TMDL: Maumee Watershed Nutrient TMDL in all or parts of 18 counties in northwestern Ohio
Date: September 28, 2023

DECISION DOCUMENT FOR THE MAUMEE WATERSHED NUTRIENT TMDL, IN ALL OR PARTS OF 18 COUNTIES IN NORTHWESTERN OHIO

Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations at 40 C.F.R. Part 130 describe the statutory and regulatory requirements for approvable Total Maximum Daily Load submittals (TMDLs). Additional information is generally necessary for EPA to determine if a submitted TMDL fulfills the legal requirements for approval under Section 303(d) and EPA regulations, and such information should be included in the submittal package. Use of the verb "must" below denotes information that is required to be submitted because it relates to elements of the TMDL required by the CWA and by regulation. Use of the term "should" below denotes information that is generally necessary for EPA to determine if a submitted TMDL is approvable. The guidelines provided under each heading in this decision document are an attempt to summarize and provide information regarding currently effective statutory and regulatory requirements relating to TMDLs, but are not a substitute for statutory requirements or EPA's regulations.

1. Identification of Water body, Pollutant of Concern, Pollutant Sources, and Priority Ranking

The TMDL submittal should identify the water body as it appears on the State's/Tribe's 303(d) list. The water body should be identified/georeferenced using the National Hydrography Dataset (NHD), and the TMDL should clearly identify the pollutant for which the TMDL is being established. In addition, the TMDL should identify the priority ranking of the water body and specify the link between the pollutant of concern and the water quality standard (see Section 2 below).

The TMDL submittal should include an identification of the point and nonpoint sources of the pollutant of concern, including location of the source(s) and the quantity of the loading, e.g., lbs/per day. The TMDL should provide the identification numbers of the NPDES permits within the water body. Where it is possible to separate natural background from nonpoint sources, the TMDL should include a description of the natural background. This information is necessary for EPA's review of the load and wasteload allocations, which are required by regulation.

The TMDL submittal should also contain a description of any important assumptions made in developing the TMDL, such as:

(1) the spatial extent of the watershed in which the impaired water body is located;
(2) the assumed distribution of land use in the watershed (e.g., urban, forested, agriculture);
(3) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources;
(4) present and future growth trends, if taken into consideration in preparing the TMDL (e.g., the TMDL could include the design capacity of a wastewater treatment facility); and
(5) an explanation and analytical basis for expressing the TMDL through *surrogate measures*, if applicable. *Surrogate measures* are parameters such as percent fines and turbidity for sediment

impairments; chlorophyll *a* and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

EPA Review of the MWN TMDL:

Location Description/Spatial Extent:
The Maumee River Watershed in northwestern Ohio, northeastern Indiana and southeastern Michigan encompasses an estimated 6,570 square miles (approximately 4,204,800 acres) (Maumee Watershed Nutrient (MWN) Total Maximum Daily Load (TMDL), Figure ES-1).[1] The Ohio Environmental Protection Agency's (Ohio EPA) MWN TMDL addresses the area of the Maumee River Watershed solely within the boundaries of the State of Ohio. This area is estimated to be 5,024 square miles (approximately 3,215,360 acres), in all or parts of 18 counties within the State of Ohio (MWN TMDL, Section 2). The Maumee River forms at the confluence of the St. Joseph River and the St. Mary's River in Fort Wayne, Indiana and flows northeastward for approximately 137 miles before emptying into Maumee Bay near Toledo, Ohio (MWN TMDL, Figure ES-1). The MWN TMDL also calculates boundary condition loads from Indiana and Michigan.

Ohio EPA developed total phosphorus (TP) TMDLs to address impaired conditions in three Lake Erie assessment units (Table 1 of this Decision Document; MWN TMDL, Section 1). The MWN TMDL addresses recreational use impairments due to excessive algae, public drinking water use impairments due to excessive algae (cyanotoxins) and aquatic life use impairments due to excessive nutrients. The water bodies in Table 1 of this Decision Document were first listed as impaired in a revision to Ohio's 2016 Integrated Water Quality Monitoring and Assessment Report on May 4, 2018 (Ohio EPA, 2018) and subsequently approved by EPA on May 10, 2018 (EPA, 2018).

