APPENDIX 8B

White Paper/Analysis for Watershed-Based Permitting Primer

Prepared for:

Milwaukee Metropolitan Sewerage District

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Executive Summary

The following White Paper/Analysis evaluates the applicability of a watershed-based permitting approach for the entities within the Greater Milwaukee Watersheds and the most appropriate option(s) under this approach. The findings of the analysis support the use of a permitting approach that is based upon implementation of the Watershed Restoration Plan (WRP) developed for the applicable watershed as well as the Southeastern Wisconsin Regional Planning Commission (SEWRPC) Regional Water Quality Management Plan Update (RWQMPU, 208 Plan). Under this approach, the WRP and the RWQMPU would be limited to plans and processes for protecting water quality standards and would be cited in each facility's Permit Fact Sheet as the basis for the control requirements established in the permit. The WRP and RWQMPU would also be used to establish the monitoring and reporting requirements for the permit. The federal regulations require permits to include limits that are as stringent as necessary to meet water quality standards, and that the limits be consistent with approved 208 plans (see 40 CFR 122.44(d)(1)[1] & (d)(6)). The regulations also prohibit the issuance of a permit that is not consistent with an approved 208 Plan (see 40 CFR 122.4(g). This may be accomplished through development and issuance of individual coordinated permits as an appropriate approach for this region or a multi-source integrated permit depending on decisions made by those involved in the Greater Milwaukee Watersheds regarding pollutants of concern to be addressed and priorities for applying resources.

By developing the permits in a coordinated fashion and using the WRP and RWQMPU as the basis for the permit, the approach will allow the permittees to continue to work together on restoration efforts and ensure that there is no conflict between regionally identified goals and requirements established in the NPDES permits. A watershed-based approach will allow the permittees to align permit requirements with the WRP and RWQMPU and allow the permit to become a vehicle to support the WRP. Additionally, the linkage of plans required by CSO and stormwater permits (such as the combined sewer system Long Term Control Plan or the stormwater management plan) with the watershed plans and their associated goals can be ensured through this process. If the permits are not developed on a watershed-basis and are not aligned with the WRP there is the potential for resources being directed at permit requirements and plans that are not part of the WRP and, consequently, there is potential for conflicting efforts such as monitoring that is not coordinated or projects that are focused on different priorities.

As discussed in US EPA's *Watershed-Based National Pollutant Discharge Elimination System (NPDES) Permitting Implementation Guidance* (2003), although the permitting authority often initiates this process, the process can also be based on the initiative of one or more stakeholders who spearhead this approach. Due to concerns at the state level in Wisconsin regarding resources to pursue a non-traditional approach to permitting, it is recommended that the permittee/stakeholders develop the draft permit language as well as the fact sheet for submission

[1] 122.44(d)
(1) Achieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality.
(6) Ensure consistency with the requirements of a Water Quality Management plan approved by EPA under section 208(b) of CWA.

122.4
(g) For any discharge inconsistent with a plan or plan amendment approved under section 208(b) of CWA.

to the Wisconsin Department of Natural Resources. A similar approach was used for permits in Oregon and found to be very beneficial. Having the stakeholders directly involved in the permit development is also beneficial as they best understand the system and the issues at the watershed level.

The process outlined in the paper provides a system for the stakeholders and permittees evaluating this approach in the Greater Milwaukee Watersheds (herein after referred to as the "Group") to more fully assess priorities and apply a permitting approach to better focus on priorities. The approach discussed in this paper was structured according to the steps identified in the *Watershed-Based National Pollutant Discharge Elimination System (NPDES) Permitting Technical Guidance* (US EPA 2007). The Technical Guidance facilitates the use of a NPDES Watershed Navigator (the Navigator), which includes three elements that are broken into a series of questions that facilitate analysis of watershed data and determine how best to structure and manage implementation of the NPDES program in a way that considers the entire watershed. The Navigator is used to help a permittee work through a watershed permitting analytical approach and construct an NPDES watershed framework in a watershed. In this paper, each of the questions is evaluated from the perspective of the point sources (this includes wastewater treatment plants and stormwater) within the Greater Milwaukee Watershed and recommendations are made based on this evaluation.

Note that the recommendations that are included in this Paper are only preliminary suggestions. The entities working through this process in the Greater Milwaukee Watersheds are indeed at an advantage in having already collected and analyzed extensive data and initiating planning and permitting at the watershed level. **It is still important; however, to continue the current process of stakeholder and public participation (through the Southeastern Wisconsin Watersheds Trust, etc.) and to work through the process described in US EPA's 2007 Technical Guidance as a group to ensure all information and views are considered. This process can indeed proceed more quickly than in a region starting from scratch, but following this stepwise process can help ensure that appropriate decisions are made based on the data available and a comprehensive evaluation of all the options is made.**

Introduction

In 2002 the U.S. Environmental Protection Agency (US EPA) issued a formal endorsement for the watershed-based approach to planning in an effort to better address water resource issues. Based on this endorsement, entities in the Greater Milwaukee Watershed have embraced this approach and have been developing management and restoration plans on a watershed level. This paper addresses the efforts to date, identifies decisions to be made, and discusses potential options for the Greater Milwaukee Watersheds.

The approach outlined in this paper was structured according to the steps identified in the *Watershed-Based National Pollutant Discharge Elimination System (NPDES) Permitting Technical Guidance* (US EPA 2007). It was felt that use of this established approach would clearly identify the thought process used to walk through the issues faced in the Greater Milwaukee Watersheds and would help to facilitate discussion with US EPA and the state.

As discussed in the Technical Guidance, a number of factors are involved in selecting a watershed for a watershed-based permitting approach as well as questions that need to be asked

to determine the direction of such an approach. US EPA's Technical Guidance includes an NPDES Watershed Navigator (the Navigator) to help a group work through a watershed permitting analytical approach and construct an NPDES watershed framework in a watershed. The Navigator consists of a series of questions that facilitate analysis of watershed data and determine how best to structure and manage implementation of the NPDES program in a way that considers the entire watershed.

