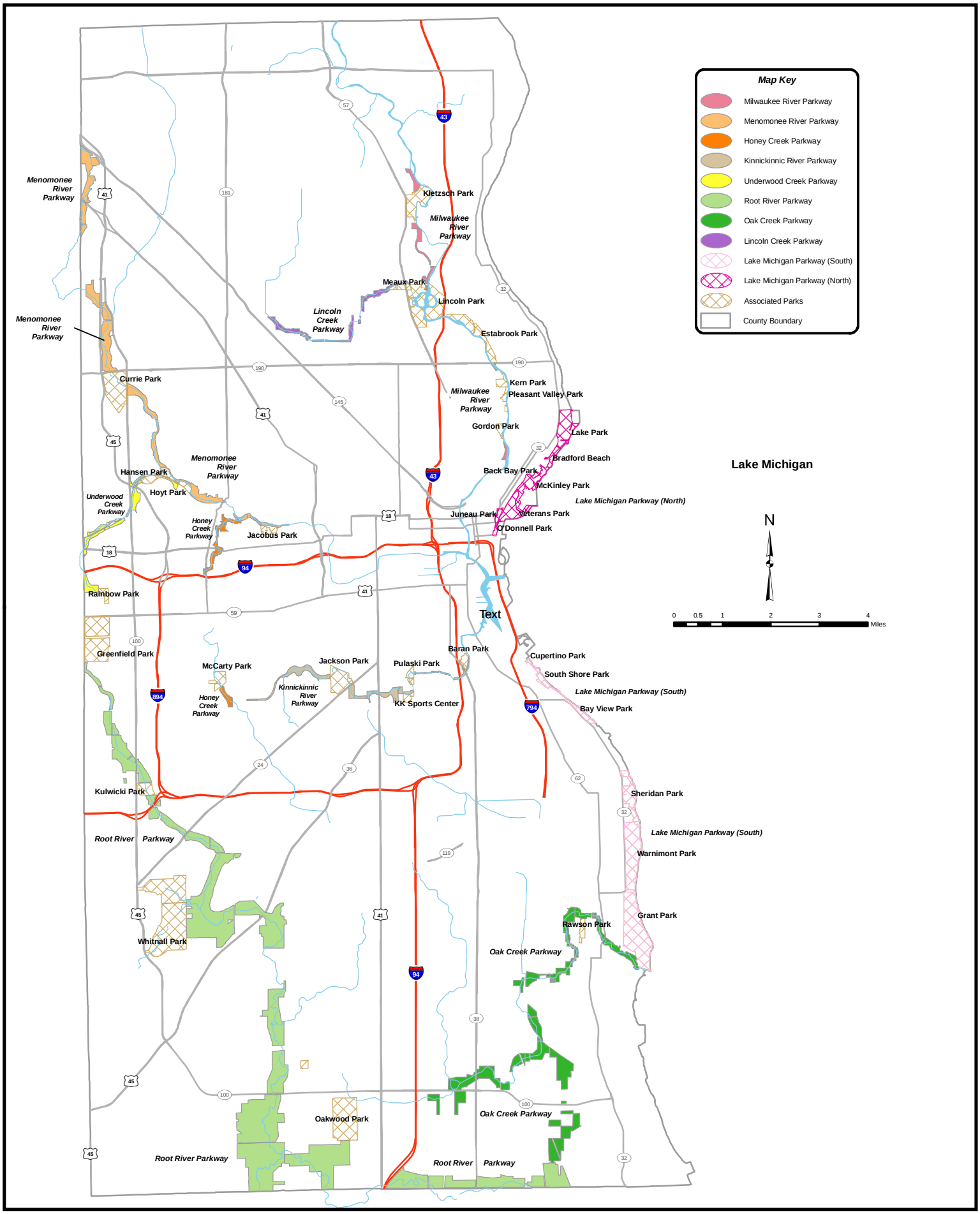
2.3.2 Water

Water requiring treatment will be generated from the following sources:

- Cofferdams: initial surface water, precipitation, in-situ sediment dewatering, storm sewers outfalls
- Hydraulic dredging: slurry water
- Dewatering pad: sediment dewatering, precipitation
- Decontamination pad: decontamination water, precipitation
- Water Treatment pad: precipitation, leaks, and spills.

ATTACHMENT 6:

COUNTY PARKWAYS MAP



Milwaukee County Parkway System

MEAD & HUNT

ATTACHMENT 7:

WETLAND INVENTORY MAP

Estabrook Dam Rehabilitation
NE Quarter, Section 5, T07N-R22E
Cities of Milwaukee and Glendale, Milwaukee County
West Hampton Avenue
West River Woods Parkway
North 1st Street
1
2
3
4
5
6
7
8
Legend
Project Area
Primary Environmental Corridor
Wetland
Plant Community Number
Preliminary Wetland Delineation
by SEWRPC on 11/17/11
N
0
100
200
Feet
Source: SEWRPC
Date of Photography: 2010
CA#406-30

ATTACHMENT 8:

WETLAND RELATED CORRESPONDENCE

December 9, 2011

Mr. Karl D. Stave, P.E.
Milwaukee County Department of Public Works
2711 W. Wells Street
Milwaukee, WI 53208

Re: SEWRPC No. CA-406-30

Dear Mr. Stave:

This will respond to your electronic mail message of October 25, 2011, requesting the Commission staff to conduct a field inspection of the Estabrook Dam rehabilitation site, including lands adjacent to the dam where access roads and stockpile areas are proposed, for the purpose of identifying in the field the boundary of any wetlands within the project area. The project area is located in parts of the Northeast one-quarter of U.S. Public Land Survey Section 5, Township 7 North, Range 22 East, Cities of Glendale and Milwaukee, Milwaukee County, Wisconsin.

Following the receipt of your electronic mail message, the Commission staff contacted you to discuss our field schedule constraints given that the end of the wetland delineation season was fast approaching. The regulatory agencies, namely the U.S. Army Corps of Engineers and the Wisconsin Department of Natural Resources, have set guidelines restricting final wetland determinations to the growing season. The growing season in this region typically extends between early April and early November. Due to the backlog of wetland delineation projects, the Commission staff indicated to you that a wetland delineation on the Estabrook Dam site would not be possible during the 2011 growing season. Instead, it was agreed that a preliminary wetland delineation would be scheduled in mid November after the growing season had ended, and then verified when the growing season begins in the spring of 2012.

Accordingly, Dr. Donald M. Reed, Commission Chief Biologist, conducted a field inspection of the Estabrook Dam rehabilitation site on November 17, 2011. A preliminary identification and staking of the wetland boundaries was completed. It is the Commission staff's expectation that the wetland boundaries will be surveyed and identified on forthcoming design plans attendant to the dam rehabilitation. A list of plant species identified within the subject wetlands is attached hereto as Exhibit A. Please note that the Commission staff will schedule a field inspection in the spring of 2012 after the growing season begins for the purpose of verifying our preliminary wetland delineation.

In addition, please be advised that the wetlands located within the designated Primary Environmental Corridor as shown on the attached map, have been designated as ADID wetlands under the Section 404(b)(1) Guidelines of the Clean Water Act.

Should you have any questions regarding this information, please do not hesitate to call.

Sincerely,

Kenneth R. Yunker, P.E.
Executive Director

KRY/DMR/CJJ/dad
#160145 v1 - ca406-30 2011 visit

Enclosures

cc: Mr. Don Pirrung
Mr. Richard E. Maslowski
Ms. Sharon Robinson
Ms. Jamie Lambert
Mr. Anthony Jernigan

SVY3865
CA406-30

EXHIBIT A

PRELIMINARY VEGETATION SURVEY
ESTABROOK DAM REHABILITATION

Date: November 17, 2011

Observers: Donald M. Reed, Ph.D., Chief Biologist
Christopher J. Jors, Biologist
Kristi Sherfinski, Biologist
Southeastern Wisconsin Regional Planning Commission

Location: Cities of Glendale and Milwaukee in parts of the Northeast one-quarter of U.S. Public Land Survey Section 5, Township 7 North, Range 22 East, Milwaukee County, Wisconsin.

Species List: Plant Community Area No. 1

GRAMINEAE
- Poa pratensis[1]--Kentucky bluegrass
- Eragrostis poaeoides[1]--Low love grass
- Elymus virginicus--Virginia wild rye
- Phalaris arundinacea[1]--Reed canary grass
- Panicum dichotomiflorum--Knee grass

CYPERACEAE
- Carex sp.--Sedge

JUNCACEAE
- Juncus dudleyi--Dudley's rush

IRIDACEAE
- Iris virginica--Virginia blueflag

SALICACEAE
- Populus deltoides--Cottonwood
- Salix (alba?[1])--White willow
- Salix nigra[2]--Black willow
- Salix interior--Sandbar willow

ULMACEAE
- Ulmus americana--American elm

URTICACEAE
- Urtica dioica--Stinging nettle

POLYGONACEAE
- Polygonum pensylvanicum--Pinkweed
- Polygonum punctatum--Smartweed

AMARANTHACEAE
- Amaranthus retroflexus[1]--Redroot pigweed

CRUCIFERAE
- Barbarea vulgaris[1]--Yellow rocket
- Alliaria officinalis[1,2]--Garlic-mustard

SAXIFRAGACEAE
- Ribes americanum--Wild black currant

ROSACEAE
- Geum canadense--White avens
- Rubus occidentalis--Black raspberry
- Rosa multiflora[1]--Multiflora rose
- Crataegus sp.--Hawthorn

CELASTRACEAE
- Euonymus atropurpureus--Burning bush

ACERACEAE
- Acer saccharinum[2]--Silver maple
- Acer negundo[2]--Boxelder

RHAMNACEAE
- Rhamnus cathartica[1,2]--Common buckthorn
- Rhamnus frangula[1]--Glossy buckthorn

VITACEAE
- Vitis riparia--Riverbank grape

LYTHRACEAE
- Lythrum salicaria[1]--Purple loosestrife

UMBELLIFERAE
- Cryptotaenia canadensis--Honewort
- Daucus carota[1]--Queen Anne's lace

CORNACEAE
- Cornus stolonifera--Red-osier dogwood

OLEACEAE
- Fraxinus pennsylvanica--Green ash

CONVOLVULACEAE
- Cuscuta sp.--Dodder

HYDROPHYLLACEAE
- Hydrophyllum virginianum--Virginia waterleaf

LABIATAE
- Glechoma hederacea[1]--Creeping Charlie

SOLANACEAE
- Solanum dulcamara[1]--Deadly nightshade

PLANTAGINACEAE
- Plantago major[1]--Common plantain

CAPRIFOLIACEAE
- Viburnum opulus[1]--European highbush-cranberry
- Lonicera X bella[1]--Hybrid honeysuckle

DIPSACACEAE
- Dipsacus sylvestris[1]--Common teasel

COMPOSITAE
- Rudbeckia laciniata--Green-headed coneflower
- Ambrosia artemisiifolia--Common ragweed
- Xanthium strumarium--Cocklebur
- Artemisia vulgaris[1]--Mugwort
- Artemisia sp.[1]--Wormwood
- Solidago gigantea--Giant goldenrod
- Solidago altissima--Tall goldenrod

COMPOSITAE cont'

Aster lateriflorus--Calico aster
Erigeron strigosus--Daisy fleabane
Conyza canadensis--Horseweed
Eupatorium serotinum[1]--Late boneset
Arctium minus[1]--Common burdock
Cirsium arvense[1]--Canada thistle
Taraxacum officinale[1]--Common dandelion
Lactuca serriola[1]--Prickly wild lettuce

Total number of plant species: 58
Number of alien, or non-native, plant species: 25 (43 percent)

This approximately 0.1-acre plant community area is part of the Milwaukee River floodplain-wetland complex and consists of fresh (wet) meadow and second growth, Southern wet to wet-mesic lowland hardwoods. Disturbances to the plant community area include clearing of vegetation, dumping, the ad hoc establishment of footpaths, past filling, siltation and sedimentation due to stormwater runoff from adjacent lands, and water level changes due to impoundment. While no Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection, Striped shiner (Luxilus chrysocephalus), a State-designated Endangered fish species; and Greater redhorse (Moxostoma valenciennesi), a State-designated Threatened fish species, are known to occur in this reach of the Milwaukee River.

