Appendix 7. Additional Considerations

In accordance with House Bill 49 of the 132nd General Assembly and Sections 6111.562(B) and (C) of the Ohio Revised Code (***codes.ohio.gov/ohio-revised-code/section-6111.562***), additional factors shall be considered and evaluated by Ohio EPA prior to the finalization of a Total Maximum Daily Load (TMDL) report after September 29, 2017. This Appendix serves to document the Agency's considerations and evaluations as required by the statute to the extent possible given the unique nature of this project. Considerations are divided by this appendix's subsections.

In addition, Section 6111.561 of the Ohio Revised Code (***codes.ohio.gov/ohio-revised-code/section-6111.561***) requires Ohio EPA to establish each TMDL at a level necessary to achieve the applicable water quality standards for which the water of the state is impaired that accounts for seasonal variations, and lack of knowledge concerning the relationship between effluent limitations and water quality (referred to as the margin of safety). This information can be found in Sections 2 and 6 of the TMDL report. Section 6111.563 of the Ohio Revised Code (***codes.ohio.gov/ohio-revised-code/section-6111.563***) requires the official draft TMDL to include an estimate of the total amount of each pollutant that causes water quality impairment from all sources and an estimate of the total amount of pollutants that may be added to the water of the state while still allowing the water of the state to achieve and maintain applicable water quality standards. This information is in Section 6 of the report.

A7.1. The relative contribution of pollutant loading between point sources and nonpoint sources (ORC 6111.562 [B][1])

The Maumee watershed is predominantly rural and used for agricultural production, but it also contains some heavily urbanized areas and forested lands. Additional information on land use and land cover can be found in Section 2 of the MWN TMDL report.

A detailed source assessment for phosphorus – in both its total and dissolved reactive forms – is available in Section 4.2 of the report. This source assessment leverages an extensive amount of water quality observations and studies that have been conducted in the Maumee watershed. It intends to identify and characterize pollutant sources by type, magnitude, and location. Total phosphorus loads are divided into three broad source categories based on Ohio EPA's Nutrient Mass Balance study: National Pollutant Discharge Elimination System (NPDES), home sewage treatment systems (HSTS), and nonpoint source (NPS).

NPDES

The NPDES load is made up of the individual NPDES permits and consists mostly of effluent from public wastewater treatment plants. However, the NPDES load also includes several other point sources that can be broken down into different categories including NPDES, stormwater, and beneficial use. Table A7.1 provides a summary of the different types of NPDES permitted sources that were considered in this source assessment.

Table A7.1. Summary of types of NPDES permitted sources. Detailed categories that are shaded in gray are not included in the phosphorus TMDL wasteload allocations.

Program	Permit type	Major category	Detailed category
Treatment Facilities: Point source pipe(s) directly contributing waste to surface waters	**Individual NPDES Permit**: Facility-specific permits issued for each facility	**Public**: Treats most of the municipal/human waste, most often delivered from public sewer systems	Major: Plants that are permitted to treat about 1 million gallons a day or more
			Minor: Plants that are permitted to treat less than 1 million gallons a day
		Industrial: Facilities that treat waste from industrial processes	Phosphorus discharging: Mostly commercial plants treating phosphorus at concentrations requiring treatment (e.g., food processing facilities)
			Non-phosphorus discharging: Discharging plants that do not treat phosphorus at concentrations greater than background (e.g., most drinking water treatment plants)
		Concentrated Animal Feeding Operation (CAFO)	Livestock operations meeting certain criteria requiring an individual permit; none in the Maumee watershed
	General: Permits that cover facilities with similar operations and wastewater characteristics	Phosphorus discharging	Discharging general permits considered to contribute phosphorus at concentrations greater than background; these include household sewage treatment systems and small sanitary discharges
		Non-phosphorus discharging	The several discharging general permits not considered to contribute phosphorus at concentrations greater than background
Stormwater	**Individual**: Facility-specific permits	Facility based	Stormwater controls measures and pollution prevention provisions, very often included within individual treatment facility permits
		Municipal based	Phase I Individual MS4 Permits
	General: Permits that cover facilities or areas with similar operations	Facility based	Construction and multi-sector industrial general stormwater permits (i.e., MSGP)
		Municipal based	Phase II Small MS4 General Permit
Beneficial Use	**Beneficial Use of Materials**: Discharge of these materials is prohibited	Biosolids	Field application of biosolids generated by publicly owned treatment works in Ohio
		Land application	Wastewater treatment effluent irrigation
			Industrial waste used for agronomic benefit

The "major" municipal NPDES wastewater treatment plants, those treating sewage from the largest populated areas, contribute the greatest proportion of phosphorus in the NPDES category. Permitted stormwater from urbanized areas, some industrial sources, and many small sources of NPDES permitted phosphorus are also included in this discussion. Section 4.1.2. of the report discusses these facilities, as well as other permitted facilities in the watershed, at length.

Since stormwater behaves similarly to nonpoint source pollution in that it is driven by precipitation, Ohio EPA's Nutrient Mass Balance report groups stormwater within the broad nonpoint source category. However, the Clean Water Act requires that some stormwater is permitted and that stormwater must be included within the point

source wasteload allocation of the TMDL. The land area covered by stormwater permits has been estimated for this project at 4.3 percent of the total watershed area.

In analysis carried out for Ohio's 2020 Domestic Action Plan, far-field total phosphorus targets were developed for small watershed management units. In that analysis, the state considered all developed land runoff to contribute load total phosphorus at a rate half that from agricultural lands. Section 4.1.2.2 of the draft TMDL report further evaluates stormwater sources of total phosphorus and DRP.

Overall, biosolids are a small source of agricultural nutrients in the Maumee watershed. On average, biosolids were beneficially used as a source of agricultural nutrients on less than 3,000 acres per year in the Maumee watershed from 2016 to 2020. There are three facilities authorized to land apply treated effluent and five facilities beneficially reusing liquid industrial waste with Ohio EPA state permits. These facilities will not receive a wasteload allocation in the TMDL. More information on biosolids and land application can be found in Section 4.1.2.3.