Each element addressed by the Navigator is discussed below. These elements include:

- *Element 1: Create Watershed and Source Data Inventories* – this element focuses on the types of data needed to conduct an analysis of a watershed-based permitting approach. An extensive amount of data has been collected and analyzed on watersheds in this region through efforts associated with the development of the Watershed Restoration Plans as well as the Southeastern Wisconsin Regional Planning Commission's (SEWRPC) Regional Water Quality Management Plan (Planning Report No. 50 and Technical Report No. 39) and MMSD's 2020 Facilities Plan (Section 201 Plan). Most, if not all, of the important data needed for this effort has been collected as part of the development of these documents.
- *Element 2: Apply a Watershed Permitting Analytical Approach* – taking the data from Element 1, this step looks at several ways the data can be analyzed to identify implementation options. Much of this analysis for the Menomonee and Kinnickinnic Rivers has been undertaken as part of the Watershed Restoration Planning process.
- *Element 3: Construct an NPDES Watershed Framework* – building off of Element 2, this step discusses potential options in more detail and helps with priority setting.

Each element of the Navigator has a goal, specific activities to be undertaken, and a specific set of results to help readers make decisions in the remaining elements. This paper will walk through these elements one by one.

It is important to note that an initial decision on the scale of the watershed-based permitting approach needs to be made upon moving forward with this effort. One approach could be focusing on one specific watershed, such as the Menomonee River watershed, while another approach could be more encompassing, such as including all of the Greater Milwaukee watersheds in the effort. The flexibility of this approach; however, as well as the fact that a significant amount of data have already been collected, will allow the Group to move forward at one scale. If it is determined that this scale is inappropriate, the Group can step back through the process fairly easily to readjust the scale.

The Navigator Process

The following section walks through each element of the US EPA approach discussed above and addresses the key questions associated with each element, working through the answers where possible in light of the specific situation in the Greater Milwaukee Watersheds.

Navigator Element 1: Create Watershed and Source Data Inventories

Focusing on a watershed of interest, this step includes collecting and sorting available data on that watershed. Here the data will be evaluated in order to understand conditions in the watershed

in relation to water quality standards and watershed goals. The Group is at an advantage at this point because of the extensive data that have been collected as well as the fact that analysis of these data has been, and continues to be at the watershed level. Focusing on the drivers behind the desire to pursue this approach will help the Group focus on the most relevant types and sources of data. It is likely that only minimal additional data will be needed for this effort so this Paper will not go into great detail on this element. Questions to address are as follows:

Question #1: What types of data should be gathered?
Data to be gathered under this element includes watershed data as well as pollutant source data. Watershed data includes information on the physical and natural features of the watershed as well as watershed goals and conditions. Pollutant source data includes data on locations and characteristics of both point and nonpoint sources.

Much of this data has already been collected, compiled, and analyzed (or is in the process of being analyzed). These data will be used in Element 2, but some data could also be used in association with the development of environmental indicators to measure performance (see Indicator Development for Watershed-based Stormwater Management on page 13, below). As will be discussed later, it may be possible to use "flow" as an indicator or surrogate for a number of pollutants. The approach here would be to use watershed-based data to demonstrate that by controlling flow there is a measurable reduction in pollutant loading. This would be similar to processes used in TMDLs to address stormwater impacts. Once this linkage can be made, then flow would be used as the control parameter in the permit. It is anticipated that this should fit well with current activities in the watershed to address flow via use of low impact development techniques, stormwater BMPs such as rain gardens and rain barrels, working with non-governmental organizations, etc.

Question #2: How are gaps in the watershed and source data assessed?
Based on the issues of concern in the selected watershed, the Group will want to focus on the most relevant types and sources of data applicable to the concern(s). Focusing on these specific sources and evaluating issues such as the ease of data assess, the source of the data and the format it is in, and the quality of the data will help identify data gaps or needs for new or improved data.

Question #3: How is a data inventory organized?
As much of the data already collected on the watersheds in the Greater Milwaukee Watersheds has been incorporated, or is being incorporated into, management or restoration plans, much of this step has already been achieved. Because of the analysis of this data in these plans it is assumed that information such as monitoring data referenced in these plans is also in a format that makes it useful to search or query. Additional data compiled over time should also be included in the summary of data on the watershed.

Navigator Element 2: Apply a Watershed Permitting Analytical Approach
The next step in this process is taking the data collected through the previous step and analyzing it so the Group can conduct a "targeted and iterative analysis of the data." This will allow the Group to identify potential approaches to the situation in the Greater Milwaukee Watersheds. Questions to address are discussed below. Options that may be available based on the answers to each of these questions are included in the call-out boxes along the side of the page.

Question #1: Are there common stressors or sources of pollutants of concern in the watershed?
This element includes not only identifying pollutants of concern, but also identifying relationships among existing NPDES permit, nonpoint sources, and these pollutants or stressors of concern that can be addressed within a watershed framework. The analysis that has already been performed on water quality data in the Greater Milwaukee Watersheds has identified a number of parameters of concern including nutrients, sediment, and bacteria

OPTIONS BASED ON POTENTIAL ANSWERS TO QUESTION#1

Several urban wet-weather sources identified

- Wet-weather integration
- Indicator development for stormwater management

Few common pollutants across sources

- Permit synchronization

Common stressors unknown because of lack of data

- Monitoring consortium development

Several common sources and stressors

- Continue to Question #2 – additional watershed-based approaches are possible

For each of the watersheds and subwatersheds in the Greater Milwaukee Watersheds, the SEWRPC Regional Water Quality Management Plan Update (RWQMPU) evaluates the average annual loads of the various pollutants of concern for point sources (industrial point sources, SSOs, CSOs) and nonpoint sources (urban and rural stormwater runoff) (see Table 1 as an example). Although not evaluated on a permit-by-permit level, each pollutant of concern is evaluated in this manner. Similarly to US EPA's Technical Guidance this approach highlights commonalities among sources and pollutants for further analysis. (It is important to note for

Table 1. Average Annual Loads of Total Phosphorus in the Menomonee River Watershed