Table 1: Impaired segments addressed by the Maumee Watershed Nutrient TMDL (Ohio)

Segment ID	Segment Name	Beneficial Use	Cause of Impairment
OHLE041202000201	Lake Erie Western Basin Shoreline (≤ 3 meters in depth)	Recreational Use	Algae
		Public Drinking Water Use	Algae (Cyanotoxins)
		Aquatic Life Use	Nutrients
OHLE041202000301	Lake Erie Western Basin Open Water (> 3 meters in depth)	Recreational Use	Algae
		Public Drinking Water Use	Algae (Cyanotoxins)
OHLE041202000101	Lake Erie Islands Shoreline (≤ 3 meters in depth)	Recreational Use	Algae
		Public Drinking Water Use	Algae (Cyanotoxins)
		Aquatic Life Use	Nutrients

Land Use:
Land use in the Maumee River Watershed (MRW) is predominantly agricultural, according to the Ohio 2020 Domestic Action Plan (DAP) (hereafter, the Ohio DAP) and Section 2.2 of the MWN TMDL document. Ohio EPA utilized land use information from the National Land Cover Database's (NLCD) 2016 land survey and determined that approximately 80.5% of land in the Ohio portion of the MRW is agricultural[2] with the remaining 19.5% of land use is split between developed land and natural lands

[1] This includes the Ohio portion of the following HUC-8 subwatersheds: the St. Joseph River Watershed (04100003), the St. Marys River Watershed (04100004), the Upper Maumee River Watershed (04100005), the Tiffin River Watershed (04100006), the Auglaize River Watershed (04100007), the Blanchard River Watershed (04100008), and the Lower Maumee River Watershed (04100009).
[2] Approximately 70% of the agricultural land is identified as row-crop agricultural (MWN TMDL, Section 4.1.1.1).

(MWN TMDL, Section 2.2). Table 20 of the MWN TMDL includes a breakout of NLCD land use types that Ohio EPA considered in its development of the MWN TMDL and how it grouped those land use types into three main land use categories: agricultural, developed, and natural lands. Table 21 of the MWN TMDL document further subdivides the developed land use category and approximates percentages of those developed land use categories in the MRW. Land use information across the Ohio portion of the MRW was considered by Ohio EPA to establish baseline loading conditions and loading estimates as discussed in Section 5 of the MWN TMDL.

Problem Identification:

Total phosphorus TMDL: Since the early 2000s, the waters in the Western Basin of Lake Erie have experienced increased algal growth, resulting in impacts to water quality and uses (MWN TMDL, Section 2.1). Algae occur naturally in freshwater systems, but too much algal growth can lead to dense algal blooms that can deplete oxygen, interfere with natural food webs, interfere with recreational uses, clog water intakes and produce toxins (e.g., microcystin) which threaten human and animal life (Bocaniov et. al., 2016). In 2014, Maumee Bay experienced a massive algal bloom resulting in the closure of the Toledo drinking water system.

Phosphorus is an essential nutrient for plant growth but excessive phosphorus loading to surface waters is a concern for aquatic ecosystems. Under natural conditions where human activities do not dominate the landscape, phosphorus is generally in short supply and is a limiting factor for aquatic plant growth. As more phosphorus enters a surface water body, the phosphorus acts to fertilize the aquatic system, allowing for more plant and algae growth. This condition of nutrient enrichment, and a transition from plant to algae-dominated primary production, is referred to as eutrophication. Eutrophication can alter the ecology of the water body and degrade the beneficial uses the surface water provides, such as recreation (i.e., swimming and fishing), and public drinking water supply uses.

Blooms of aquatic plants, nourished by excessive nutrient loading, may also include cyanobacteria (i.e., blue-green algae). Cyanobacteria can release toxins (e.g., microcystin) that can be harmful to aquatic species and pose health risks to humans and animals (e.g., livestock and pets). Additional concerns linked to algal blooms in freshwater environments include: appearance (i.e., surface scums), discolored water, reduced light penetration, taste and odor problems, and dissolved oxygen depletions during cyanobacteria die-off events (Michalek, et. al, 2013). Depending on the severity of the low dissolved oxygen event, large fish kills can occur.

Surface waters in the three assessment units addressed by the MWN TMDL (see Table 1 of this Decision Document) are impaired due to excessive phosphorus loading and all three assessment units were included on the 2022 Ohio 303(d) list.[3] Excessive phosphorus loading can lead to nuisance algae growth, oxygen depletion within the water column, fish mortality, reduced submerged aquatic vegetation, water clarity problems, and degraded habitat for fish and macroinvertebrate species. Water quality conditions during algal bloom events adversely affect recreation, public drinking water supply and aquatic life.