Figure A7.1, taken from Section 4.1.2.1 of the MWN TMDL, provides a breakdown of the NPDES proportion of total phosphorus in the Maumee watershed, and then further divides that amount into the treatment facility categories.

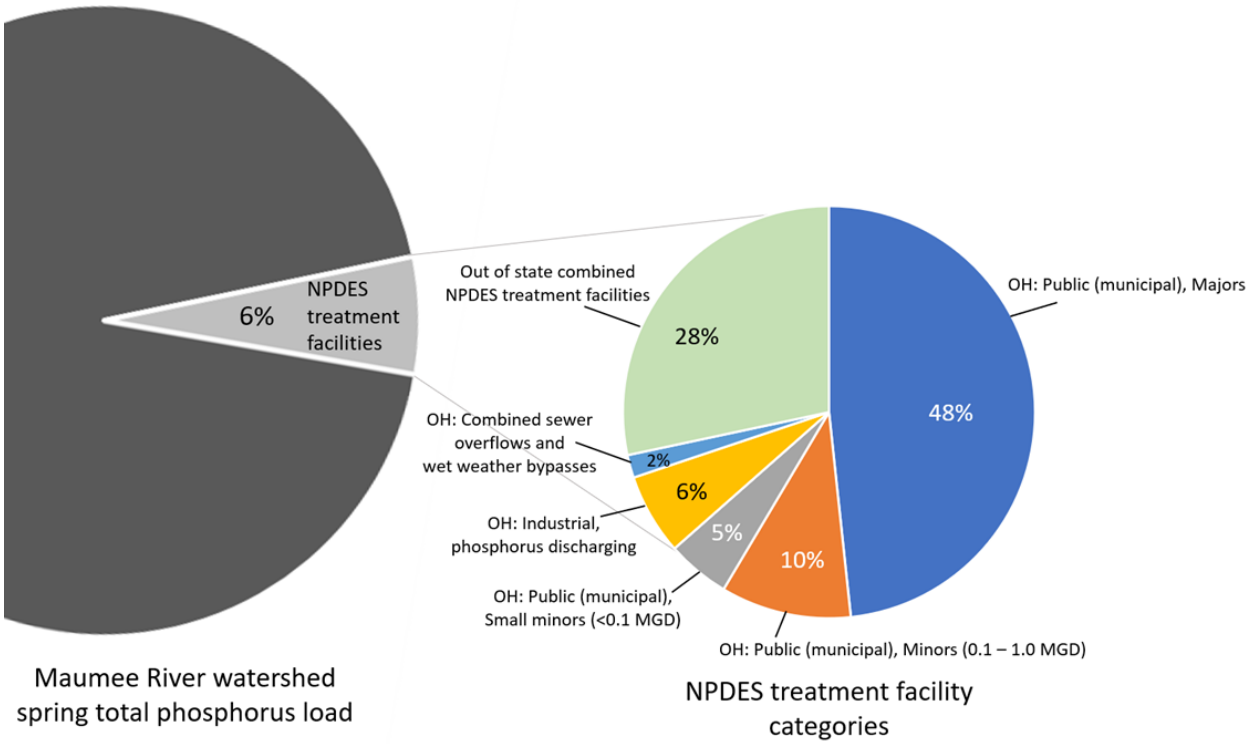

Figure A7.1. The left pie chart shows the five-year (2015-2019) average spring season total phosphorus Maumee River watershed load proportion of NPDES treatment facilities. The right pie chart breaks that 6 percent down by treatment facility categories. (Ohio EPA, 2020b)

HSTS

Section 4.1.3 discusses how HSTS were considered in the development of this TMDL. In the TMDL accounting, phosphorus loads from HSTS can be considered nonpoint or point sources depending on if the HSTS is permitted. Non-discharging systems are not covered by Ohio EPA's HSTS general permit. Their load is accounted for as a nonpoint source in the TMDL's load allocation. By design, discharging systems contribute a phosphorus load to the watershed. Because these are a permitted source, the loads fall into the point source category for TMDLs and are included in the wasteload allocation.

Ohio's Nutrient Mass Balance Report finds HSTS to contribute the smallest total phosphorus load to the Maumee watershed among its three coarse source categories (NPDES, HSTS, NPS). This is 2 percent for the average spring loading season.

Nonpoint Source

Extensive review of potential nonpoint sources of phosphorus in the WLEB can be found in Section 4.1.1 of the report. The source assessment considers row crop fertilizer sources: commercial and manure; agricultural soil and legacy sources; non-agricultural stormwater sources; ditch and streamside sources; natural sources; atmospheric deposition; and changes in watershed hydrology. Several studies have confirmed that a large majority of the phosphorus loads are the result of nonpoint sources. While a range of analyses share this finding, this TMDL does not rely on a single, definitive accounting for the proportions of detailed sources.

Acquired from Section 4.3 of the report, Table A7.2 shows the varying sources of phosphorus in the watershed – both point and nonpoint sources – that were evaluated for this assessment.

Table A7.2. Summary of various phosphorus sources in the Maumee watershed.