	Point Sources				Nonpoint Sources			
Subwatershed	Industrial Point Sources (pounds)	SSOs (pounds)	CSOs (pounds)	Subtotal (pounds)	Urban (pounds)	Rural (pounds)	Subtotal (pounds)	Total (pounds)
Butler Ditch	0	10	0	10	1,490	50	1,540	1,550
Honey Creek	200	10	0	210	3,900	20	3,920	4,130
Lilly Creek	0	0	0	0	1,200	90	1,290	1,290
Little Menomonee Creek	0	0	0	0	80	350	430	430
Little Menomonee River	360	<10	0	360	3,300	840	4,140	4,500
Lower Menomonee River	15,650	550	1,880	18,080	7,180	70	7,250	25,330
North Branch Menomonee River .	0	0	0	0	50	220	270	270
Nor-X-Way Channel ……..	160	0	0	160	630	340	970	1,130
Underwood Creek ..	30	10	0	40	6,350	270	6,620	6,660
Upper Menomonee River	1,150	<10	0	1,150	4,170	1,150	5,320	6,470
West Branch Menomonee River .	0	0	0	0	370	240	610	610
Willow Creek	0	0	0	0	320	430	750	750
Total	17,550	580	1,880	20,010	29,040	4,070	33,110	53,120
Percent of Total Load	33.0	1.1	3.5	37.6	54.7	7.7	62.4	100.0

(SEWRPC 2007 – Technical Report No. 39)

comparison purposes that urban nonpoint sources identified in Table 1 include permitted

municipal stormwater runoff, which is defined by US EPA as a point source).
Additionally, the Draft Watershed Restoration Plan for the Menomonee River cites issues such as the fact that stormwater runoff is the largest source of fecal colifom and that eliminating CSOs and SSOs would not result in water quality improvements. This type of information and data will be helpful in establishing the levels of control and supporting the use of aggregate limits or allocations done on a categorical rather than outfall-by-outfall basis. This is similar to the process used in TMDLs to address diffuse sources that may be controlled via BMPs where the assumption is that use of BMPs on a system-wide basis will reduce loadings.

Question #2: Are pollutants and stressors common to sources in the watershed best addressed at a watershed level?

This question is important as it evaluates the pollutants of concern that were identified in Question #1, above, and evaluates if they could be addressed at a watershed scale. For a watershed-based approach the pollutants of concern should have more than just localized effects, but can be addressed at a watershed level.

This question must be answered in two parts: (1) is the pollutant an issue watershed-wide where there is potential for cumulative effects from multiple sources and (2) is the form of the pollutant the same or can different forms be converted to the same form for common measurement (e.g., phosphorus, nitrogen, oxygen demand).

OPTIONS BASED ON POTENTIAL ANSWERS TO QUESTION#2

Common pollutants or stressors are not best addressed at the watershed level

- Permit synchronization

Common pollutants and stressors lend themselves to being addressed at a watershed level

- Continue to Question #3 – additional watershed-based approaches are possible

As opposed to individual point sources with localized effects that could be addressed through individual permits, where the aggregate effect of the point sources lead to more far-field issues, a watershed permitting approach can be helpful. This is already being addressed at the watershed scale in the Menomonee River Watershed. As seen in Tables 1, 2, and 3, the bulk of the loading of phosphorus, fecal coliform, and total suspended solids in this watershed come from a limited number of sources, but predominantly come from urban stormwater. Coverage of the eight communities under this type of permit allows evaluating these pollutants in a more comprehensive manner.

Evaluating the connection between these discharges can help identify the pollutants of concern upon which to optimally place focus through a watershed-based approach. Using a watershed approach for these types of pollutants will also allow the Group to prioritize controls based on type of source, loading, and location and apply resources where there will be the greatest potential for positive impact.

Table 2. Average Annual Loads of Fecal Coliform Bacteria in the Menomonee River Watershed

Subwatershed	Point Sources				Nonpoint Sources			
	Industrial Point Sources (trillions of cells)	SSOs (trillions of cells)	CSOs (trillions of cells)	Subtotal (trillions of cells)	Urban (trillions of cells)	Rural (trillions of cells)	Subtotal (trillions of cells)	Total (trillions of cells)
Butler Ditch	0.00	6.07	0.00	6.07	223.75	0.46	224.21	230.28
Honey Creek	0.00	9.01	0.00	9.01	2,342.61	0.14	2,342.75	2,351.76
Lilly Creek	0.00	0.00	0.00	0.00	199.31	1.25	200.56	200.56
Little Menomonee Creek .	0.00	0.00	0.00	0.00	65.43	84.91	150.34	150.34
Little Menomonee River .	0.00	0.52	0.00	0.52	2,097.81	105.28	2,203.09	2,203.61
Lower Menomonee River	0.00	604.24	1,727.39	2,331.63	4,067.91	0.28	4,068.19	6,399.82
North Branch Menomonee River	0.00	0.00	0.00	0.00	9.30	7.82	17.12	17.12
Nor-X-Way Channel	0.00	0.00	0.00	0.00	256.06	48.78	304.84	304.84
Underwood Creek	0.00	16.33	0.00	16.33	3,454.09	1.67	3,455.76	3,472.09
Upper Menomonee River	0.00	4.65	0.00	4.65	1,274.47	79.98	1,354.45	1,359.10
West Branch Menomonee River	0.00	0.00	0.00	0.00	62.41	16.80	79.21	79.21
Willow Creek	0.00	0.00	0.00	0.00	58.69	45.74	104.43	104.43
Total	0.00	640.82	1,727.39	2,368.21	14,111.84	393.11	14,504.95	16,873.16
Percent of Total Load	0.0	3.8	10.2	14.0	83.7	2.3	86.0	100.0

(SEWRPC 2007 – Technical Report No. 39)

Table 3. Average Annual Loads of Total Suspended Solids in the Menomonee River Watershed