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[1] Alien or non-native plant species
[2] Co-dominant plant species

Plant Community Area No. 2

GRAMINEAE
- Phalaris arundinacea[1]--Reed canary grass

ARACEAE
- Acorus calamus--Sweet flag

LEMNACEAE
- Lemna minor--Lesser duckweed

IRIDACEAE
- Iris virginica--Virginia blueflag

SALICACEAE
- Salix nigra[2]--Black willow

ULMACEAE
- Ulmus americana--American elm

URTICACEAE
- Urtica dioica--Stinging nettle

POLYGONACEAE
- Rumex crispus[1]--Curly dock
- Polygonum lapathifolium--Smartweed
- Polygonum pensylvanicum--Pinkweed
- Polygonum punctatum--Smartweed
- Polygonum persicaria[1]--Lady's thumb

AMARANTHACEAE
- Amaranthus retroflexus[1]--Redroot pigweed

RANUNCULACEAE
- Ranunculus acris[1]--Tall buttercup

CRUCIFERAE
- Brassica sp.[1]--Mustard
- Lepidium campestre[1]--Field-cress
- Alliaria officinalis[1]--Garlic-mustard

ROSACEAE
- Potentilla recta[1]--Sulfur cinquefoil

FABACEAE
- Trifolium repens[1]--White clover

CELASTRACEAE
- Celastrus scandens--Bittersweet

ACERACEAE
- Acer saccharinum[2]--Silver maple
- Acer negundo--Boxelder

RHAMNACEAE
- Rhamnus cathartica[1,2]--Common buckthorn
- Rhamnus frangula[1]--Glossy buckthorn

VITACEAE
- Vitis riparia--Riverbank grape

LYTHRACEAE
- Lythrum salicaria[1]--Purple loosestrife

ONAGRACEAE
- *Epilobium coloratum*--Willow-herb
- *Oenothera biennis*--Evening-primrose

CORNACEAE
- *Cornus stolonifera*--Red-osier dogwood

OLEACEAE
- *Fraxinus pennsylvanica*--Green ash

ASCLEPIADACEAE
- *Asclepias incarnata*--Marsh milkweed

CONVOLVULACEAE
- *Cuscuta* sp.--Dodder

VERBENACEAE
- *Verbena urticifolia*--White vervain
- *Verbena hastata*--Blue vervain

LABIATAE
- *Mentha arvensis*--Wild mint

SOLANACEAE
- *Solanum dulcamara*[1]--Deadly nightshade

CAPRIFOLIACEAE
- *Viburnum opulus*[1]--European highbush-cranberry
- *Lonicera* X *bella*[1]--Hybrid honeysuckle

DIPSACACEAE
- *Dipsacus sylvestris*[1]--Common teasel

COMPOSITAE
- *Bidens* sp.--Beggars-ticks
- *Ambrosia trifida*--Giant ragweed
- *Ambrosia artemisiifolia*--Common ragweed
- *Xanthium strumarium*--Cocklebur
- *Artemisia vulgaris*[1]--Mugwort
- *Erechtites hieracifolia*--Pilewort
- *Solidago altissima*--Tall goldenrod
- *Aster lateriflorus*--Calico aster
- *Aster simplex*--Marsh aster
- *Conyza canadensis*--Horseweed
- *Vernonia fasciculata*--Common ironweed
- *Arctium minus*[1]--Common burdock
- *Cirsium arvense*[1]--Canada thistle
- *Sonchus arvensis*[1]--Sow thistle

Total number of plant species: 53
Number of alien, or non-native, plant species: 21 (40 percent)

This approximately 0.2-acre plant community area is part of the Milwaukee River floodplain-wetland complex and consists of fresh (wet) meadow and second growth, Southern wet to wet-mesic lowland hardwoods. Disturbances to the plant community area include dumping, past filling, siltation and sedimentation due to stormwater runoff from adjacent lands, and water level changes due to impoundment. While no Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection, Striped shiner (Luxilus chrysocephalus), a State-designated Endangered fish species; and Greater redhorse (Moxostoma valenciennesi), a State-designated Threatened fish species, are known to occur in this reach of the Milwaukee River.

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[1] Alien or non-native plant species
[2] Co-dominant plant species

Plant Community Area No. 3

GRAMINEAE

Poa compressa[1]--Canada bluegrass
Poa pratensis[1]--Kentucky bluegrass
Elymus virginicus--Virginia wild rye
Panicum dichotomiflorum--Knee grass
Echinochloa crusgalli[1]--Barnyard grass

CYPERACEAE

Carex sp.--Sedge

LEMNACEAE

Lemna minor--Lesser duckweed

LILIACEAE

Hemerocallis fulva[1]--Day-lily

IRIDACEAE

Iris virginica--Virginia blueflag

SALICACEAE

Populus deltoides--Cottonwood
Salix nigra[2]--Black willow
Salix interior--Sandbar willow

URTICACEAE

Urtica dioica--Stinging nettle
Boehmeria cylindrica--False nettle

POLYGONACEAE

Rumex crispus[1]--Curly dock
Polygonum pensylvanicum--Pinkweed
Polygonum punctatum--Smartweed

AMARANTHACEAE

Amaranthus retroflexus[1]--Redroot pigweed

RANUNCULACEAE

Ranunculus sceleratus--Cursed crowfoot

CRUCIFERAE

Alliaria officinalis[1]--Garlic-mustard

CRASSULACEAE

Penthorum sedoides--Ditch stonecrop

ROSACEAE

Geum canadense--White avens

ACERACEAE

Acer saccharinum[2]--Silver maple
Acer negundo--Boxelder

BALSAMINACEAE

Impatiens capensis--Jewelweed

RHAMNACEAE

Rhamnus cathartica[1,2]--Common buckthorn
Rhamnus frangula[1]--Glossy buckthorn

VITACEAE

Vitis riparia--Riverbank grape

LYTHRACEAE
Lythrum salicaria[1]--Purple loosestrife

ONAGRACEAE
Epilobium coloratum--Willow-herb

CORNACEAE
Cornus amomum--Silky dogwood
Cornus stolonifera--Red-osier dogwood
Cornus racemosa--Grey dogwood

PRIMULACEAE
Lysimachia nummularia[1]--Moneywort

OLEACEAE
Fraxinus pennsylvanica--Green ash

ASCLEPIADACEAE
Asclepias incarnata--Marsh milkweed

SOLANACEAE
Solanum dulcamara[1]--Deadly nightshade

CAPRIFOLIACEAE
Viburnum opulus[1]--European highbush-cranberry
Lonicera X bella[1]--Hybrid honeysuckle

COMPOSITAE
Bidens sp.--Beggars-ticks
Ambrosia artemisiifolia--Common ragweed
Xanthium strumarium--Cocklebur
Artemisia vulgaris[1]--Mugwort
Solidago gigantea--Giant goldenrod
Aster pilosus--Frost aster
Aster lateriflorus--Calico aster
Conyza canadensis--Horseweed
Vernonia fasciculata--Common ironweed

Total number of plant species: 48
Number of alien, or non-native, plant species: 15 (31 percent)

This approximately 0.4-acre plant community area is part of the Milwaukee River floodplain-wetland complex and consists of second growth, Southern wet to wet-mesic lowland hardwoods. Disturbances to the plant community area include clearing of vegetation, dumping, the ad hoc establishment of footpaths, past filling, siltation and sedimentation due to stormwater runoff from adjacent lands, and water level changes due to impoundment. While no Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection, Striped shiner (Luxilus chrysocephalus), a State-designated Endangered fish species; and Greater redhorse (Moxostoma valenciennesi), a State-designated Threatened fish species, are known to occur in this reach of the Milwaukee River.

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[1] Alien or non-native plant species
[2] Co-dominant plant species

Plant Community Area No. 4

GRAMINEAE
Elymus virginicus--Virginia wild rye

CYPERACEAE
Carex sp.--Sedge

SALICACEAE
Populus deltoides[1]--Cottonwood

POLYGONACEAE
Polygonum persicaria[2]--Lady's thumb

CRUCIFERAE
Alliaria officinalis[2]--Garlic-mustard

SAXIFRAGACEAE
Ribes americanum--Wild black currant

ACERACEAE
Acer negundo--Boxelder

RHAMNACEAE
Rhamnus cathartica[1,2]--Common buckthorn

VITACEAE
Vitis riparia--Riverbank grape

CORNACEAE
Cornus racemosa--Grey dogwood

OLEACEAE
Fraxinus pennsylvanica--Green ash

CAPRIFOLIACEAE
Viburnum opulus[2]--European highbush-cranberry

COMPOSITAE
Aster lateriflorus--Calico aster

Total number of plant species: 13
Number of alien, or non-native, plant species: 4 (31 percent)

This approximately 0.3-acre wetland plant community area consists of an ephemeral pond with second growth, Southern wet to wet-mesic lowland hardwoods. Disturbances to the plant community area include dumping, the ad hoc establishment of footpaths, past filling, and siltation and sedimentation due to stormwater runoff from adjacent lands. No Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection.

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[1] Co-dominant plant species
[2] Alien or non-native plant species

Plant Community Area No. 5

GRAMINEAE
- Poa pratensis[1]--Kentucky bluegrass
- Elymus virginicus--Virginia wild rye
- Phalaris arundinacea[1,2]--Reed canary grass

CYPERACEAE
- Scirpus atrovirens--Green bulrush
- Carex sp.--Sedge

JUNCACEAE
- Juncus tenuis--Path rush

URTICACEAE
- Urtica dioica--Stinging nettle

CRUCIFERAE
- Alliaria officinalis[1]--Garlic-mustard

ROSACEAE
- Geum canadense--White avens

ACERACEAE
- Acer negundo--Boxelder

BALSAMINACEAE
- Impatiens capensis--Jewelweed

RHAMNACEAE
- Rhamnus cathartica[1]--Common buckthorn

ONAGRACEAE
- Epilobium coloratum--Willow-herb

CORNACEAE
- Cornus stolonifera--Red-osier dogwood

OLEACEAE
- Fraxinus pennsylvanica--Green ash

VERBENACEAE
- Verbena urticifolia--White vervain

LABIATAE
- Glechoma hederacea[1]--Creeping Charlie

SOLANACEAE
- Solanum dulcamara[1]--Deadly nightshade

CAPRIFOLIACEAE
- Lonicera X bella[1]--Hybrid honeysuckle

COMPOSITAE
- Solidago gigantea--Giant goldenrod
- Solidago graminifolia--Grassleaf goldenrod
- Aster pilosus--Frost aster
- Aster lateriflorus--Calico aster
- Cirsium arvense[1]--Canada thistle

Total number of plant species: 24
Number of alien, or non-native, plant species: 8 (33 percent)

This approximately 0.1-acre wetland plant community area consists of an ephemeral pond with fresh (wet) meadow. Disturbances to the plant community area include the ad hoc establishment of foot paths and tire ruts, past filling, siltation and sedimentation due to stormwater runoff from adjacent lands, and water level changes due to impoundment. No Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection.

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[1] Alien or non-native plant species
[2] Dominant plant species

Plant Community Area No. 6

TYPHACEAE
- Typha latifolia--Broad-leaved cat-tail
- Typha angustifolia[1]--Narrow-leaved cat-tail

GRAMINEAE
- Poa pratensis[2]--Kentucky bluegrass
- Phragmites australis--Tall reed grass
- Agrostis stolonifera[1,2]--Redtop grass
- Phalaris arundinacea[1,2]--Reed canary grass

JUNCACEAE
- Juncus dudleyi--Dudley's rush

SALICACEAE
- Salix nigra--Black willow
- Salix interior--Sandbar willow

POLYGONACEAE
- Rumex crispus[2]--Curly dock

CRUCIFERAE
- Barbarea vulgaris[2]--Yellow rocket
- Alliaria officinalis[2]--Garlic-mustard

ROSACEAE
- Potentilla recta[2]--Sulfur cinquefoil

ACERACEAE
- Acer negundo--Boxelder

RHAMNACEAE
- Rhamnus cathartica[2]--Common buckthorn

ONAGRACEAE
- Epilobium coloratum--Willow-herb

UMBELLIFERAE
- Daucus carota[2]--Queen Anne's lace

OLEACEAE
- Fraxinus pennsylvanica--Green ash

PLANTAGINACEAE
- Plantago major[2]--Common plantain

CAPRIFOLIACEAE
- Lonicera X bella[2]--Hybrid honeysuckle

COMPOSITAE
- Bidens sp.--Beggars-ticks
- Solidago gigantea--Giant goldenrod
- Solidago altissima--Tall goldenrod
- Solidago graminifolia--Grassleaf goldenrod
- Aster pilosus--Frost aster
- Aster lateriflorus--Calico aster
- Cirsium arvense[2]--Canada thistle
- Taraxacum officinale[2]--Common dandelion

Total number of plant species: 28
Number of alien, or non-native, plant species: 13 (46 percent)

This approximately 0.1-acre wetland plant community area consists of shallow marsh and fresh (wet) meadow. Disturbances to the plant community area include dumping, filling, grading, and siltation and sedimentation due to stormwater runoff from adjacent lands. No Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection.

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[1] Co-dominant plant species
[2] Alien or non-native plant species

Plant Community Area No. 7

TYPHACEAE
- Typha angustifolia[1]--Narrow-leaved cat-tail

GRAMINEAE
- Poa pratensis[2]--Kentucky bluegrass
- Phragmites australis[1]--Tall reed grass
- Agrostis stolonifera[2]--Redtop grass
- Phalaris arundinacea[1,2]--Reed canary grass
- Echinochloa crusgalli[2]--Barnyard grass

CYPERACEAE
- Eleocharis erythropoda--Red-root spike-rush
- Scirpus validus--Soft-stemmed bulrush

POLYGONACEAE
- Rumex crispus[2]--Curly dock

COMPOSITAE
- Solidago gigantea--Giant goldenrod
- Solidago graminifolia--Grassleaf goldenrod
- Aster pilosus--Frost aster
- Aster lateriflorus--Calico aster

Total number of plant species: 13
Number of alien, or non-native, plant species: 5 (38 percent)

This approximately 0.1-acre wetland plant community area consists of shallow marsh and fresh (wet) meadow. Disturbances to the plant community area include dumping, filling, grading, side casting of dredge spoil material, and siltation and sedimentation due to stormwater runoff from adjacent lands. No Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection.