	Sources	Subcategory	Primarily driven by hydrology?
Nonpoint sources	Agricultural fertilizer	Commercial	Yes
		Manure	Yes
	Sediment sources	Soil erosion	Yes
		Legacy	Yes
	Streambank erosion		Yes
	Instream (stored P export)		Sometimes
	Nonpoint stormwater		Yes
	Nonpoint (onsite) HSTS		No
	Natural lands		Yes
Point sources	Wastewater treatment plants	Individual NPDES	No
		General NPDES	No
	Permitted stormwater	MS4 NPDES	Yes
		General facility- based NPDES	Yes
		General construction NPDES	Yes
	Discharging HSTS		No
	Agricultural fertilizer	Biosolids	Yes

A7.2. The flow dynamics, including but not limited to, periodic or seasonal flow variations, runoff, groundwater, and hydrologic or channel modifications (ORC 6111.562 [B][2])

Section 2 of the report contains detailed information on the hydrology and characteristics of the Maumee watershed including land cover, percent of impervious cover, geology and soils, climate, and hydrology. Section 4 of the TMDL, the source assessment, provides an in-depth analysis of the potential sources of phosphorus in the WLEB. In this analysis, considerations are taken for seasonal flow variations, runoff, groundwater, and hydrologic

or channel modifications, as well as many other variables. Periodic or seasonal flow variations are also discussed at length in Section 5, where the modeling methods, targets, and initial TMDL allocations of total phosphorus are presented. Lastly, these variables are again addressed in Section 7, where the implementation plan is outlined.

The source assessment is intended to provide guidance on pollutant reduction implementation recommendations. This includes those that are seasonal in nature and explicitly address the spring runoff and its relationship to relevant seasonal agricultural practices such as fertilizer application. Changes in precipitation amount, timing, and intensity present a complicating challenge to nonpoint source control of phosphorus. Overall, the studies discussed in Section 4.1.1 imply that land management plays as much as or greater role than hydrology on increasing nutrient loads in the Maumee watershed. Moreover, precipitation factors and land management have had an additive impact on increasing nutrient loads.

Hydrology directly plays a role in all nonpoint sources discussed in Section 4.1.1 as well as permitted stormwater sources which are described in Section 4.1.2.2. Increased rainfall in the Maumee watershed has, and most likely will continue to, exacerbate controlling these sources. Regardless of modeling findings that indicate climate warming may offset some of these issues due to increased evapotranspiration and decreased snowfall in the watershed, hydrology must be considered when recommending, planning, and designing nutrient controls.

This TMDL addresses impairments that are a result of HABs occurring in western Lake Erie during the summer and fall seasons, and several aspects of this project directly consider seasonal variation in loading and lake response (Section 5.7.1). The phosphorus that directly contributes to the growth of the HABs was determined to be primarily delivered with springtime snowmelt and rain. This resulted in targets limited to phosphorus delivered to Lake Erie from the Maumee River in the "spring" March 1 through July 31 period each year; therefore, TMDL allocations are only applicable during this spring season.

Section 7 again factors in what changes in hydrology, seasonality, and other flow dynamics have on the contribution of phosphorus to the Maumee watershed when considering management strategies to address impairment. Addressing nutrients in the watershed includes considerations of managing the water volume, not just the concentrations of nutrients. Natural infrastructure and controlled drainage have been identified as cost-effective management practices directed at water management. These practices help store water on the landscape so it can infiltrate or be lost through evapotranspiration.

A7.3. The degree to which point source reductions would influence attainment of applicable water quality standards for which the water of the state is impaired (ORC 6111.562 [B][3])

The degree to which point source reductions influence attainment of applicable water quality standards for which a water is impaired is discussed in Section 4.1.2. This section explains wastewater treatment facilities currently discharge well below their permitted allowance for phosphorus and provides information on existing point source reduction efforts. The allocations for the wastewater treatment facilities are based on an objective of preserving the baseline total phosphorus reductions already realized by this source. While this does not result in new reductions from what is currently being discharged, it effectively eliminates capacity between the currently authorized and actual loads.

Section 5.4 discusses the wasteload allocations for this TMDL project. The potential that phosphorus reductions can be met in the fashion outlined by the methods presented in this section has been carefully considered.

Point source management is discussed in Sections 7.3.1 and 7.3.2 in the report. These sections detail implementation strategies for wastewater treatment facilities and permitted stormwater sources, and to what degree implementation of these practices would influence phosphorus reductions in the watershed.

A7.4. The degree to which nonpoint source reductions would influence attainment of the applicable water quality standards for which the water of the state is impaired (ORC 6111.562 [B][4])

Section 5.3.6 discusses the load allocations for this TMDL project. The potential that phosphorus reductions can be met in the fashion outlined by the methods presented in this section has been carefully considered.

As mentioned in Section A7.1, most phosphorus loads are the result of nonpoint sources. The source assessment (Section 4.1.1) intends to take a weight of evidence approach towards phosphorus sources. Many sources contribute to the phosphorus load, but nonpoint source, particularly from agriculture, dominate this load. While a range of analyses share this finding, this TMDL does not rely on a single, definitive accounting for the proportions of detailed sources.

Due to the nature of this allocation calculation method, and the way nonpoint source implementation actions are proposed, the nonpoint source landscape load allocation is not itemized by land use or any other means – just one total allocation value is provided. A separate load allocation for the onsite HSTS is provided in the results section of the report. The sum of the nonpoint source landscape and onsite HSTS allocations is the total load allocation.

Nonpoint source management is examined in Section 7.3.3 in the report. This section discusses implementation strategies for nonpoint sources of phosphorus and to what extent they would influence phosphorus reductions in the watershed.

A7.5. Reasonable assurances that reductions can be implemented (ORC 6111.562 [B][5])

When U.S. EPA approves a TMDL that allocates pollutant loads to both point and nonpoint sources, it determines whether there is reasonable assurance that the nonpoint source load allocations will be achieved and WQS will be attained. This ensures that the allocations in the TMDL are not based on overly ambitious assumptions regarding the amount of nonpoint source pollutant reductions that will occur. This is necessary because excessive projections of nonpoint source reductions could be used to offset pollutant reductions from point source allocations. Since point source allocations are required to be implemented through existing NPDES permitting programs, an unrealistic elevated nonpoint source load reduction could be considered evading more strict permitting regulations. Such a situation would also result in a failure to achieve water quality standards. Section 8 of the MWN TMDL report explains there is reasonable assurance that the nonpoint source allocations in this TMDL can be met through the commitments, collaboration, implementation activities to realize phosphorus reductions, and accountability to meet the goal.