Subwatershed	Point Sources				Nonpoint Sources			
	Industrial Point Sources (pounds)	SSOs (pounds)	CSOs (pounds)	Subtotal (pounds)	Urban (pounds)	Rural (pounds)	Subtotal (pounds)	Total (pounds)
Butler Ditch	0	320	0	320	689,190	8,000	697,190	697,510
Honey Creek	800	470	0	1,270	1,874,860	2,400	1,877,260	1,878,530
Lilly Creek	0	0	0	0	666,000	53,720	719,720	719,720
Little Menomonee Creek .	0	0	0	0	58,630	205,820	264,450	264,450
Little Menomonee River ..	2,530	30	0	2,560	1,976,270	437,140	2,413,410	2,415,970
Lower Menomonee River	51,660	31,670	182,960	266,290	4,001,330	10,180	4,011,510	4,277,800
North Branch Menomonee River	0	0	0	0	27,660	117,390	145,050	145,050
Nor-X-Way Channel	280	0	0	280	478,790	351,000	829,790	830,070
Underwood Creek	90	860	0	950	3,031,420	46,540	3,077,960	3,078,910
Upper Menomonee River	3,380	240	0	3,620	2,504,060	462,670	2,966,730	2,970,350
West Branch Menomonee River	0	0	0	0	232,070	103,580	335,650	335,650
Willow Creek	0	0	0	0	197,990	151,790	349,780	349,780
Total	58,740	33,590	182,960	275,290	15,738,270	1,950,230	17,688,500	17,963,790
Percent of Total Load	0.3	0.2	1.0	1.5	87.6	10.9	98.5	100.0

(SEWRPC 2007 – Technical Report No. 39)

Question #3: What are critical environmental conditions for the pollutants or stressors of concern?

As defined in the Technical Guidance, critical environmental conditions are the environmental conditions in the waterbody where controls designed to protect those conditions will ensure attainment of water quality standards and goals for all other conditions. These conditions could include a combination of factors (e.g., stream flow, temperature) and might actually occur infrequently. Depending on the pollutant or stressor of concern and the sources of those pollutants and stressors, critical conditions might occur during low stream flow, runoff events, rainfall events, or hot and dry periods.

OPTIONS BASED ON POTENTIAL ANSWERS TO QUESTION #3

Critical environmental conditions unknown because of insufficient data

- Monitoring consortium development

Critical conditions are well defined, but vary by pollutant

- Consider narrowing the scope of the watershed analysis
- Continue to Question #4 – additional watershed-based approaches possible

Critical conditions are well defined and consistent for pollutants of concern

- Wet-weather integration (if wet weather conditions are critical)
- Indicator development for watershed-based stormwater management (if wet-weather conditions are critical)
- Continue to Question #4 – additional watershed-based approaches are possible

The US EPA Technical Guidance suggests reviewing the applicable water quality standards or written water quality goals for the waterbody for information about critical conditions. The SEWRPC has already analyzed previous monitoring data for the Milwaukee area watersheds which is documented in the RWQMPU (Planning Report No. 50 and Technical Report No. 39). The Report developed water quality summary statistics for 106 water quality assessment points within the study area, evaluating compliance with water quality standards/criteria.

The Technical Guidance also recommends examining the nature of the pollutants or stressors, their impacts, and the potential sources to ensure an understanding of critical conditions. The SEWRPC RWQMPU also evaluates wet and dry-weather loading to local waterbodies. For each of the watersheds, daily average loads of six pollutants—total phosphorus, total suspended solids, fecal coliform bacteria, total nitrogen, biochemical oxygen demand, and copper, were estimated for both wet-weather and dry-weather conditions for one or two sites based upon flow and water quality data. For all watersheds, the loads detected during wet-weather periods were considerably higher than the loads detected during dry-weather periods.

Identifying wet weather as the critical condition for each of the pollutants of concern in the Greater Milwaukee Watersheds is helpful in identifying the level of complexity of the issues in this region. Based on the data available there is a clear linkage between pollutants (bacteria, phosphorus, and suspended solids) and urban stormwater. As outlined in the box above, there are several options available, which will be discussed in more depth, below.

Question #4: In what quantities or to what degree do point and nonpoint sources contribute pollutants or stressors in the watershed?

This step requires that, after defining critical conditions in the watershed, available data be analyzed to determine whether point and nonpoint source contributions of pollutants of concern at critical conditions have been quantified through monitoring or have been modeled.

As discussed above, contributions of pollutants of concern have been analyzed for both point and nonpoint sources in the Milwaukee area watersheds. This has included evaluating both monitoring data as well as assessing instream water quality conditions through modeling existing (year 2000), planned (year 2020), and recommended RWQMPU conditions.

As explained in the Technical Guidance, understanding the relationship between point and nonpoint sources is important to understanding if point sources in the watershed contribute enough of the pollutant load, relative to nonpoint sources, to warrant a watershed-based approach. **Although there is significant information available to make this determination, a rough estimate of relative contributions is all that is necessary to make this assessment.** For example, because urban stormwater is a significant source of pollutants for the parameters of concern addressed above in Tables 1, 2 and 3, as are industrial point sources for phosphorus, point sources can be identified as significant contributors of certain pollutants in the Menomonee River watershed.

Question #5: How are point and nonpoint sources related spatially and temporally?
As stated in the US EPA Technical Guidance, consideration should be given to defining the spatial and temporal relationships among contributing sources. Understanding relationships among sources is especially important for implementing a successful trading program, if this approach is ultimately pursued by the Group. For pollutants with watershed-wide or regional effects, contributions at one point in a watershed are not necessarily equivalent to contributions at another point in the watershed in terms of their overall impact on the watershed.

The Technical Guidance provides the example of a lake that has experienced nuisance aquatic plant growth and dissolved oxygen sags resulting from nutrient enriched water. Total phosphorus has been identified as a

OPTIONS BASED ON POTENTIAL ANSWERS TO QUESTION#4

Relative contributions unknown because of insufficient data

- Monitoring consortium development
- Watershed management plan development
- TMDL development and implementation support
- Statewide rotating basin planning

Pollutants predominantly contributed by nonpoint sources

- State-approved watershed management plan development and implementation
- Section 319 nonpoint source management program and watershed planning

Point sources are significant contributors*

- NPDES permit development on a watershed basis
- Water quality trading
- Permit synchronization
- Continue to Question #5 – additional watershed-based approaches are possible

*Note that "point sources" as defined here by EPA include permitted urban stormwater sources.