[3] Ohio EPA webpage, https://epa.ohio.gov/divisions-and-offices/surface-water/reports-data/ohio-integrated-water-quality-monitoring-and-assessment-report, approved by EPA on April 27, 2022, (last visited 9/24/23).

Priority Ranking:

EPA regulations codify and interpret the requirement in Section 303(d)(1)(A) of the Clean Water Act (CWA) that states establish a priority ranking for waters recognized by the state as impaired. The regulations at 40 C.F.R. § 130.7(b)(4) require states to prioritize waters on their Section 303(d) lists for TMDL development, and to identify those water quality limited segments (WQLSs) targeted for TMDL development in the following two years. In prioritizing and targeting waters, states must, at a minimum, take into account the severity of the pollution and the uses to be made of such waters.[4] As long as these factors are taken into account, the CWA provides that it is up to the states to establish priorities. States may consider other factors relevant to prioritizing waters for TMDL development, including immediate programmatic needs; vulnerability of particular waters as aquatic habitats; recreational, economic, and aesthetic importance of particular waters; degree of public interest and support; and state or national policies and priorities.[5]

Ohio and Michigan have recognized waters in the Western Basin of Lake Erie as impaired on their respective Clean Water Act Section 303(d) Impaired Waters Lists and EPA has approved these listing decisions. Listing of these waters as impaired requires the development of TMDLs, which may result in changes to discharge limitations or other requirements in National Pollutant Discharge Elimination System (NPDES) permits along with measures to reduce nonpoint source loadings.

In the Ohio 2020 Integrated Report (Section J), Ohio EPA assigned a high priority for TMDL development to the three impaired assessment units of the Western Basin of Lake Erie (i.e., the Lake Erie Western Basin Shoreline assessment unit, the Lake Erie Western Basin Open Water assessment unit, and the Lake Erie Islands Shoreline assessment unit, see Table 1 of this Decision Document) and committed to develop a Maumee Watershed Nutrient TMDL to address the impairments in the Western Basin of Lake Erie within two to three years.

Since 2020, Ohio EPA has been working with stakeholders to develop a total phosphorus TMDL for the Ohio portion of the MRW. Ohio EPA has completed its multi-step TMDL development process (Guide to Total Maximum Daily Loads (TMDLs) (factsheet), Ohio EPA, 2022)[6] and submitted the MWN TMDL to EPA on June 30, 2023.

Pollutants of Concern:

The pollutant of concern is total phosphorus.

Source Identification (point and nonpoint sources):

Point Source Identification: The potential point sources to the Maumee River Watershed within the boundaries of the State of Ohio are:

National Pollutant Discharge Elimination Systems (NPDES) permitted facilities: NPDES permitted facilities may contribute phosphrous loads to surface waters through discharges of treated wastewater.

[4] CWA Section 303(d)(1)(A).
[5] Surface Water Toxics Control Program and Water Quality Planning and Management Program, 57 *Fed. Reg*. 33040, 33045 (July 24, 1992); *see also* EPA's 1991 Guidance.
[6] Ohio EPA webpage, https://epa.ohio.gov/static/Portals/35/tmdl/TMDL_Fact_Sheet_Feb_2020.pdf, (last visited 9/24/23).

Permitted facilities must discharge wastewater according to their NPDES permit. Ohio EPA summarized the contributing wastewater treatment plants (WWTPs) and other facilities that contribute phosphorus from treated wastewater releases in Section 4.1.2 of the MWN TMDL document. A list of NPDES facilities that received a portion of the TMDL's wasteload allocation (WLA) is found in Tables A4.1 and A4.2 in Appendix 4 of the MWN TMDL document. Ohio EPA assigned each of these individual facilities a portion of the total phosphorus WLA (Tables 1B and 1C of Attachment 1 of this Decision Document). EPA notes that several of these facilities already have approved WLAs through previously approved TMDLs (Appendix 5 of the MWN TMDL document; Tables 1B, 1C and 1D of Attachment 1 of this Decision Document).

Municipal Separate Storm Sewer System (MS4) communities: In Section 4.1.2.2 of the MWN TMDL, Ohio EPA explained that stormwater from MS4s can transport phosphorus to surface water bodies during or shortly after storm events. Ohio EPA identified one individual MS4 permittee, the City of Toledo (2PI00003), as a Phase I Individual MS4 community. Additionally, Ohio EPA identified other smaller MS4 communities (i.e., Phase II communities that serve less than 100,000 people) that for TMDL accounting purposes are covered under an Ohio MS4 General Permit (OHQ000004). Further discussion on the impacts of MS4 dischargers is found in Section 5 of this Decision Document.