A7.6. The site of impairment relative to the location of the source (ORC 6111.562 [B][6])

Figure 5 in the MWN TMDL report contains the locations of the impaired LEAUs applicable to this TMDL project. This figure also shows the Maumee watershed. Figure 4 in the report focuses on the LEAUs to be included in this TMDL. Ohio EPA plans to target near-field implementation in Ohio's Maumee watershed as it works to meet the far-field phosphorus targets and allocations.

A7.7. The degree to which habitat affects impairment and restoration potential (ORC 6111.562 [B][7])

Section 2 of the MWN TMDL report considers how geomorphology and hydrology play a role in the expression of HABs in the western basin of Lake Erie. The Section 2.1 describes how human disturbances have impacted eutrophication of the western basin of Lake Erie. That history shows that Lake Erie has responded to changes in phosphorus loads and the type of phosphorus. Section 3.4. describes the targets used to develop the TMDL. These targets have been met in dry years (2004 and 2012), and the algal community in those years was consistent with the levels that would show attainment of the designated uses. Together these factors show that the habitat in the western basin of Lake Erie is sufficient to support an algal community that will meet the goals of the TMDL.

A7.8. The feasibility of available demonstrated treatment technology to achieve the degree of pollutant treatment removal necessary to attain the point source reduction recommended in the TMDL wasteload allocation (ORC 6111.562 [C][1])

As referenced in section A7.3 of this appendix and discussed thoroughly in Section 4.1.2 of the TMDL, wastewater treatment facilities currently discharge well below their permitted allowance for phosphorus, so allocations for these facilities are based on the objective of preserving the baseline total phosphorus reductions that have already been realized by this source. This TMDL will introduce the concept of grouping most of the facility-based load to provide the most flexibility to permitted facilities and would be implemented via a watershed general permit. This is described in detail in Section 5.3 of the report.

Grouped wastewater treatment facilities

Facilities that are proposed to be part of the grouped load, which may result in a special TMDL general permit, are generally based on what are currently considered "majors" (Section 4.1.2). These are municipal wastewater treatment plants with an average design flow of one million gallons per day or greater. Also included will be significant minors that have an average design flow of greater than half a million gallons per day and several industrial facilities that have been previously identified as contributing significant amounts of total phosphorus. The facilities included in the grouped load are shown in Section 5.3.1. in the report.

The sum of the load that all facilities within this group contributed during the 2008 spring season is used to determine the total allowable load for the group. This reflects the objective of not exceeding the baseline load from these sources. Allowance for future growth is also reserved for new or expanding facilities in this calculation method. Below is a summary table of the different tiers for calculating wasteload allocations in the proposed grouped load.

Table A7.3. Different tiers for calculating wasteload allocations for the facilities in the proposed grouped load.

Grouped Permit WLA Tier	Description	Wasteload Allocation Calculation Method
GP1	Municipal wastewater treatment plants with average daily design flows greater 10 MGD	Average daily design flow at a total phosphorus concentration of 0.37 mg/L (the expected long term average total phosphorus discharge concentration where a 0.5 mg/L monthly limit exist) for the 153 days of the spring season.
GP2	Municipal wastewater treatment plants with average daily design flows between 1 and 10 MGD	Calculated for each facility as their average design flow divided by the sum of all the GP2 design flows and then multiplied by the remainder of load available after accounting for the other grouped permit tiers. This results in a concentration of 0.44 mg/L (~0.60 mg/L monthly limit) over the 153 days of the spring season.
GP3	Minor municipal wastewater treatment plants with average daily design flows between 0.5 and 1 MGD; several industrial facilities	Average daily design flow at a total phosphorus concentration of 0.73 mg/L (the expected long term average total phosphorus discharge concentration where a 1.0 mg/L monthly limit exist) for the 153 days of the spring season.
GPX	Industrial facilities included in grouped WLA	Calculation methods are specific to each facility and described below.
Grouped permit AFG	1.4 metric tons of total phosphorus reserved for future growth	This amount of load can accommodate new effluent treating about 6.5 MGD at the 0.37 mg/L (GP1) level.

Minor and general wastewater treatment facilities

Wastewater treatment facilities not included in the grouped permit approach contribute a relatively small portion of the total facility-based wasteload allocation. The individual wasteload allocation for each of these facilities is set based on the greatest spring season load each facility has discharged in the last five spring seasons (2017-2021). Since many of these facilities do not monitor total phosphorus in their effluent, a similar assumption to those used to calculate the 2008, baseline, loads were used to determine their total phosphorus concentrations.

Exceptions to this calculation method are reserved for wastewater plants that have not reported any effluent flow during this time; in which case, assumptions are made to determine an appropriate discharge from which to calculate the facility's wasteload allocation. Appendix 3 contains a table of the names, permit numbers, and actual wasteload allocation results for these facilities.

There are currently 11 facilities in the Maumee watershed covered under Ohio's Small Sanitary General Permit (OHS000005). A single wasteload allocation is calculated for these facilities, and since Ohio EPA is aware there are still many small sanitary treatment systems that are currently unpermitted across the state, the existing number of 11 plants is increased to 25 for the WLA calculation of this general permit.

CSO and other wet weather events

There are 24 CSO communities within the Ohio portion of the Maumee watershed, all of which have plans to address their systems. Twelve of these communities have planned for complete separation of storm and sanitary sewers in which case the WLA is zero load. For the remaining 12 communities, six of these communities have a WLA set at 80 percent reduction of the calculated baseline, 2008, CSO load, and the other six used a level of control hydraulic mode and a 0.75 mg/L total phosphorus concentration to calculate the WLA. SSOs are prohibited by the Clean Water Act, so all communities with known SSOs must plan to eliminate these sources and there are no WLAs given for SSOs.