Spatial and temporal relationships unknown because of insufficient data

- NPDES permit development on a watershed basis
- Monitoring consortium development
- TMDL development and implementation support
- Statewide rotating basin planning
- Permit synchronization

Spatial and temporal relationships well defined

- NPDES permit development on a watershed basis
- Water quality trading
- Permit synchronization
- Statewide rotating basin planning

pollutant of concern. Nine sources of phosphorus have been shown to contribute loads to the basin. These sources are along the river that feeds the lake. One of the sources, a publicly owned treatment works (POTW), is a permitted point source upstream of the lake, but 20 miles downstream of an irrigation return flow to the river. A farm, an agricultural nonpoint source, is the only source discharging phosphorus to the irrigation return ditch. In addition, there is an agriculture diversion that diverts 75 percent of the river flow between the farm and the POTW. Total phosphorus discharges from the farm and the POTW would not have the same relative impact on the downstream lake. First, the phosphorus is likely to be in different forms—soluble from the POTW and non-soluble from the farm. Second, the distance between the farm and the POTW and the significant agricultural diversion between the two sources mean that even phosphorus discharges from the two sources that are in the same form would not have equal impact on the lake. The regulatory authority would need to quantify the relationship between the effects of a pound of phosphorus discharged by the farm and a pound of phosphorus discharged by the POTW to determine an approach for effectively managing water quality in the lake. It might be helpful to use equations and models that have been developed to estimate the decay rate, or attenuation, of water quality pollutants to account for spatial relationships in calculating the relative contributions of various sources in a watershed.

Answering the question of how point and nonpoint sources are related in the Greater Milwaukee Watersheds will, of course, depend on the scale chosen for the project. Urban stormwater permittees (covered under the WPDES permitting program) cover a vast majority of the watersheds. The location of other point sources, such as CSOs, SSOs, or industrial sources vary by watershed. Additionally, there may be temporal variability with other sources, such as from agricultural sources, or temperature impacts on pollutants during warmer summer months. Much of the monitoring and modeling data already exists in the SEWRPC plans and will be utilized in the upcoming watershed plans. Further discussion of the scale of this approach will be helpful at this point. The approaches could include addressing only one watershed (i.e., the Menomonee or the Kinnicknnic River watershed), assess all watersheds in the Greater Milwaukee area; or consider all watersheds at the same time, but address them each separately, but include coordination between the watersheds given they all ultimately impact Lake Michigan.

Navigator Element 3: Construct an NPDES Watershed Framework

There are a range of options possible for a watershed-based approach. Ultimately, the option that is chosen for the region will be based on the condition of the selected watershed and specific pollutants of concern and watershed goals identified by the Group. The Group may also choose to pursue all or a subset of these approaches according to stakeholder priorities and the comfort level of the permitting authority. The questions below walk through the range of possible implementation options.

Navigator Element 3 - Question #1: What are the implementation options to consider in constructing an NPDES watershed framework?

Although an NPDES watershed framework should focus primarily on programs and approaches directly related to NPDES program implementation and activities, other water programs influence NPDES implementation and local water quality and may also be included in this approach. EPA has identified a number of implementation options to consider under an NPDES watershed-based approach including:

- NPDES Permit Development and Issuance on a Watershed-basis
- Water Quality Trading
- Wet-Weather Integration
- Indicator Development for Watershed-based Stormwater Management
- TMDL Development and Implementation Support
- Monitoring Consortium Development
- Permit Synchronization
- Statewide Rotating Basin Planning Approach
- State-Approved Watershed Management Plan Development and Implementation
- Section 319 Nonpoint Source Management Program and Watershed Planning
- Source Water Protection Plan Development and Implementation.

As stated previously, the watershed-based approach is very flexible. Approaches that have been used elsewhere can be modified to meet the local requirements, the local issues, and the comfort level of the Group as well as the permitting authority. The Group might choose only one or two of these approaches for inclusion into the approach for the Greater Milwaukee Watersheds, or the Group could design a comprehensive framework that incorporates a suite of these approaches. Below several approaches are identified and discussed further that may be of most interest to stakeholders in the Milwaukee area and most applicable to the specific situation in the region.

NPDES Permit Development and Issuance on a Watershed Basis

As the Group walks through each of the steps identified above the associated questions could either be answered or possibly initial thoughts or ideas might be facilitated. Because of the amount of work that has already been achieved collecting and analyzing data on the watersheds in the region, conditions in the watershed are well understood. It is also known that there are common stressors or pollutants of concern among sources in the watersheds and that certain point sources most notably urban stormwater sources have a significant impact in the watersheds. Given this scenario, developing and issuing NPDES permits on a watershed basis is an appropriate approach for addressing point source loads of one or more pollutants. As stated earlier, in cases where there are multiple sources contributing the same pollutants and those pollutants have primarily far-field or additive effects, a watershed-based permit is appropriate. The types of permits that might be considered for a watershed will vary depending on the specific conditions and types of dischargers within a watershed (again, this would depend on the scale of the project – choose one specific watershed such as the Menomonee River watershed – or scale the project up to the encompass the Greater Milwaukee area). The permit types that are available under this approach include coordinated individual permits, integrated municipal permits, and multisource watershed-based permits. Each of these permit types is discussed in greater detail below.

Coordinated Individual Permits - This permitting approach is the closest to traditional NPDES permitting in that each discharger receives an individual permit. The difference is that water quality based effluent limits (WQBELs) and other conditions of coordinated individual permits (such as monitoring) are developed using a holistic analysis of the watershed conditions rather than being established to ensure attainment of water quality standards on a permit-by-permit basis. Often where permits are developed on a permit-by-permit basis assumptions are made regarding other sources that are not realistic such as zero contribution of pollutants or zero background loadings. Given the extensive monitoring and modeling of watersheds such as the Menomonee and Kinnickinnic, this holistic analysis is (or soon will be) complete to serve as a basis for this approach.

Watershed characteristics leading to consideration of this option: common stressors or sources of pollutants of concern; critical environmental conditions are defined; point and nonpoint source contributions are understood, at least for the pollutant(s) of concern; point sources contribute a notable portion of the pollutant load or there are significant differences among the loadings contributed by various point sources, or there are a number of point sources with similar types of discharges.