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[1] Co-dominant plant species
[2] Alien or non-native plant species

Plant Community Area No. 8

GRAMINEAE

Poa compressa[1,2]--Canada bluegrass
Poa pratensis[1]--Kentucky bluegrass
Phragmites australis--Tall reed grass
Agropyron repens[1]--Quack grass
Agrostis stolonifera[1]--Redtop grass
Phalaris arundinacea[1]--Reed canary grass
Panicum capillare--Witch grass

JUNCACEAE

Juncus dudleyi[2]--Dudley's rush
Juncus torreyi--Torrey's rush

ONAGRACEAE

Epilobium coloratum--Willow-herb

COMPOSITAE

Solidago graminifolia--Grassleaf goldenrod
Aster pilosus--Frost aster
Aster lateriflorus--Calico aster

Total number of plant species: 13
Number of alien, or non-native, plant species: 5 (38 percent)

This approximately 0.1-acre wetland plant community area consists of fresh (wet) meadow. Disturbances to the plant community area include dumping, filling, grading, side casting of dredge spoil material, and siltation and sedimentation due to stormwater runoff from adjacent lands. No Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection.

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[1] Alien or non-native plant species
[2] Co-dominant plant species

ATTACHMENT 9:

COST ESTIMATE FOR ALTERNATIVES

ATTACHMENT 9
COST ESTIMATES FOR ALTERNATIVES

Present Worth Analysis

Prepared by Don Pirrung, AECOM

A. Estimated Capital Cost:

Alternative 1A:	$2,518,000
Alternative 2:	$1,674,000
Alternative 4:	$2,419,000

B. Estimated Annual O&M Cost:

Alternative 1A:	$160,000
Alternative 2:	$0
Alternative 4:	$55,000

C. Present Worth of O&M Costs:

Interest Rate:	2%
Time Period:	20 Years
Present Worth Factor:	16.351
Present Worth:	Factor x Annual O&M Cost

Alternative 1A: 16.351 x $160,000	Present Worth = $2,616,000
Alternative 2:	Present Worth = 0
Alternative 4: 16.351 x $55,000	Present Worth = $899,000

D. Total Present Worth:

Total Present Worth = Capital Cost + Present Worth O&M Costs

1. Alternative 1A: $2,518,000 + $2,616,000	Total Present Worth = $5,134,000
2. Alternative 2: $1,674,000 + 0	Total Present Worth = $1,674,000
3. Alternative 4: $2,419,000 + $899,000	Total Present Worth = $3,318,000

ATTACHMENT 9
COST ESTIMATES FOR ALTERNATIVES

A. Estimated Annual Operation and Maintenance Costs:

1. Alternative 1A:

	Annual O&M Cost
Gate Labor and River Monitoring	$100,000
Debris Removed	40,000
Gate Maintenance	20,000
Annual O&M Cost	$160,000

2. Alternative 2:

Annual O&M Cost is zero.

3. Alternative 4:

	Annual O&M Cost
Debris Maintenance	$40,000
Rock Ramp Alternatives	15,000
Annual O&M Cost	$55,000

ATTACHMENT 10:

OPERATION PLAN INFORMATION

ATTACHMENT 10
OPERATION PLAN

Prepared by Don Pirrung, AECOM

I. Alternative 1A – Rehabilitate the Dam and Add Fish Passage

A. Operation Plan

Two periods are proposed for operation of the dam:

1. Summer Period From May 15 to September 15

Dates: Start refilling pool no earlier than May 15 and have drawdown completed by September 15.

Actions: Gates are usually closed. Impoundment is in place. The flashboards are removed to be replaced with the fish passage section. County will have a gate operator on staff to monitor river levels, weather conditions, and gate positions. If a storm or high river levels are observed, the dam operator will open the gates as appropriate to pass the river flow to maintain a normal pool level. WDNR criteria limits drawdown to 6 inches per day or less.

Estabrook Dam is required to pass at all times a minimum flow downstream at least 25 percent of the natural low flow, which has been administratively set at Q710, S.Statutes 31.34, Wis. Stats.

The County proposes a normal water level in the pool based on the fixed crest spillway elevation. The gates will be operated as needed to establish the normal water level. If rising water levels occur above the normal, the County has the option to open gates to adjust pool levels accordingly.

Refer to SEWRPC's Technical Memo dated April 25, 2014, for additional information on river flows, flood frequency, and impoundment levels (Attachment 3). A rating curve is provided for the dam and is based on the 10 gates open. After the high flows have passed, the dam operator will gradually close the 10 gates to maintain the impoundment.

When the gates are closed, the river will flow over the fixed crest spillway and through the fish passage. The key dam elevations are as follows:

Fixed Crest Spillway	Elevation 616
Bottom of Flashboards	Elevation 613
Bottom of Slab Gated Section	Elevation 609
Top of Gate Piers	Elevation 618
Top of Flashboards	Elevation 616

The fish passage will consist of a series of riffles and pools. At the dam structure, the fish passage elevation will be Elevation 613 at the low point and Elevation 616 at the ends based on a cross section view at the dam and perpendicular to the river flow. The cross section of the fish passage is similar to a semi-circle with the low point in the middle, and the high point on both ends. The preliminary concept is to locate the fish passage at the existing flashboards. The flashboards may or may not be deleted during the design phase depending on the final layout.

2. Balance of the Year Period From September 15 to May 15

Actions: Gates are open to avoid potential of ice damage in winter. Timing of the gates being opened is to allow the aquatic life to acclimate to the lower river levels before winter arrives. The drawdown will follow WDNR criteria of no more than 6 inches per day drawdown.

The closing of the gates in mid-May will depend on river flows and weather conditions. The time of the gates closing will also take into account the wildlife so as not to interfere with nesting ducks and birds when the impoundment is raised. If this is an issue, the closing of the gates could be postponed as appropriate. The impoundment will be gradually filled to minimize the environmental impact.

B. River Levels

Refer to the SEWRPC Technical Memo dated April 25, 2014, for river levels for this alternative (Attachment 3). During flood events, the 10 gates are assumed to be open.

II. Alternative 2 – Abandon and Remove the Dam

No operation plan is necessary because the dam is removed.

III. Alternative 4 – Gated Spillway Removed, Serpentine Overflow Spillway Lowered, and a 6.3-Foot High Rock Ramp Constructed

The rock ramp will replace the gated section of the dam. The rock ramp will have a crest elevation of 615.4 and an overflow length of 200 feet perpendicular to the flow, a three horizontal to one vertical slope on its upstream face, and a hemi-circular weir configuration on the downstream face with a slope ranging from 5.5 percent at the center of the weir to 3.3 percent at the banks to provide a slope gradual enough to enable fish passage (April 25, 2014 SEWRPC Technical Memo).

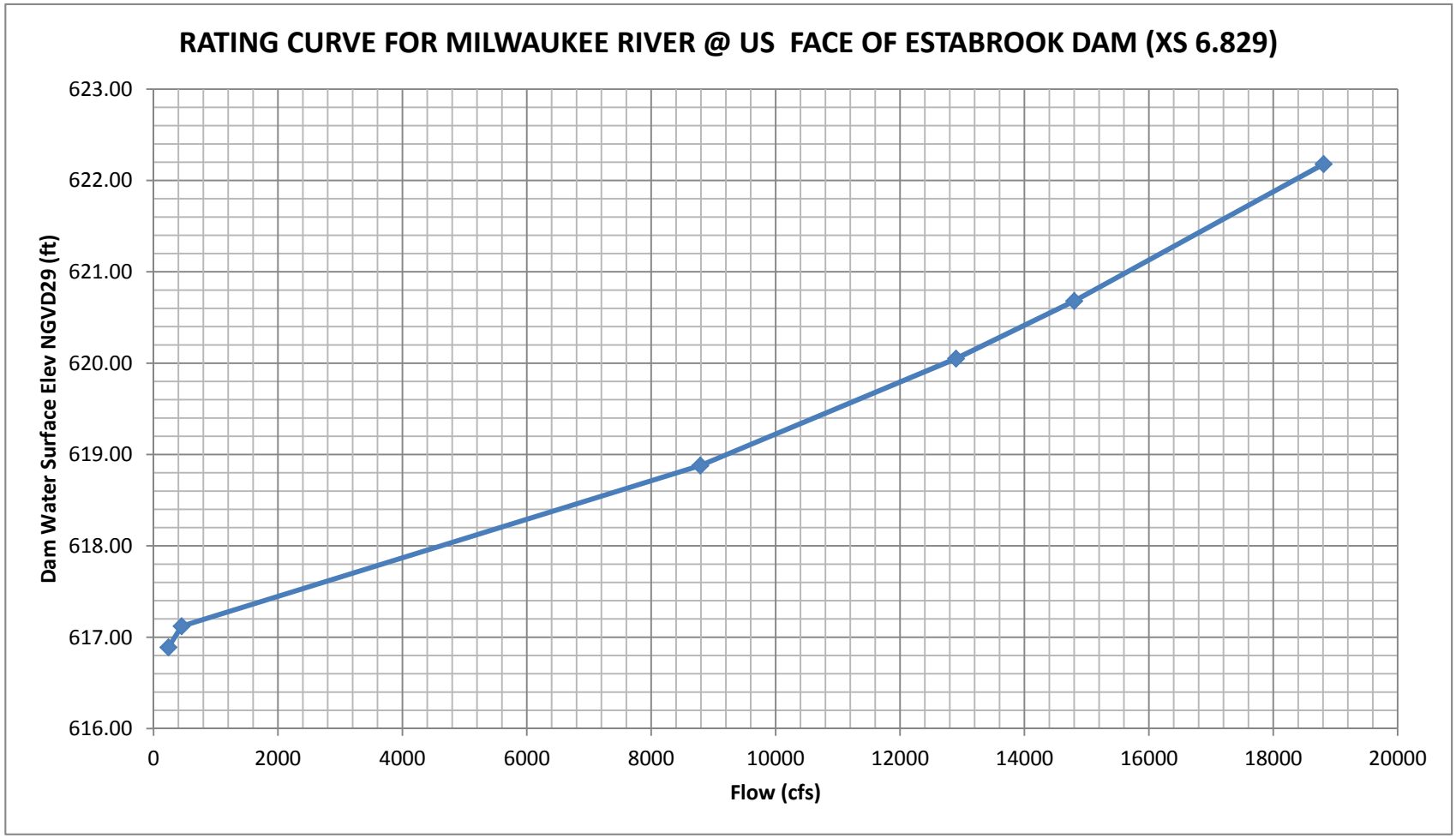
The existing flashboards may or may not be left in place. The bottom of the flashboards is Elevation 613 and the top of the flashboards would be revised from Elevation 616 to Elevation 615.4. The flashboards would allow the County the option to lower the pool an additional 2.4 feet for maintenance, for example.

A. Operation Plan

The operation plan is to maintain a pool year-round. The flashboards allow the county to lower the pool by 2.4 feet to perform maintenance on a short-term basis. Water levels would be adjusted to comply with WDNR's criteria to limit drawdown to no more than 6 inches per day.

B. River Levels

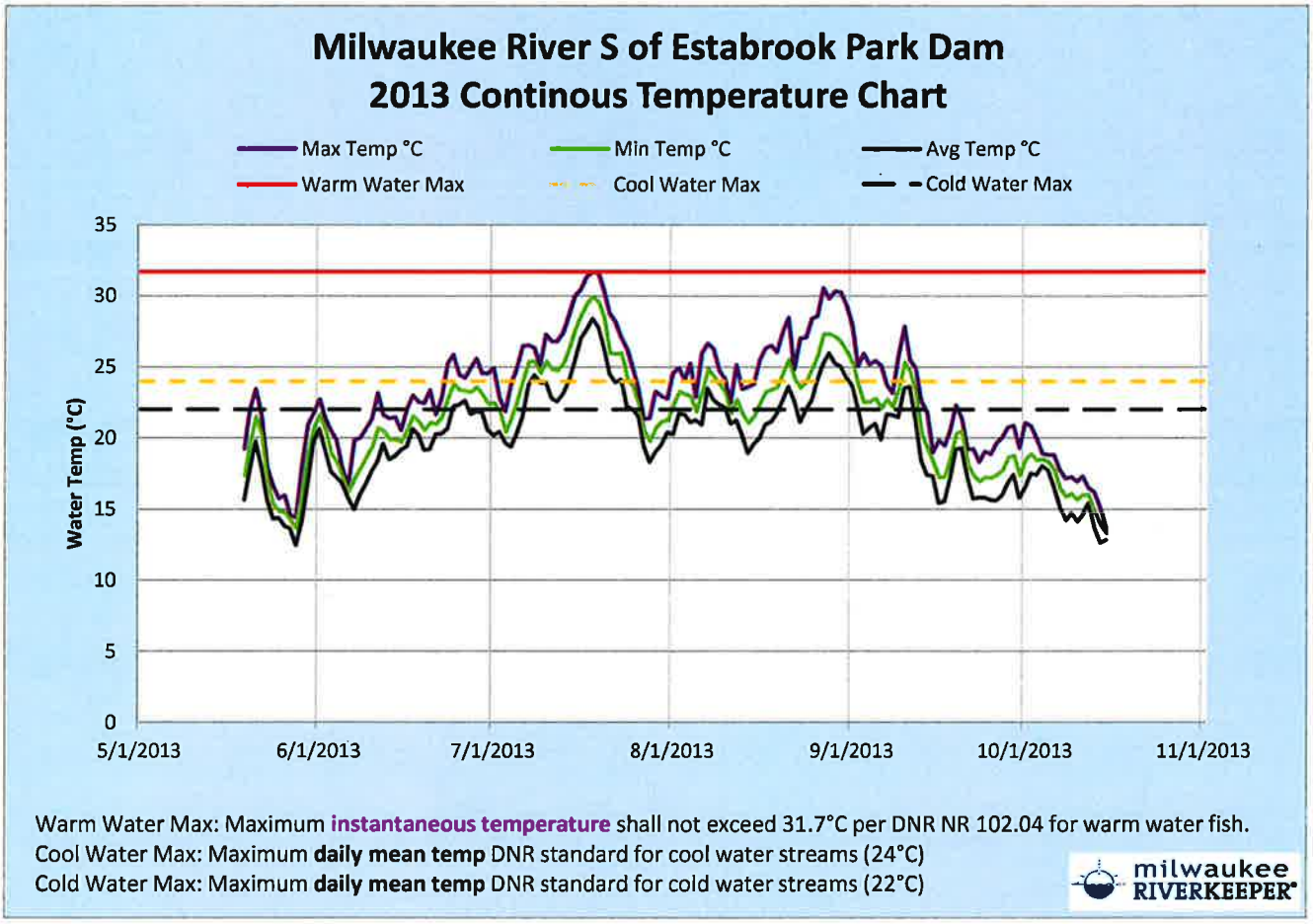
Refer to the SEWRPC Technical Memo dated April 25, 2014, for river levels for this alternative (Attachment 3).