Combined Sewer Overflows (CSOs): In Sections 4.1.2.1 and 5.3.1.3 of the MWN TMDL document, Ohio EPA explained that combined sewer systems exist in the Ohio portion of the MRW and that combined sewer overflow events can occur during or shortly after precipitation and/or flooding events. During CSO events, a mixture of stormwater and sanitary sewage can deliver phosphorus to surface waters of the MRW. In Table 10 of the MWN TMDL document, Ohio EPA identified CSO communities within the Ohio portion of the MRW and assigned certain facilities a portion of the WLA (see Table A4.3 of Appendix 4 of the MWN TMDL document as well as Table 1D of Attachment 1 of this Decision Document). Further discussion of how Ohio EPA assigned allocations to CSOs is in Section 5 of this Decision Document.

Construction stormwater runoff from permitted construction areas: Construction sites may contribute phosphorus via stormwater runoff during or shortly after precipitation and/or flooding events (MWN TMDL, Section 4.1.2.2). Ohio EPA noted that construction sites with a site footprint of one or more acres must be covered under Ohio's Construction General Permit (OHC000005). Sites with less than 1 acre footprint and are part of a larger development plan or sale also must be permitted to discharge stormwater. Ohio EPA calculated a portion of the total phosphorus WLA, based on an areal percentage of the developed land use category, and assigned that to the Construction General Permit (OHC000005). Further discussion of how Ohio EPA assigned allocations to the construction general permit is in Section 5 of this Decision Document.

Industrial stormwater runoff from permitted facilities: Industrial facilities may contribute phosphorus via stormwater runoff during or shortly after precipitation and/or flooding events. Ohio EPA identified facilities with stormwater provisions as part of their NPDES permit and assigned those facilities a portion of the total phosphorus WLA.

Additionally, Ohio EPA explained that certain industrial facilities must apply to be covered by its Multi-Sector General Permit (MSGP) if such a facility has the potential to discharge stormwater to a surface water of the State of Ohio and participates in one or more of the 29 industrial sectors outlined in the

permit (MWN TMDL, Section 4.1.2.2). Facilities covered by the MSGP are expected to implement stormwater controls and develop a stormwater pollution prevention plan.

Discharging Small Sanitary Systems: Discharges from small sanitary systems can contribute phosphorus to surface waters of the Maumee River Watershed (MWN TMDL, Section 5.3.1.2). Ohio EPA determined that there are 11 such small sanitary facilities (e.g., small package plants/restaurants or mobile home parks) in the Ohio portion of the MRW and these facilities are covered by Ohio's Small Sanitary General Permit (OHS000005).

Discharging Home Sewage Treatment Systems (HSTS): Residential homes with individual HSTS may discharge phosphorus to surface waters in the MRW (MWN TMDL, Section 4.1.3). The MWN TMDL refers to HSTS that provide enhanced treatment and then directly discharge to surface waters as *discharging HSTS* and these HSTS are covered by a Discharging HSTS General Permit (OHK000004). Ohio EPA assigned a portion of the total phosphorus WLA to the Discharging HSTS General Permit (OHK000004) based on estimates of the population that is using a discharging HSTS and expected failure rates of HSTS.

Concentrated Animal Feeding Operations (CAFOs): Ohio EPA discusses CAFOs within the MRW in Sections 4.1.1.1 and 5.3.4 of the MWN TMDL document. Ohio EPA explained that CAFO facilities must be designed to contain all surface water runoff (i.e., have zero discharge from their manure-handling facilities) and have a current manure management plan. Ohio EPA further explained that these facilities are not authorized to discharge non-agricultural stormwater effluent and therefore, CAFOs were not assigned a portion of the total phosphorus WLA (i.e., WLA = 0). Please see Attachment 3 of this Decision Document for further discussion of CAFOs and the MWN TMDL.

Ohio EPA acknowledges that several types of discharges occur that are prohibited by the Clean Water Act and associated federal requirements or other state requirements. The TMDL does not include a WLA for these sources (i.e., WLA=0) because Ohio plans to eliminate these sources. Ohio EPA states that "[d]ischarge prohibitions apply to both SSOs (Section 5.3.1.3) and CAFOs/CAFFs (Section 5.3.4)." (See MWN TMDL, Section 8.4.7 (Enforcement for Clean Water Act prohibited discharges) pg. 170.)