With this approach, the individual permits are designed to meet watershed-specific goals (e.g., comprehensive watershed monitoring, nutrient reduction). The permitting authority may re-issue permits to single dischargers or modify existing single discharger permits. To strengthen the coordination among individual permits, expiration and reissuance or effective dates should also be synchronized. By synchronizing permit issuance it ensures that the data used to make permit decisions are consistent and the data collected will also be consistent across the permits and the watershed.

Integrated Municipal NPDES Permit Coverage - This approach is most often applicable in cases where all municipal discharges are under the ownership of a single entity. In cases where there is single ownership the permitting authority may bundle a number of point source permit requirements for a municipality (POTWs, combined sewer overflows [CSOs], biosolids, pretreatment, and stormwater, including municipally owned industrial activities such as public works and utility yards) into a single permit. In cases where the treatment plants, stormwater, CSOs (if applicable), and other municipally controlled point source activities are all under single ownership, the permitting authority could consider one permit that covers and integrates all NPDES requirements. Ideally, these activities would take place within the boundaries of the same watershed. This approach may reduce the administrative burden for both the permittee and permitting authority (e.g., one application, one public notice and public hearing, one compliance report) and allow the permitting authority to develop permit conditions (limitations and monitoring requirements) that specifically address existing watershed goals and watershed management plans. In the case of the Greater Milwaukee Watersheds, this may still be done instead of a permit with a single owner, there would be multiple owners and they would be considered co-permittees under a single permit with permit language clearly delineating compliance liability (e.g., language in the Neuse River NPDES permit) (NCDENR 2004). The permit conditions would be developed using the same process as for an integrated municipal permit, but the issuance of the permit would be done differently to recognize the different owners.

Multi-source Watershed-based Permit - This type of permitting approach is also a single permit and would cover multiple sources included in the same watershed, watershed plan, or TMDL. It

would allow several point sources in a watershed to apply for and obtain permit coverage under the same permit. This type of permit might be appropriate in situations where a watershed plan, such as one developed for the Menomonee River or Kinnicknick River watersheds, identifies the need to address a specific pollutant(s). A watershed plan might include agreed-upon controls necessary to achieve watershed goals. Stakeholders can then identify point sources that would be logical to group under a single permit.

Some permitting authorities have chosen to issue a single watershed-based permit that supplements or overlays the existing individual permits for the covered facilities. This approach allows the permitting authority to focus effluent limitations, monitoring requirements, trading provisions, and other special permit conditions that are developed on a watershed basis in a single permit and clearly links the permitted facilities in a way that simply incorporating watershed-based permit conditions into individual permits does not accomplish. The permit would identify all point sources that have agreed to the controls and the individual specific requirements for each point source. An example is a permit that includes control requirements for nutrients issued to all POTWs in the watershed and requires specific nutrient reductions that reflect agreed-upon goals and, possibly, trades. This same approach could be used for multiple types of discharges such as POTWs, stormwater, CSOs, etc. to address the same pollutant such as TSS or nutrients. This permit might be issued in addition to the existing individual permits and, if so, would include limitations or controls to address only the watershed-specific common pollutant or pollutants. Other pollutants would continue to be addressed through each facility's individual permit.

Wet-Weather Integration

Wet-weather integration is an approach to address wet-weather discharges in a holistic manner to provide for greater efficiency, more comprehensive planning, less redundancy among permitting requirements, and better water quality outcomes. It is focused on urban areas that include permitted wastewater treatment facilities and sewer systems, such as that in the Greater Milwaukee Watersheds.

Watershed characteristics leading to consideration of this option: identified critical conditions occur during wet weather; predominantly urban or urbanizing watershed, or watershed with multiple wet-weather problems competing for the same resources.

The major drivers of wet weather integration are all found in the Greater Milwaukee Watersheds – multiple programs driven by wet weather events, shared common pollutants between the program, and hydraulic connectivity of the systems. Wet-weather integration can include not only WPDES programs, but also other issues such as non-point source discharges, which are also an issue in the region. As addressed in US EPA's Technical Guidance, wet-weather integration includes:

- Unifying individual WPDES permits and programs, and consolidating and streamlining their overlapping requirements
- Coordinating with water quality standards programs and enforcement and compliance programs across an urban area (municipal footprint)
- Coordinating with the development and implementation of TMDLs

- Considering the water quality goals and objectives of existing watershed management plans and the resources needed to address pollutant loads and setting priorities
- Planning and developing solutions across all municipal wet-weather programs to achieve the best environmental benefits at a reasonable or lower cost.

This approach could be tied together with an integrated wet-weather permit approach as is discussed above ("NPDES Permit Development and Issuance on a Watershed Basis").

A guiding principle for the integration of wet-weather programs is reducing the volume of water entering sewer systems (sanitary, combined, and storm sewers) for example focusing on infiltration reuse, and evapotransporation techniques rather than traditional stormwater controls. Methods to reduce water volume through this approach are less focused on end of pipe treatment and more on initiatives such as the reduction of inflow and infiltration, natural infiltration (low impact development, LID), and water conservation. Entities, such as MMSD, are already encouraging the use of LID, in recognition of the principles of wet-weather integration.

Indicator Development for Watershed-based Stormwater Management

Excessive stormwater runoff is often the cause for aquatic life impairment because of the relationship among stormwater runoff volume, pollutant loadings, and habitat degradation. The connections between these stressors are very complex, posing a unique challenge for effectively managing stormwater and tracking progress toward water quality standards attainment. US EPA and several states have begun using stormwater/hydrologic targets, or indicators, for use in developing and implementing stormwater TMDLs. Indicators might include a percent reduction in annual surface runoff volume or a percent reduction in peak runoff rates for a specific design storm. Using stormwater/hydrologic indicators is based on the premise that the hydrologic condition of a watershed where streams have aquatic life impairments related to stormwater is a surrogate for the pollutant and non-pollutant stressors contributing to those impairments.

Watershed characteristics leading to consideration of this option: multiple sources of pollutant loads; critical conditions identified and occur during wet weather.