Annual Probability of Occurrence	Dam Rehab W.S. Elev NGVD29 (ft)	Flow (cfs)
Median Flow	616.89	240
Mean Flow	617.12	451
10-percent-annual-probability	618.88	8790
2-percent-annual-probability	620.05	12900
1-percent-annual-probability	620.68	14800
0.2-percent-annual-probability	622.18	18810

ATTACHMENT 11:

MILWAUKEE RIVER WATER QUALITY INFORMATION



Warm Water Max: Maximum **instantaneous temperature** shall not exceed 31.7°C per DNR NR 102.04 for warm water fish.
Cool Water Max: Maximum **daily mean temp** DNR standard for cool water streams (24°C)
Cold Water Max: Maximum **daily mean temp** DNR standard for cold water streams (22°C)

milwaukee RIVERKEEPER®

Milwaukee River at South of Estabrook Park Dam, 10012616
Milwaukee River
Latitude: 43.10139, Longitude: -87.91028

Cheryl Nenn, Milwaukee Riverkeeper
William Kalmer, Milwaukee Riverkeeper
Janet Amundson, Milwaukee Riverkeeper
Jason Schroeder, Milwaukee Riverkeeper
Joe Rath, Milwaukee Riverkeeper
John Schafer, Milwaukee Riverkeeper

Reporting Period: 01/01/2006 to 01/01/2013

Understanding the Level 2 Stream Monitoring Data Report

This report provides summary information for data gathered by volunteers participating in Level 2 monitoring of the Citizen Based Stream Monitoring Program. The report includes data for Milwaukee River - South Of Estabrook Park Dam which is referred to as Station ID 10012616, and includes all data entered into the WDNR database (SWIMS) under the CBSM program. This report includes any data collected between the dates of 01/01/2006 and 01/01/2013.

This report highlights monthly recorded values for dissolved oxygen (DO), pH, transparency, and temperature. Data are summarized to report minimum, maximum, mean, and median values for the period the site has been monitored. We also report minimum, maximum, and mean daily temperatures calculated from temperature data originally recorded hourly by continuous data loggers.

Helpful Terms

In this report, for each parameter monitored, some statistical information is provided to help explain what has been found. You may want to refer back to this section as you read through the report to help you understand what is being presented.

Mean: This is the average score in a dataset, or a typical expected value.

Median: This is the middle value in a data set of ranked values. When few data points have been collected, the median is considered a better estimate than the mean for a typical expected value.

For instance, assume the following readings (in mg/L) were found for five D.O. assessments: 10.5, 10.0, 12.5, 14.5, and 8.0. Ranking them in order from lowest to highest, we get: 8.0, 10.0, 10.5, 12.5, and 14.5. The value in the middle of that ranked data set is 10.5.

Thus, 10.5 mg/L is the median. (If you have an even number of data points in the data set, the median is the mean of the middle two numbers in the ranked list.)

If we determined the mean for the same data set, very high and/or low values might affect it. For this example the mean is determined in the following way:
8.0 + 10.0 + 10.5 + 12.5 + 14.5 = 55.5

55.5/ 5 = 11.1 mg/L Thus, 11.1 mg/L is the mean.

Although there isn't a large difference in the median (10.5 mg/L) and the mean (11.1 mg/L) in this example, in a small data set where one or two values are very different than most of the other values, using the median instead of the mean should provide a better estimate of the expected value. In a large data set, the mean and median are expected to be the same or nearly the same.

Dissolved Oxygen

Dissolved oxygen (DO) is a gas found in water that is critical for sustaining aquatic life (just as oxygen is required for us to survive). Dissolved oxygen enters water through mixing with air in turbulent waters or through photosynthetic processes by aquatic plants and algae. Dissolved oxygen leaves water through decomposition of organic materials that have entered the system from point or non-point source inputs (such as runoff from a yard or field), plant respiration and oxygen demand by organisms such as macroinvertebrates and fish. DO varies over a 24-hour period, with lowest levels expected just before sunrise, when plants and animals have been respiring, but photosynthesis has not been occurring. This flux over a 24-hour period is called diurnal variation. Large fluctuations in diurnal DO levels (e.g., 8-10 mg/L and supersaturated conditions at times) generally indicate increased photosynthesis and respiration due to elevated levels of plant and/or algal growth. Streams having levels of dissolved oxygen at greater than 100% saturation (i.e. supersaturation) do so during the day when the rate of oxygen production via photosynthesis exceeds the rate of diffusion of dissolved oxygen from water to air. Levels of DO saturation typically range from 80-120%, although highly productive streams can experience levels upwards of 140-150% during the middle of the day.

Dissolved oxygen levels are important in determining various communities of aquatic life. DO levels below 2 mg/L generally do not support aquatic life, and most fish and many insects cannot tolerate levels below 4-5 mg/L for a sustained period of time. DO levels above 7 mg/L are amenable to coldwater species such as trout. Different species of fish will migrate within a stream to seek suitable dissolved oxygen conditions.

There are several categories by which waters of Wisconsin are classified by state law. These include (but aren't limited to) trout waters, other fish or aquatic life-designated waters, limited forage fish communities, and limited aquatic life communities. There are defined DO minimums set for each type of classification. The minimums are designed to allow the aquatic organisms defined in the classification to survive in those waters. Since different organisms have different DO requirements, the DO minimums vary based on stream classification. The table below shows the minimum DO allowed in waters classified in certain ways by Wisconsin state law.

Stream classification	Minimum dissolved oxygen allowed
Trout waters	6 mg/l (out of spawning season) and 7 mg/L (during spring/fall spawning season)
Fish or aquatic life-designated waters	5 mg/L
Limited forage fish waters	3 mg/L
Limited aquatic life waters	1 mg/L

Is My Site on a Warm Water or Cold Water Stream?

You can identify if your stream is designated as a trout stream by opening this file from the Wisconsin Department of Natural Resources (WDNR) website (available at: http://dnr.wi.gov/fish/species/trout/wisconsintroutstreams.pdf).

Lists of waters that are designated as limited forage fish or limited aquatic life communities are included in Chapter NR 104 Uses and Designated Standards (available at: http://dnr.wi.gov/org/water/wm/wqs/codes/nr104.pdf) and in Chapter NR 102 Water Quality

Standards for Wisconsin Surface Waters (available at: http://www.legis.state.wi.us/rsb/code/nr/nr102.pdf).

You can also create your own maps of your monitoring station and river using the ***Surface Water Data Viewer***. More information is located at: http://dnr.wi.gov/org/water/data_viewer.htm

Dissolved Oxygen and Temperature -- a Special Link

Since DO and temperature are intimately related (e.g., water with a higher temperature can hold less oxygen than water with a lower temperature, so the general concentration of the two parameters in water generally mimic one another), it's important to consider the two together.

Dissolved oxygen content in streams is linked with temperature requirements of aquatic life. Colder water generally holds more oxygen and warmer water holds less oxygen.

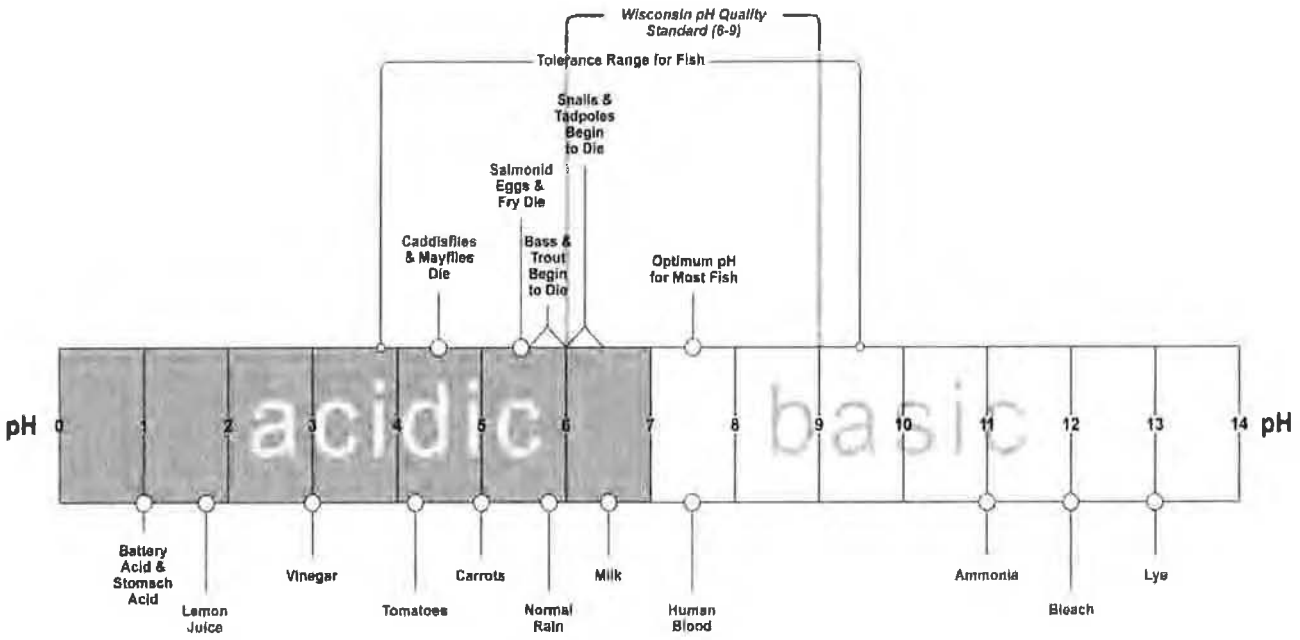
Very High DO	Moderately high DO	Low DO
	ANIMALS	
Brook or rainbow trout Mottled sculpin	Brown trout Redbelly dace Bass	Carp Green sunfish Fathead minnow
	PLANTS	
Much plant variety	Moderate plant variety	Little plant variety

Source: Dane County Water Watchers

pH

pH is a measure of the hydrogen-ion activity of water and is expressed as a logarithmic unit that ranges from 1 to 14 Standard Units. That means for every 1 pH unit change, there is a tenfold change in the activity of hydrogen ions. Waters with high hydrogen-ion activity have low pH and are considered acidic. The presence of dissolved carbon dioxide, carbonic acid, bicarbonate ions and carbonate ions strongly influence the pH of freshwater systems. Much of Wisconsin has bedrock that is composed of limestone and other rock that is rich in bicarbonate and carbonate. These types of rock can minimize impacts of acid rain or other acidic inputs to the water. In northern Wisconsin, bedrock is composed of granite which is not rich in bicarbonates and carbonates, and thus those rocks are less able to buffer or offset the impacts of acid rain or other acid inputs to the waters. In poorly buffered waters, pH may change a lot in the course of a 24-hour period based on photosynthesis (which uses carbon dioxide) and respiration (which releases carbon dioxide) by aquatic plants and algae. In other parts of the state which are well buffered, pH may not change much over a 24-hour period. Dissolved metal ions tend to increase with increased acidity and as a result, pH is an important factor influencing toxicity of metals. pH also affects the concentration of un-ionized ammonia, a form of nitrogen that is extremely toxic to aquatic life. Wisconsin has adopted a pH standard that incorporates a range from 6 to 9 units to protect and support aquatic life use.

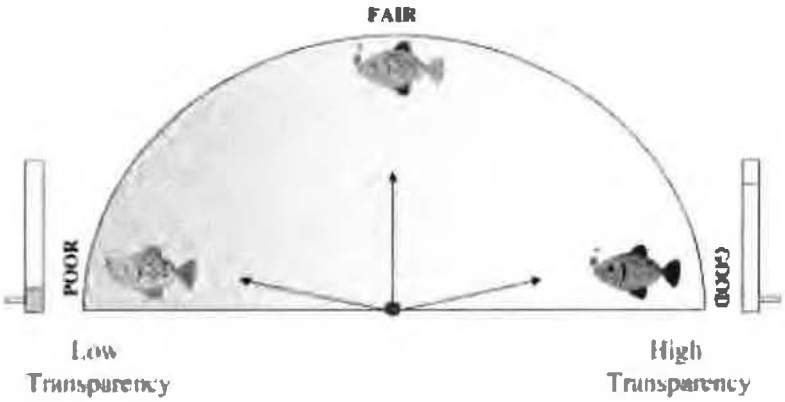
This figure shows the WI pH quality standard along with some reference points for aquatic organisms and everyday substances. Is your site's pH fairly static or does it vary over time?