Permitted stormwater

MS4 allocations are set based on a 20 percent reduction from their baseline condition, which is approximately half the reduction set for the nonpoint source load allocation. The non-MS4 regulated stormwater sources that contribute a small percentage of both the total baseline regulated stormwater load and total watershed baseline load, have conditions in their permits that require management actions that improve pollutant source control. Because of this, additional reductions are not included in these source's wasteload allocations and the WLAs are set equal to their baseline load.

HSTS

Discharging HSTS are covered under Ohio EPA's general permit (OHK000004) and as such, are considered part of the wasteload allocation. Onsite HSTSs are not considered point sources and are therefore part of the load allocation. Since no extra load is expected from the discharging systems, the wasteload allocation is set at the calculated baseline load.

A7.9. Sources of funding available for point and nonpoint sources (ORC 6111.562 [C][2])

Section 7 of this report details the implementation strategy to address impairments in the MWN TMDL project area. The implementation plan also summarizes sources of funding available for both point and nonpoint sources.

A7.10. Alternative approaches and actions for point and nonpoint sources to achieve TMDL-recommended pollutant reductions, and adaptive management (ORC 6111.562 [C][3])

See Section 7 of the MWN TMDL report for alternative approaches and adaptive management of the recommended TMDL implementation actions.

Adaptive management starts with setting goals, or establishing milestones, to provide clear targets for implementation measures. Implementing the strategy is the most resource intensive part of the process that involves many local, state, and federal agencies, nonprofit organizations, and individuals. To inform adaptive management, monitoring of the watershed and the lake must occur to link implementation to the desired environmental response. Evaluating that information by defining metrics turns that monitoring data into information that can then be used to adjust the strategy if necessary. The implementation plan will lay out the framework for the initial strategy and propose ideas for milestones, implementation actions, monitoring, evaluating progress, and adjusting the strategy moving forward.

From the point source perspective, wastewater treatment plants are expected to continue ongoing optimization for phosphorus removal. The use of the general permit for the largest wastewater treatment facilities provides opportunities for trading to offset growth. This general permit provides 'de facto' trading by allowing loads across the community to be grouped. See Section 7.3.1 of the main report for more information on water quality trading.

This section will be updated after the comment period on the draft report to include stakeholder feedback.

A7.11. The implementation of the recommended wasteload reductions to achieve compliance with water quality standards, as appropriate, to mitigate potential economic impacts of the TMDL's recommended load reductions on such sources (ORC 6111.562 [C][4])

NPDES Treatment Facilities

As discussed in previous sections of this appendix, and at length in the MWN TMDL report, wastewater treatment facilities currently discharge well below their permitted allowance for phosphorus. See Section A7.8 of this appendix for a summary of the grouped WLA analysis, and Section 5.4 of the main report for a detailed discussion of the approach to determining wasteload reductions in NPDES facilities. Below is a summary of how the WLA will be implemented as well as benefits to this approach, as opposed to distributing the WLA equally to individual facilities. More in-depth discussions on point source management can be found in Section 7.3.1 of the report. Additionally, Appendix 4 presents the wasteload allocations for the individually permitted facilities within this TMDL project, and the wasteload allocations for the regular effluent discharge of the NPDES permits that are in the grouped load category for consideration of a general permit.

For the 20 percent of the NPDES-permitted treatment facilities that account for more than 85 percent of the point source waste load allocation, the WLA was set based on the level of control demonstrated in 2008. Collectively, this WLA has been maintained in years since, and if it were to be distributed equitably to individual facilities, not all facilities would meet the individual allocation every season. Ohio EPA has proposed the implementation of a general permit to facilitate flexibility for permitted facilities**.** If a facility receives coverage under the general permit and the grouped wasteload allocation is achieved, Ohio EPA will consider the phosphorus discharge to be consistent with the assumptions and requirements of the WLA for the permittee. This flexible permitting proposal will allow facilities to continue to optimize and operate existing facilities to maintain the WLA, without incurring any additional costs.

For individual facilities looking to grow, or when capital upgrades are planned, or new facilities are proposed, an opportunity is presented to utilize more advanced technology at a marginal cost when compared to an unplanned upgrade triggered by a compliance schedule. Specific project costs will involve several factors related to an individual facility's design. More information can be found in Section 7.3.1 and Appendix 6 of the report.

Should an NPDES permit holder determine that compliance with the TMDL is technically and/or economically unattainable and that permittee is eligible for a variance, the permittee may apply for a variance to the underlying

WQS (e.g., the narrative criteria for algae) used to develop the proposed effluent limitation in accordance with the terms and conditions set forth in OAC 3745-1-38(D).

The remaining facilities that contribute less than 15 percent of the load from permitted facilities may not have phosphorus-specific controls and the WLA in the TMDL is consistent with the existing performance. Additional phosphorus reductions are not proposed for these facilities. Existing efforts to promote optimization, regionalization, and onsite discharge will continue but have not been accounted for as reductions expected to meet the WLA.

NPDES Stormwater

Due to timing of the NPDES Small MS4 General Permit renewal and the drafting of this TMDL, only small MS4 communities listed in Appendix A of the permit will be required to follow the near-field phosphorus TMDL related requirements during the term of the renewed general permit. The additional phosphorus allocation to small MS4 communities identified in this draft far-field TMDL report will be incorporated into the next renewal of the NPDES Small MS4 General Permit (renewal in 2026). The renewal will include communities affected by the allocations and additional measures to direct phosphorus reduction activities to improve management of DRP.

The cost will vary for each small MS4 depending upon the number of pollutants causing water quality issues within a watershed, the types of pollutants and size of small MS4 (number of watersheds the MS4 is in), and the current level of BMP implementation. The cost may include the extra time in developing materials, distributing materials, additional construction site inspections of sites in noncompliance, education of contractors on green infrastructure practices, additional street sweeping and catch basin cleanouts, etc. Further discussion on stormwater management practices can be found in Section 7.3.1. of the report.