For aquatic life impairments, there often is not one specific pollutant of concern; instead, the impairment may be caused by a mix of pollutants and physical alterations to the stream system. In Vermont, TMDLs use stormwater as it represents a combination of stressors. The use of this surrogate has the primary benefit of addressing the physical impacts to the stream channel caused by stormwater runoff such as sediment release from channel erosion and scour from increased flows. These physical alterations to the stream are substantial contributors to the aquatic life impairment. Also, reductions in stormwater runoff volume will help restore diminished base flow (increased groundwater recharge), another aquatic life stressor.

As described in US EPA's Technical Guidance, calculating percent impervious cover or runoff volume reduction as a single categorical stormwater loading promotes implementation using an adaptive, watershed-based approach. Consequently, a watershed-based stormwater permit could be an effective mechanism for implementing this phased program for attaining water quality standards. The permit could require development and implementation of the phased BMP program and periodic plan updates. The monitoring program required by the permit might include stormwater effluent monitoring, where appropriate, but also could focus on cooperative

ambient monitoring (e.g., a monitoring consortium) by the regulated community. The ambient monitoring could include biological monitoring, with follow-up stressor identification analysis to verify the appropriateness of selected BMPs.

Permit Synchronization

This implementation option focuses on coordinating expiration and reissuance of existing NPDES permits within a specified watershed. As discussed in US EPA's Technical Guidance, permit synchronization has several benefits including coordination of NPDES support activities such as biological and water quality surveys, industrial pretreatment inspections, and compliance inspections that provide up-to-date information at the time of permit issuance. An important benefit of this approach is that watershed-based needs, such as monitoring requirements or wasteload allocation (WLAs), are reflected equitably in all permits even within the standard individual permit approach, because all permits in a watershed are being considered simultaneously. Permit synchronization is currently being done in a number of states and these states have found the process to be very beneficial (see North Carolina Case Study; US EPA 2007).

Watershed characteristics leading to consideration of this option: some overlap in pollutants discharged by sources within the watershed that present the opportunity to achieve efficiencies by simultaneously analyzing watershed data for the same pollutant(s).

The feasibility of permit synchronization as an implementation option might depend the types of permits (e.g., general or individual) currently issued to dischargers in the watershed, the current timing of permit reissuance in the watershed, and determining if it is necessary to delay issuance of some permits to synchronize permit issuance on a watershed basis. It also is important to determine if all stakeholders are in support of the synchronization concept and the process to achieve synchronization.

In the Greater Milwaukee Watersheds, there are a number of permittees including MMSD (whose discharge permit is currently up for renewal), municipal stormwater permittees (such as those covered under the municipal stormwater watershed based permit in the Menomonee River watershed, which expires in 2012), and numerous other individual permittees. These permits separately will need to address the pollutants of concern. Given this fact there may be opportunities to gain efficiency while also addressing watershed-based problems. In order to address these watershed-wide problems it is necessary to look at the watershed in total and make decisions on a watershed scale rather than outfall pipe by outfall pipe.

State-Approved Watershed Management Plan Development and Implementation

Watershed management planning, such as currently being done in the Greater Milwaukee Watersheds, is an iterative process for documenting watershed goals; known, suspected, and potential pollutant sources and loadings; potential management strategies; and evaluation tools. Through the region's watershed-based management plans, stakeholders have and continue to formulate goals, identify any additional data needs, and evaluate potential pollutant control strategies. The information in the watershed plans can serve as the foundation for implementation options

Watershed characteristics leading to consideration of this option: multiple sources of pollutants or causes of environmental degradation; point and nonpoint contributions understood; local interest in protecting high quality watersheds.

under the watershed framework (such as the Screening Alternatives identified in the RWQMPU).

Navigator Element 3 - Question #2: How should priorities for implementing the components of an NPDES watershed framework be set?

There are a number of approaches available to stakeholders in the Greater Milwaukee Watersheds within a WPDES watershed framework for the pollutants of concern that have been identified. As discussed further in the Technical Guidance, a scoring system can be used to prioritize initiatives upon which to place the most focus. This approach is one option for attempting to provide a more objective approach for determining whether the overall process is appropriate. There may be other ways for making the same determination.

The Technical Guidance outlines the first step in the suggested approach as determining whether and how to group implementation options for priority setting. For the Greater Milwaukee Watersheds two initial groupings were considered in an example prioritization (see Figure 1) including (1) watershed analysis/pollutant source analysis and (2) permitting. As so much data collection and analysis has already occurred for the Greater Milwaukee Watershed, watershed analysis and pollutant source analysis were grouped to reduce redundancy. Had this level of effort not already occurred in the region, a more intensive analysis would be required to determine additional data needs, etc. These groupings represent the major activities that could be undertaken in implementing an NPDES watershed approach that focuses on watershed-based permitting as the primary implementation option. Grouping implementation options in this manner allows assessment of the implementation options based on a clear methodology for decision-making.

Once potential implementation options are listed and grouped, the Group should consider establishing criteria for setting priorities and determining the manner in which the criteria will be used to evaluate potential options or groups of options. Criteria could consider factors such as environmental impact, availability of resources, and current planning priorities. It is at this point in developing a watershed framework that the Group might need to look beyond technical feasibility and environmental impact to include administrative criteria (e.g., availability of funding) to set priorities among the possible implementation options.

One screening level method for priority setting is to develop a scoring process for all potential implementation options. For example, a scoring scale from one to three for a series of criteria could be used to evaluate each implementation option on how it compares to each criterion. The