Transparency

Stream water transparency is a measure of water clarity made with a transparency tube. The transparency tubes used by Level 2 Stream Monitors are 120 centimeters (cm) long and have a black and white disc at the bottom. Transparency is measured by determining the maximum depth of water in the tube that still allows the black and white disc to be visually detected from above. Transparency is measured in centimeters. Since the maximum tube depth is 120 cm, when the disc is visible with a full tube of water, the exact transparency is not measurable, but is greater than or equal to 120 cm. High transparencies indicate good water quality (Figure below).

Low Water Transparency Influences Fish Health



Transparency measurements are affected by both the presence of suspended particles, such as soil particles and microscopic organisms, and by water color, which is caused by certain dissolved substances. Transparency is an easily made measurement that can be correlated with turbidity, although the two measurements are not directly comparable.

Turbidity is a somewhat more difficult measurement that is often made in a lab. Turbidity has been a commonly used measurement in water quality studies and its relationship to the health of fish and other aquatic life has been established.

Turbidity is a measure of water clarity or "cloudiness" caused primarily by the presence of suspended particulate matter. It is basically an optical measurement of the amount of light scattering caused by fine organic or inorganic particles and to a lesser extent some dissolved substances in the water. These small particles of soil, algae or other materials generally range in size from microscopic to about one millimeter (about the thickness of a pencil lead). More suspended particles cause greater turbidity resulting in less light penetration through the water. This hinders photosynthesis, necessary for healthy aquatic plant growth and production of dissolved oxygen. With increased turbidity, water also becomes warmer because the suspended particles absorb heat. Since warmer water holds less dissolved oxygen than cold water, oxygen levels are also affected by turbidity. Extremely high levels of turbidity may also impair aquatic organism survival, for instance, by blocking gas exchange in membranes used for respiration, interfering with filter feeding mussels, or by restricting predation by sight-feeding fish. In general, turbidity increases with increasing river flow due to erosional processes and bad sediment resuspension. Sources of turbidity include:

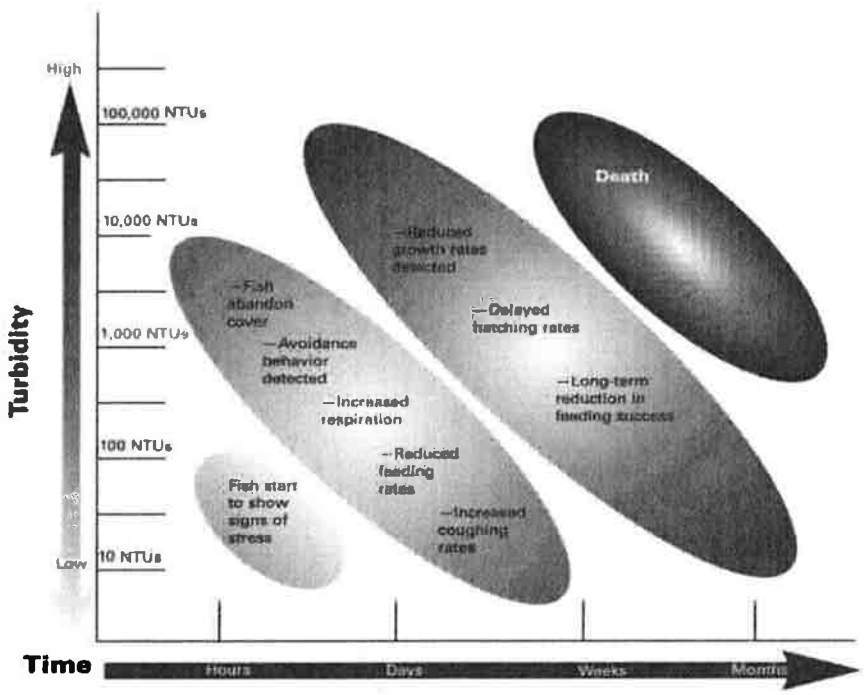
- erosion from fields, construction sites
- urban runoff from rainstorms and melting snow
- eroding stream banks
- decaying plant matter
- large number of bottom feeders (such as carp) which stir up bottom sediments
- algae
- wastewater discharges

All streams have background or normal levels of water clarity. Fish and aquatic life that inhabit particular streams are adapted to those background levels of water clarity. Time is probably the most influential factor in determining how turbidity affects the aquatic environment. The longer the water remains at unusually high values of turbidity, the greater effect it has on fish and other aquatic life. Fish in particular become very stressed in waters that remain highly turbid for a long time. Signs of stress include increased respiration rate, reduced growth and feeding rates, delayed hatching and, in severe cases, death. Fish eggs are ten times more sensitive to changes in turbidity than adult fish.

Since transparency is a surrogate measurement of turbidity and the two measurements are correlated, the table to the right can be used to covert transparency values to approximate turbidity values. The figure below can be used to further understand how the resultant turbidity values and exposure times impact fish.

Transparency (cm)	Turbidity (NTUs)
<6.4	>240
6.4 to 7.0	240
7.1 to 8.2	185
8.3 to 9.5	150
9.6 to 10.8	120
10.9 to 12.0	100
12.1 to 14.0	90
14.1 to 16.5	65
16.6 to 19.1	50
19.2 to 21.6	40
21.7 to 24.1	35
24.2 to 26.7	30
26.8 to 29.2	27
29.3 to 31.8	24
31.9 to 34.3	21
34.4 to 36.8	19
36.9 to 39.4	17
39.5 to 41.9	15
42.0 to 44.5	14
44.6 to 47.0	13
47.1 to 49.5	12
49.6 to 52.1	11
52.2 to 54.6	10
>54.7	<10

* Nephelometric Turbidity Units (NTU) are units of particle dispersion (suspended particles) providing a measure of turbidity using a *nephelometer.*



Water Temperature

Water temperature is an important physical property that influences the growth and distribution of aquatic organisms. It is also an important factor regulating chemical and biochemical reactions in aquatic animals and plants. Surface water temperature is strongly influenced by solar radiation, local climate and groundwater inflows.

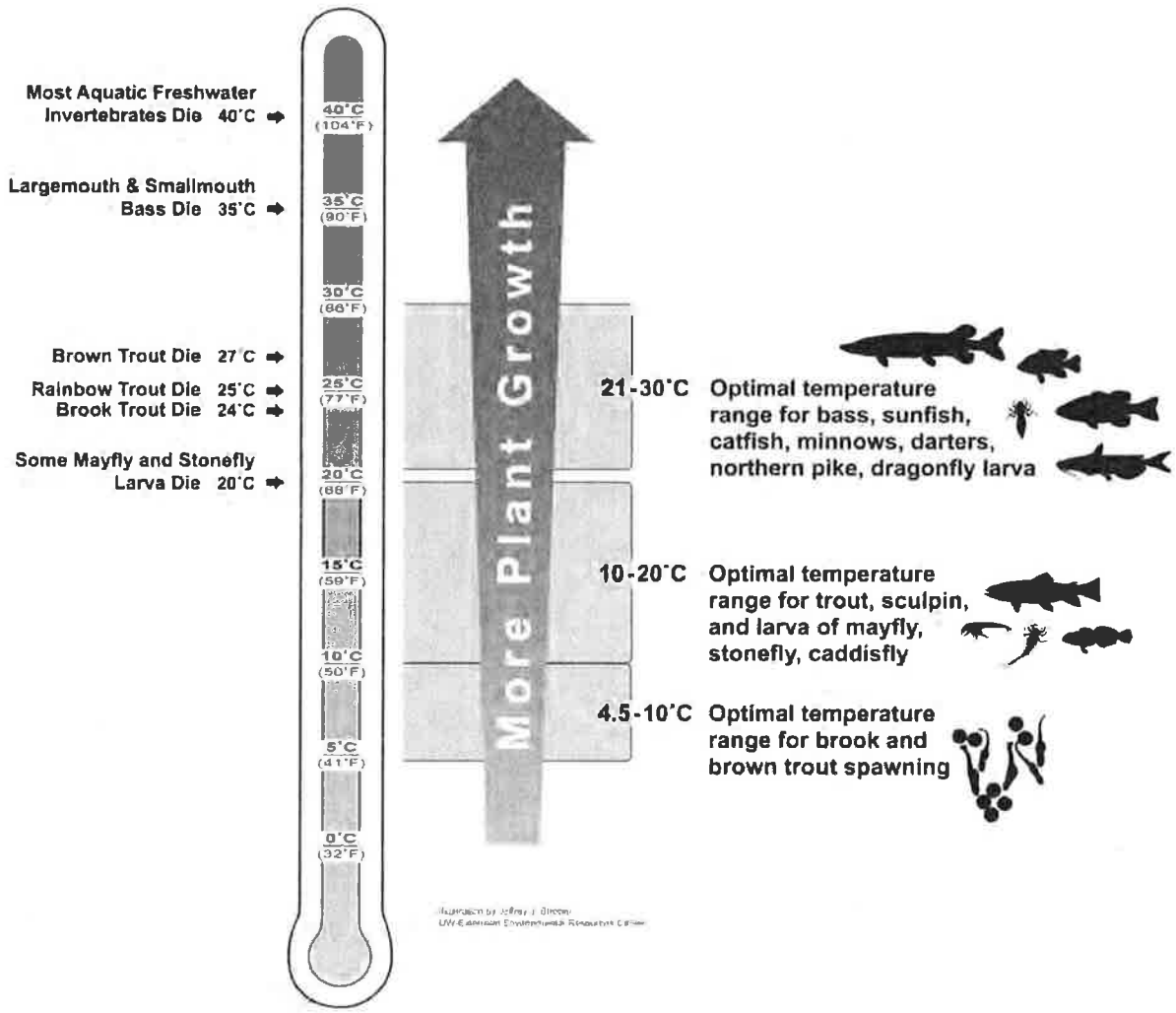
Wisconsin uses water temperature as an important variable in the designation of fish and aquatic life uses for surface waters. Use designations are utilized to classify waters of the state into certain categories so that management decisions can be made to protect the quality of those water resources.

Long-term water temperature data are useful for interpreting temporal variations. The WDNR uses temperature data averaged over months or seasons to calculate effluent limits. By setting effluent limits to surface waters, aquatic life present in the streams being monitored can be protected.

The WDNR also classifies streams by their water temperatures, indicating if they are cold, cool, or warm water streams (Table below).

Thermal regime	Maximum instantaneous temperature	Maximum daily mean temperature
Cold water stream	<25 °C (77 °F)	< 22 °C (72 °F)
Cool water stream	25-28 °C	22-24 °C
Warm water stream	>28 °C (82 °F)	> 24 °C (75 °F)

These classes of streams support different types of fish species. The best quality coldwater streams have relatively few species of fish as compared to warm water streams. Salmonids such as brook trout dominate the fish populations in the best quality coldwater streams, while brown trout, an exotic salmonid species, dominate coldwater streams that have slightly less pristine water quality. Bass, darter and sucker species are more prevalent in warmwater streams than in coldwater streams. Different species of fish have different temperature requirements. Trout need cool temperatures, while fish species such as bass can live in waters with higher temperatures (see figure 3 on following page).



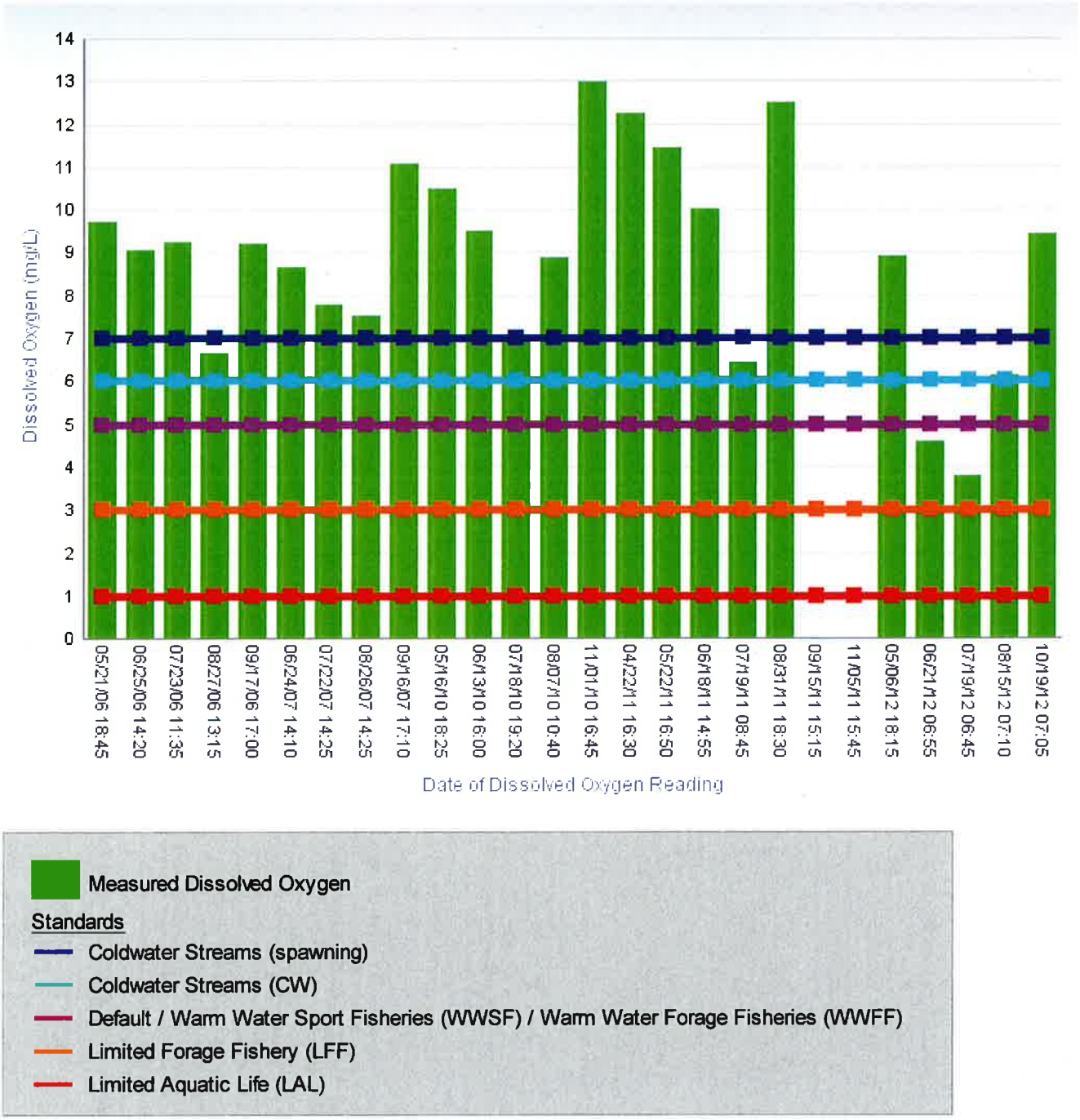
Based on the table above and your site's minimum, maximum and mean water temperatures for each month (see next page), how would you classify your stream based on its temperature over time? Coldwater, coolwater, or warmwater? If you monitor macroinvertebrates, how do your findings for macroinvertebrates and temperature compare with their temperature tolerances as listed in Figure 3? Do you find many plants at your monitoring site? Does their presence make sense in relation to average water temperatures?