A7.12. The estimated economic impact, on a categorical basis, on government subdivisions, point sources, agricultural operations, and nonpoint sources (ORC 6111.562 [C][5])

There is a cost to restoring water quality in the WLEB. This cost will be discussed for point sources and nonpoint sources and is based upon the recommended implementation in Chapter 7 of this report. Overall, the cost analysis of implementing the WLEB is highly variable and includes many assumptions since it is prepared without facility/best management practice specific information. Costs will also change as treatment technologies become more common for point sources and as progressive practices are voluntarily adopted to reduce impacts from nonpoint sources.

This analysis can be updated after the stakeholder comment period based upon information received. See Section A7.13, below.

Point Sources

Several management decisions were made when evaluating allocations for point sources and the implementation strategy that will help mitigate the economic impact of the TMDL. First, the allocations recognize the large reductions that were made historically through the implementation of phosphorus removal technology at major WWTPs. These historical actions resulted in conditions within the Maumee watershed where point sources contribute a small fraction of the load (See Section 4.1.2.1.). The allocations recognize this work and were set consistent with the demonstrated performance of the overall point source community. However, when distributed to individual facilities these allocations would likely result in capital improvements for some facilities. Section 7.3.1.2. discusses the use of a general permit as an implementation tool to further increase flexibility for measuring compliance. An evaluation of existing capacity shows that existing technology can be used to meet the WLA by using a general permit. Better treatment technology, designed to meet monthly average concentration limits of 0.5 mg/L, will be required for new major facilities or when existing facilities implement planned upgrades. Another

group of facilities defined as 'significant minors' will be expected to implement technology to meet limits of 1.0 mg/L as a monthly average. This will help build loading capacity for future growth and ensure that the WLA continue to be met.

The cost associated with reducing total phosphorus varies on a case-by-case basis for each WWTP. Factors contributing to the variation include total phosphorus concentration of the raw wastewater influent, type of treatment system, design flow of treatment system, layout/location of the treatment system (available space for additional treatment components), etc. The implementation strategy is proposed so these costs are realized on a marginal basis, rather than as unplanned capital upgrades. This strategy will help further manage the cost of new technology but not eliminate it. Ohio EPA contracted with Tetra Tech to use CapdetWorks to evaluate these marginal costs for several different scenarios (See Appendix 6). In general, cost of phosphorus removal is lower for larger WWTPs. The impact of facility size is more pronounced when using enhance biological phosphorus removal technologies. Figure A7.2 shows one example from Appendix 6. For facilities from 10 – 50 million gallons per day (mgd) total incremental annual cost may range from less than $0.01 - $0.065 per gallon per day of design flow. This range is influenced both by facility size and they type of upgrades needed.

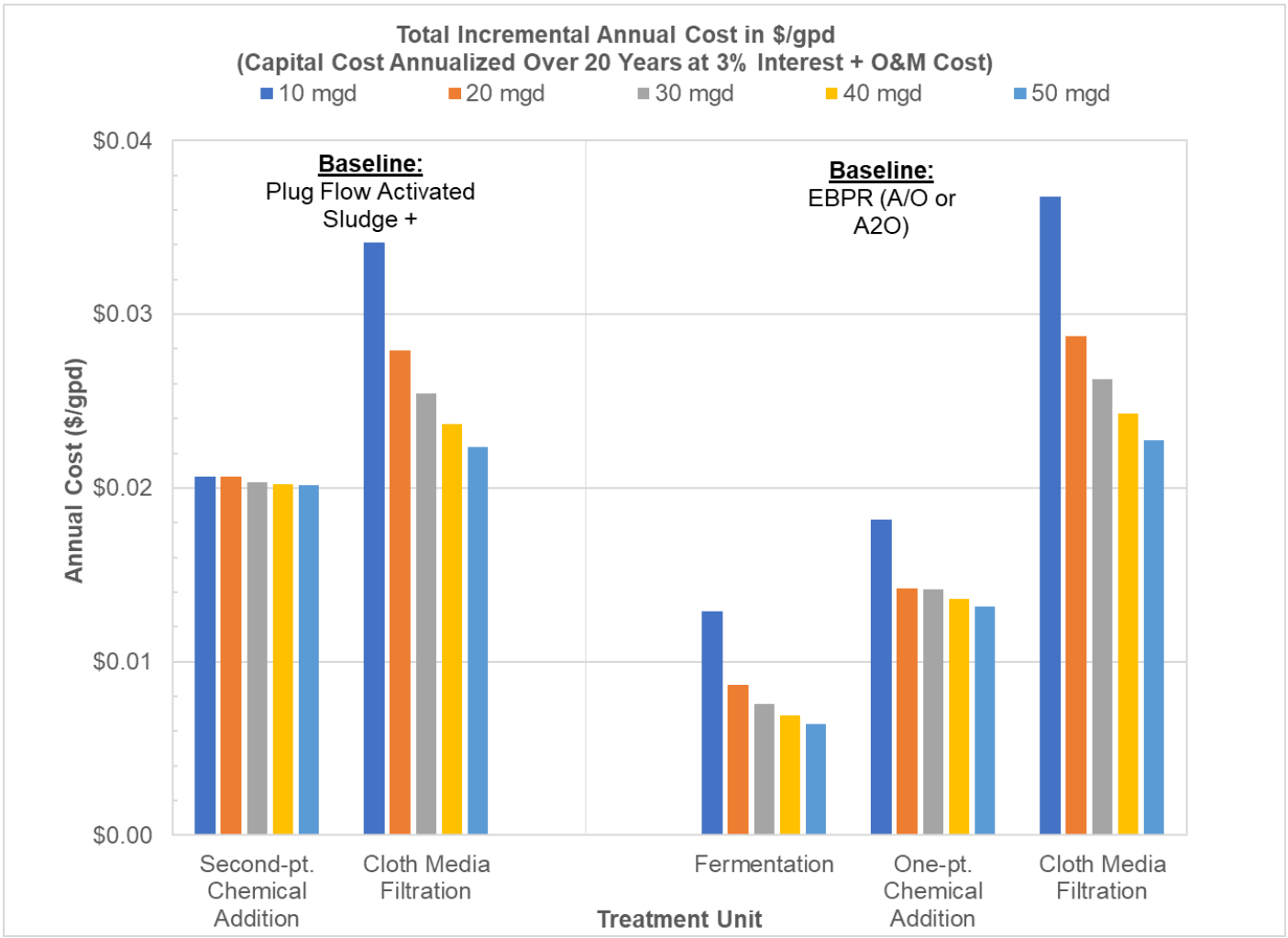

Figure A7.2. Facility Group 1: Incremental Annual Cost in $/gpd

Small Municipal Separate Storm Sewer Systems (MS4s)