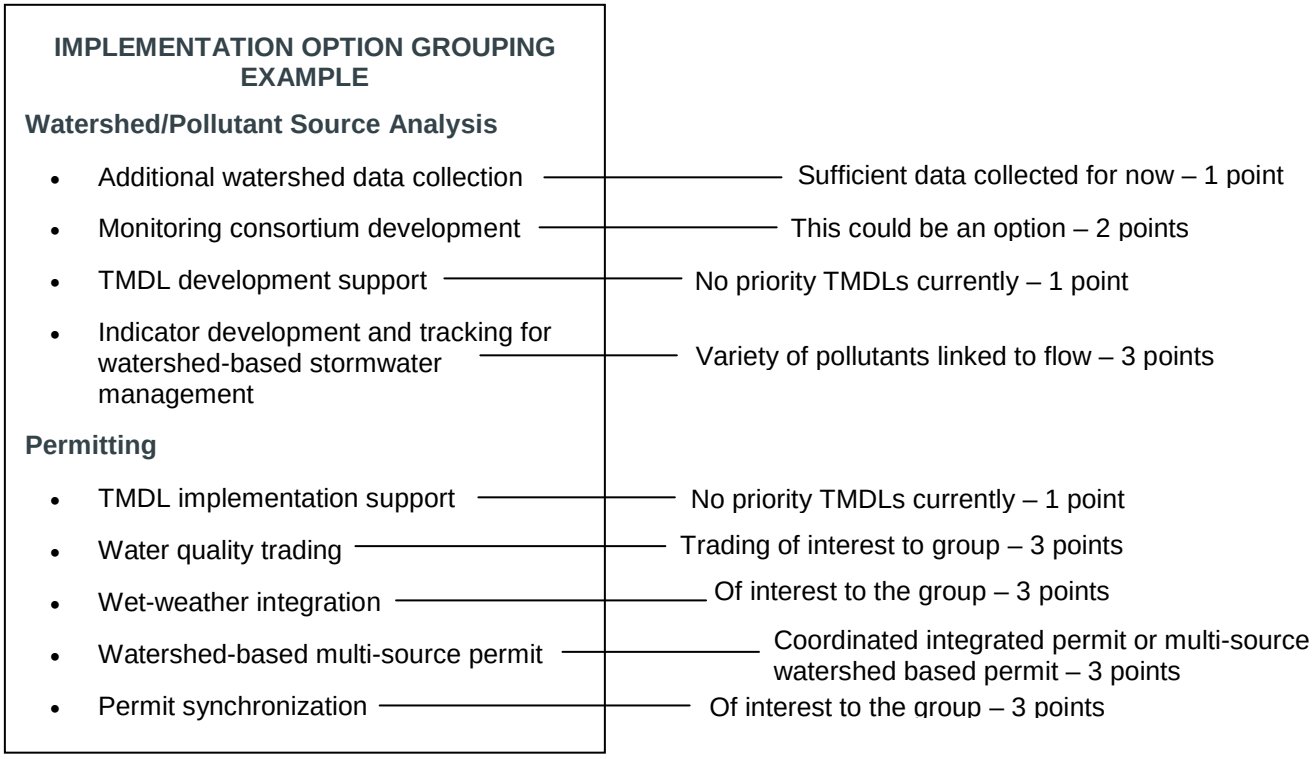

Figure 1 – Implementation option scoring

criteria can be weighted, with those most important to stakeholders receiving a higher weighting factor than others. Implementation options with the highest weighted total scores would be initially identified as potentially higher priority approaches. Such a procedure does not provide mathematical precision in ranking potential implementation options. It simply helps stakeholders get a general sense of which approach seems to best fit the Group's multiple and, sometimes, competing priorities. The Group could use the results of such an analysis to further refine its selection of the highest priority projects or approaches.

Building the Permit

Assuming that the point sources in the Greater Milwaukee Watershed decide to move forward with some form of a watershed-based permit, there are specific conditions that must be considered and included in any type of NPDES permit. Specifically:

- Technology-based effluent limitations (TBEL)
- Water quality-based effluent limitations (WQBEL)
- Numeric effluent limits vs. BMPs as effluent limits
- Monitoring and reporting requirements

The regulations require the permitting authority to issue permits requiring the permittee to meet permit limits. The regulations further require the permitting authority to include effluent limits in

the permit and that these limits be based on technology-based standards or water quality-based standards if the limits derived from technology-based standards are not stringent enough to meet water quality standards. The regulations require the NPDES permitting authority to develop limits for all outfalls (40 CFR §122.45(a)) and include the applicable technology-based limits (40 CFR §122.44(a)); if the technology-based effluent limits are not stringent enough to meet the applicable water quality standards then the permitting authority must include more stringent limits (40 CFR §122.44(d)). In setting the limits, the permitting authority is expected to set numeric limits whenever "feasible." In cases where it is infeasible to set numeric effluent limits, the permitting authority may establish BMPs that the permittee must meet (40 CFR §122.44(k)). All permits must include monitoring and reporting requirements for any pollutants for which the permitting authority has established limits in the permit. This is so the permittee may demonstrate compliance.

The permitting regulations provide flexibility regarding the process for determining the appropriate limitations. In cases where the limitations are set to meet water quality standards (water quality-based effluent limitations), it is possible to set aggregate limits or limits that are based on trading allocations. This provides flexibility to prioritize or focus pollutant control efforts on specific areas. The distinction here is that there will be controls established for all discharges, but the controls will not be uniform, rather they will be coordinated and to some degree dependent on the control at other outfalls. This approach was used in the Neuse River Compliance Association permit and approved by EPA Region 4. The permit considers the total discharge of all the POTWs in the association that discharge to the Neuse River Watershed and sets compliance based on the aggregate allocation. If compliance is not achieved for the aggregate discharge limit, then individual allocations are considered.

Many of the discharges that need to be controlled are discharges due to wet weather events and are best handled by BMPs. US EPA has issued many guidance manuals and policies regarding wet weather impacts and how to address wet weather issues in permits. This BMP approach is consistent with US EPA guidance for addressing non-continuous discharges. Specifically, the 2002 Wayland and Hanlon memo, "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs" and the 1996 memo from Robert Perciasepe, "Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits" explain that BMPs are preferred when discharges "are highly variable in frequency and duration and are not easily characterized." The Perciasepe memo goes on to state, "only in rare cases will it be feasible or appropriate to establish numeric limits." Due to the nature of the stormwater discharges – variable frequency, duration and volume, and unpredictable as far as location – there is no clear way to arrive at a numeric effluent limit. Because it is infeasible to calculate a numeric limit, BMPs are required in the permit as the effluent limitations (see 40 CFR §122.44(k)). This BMP approach is also consistent with 40 CFR §122.45(e)(1).

In order to include flexibility in the permit, the Fact Sheet will need to be written to clearly explain how the permit is consistent with the regulations and also explain how the limitations meet both technology and water quality-based requirements. The watershed restoration plans will be very important for this part of the process. The watershed restoration plans will be used to demonstrate where control is needed and how the control will ensure water quality standards are being addressed.

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