The following pages summarize the results of monitoring on Milwaukee River - South Of Estabrook Park Dam, 10012616.

Dissolved Oxygen (Instantaneous Data) at Milwaukee River - South Of Estabrook Park Dam, 10012616

Instantaneous dissolved oxygen was gathered at this station 25 times during the period of monitoring, from 05/21/06 to 10/19/12. Dissolved oxygen values are displayed in the Graph 1 below and reflect the following values:

Instantaneous D.O. minimum: 3.77 mg/l
Instantaneous D.O. maximum: 12.93 mg/l
Instantaneous D.O. mean: 8.76 mg/l
Instantaneous D.O. median: 9.04 mg/l



Measured Dissolved Oxygen

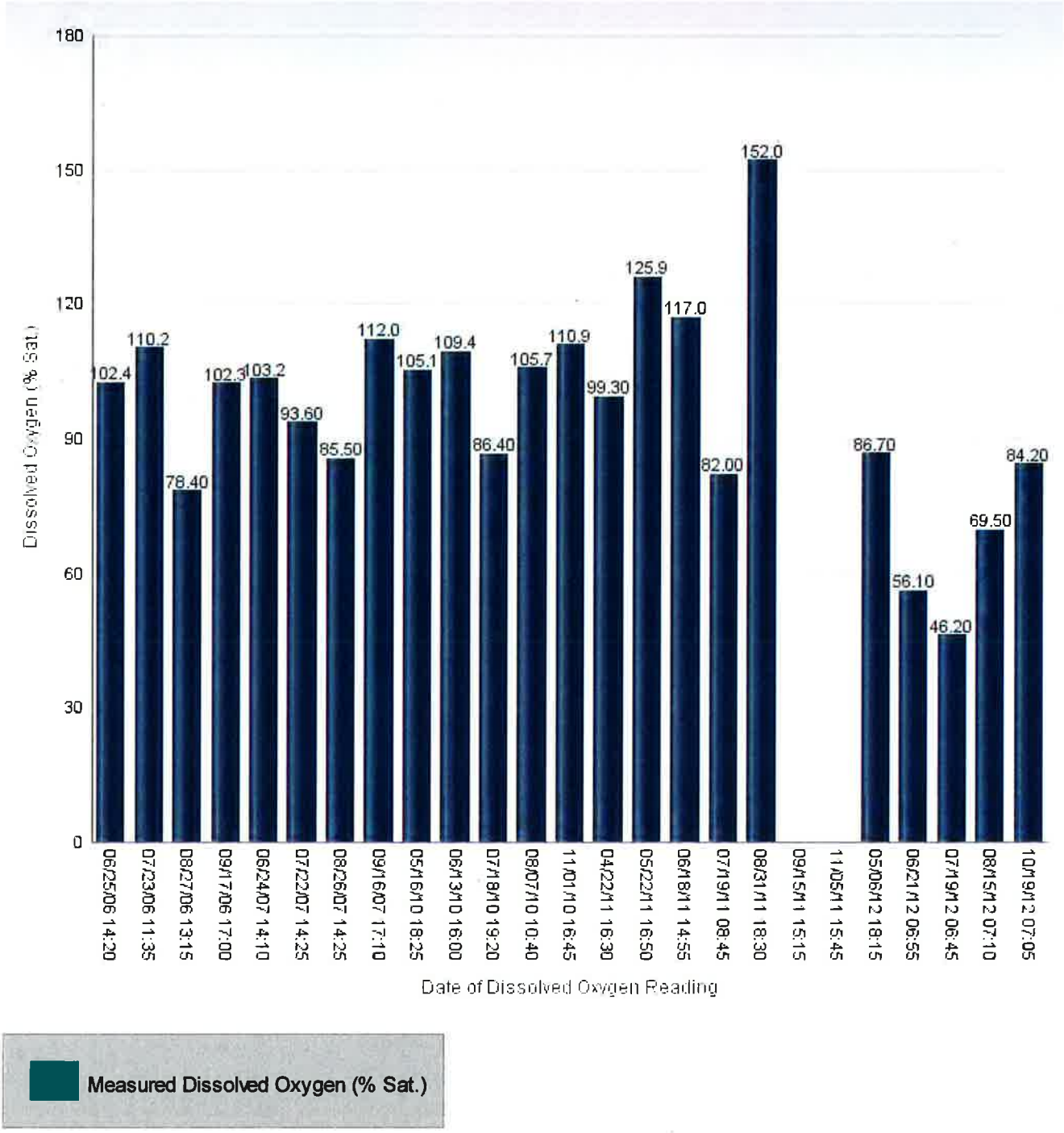
Standards

- Coldwater Streams (spawning)
- Coldwater Streams (CW)
- Default / Warm Water Sport Fisheries (WWSF) / Warm Water Forage Fisheries (WWFF)
- Limited Forage Fishery (LFF)
- Limited Aquatic Life (LAL)

Dissolved Oxygen, Percent Saturation (Instantaneous Data) at Milwaukee River - South Of Estabrook Park Dam, 10012616

Instantaneous dissolved oxygen percent saturation was gathered at this station 24 times during the period of monitoring, from 06/25/06 to 10/19/12. Dissolved oxygen percent saturation values are displayed in the Graph 2 below and reflect the following values:

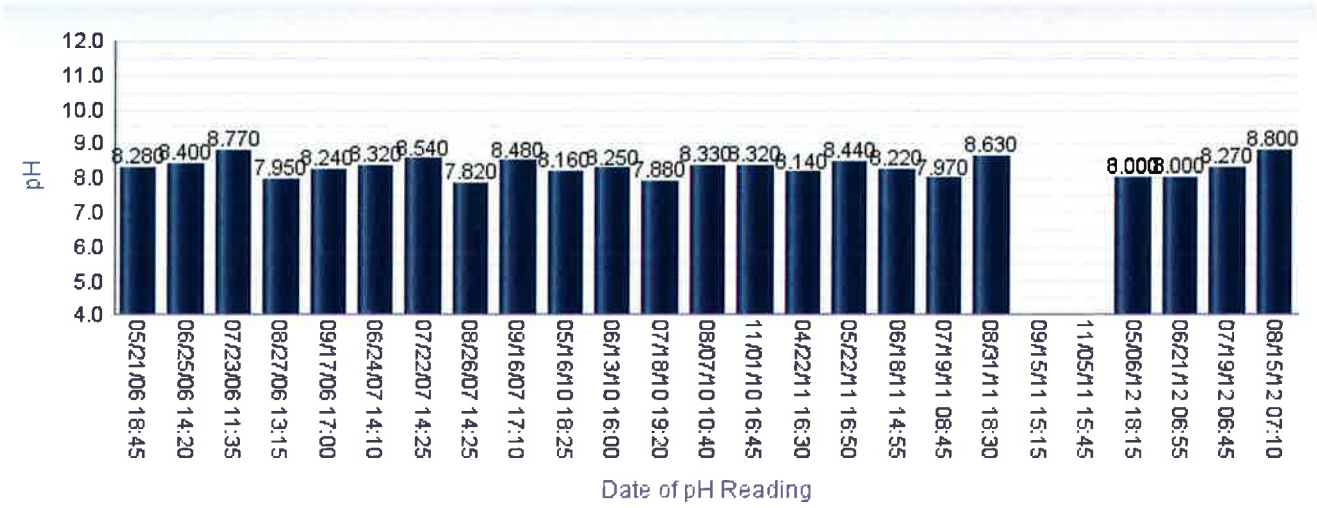
Instantaneous D.O. percent saturation minimum: 46.2 % Saturation
Instantaneous D.O. percent saturation maximum: 152 % Saturation
Instantaneous D.O. percent saturation mean: 96.08 % Saturation
Instantaneous D.O. percent saturation median: 100.8 % Saturation



pH (Instantaneous Data) at Milwaukee River - South Of Estabrook Park Dam, 10012616

Instantaneous pH was gathered at this station 24 times during the period of monitoring, from 05/21/06 to 08/15/12. pH values are displayed in the Graph 3 below and reflect the following values:

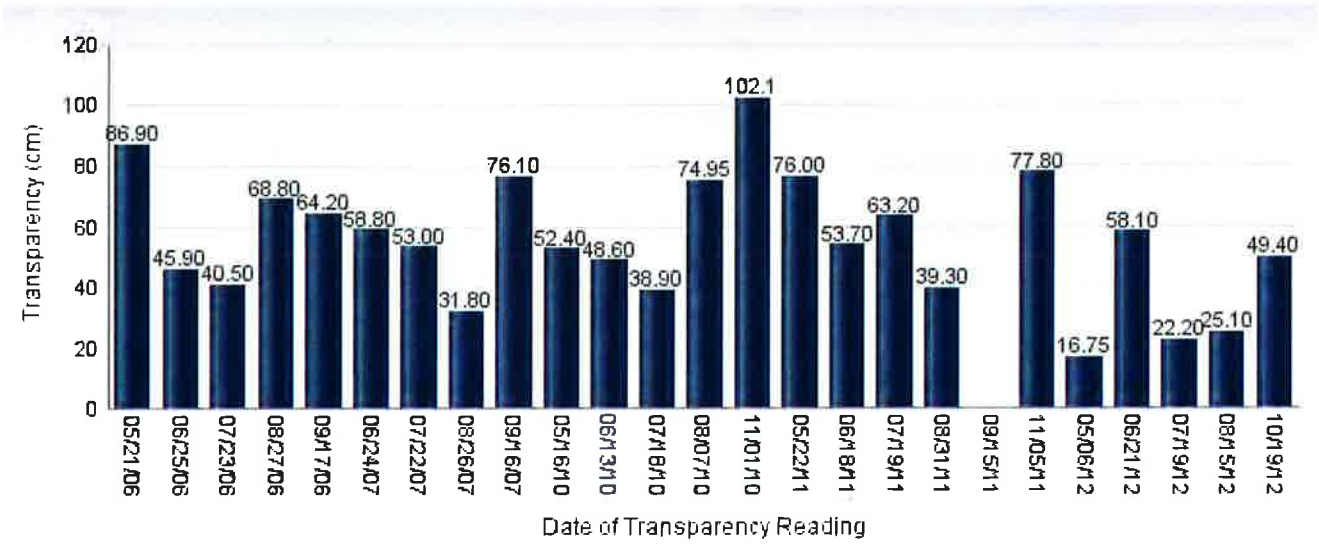
Instantaneous pH minimum: 7.82
Instantaneous pH maximum: 8.8
Instantaneous pH mean: 8.26
Instantaneous pH median: 8.26



Average Transparency (cm)

Instantaneous transparency was gathered at this station 24 times during the period of monitoring, from 05/21/06 to 10/19/12. Transparency values are displayed in the Graph 4 below and reflect the following values:

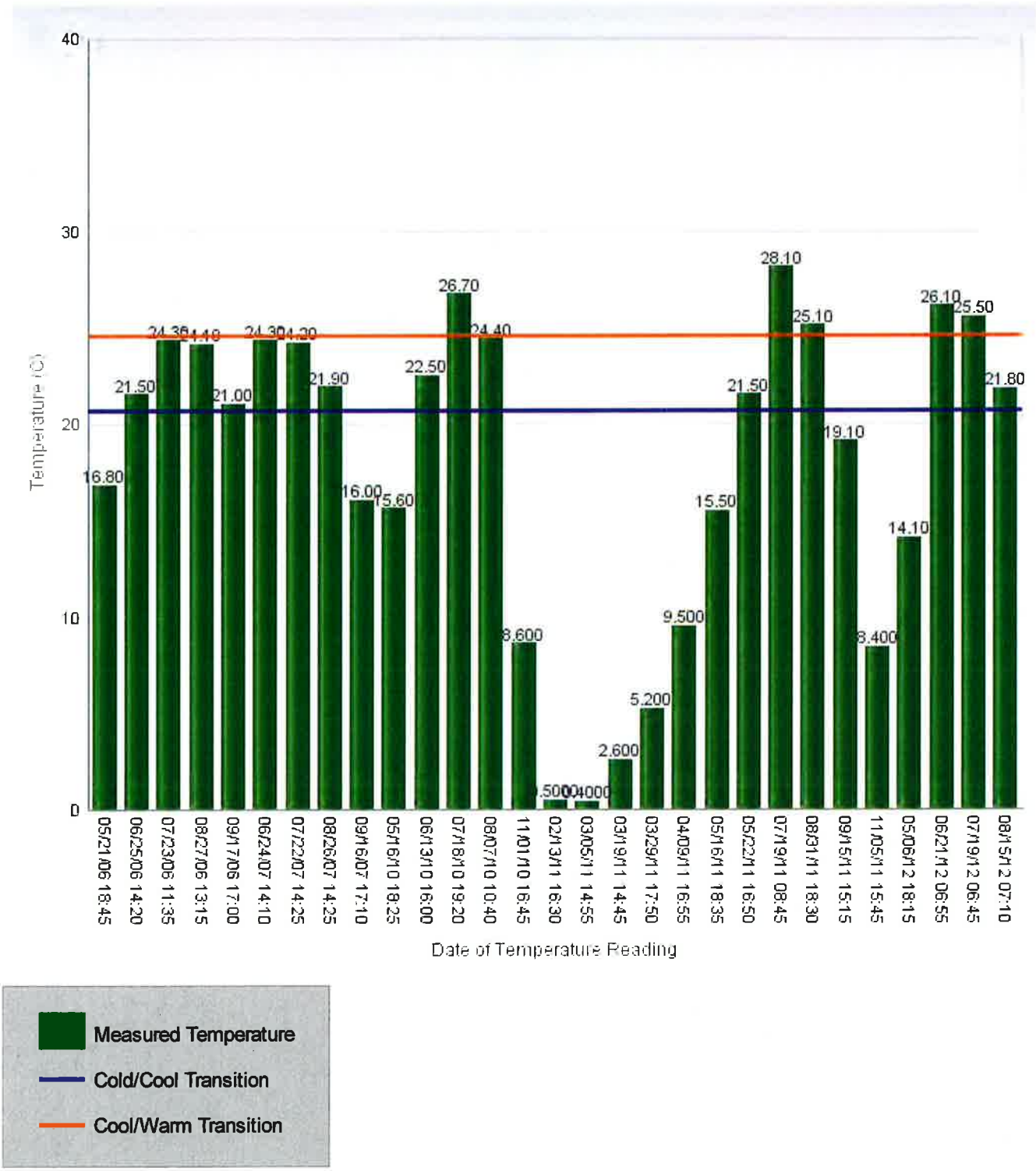
Instantaneous transparency minimum: 16.75
Instantaneous transparency maximum: 102.1
Instantaneous transparency mean: 55.19
Instantaneous transparency median: 53.35



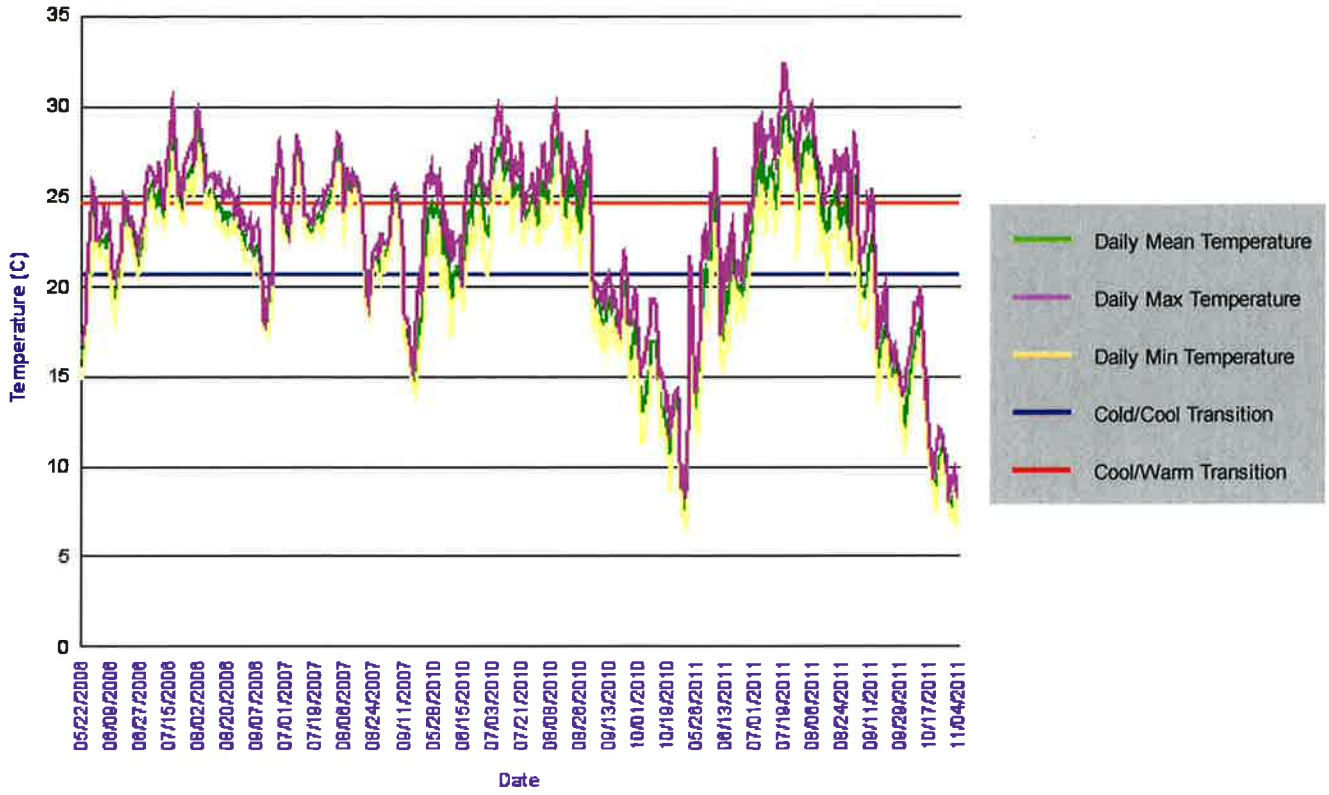
Instantaneous Water Temperature (C)

Instantaneous water temperature was gathered at this station 31 times during the period of monitoring, from 05/21/06 to 08/15/12. Water temperature values are displayed in the Graph 5 below and reflect the following values:

Instantaneous temperature minimum: .4
Instantaneous temperature maximum: 28.1
Instantaneous temperature mean: 18.02
Instantaneous temperature median: 21.5



Mean/Min/Max Daily Temperatures



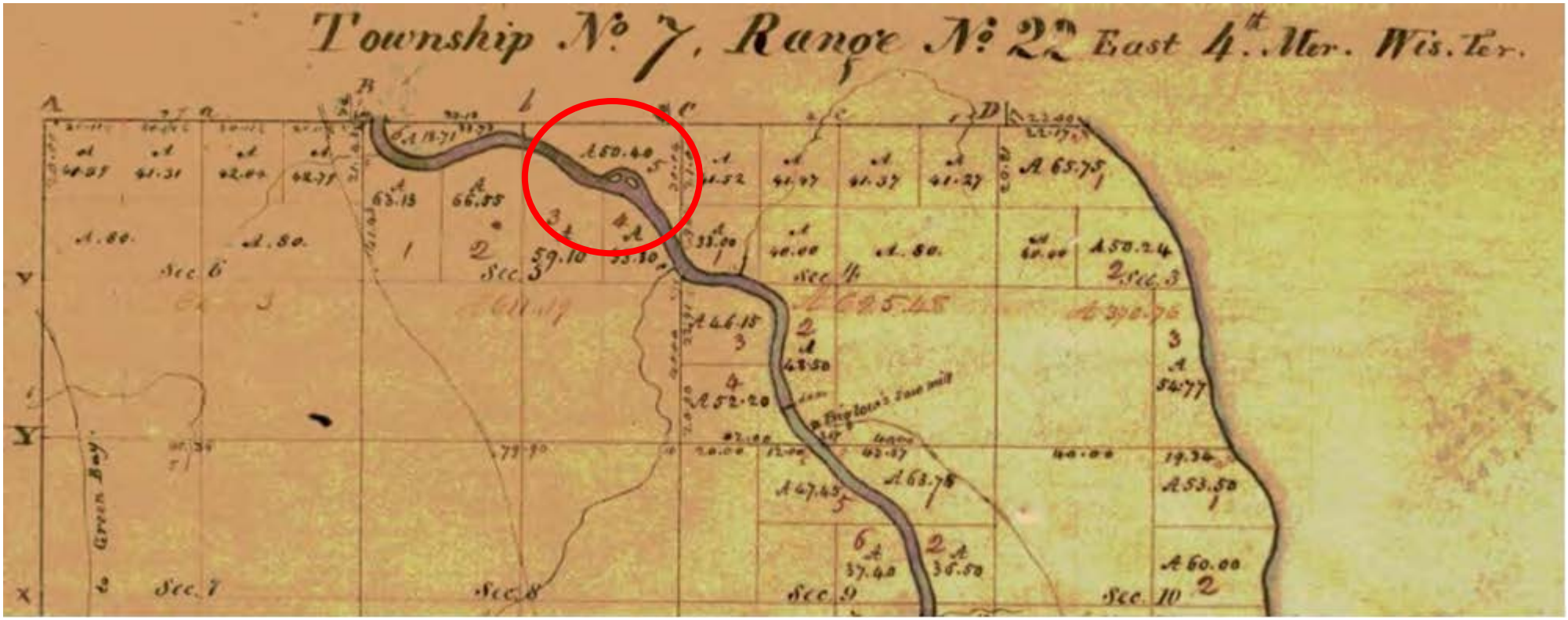
ATTACHMENT 12:

1937 AERIAL PHOTO OF THE DAM AND VICINITY

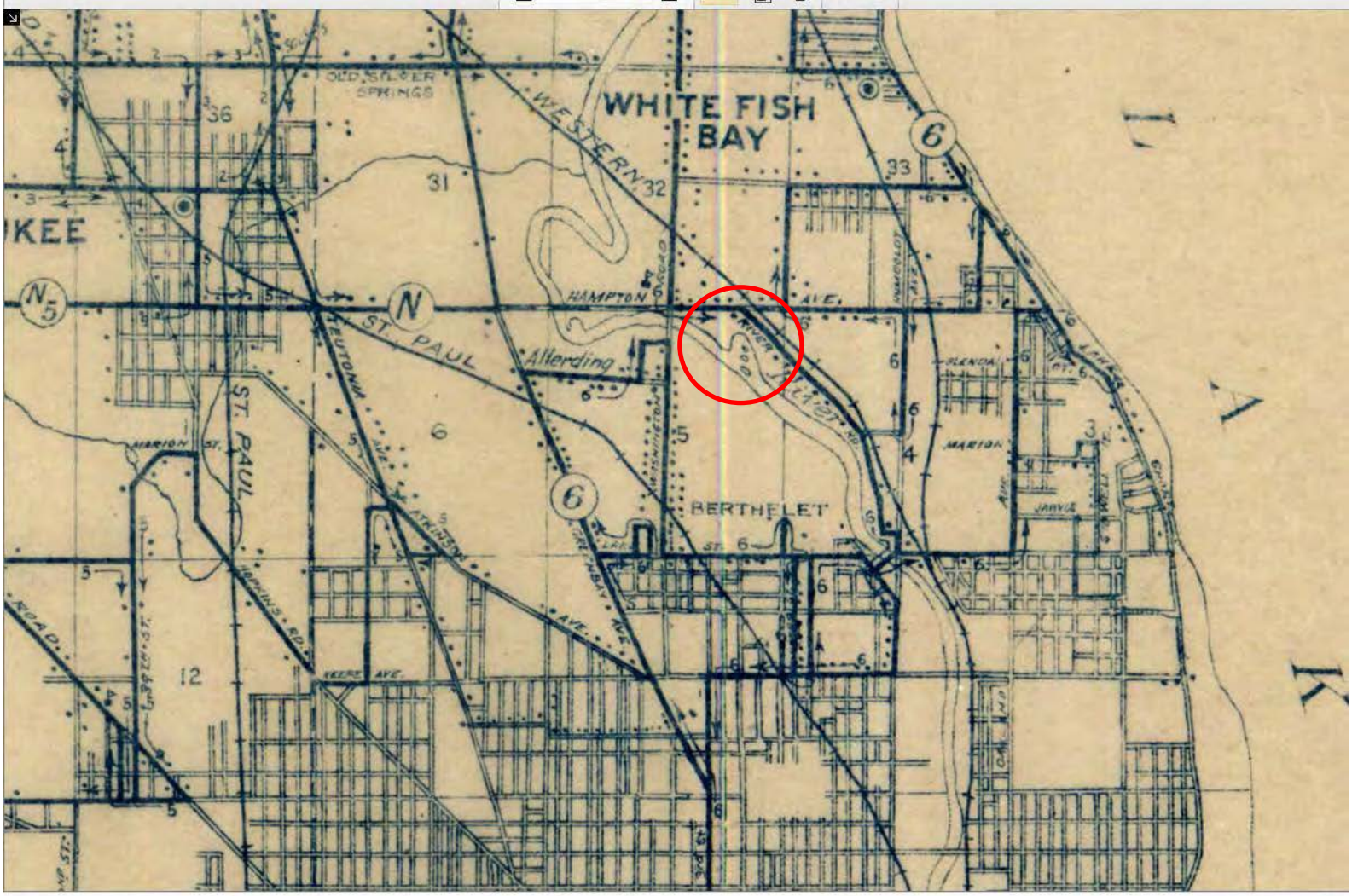
I want to...
OrthoWithParcels
W HAMPTON AVE
E HAMPTON AVE
E HAMPTON RD
N PORT WASHINGTON RD
N FAIRBROOK PKWY
4849
4841
4833
4830
500
420
420
410
306
222
4848
170
198
240
240
249
233
435
4700
4650
4800
400
100
500ft
200m
X:
Y:

ATTACHMENT 13:

HISTORICAL LAND PLAT SURVEY


Township No. 7, Range No. 22 East 4th Mer. Wis. Ter.
Green Bay
Sec. 6
Sec. 3
Sec. 7
Sec. 8
Sec. 9
Sec. 10
Sec. 4
Sec. 3

http://collections.lib.uwm.edu/cdm/fullbrowser/collection/agdm/id/84/rv/singleitem/rec/17
Milwaukee County (Wisco...
File Edit View Favorites Tools Help
Convert Select
17 of 37 View All Results



Title	Milwaukee County (Wisconsin) 1912
Full Title	Map of Milwaukee County, Wis. : showing rural delivery service / Post Office Department
Creator	United States. Post Office Dept.
Publication Date	[1912?]
Map Publisher	Post Office Dept. [Washington, D.C.]
Subject	Rural free delivery--Wisconsin--Milwaukee County--Maps Milwaukee County (Wis.)--Maps
Continent	North and Central America
Country	United States
State/Province	Wisconsin
Region	Southeastern Wisconsin
County	Milwaukee county
City	Milwaukee
Notes	Blue line print.

Type	Image
Scale	[ca. 1: 65,000]
Original Collection	American Geographical Society Library - Maps
Original Item Description	1 map : photocopy ; 84 x 44 cm.
Original Item ID	893-c.M54 D-[1912?]
Language	en
Repository	American Geographical Society Library, University of Wisconsin-Milwaukee Libraries
Digital Publisher	University of Wisconsin-Milwaukee Libraries
Rights	The Board of Regents of the University of Wisconsin System
Digital ID (link)	am001511
Digital Format	image/tif; image/jp2
Date.Digitized	2005-05-31
Digital Collection	American Geographical Society Library Digital Map Collection

ATTACHMENT 14:

BIRDS OF ESTABROOK PARK

Birds of Estabrook Park, Milwaukee County, Wisconsin
166 species (+12 other taxa)
Compiled by Charles Hagner (c_hagner@mac.com)

KEY:
+ Birds seen year-round
* Birds seen year-round or throughout summer
# Birds seen in winter (but not seen year-round or throughout summer)
^ Birds seen in spring and fall

Snow Goose
Cackling Goose
Canada Goose+*
Tundra Swan^ (fly-overs)
Wood Duck*
Mallard+*
Blue-winged Teal^
Northern Shoveler
Redhead
Greater Scaup^
Bufflehead#
Common Goldeneye#
Hooded Merganser^
Common Merganser#
Red-breasted Merganser^
Pied-billed Grebe^
Horned Grebe
Double-crested Cormorant^ (fly-overs)
Great Blue Heron*
Great Egret
Green Heron*
Black-crowned Night-Heron*
Turkey Vulture* (fly-overs)
Osprey*
Sharp-shinned Hawk
Cooper's Hawk+*
Bald Eagle
Broad-winged Hawk
Red-tailed Hawk+*
Sora
American Coot^
Sandhill Crane (fly-overs)
Killdeer*
Spotted Sandpiper*
Solitary Sandpiper^
Wilson's Snipe
American Woodcock^
Ring-billed Gull+*
Herring Gull+*
Caspian Tern
Rock Pigeon+*
Mourning Dove+*
Yellow-billed Cuckoo
Black-billed Cuckoo*
Eastern Screech-Owl
Great Horned Owl*

Barred Owl
Common Nighthawk^
Chimney Swift*
Ruby-throated Hummingbird*
Belted Kingfisher*
Red-headed Woodpecker
Red-bellied Woodpecker+*
Yellow-bellied Sapsucker^
Downy Woodpecker+*
Hairy Woodpecker+*
Northern Flicker*
American Kestrel
Merlin
Peregrine Falcon* (nests at UWM)
Olive-sided Flycatcher^
Eastern Wood-Pewee*
Yellow-bellied Flycatcher^
Alder Flycatcher
Willow Flycatcher
Least Flycatcher^
Eastern Phoebe*
Great Crested Flycatcher*
Eastern Kingbird*
White-eyed Vireo^
Yellow-throated Vireo^
Blue-headed Vireo^
Warbling Vireo*
Philadelphia Vireo^
Red-eyed Vireo*
Blue Jay+*
American Crow+*
Northern Rough-winged Swallow*
Tree Swallow*
Bank Swallow
Barn Swallow*
Cliff Swallow* (nests under Hampton Ave. bridge in Lincoln Park)
Black-capped Chickadee+*
Red-breasted Nuthatch^
White-breasted Nuthatch+*
Brown Creeper^
House Wren*
Winter Wren^
Sedge Wren
Carolina Wren
Blue-gray Gnatcatcher*
Golden-crowned Kinglet^
Ruby-crowned Kinglet^
Eastern Bluebird*
Veery^
Gray-cheeked Thrush^
Swainson's Thrush^
Hermit Thrush#^
Wood Thrush^ (but occasionally heard singing in park in summer)
American Robin+*
Gray Catbird*
Brown Thrasher^

Northern Mockingbird
European Starling+*
Cedar Waxwing+*
Ovenbird^
Louisiana Waterthrush
Northern Waterthrush^
Blue-winged Warbler^
Golden-winged Warbler^
Black-and-white Warbler^
Prothonotary Warbler
Tennessee Warbler^
Orange-crowned Warbler^
Nashville Warbler^
Connecticut Warbler
Mourning Warbler^
Kentucky Warbler
Common Yellowthroat*
Hooded Warbler
American Redstart*
Cape May Warbler^
Northern Parula^
Magnolia Warbler^
Bay-breasted Warbler^
Blackburnian Warbler^
Yellow Warbler*
Chestnut-sided Warbler*
Blackpoll Warbler^
Black-throated Blue Warbler^
Palm Warbler^
Pine Warbler^
Yellow-rumped Warbler^
Black-throated Green Warbler^
Canada Warbler^
Wilson's Warbler^
Eastern Towhee^
American Tree Sparrow#
Chipping Sparrow*
Clay-colored Sparrow^
Field Sparrow^ (but probably around throughout summer)
Savannah Sparrow
Fox Sparrow^
Song Sparrow*
Lincoln's Sparrow^
Swamp Sparrow^
White-throated Sparrow#
White-crowned Sparrow^
Dark-eyed Junco#
Scarlet Tanager^
Northern Cardinal+*
Rose-breasted Grosbeak^
Indigo Bunting*
Red-winged Blackbird*
Rusty Blackbird
Common Grackle*
Brown-headed Cowbird*
Orchard Oriole

Baltimore Oriole*
House Finch+*
Purple Finch# (irruptive)
Common Redpoll# (irruptive)
Pine Siskin# (irruptive)
American Goldfinch+*
Evening Grosbeak
House Sparrow+*

OTHER TAXA:
duck sp.
Greater/Lesser Scaup
hawk sp.
gull sp.
woodpecker sp.
Downy/Hairy Woodpecker
Empidonax sp.
swallow sp.
Catharus sp.
warbler sp.
sparrow sp.
blackbird sp.

ATTACHMENT 15:

US FISH & WILDLIFE TRUST RESOURCE LIST

U.S. Fish and Wildlife Service

Trust Resources List

This resource list is to be used for planning purposes only — it is not an official species list.

Endangered Species Act species list information for your project is available online and listed below for the following FWS Field Offices:

Green Bay Ecological Services Field Office
2661 SCOTT TOWER DRIVE
NEW FRANKEN, WI 54229
(920) 866-1717

Project Name:

Estabrook Dam

U.S. Fish and Wildlife Service

Trust Resources List

Project Location Map:

Project Counties:

Milwaukee, WI

Geographic coordinates (Open Geospatial Consortium Well-Known Text, NAD83):

MULTIPOLYGON (((-87.911927 43.1026634, -87.9111545 43.1020128, -87.9104681 43.1012138, -87.9107364 43.1005793, -87.9125066 43.1006972, -87.9137458 43.1024663, -87.9122331 43.102722, -87.911927 43.1026634)))

Project Type:

Dam

U.S. Fish and Wildlife Service

Trust Resources List

Endangered Species Act Species List (USFWS Endangered Species Program).

There are a total of 1 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fishes may appear on the species list because a project could cause downstream effects on the species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section below for critical habitat that lies within your project area. Please contact the designated FWS office if you have questions.

Species that should be considered in an effects analysis for your project:

Mammals	Status		Has Critical Habitat	Contact
northern long-eared Bat (*Myotis septentrionalis*) Population:	Proposed Endangered	species info		Green Bay Ecological Services Field Office

Critical habitats within your project area:

There are no critical habitats within your project area.

FWS National Wildlife Refuges (USFWS National Wildlife Refuges Program).

There are no refuges found within the vicinity of your project.

FWS Migratory Birds (USFWS Migratory Bird Program).

The protection of birds is regulated by the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA). Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. For more information regarding these Acts see http://www.fws.gov/migratorybirds/RegulationsandPolicies.html.

All project proponents are responsible for complying with the appropriate regulations protecting birds when planning and developing a project. To meet these conservation obligations, proponents should identify potential or existing project-related impacts to migratory birds and their habitat and develop and implement conservation measures that avoid, minimize, or compensate for these impacts. The Service's Birds of Conservation Concern (2008) report identifies species, subspecies, and populations of all migratory nongame birds that, without

additional conservation actions, are likely to become listed under the Endangered Species Act as amended (16 U.S.C 1531 et seq.).

For information about Birds of Conservation Concern, go to http://www.fws.gov/migratorybirds/CurrentBirdIssues/Management/BCC.html.

Migratory birds of concern that may be affected by your project:

There are **14** birds on your Migratory birds of concern list. The Division of Migratory Bird Management is in the process of populating migratory bird data with an estimated completion date of August 1, 2014; therefore, the list below may not include all the migratory birds of concern in your project area at this time. While this information is being populated, please contact the Field Office for information about migratory birds in your project area.

Species Name	Bird of Conservation Concern (BCC)	Species Profile	Seasonal Occurrence in Project Area
American bittern (*Botaurus lentiginosus*)	Yes	species info	Breeding
Black tern (*Chlidonias niger*)	Yes	species info	Breeding
Black-billed Cuckoo (*Coccyzus erythropthalmus*)	Yes	species info	Breeding
Bobolink (*Dolichonyx oryzivorus*)	Yes	species info	Breeding
Brown Thrasher (*Toxostoma rufum*)	Yes	species info	Breeding
Canada Warbler (*Wilsonia canadensis*)	Yes	species info	Breeding
cerulean warbler (*Dendroica cerulea*)	Yes	species info	Breeding
Common tern (*Sterna hirundo*)	Yes	species info	Breeding
Golden-Winged Warbler (*Vermivora chrysoptera*)	Yes	species info	Breeding
Least Bittern (*Ixobrychus exilis*)	Yes	species info	Breeding
Marsh wren (*Cistothorus palustris*)	Yes	species info	Breeding
Rusty Blackbird (*Euphagus carolinus*)	Yes	species info	Wintering
Willow Flycatcher (*Empidonax traillii*)	Yes	species info	Breeding

Wood Thrush (*Hylocichla mustelina*)	Yes	species info	Breeding

NWI Wetlands (USFWS National Wetlands Inventory).

The U.S. Fish and Wildlife Service is the principal Federal agency that provides information on the extent and status of wetlands in the U.S., via the National Wetlands Inventory Program (NWI). In addition to impacts to wetlands within your immediate project area, wetlands outside of your project area may need to be considered in any evaluation of project impacts, due to the hydrologic nature of wetlands (for example, project activities may affect local hydrology within, and outside of, your immediate project area). It may be helpful to refer to the USFWS National Wetland Inventory website. The designated FWS office can also assist you. Impacts to wetlands and other aquatic habitats from your project may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal Statutes. Project Proponents should discuss the relationship of these requirements to their project with the Regulatory Program of the appropriate U.S. Army Corps of Engineers District.

Data Limitations, Exclusions and Precautions
The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery and/or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Exclusions - Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

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Precautions - Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

The following wetland types intersect your project area in one or more locations:

Wetland Types	NWI Classification Code	Total Acres
Freshwater Forested/Shrub Wetland	PFO1/EMBg	0.5422
Freshwater Forested/Shrub Wetland	PFO1Bg	4.4097
Riverine	R2UBH	662.8964