Small MS4s are required to comply with requirements contained in the NPDES Small MS4s General Permit. Small MS4s are required by the NPDES permit to develop a Stormwater Management Program that contains six minimum control measures. The NPDES Small MS4 General Permit (OHQ000004) contains more specific

requirements for small MS4s in TMDL watersheds. The requirements apply to small MS4s identified in Appendix A of the General Permit (the listing includes Small MS4s with wasteload allocations in current, approved TMDL reports). The fact sheet that accompanies the General Permit contains more specific information on the requirements for the identified Small MS4s in TMDL watersheds (***epa.ohio.gov/divisions-and-offices/surface-water/permitting/small-municipal-separate-storm-sewer-systems-ms4s--general-permit***)

Due to timing of the NPDES Small MS4 General Permit renewal and the drafting of this TMDL, only small MS4 communities listed in Appendix A of the permit will be required to follow the near-field phosphorus TMDL related requirements during the term of the renewed general permit. The additional phosphorus allocation to small MS4 communities identified in this draft far-field TMDL report will be incorporated into the next renewal of the NPDES Small MS4 General Permit (renewal in 2026). The renewal will include communities affected by the allocations and additional measures to direct phosphorus reduction activities to improve management of DRP.

The cost will vary for each small MS4 depending upon the number of pollutants causing water quality issues within a watershed, the types of pollutants and size of small MS4 (number of watersheds the MS4 is in), and the current level of BMP implementation. The cost may include the extra time in developing materials, distributing materials, additional construction site inspections of sites in noncompliance, education of contractors on green infrastructure practices, additional street sweeping and catch basin cleanouts, etc. There is one new requirement for post-construction stormwater management that will likely be an additional cost to the small MS4 communities with applicable TMDLs. These requirements are contained in the existing permit. Twenty-one of 34 permittees in the watershed are already required to implement these actions because they are included in near-field TMDLs.

- Retrofit one existing stormwater practice that solely provides a peak-discharge function to meet the performance standard for an extended detention post-construction practice; or
- Perform restoration of at least 300 linear feet of channelized stream where natural channel stability and floodplain restoration will reduce stream erosion; or
- Update an ordinance or other regulatory mechanism to require OHC000005 Table 4b practices and/or other green infrastructure practices where feasible; or
- Install one or more Table 4b practices to treat a minimum of one acre of existing impervious area developed prior to 2003.

The cost associated with this requirement will depend upon the option selected by the community. The urban runoff BMPs section below contains cost information that may be applicable to this requirement. The Agency is interested in receiving cost information from small MS4s subject to this requirement in the NPDES Small MS4 General Permit renewal for consideration in future TMDL reports.

Nonpoint Sources

The MWN TMDL report includes load allocations for nonpoint sources of pollution. A weight-of-evidence approached was used in the project to determine the likely category of nonpoint source attributing to impairment in the WLEB. This cost analysis will focus on those categories identified for implementation of nonpoint source best management practices (BMPs) in Chapter 7. These include agricultural runoff BMPs, urban runoff BMPs, HSTS repair/replacement, wetlands, and other natural infrastructure. Nonpoint sources are generally not regulated by the Clean Water Act and TMDLs as serve as a planning tool. The TMDL implementation plan does not add mandatory actions for nonpoint sources but instead focuses focusing voluntary actions. These actions still have associated costs that are bore by those voluntarily implementing them. These costs can be offset by various local, state, and federal programs. The main funding programs are identified in Chapter 7 of this report.

Agricultural Runoff BMPs

Practice implementation costs of agriculture BMPs may vary widely based upon many factors including: type of BMP, area/volume of water to be treated by the BMP, concentrations of pollutants in the runoff water, landscape

attributes such as soil type and slope, etc. In general, the cost of the agriculture runoff BMP includes the cost to design, install, operate, and maintain, and can include the cost of taking working land out of production.

An important part of this TMDLs implementation plan is the ongoing implementation of Ohio's H2Ohio initiative. This initiative promotes agricultural BMPs based on an analysis that sought to identify the most cost effective BMPs to maximize the programs impact. This analysis is presented in Appendix C of Ohio's Domestic Action Plan to address nutrients (OLEC, 2020).

Others have considered costs of agricultural BMPs. Ohio United States Department of Agriculture, Natural Resources Conservation Service estimates the cost of various conservation practice standard (agriculture runoff BMPs) implementation scenarios. This information can be used to estimate the cost of various TMDL implementation items such as development of nutrient management plans, reduced tillage, cover crops, critical area plantings, etc.

The Nature Conservancy's *Cost Benefit Synthesis of Best Management Practices to Address Sediment and Nutrients in Ohio* (Tetra Tech, 2019) presents total life cycle cost information for 10 agricultural runoff BMPs. These practices and costs are included in Table A7.5 below.

Table A7.5 Total Life Cycle Cost of Ten Common Agricultural Runoff BMPs

Best Management Practice	Total Life Cycle Cost Range
Filter strips	$700 to $4,500 per acre
Conservation tillage	$29 to $49 per acre
Cover crops	$45 to $270 per acre
Drainage water management	$30 to $100 per acre
Grassed waterways	$210 to $5,000 per acre
Injection/Incorporation of fertilizer	$31 to $56 per acre
Nutrient management plans	$2 to $9 per acre
Saturated buffers	$2 to $9 per linear foot
Two-stage ditches	$8 to $78 per linear foot
Variable rate application/technology	$3 to $19 per pound/acre

Urban Runoff BMPs

The cost of urban runoff BMPs is like agriculture runoff BMPs. The cost is based upon factors such as type of BMP, area/volume of water to be treated by the BMP, concentrations of pollutants in the runoff water, landscape attributes such as soil type and slope, space available to install the BMP (especially in retrofit projects), and more. In general, the cost of an urban runoff BMP includes the cost to design, install, operate, and maintain the practice as well as the cost of using developable land. Some BMPs provide savings in terms of conventional drainage infrastructure. BMP costs can be offset by various local, state, and federal programs. The main funding programs are identified in Chapter 7 of this report.

Information on the cost associated with urban runoff BMPs in Ohio is more limited and variable than cost of agriculture runoff BMPs. The Nature Conservancy's *Cost Benefit Synthesis of Best Management Practices to Address Sediment and Nutrients in Ohio* (Tetra Tech, 2019) presents total life cycle cost information for five urban storm water BMPs, see Table A7.6 below. The total life cycle cost includes construction and maintenance of the practice.

Table A7.6 Total Life Cycle Cost of Five Urban Runoff BMPs

Best Management Practice	Total Life Cycle Cost Range
Bioretention	$9 to $37 per square foot
Dry Detention Ponds	$51,000 to $170,000 per acre-foot
Grassed Swales	$32 to $130 per linear foot
Pervious Pavement	$7 to $18 per square foot
Wet Detention Ponds	$53,000 to $190,000 per acre-foot

HSTS Repair/Replacement

The cost to repair a household sewage treatment system depends upon the type of repair needed and the type of system being repaired. The cost to replace a household sewage treatment system depends upon the amount and type of sewage to be treated, available area for a suitable treatment system, type of soils present, whether a soil-based treatment system can be installed verses mechanical system, whether an NPDES permit will be required (for a discharging system), and operation/maintenance costs with the type of system installed. Drip distribution and mound systems will be more expensive than leach lines and a mechanical system will be more expensive to operate than a soil-based treatment system. The cost of a replacement system can range from approximately $8,500 for a typical system consisting of a septic tank to leach lines to $22,500 for a system consisting of a septic tank to a drip distribution system. These costs can be offset by various local, state, and federal programs. The main funding programs are identified in Chapter 7 of this report and on the Ohio Department of Health's webpage at: ***odh.ohio.gov/know-our-programs/sewage-treatment-systems/INFORMATION-FOR-HOMEOWNERS***.

Stream Restoration

Stream restoration is a broad term that describes work to improve the quality of a stream or river. The improvement could include items like habitat restoration, reconnection to floodplain, channel restoration, removal of barriers to fish passage, etc. The cost associated with stream restoration is also highly variable and depends on the type of restoration to be completed, catchment size and length of stream to be restored, degree of surrounding landscape, and floodplain development. Some examples of cost are included in the list below:

- Two-stage Ditch: total life cycle cost range is $8 to $78 per linear foot (TNC, 2019). This cost is bench height and width specific and catchment specific. Based upon the review of past Ohio Section 319 projects, the cost may be higher (e.g., $90-$125 per linear foot) in larger ditches with wider bench design, or to include riparian plantings
- Natural Channel Design: $200 to $500 per linear foot based upon review of past Ohio Section 319 projects, and is dependent upon contributing watershed size; and degree of restoration work in the floodplain and along stream banks
- Ohio NRCS Ohio United States Department of Agriculture, Natural Resources Conservation Service estimates the cost of various conservation practice standard (agriculture runoff BMPs) implementation scenarios.

A7.13. Information submitted by indirect dischargers or other stakeholders relating but not limited to cost, economic impacts, environmental benefit, and technical feasibility (ORC 6111.562 [C][6])

Any information provided to the Agency will be included here and considered and evaluated by the Director prior to submitting the final TMDL report to U.S. EPA for review and approval.

As part of the TMDL process, Ohio EPA allows opportunities for stakeholder involvement at each step in the process. 30-day public comment periods for the Loading Analysis Plan and the Preliminary Modeling Results have already occurred. There will also be a 60-day public comment period for the draft MWN TMDL report. Ohio EPA

takes into consideration all comments received and responds appropriately with a formal response to comments that is published along with the final reports.

Ohio EPA held a public comment period from August 31 to October 22, 2021, regarding the Maumee Watershed Nutrient TMDL Loading Analysis Plan (LAP). A document summarizing the comments and questions received during this comment period can be found at:
epa.ohio.gov/static/Portals/35/tmdl/LAPs/MaumeeWatershedNutrientTMDL_LAP_RtoC.pdf

Ohio EPA held a public comment period from June 30 to August 17, 2022, regarding the Maumee Watershed Nutrient TMDL Preliminary Modeling Results (PMR). A document summarizing the comments and questions received during this comment period can be found at:
epa.ohio.gov/static/Portals/35/tmdl/MaumeeNutrient/MWN_TMDL_PMR%20RtoC.pdf

In response to comments received from PCS Nitrogen during the draft PMR public comment period, Ohio EPA acknowledged the comments made changes to the report in response. These changes are listed below.

- Ohio EPA added the suggested language in Section 5.3.1.1 to clarify that the expectations for industrial facilities requiring NPDES stormwater coverage is the same regardless of if the facility has individual permit coverage or coverage under the Multi-sector General Permit (MSGP)
- Ohio EPA has recalculated the allocations for industrial point sources considering influent characteristics, phosphorus sources, and treatment technology.

Additional information on all public outreach that occurred during the formation of this TMDL can be found in Section 9.