Nonpoint Source Identification: The potential nonpoint sources to the Maumee River Watershed within the boundaries of the State of Ohio are:

Nutrient contributions from row crop fertilizers: Land use in the MRW is predominantly agricultural and Ohio EPA estimated that approximately seventy percent of agricultural lands in the watershed are used for row crop agricultural purposes (MWN TMDL, Section 4.1.1.1). The successful cultivation of row crops requires the use of fertilizer in commercial/inorganic and/or organic (i.e., manure) form so that producers ensure the proper nutrient concentration amounts are available in the soil for crop uptake (Kalcic, et al, 2016).

Ohio EPA provides a discussion of commercial (i.e., chemical and/or inorganic) and organic (i.e., manure, composted materials and/or biosolids) fertilizers, typical fertilizer application in the MRW, and various Ohio programs and oversight in the nonpoint source discussion of the MWN TMDL document (MWN TMDL, Section 4.1.1.1). Fertilizers spread onto agricultural fields may be liberated and transported to surface waters during precipitation events across all seasons. Stormwater runoff from

agricultural lands may contribute phosphorus, other nutrients, organic material and organic-rich sediment to surface waters in the MRW. Fields underlain by tile drainage lines, which are prevalent in the MRW, can channelize precipitation to drainage ditches and/or small streams and exacerbate the transport of nutrients to surface waters.

Nutrient contributions from soils: Ohio EPA cites the oversaturation of nutrients in soils due to prior nutrient application practices in certain areas of the MRW. This contribution is labeled as "legacy" phosphorus (MWN TMDL, Section 4.1.1.2; Han et al, 2012; Kleinman et al, 2011), and is often defined as excess phosphorus in soils that is not available for immediate use by plants (Doydora et al, 2022). Precipitation events may mobilize nutrient-laden erodible soils via overland stormwater runoff events. Eroding streambanks and channelization efforts may also add phosphorus and other nutrients, organic material and organic-rich sediment to local surface waters, especially if there is particulate phosphorus bound to eroding soils (MWN TMDL, Section 4.1.1.4; Sharpley et al, 2013: Kleiman et al, 2011).

In Section 4.1.1.4 of the MWN TMDL, Ohio EPA discusses how eroding riparian areas, which can be worsened by changes to hydrologic flow patterns, contribute phosphorus and sediment inputs to the surface waters of the Ohio portion of the MRW. Down-cutting of stream channels and streambanks can also be exacerbated via changes to hydrologic flow patterns. Anthropogenic efforts to remove the natural sinuosity of the stream channel by straightening and/or channelizing streams can result in increased streamflow velocities, especially during high streamflow events. Increased streamflow velocities typically lead to greater erosion of the stream channel and streambanks. Stream channelization efforts may also disturb the natural sedimentation processes of the streambed.

Nutrient contributions from non-MS4 urban/residential areas: Phosphorus, organic material and organic-rich sediment may be added via stormwater runoff from urban/developed areas which are not covered under the jurisdictional area of a MS4 community (e.g., small communities, farm homesteads, etc.). These contributions can include phosphorus derived from lawn fertilizers/lawn applications, leaf and grass litter, pet wastes, soils deposited on road surfaces, and other sources of anthropogenic derived nutrients.

Nutrient contributions from discharges from HSTS or unsewered communities: Failing HSTS, whether they are considered by Ohio EPA as a discharging HSTS (discussed earlier in this Decision Document in the *Discharging HSTS subsection*) or a non-discharging HSTS (MWN TMDL, Sections 4.1.3 and 5.2.4), are a potential source of phosphorus within the Ohio portion of the MRW. Non-discharging HSTS use leach field systems and soil microbial activity to treat effluent. In certain circumstances those treatment technologies may fail which can lead to untreated effluent leaching into groundwater or ponding on the soil surface. Precipitation events can mobilize that effluent and transport it to surface waters of the MRW. Age, construction and use of HSTS can vary throughout a watershed and influence the effluent contribution from these systems.

Nutrient contributions from biosolids and industrial liquid wastes: Phosphorus from spread biosolids and/or treated industrial liquid wastes, under certain precipitation and runoff conditions, can be transported to surface waters of the MRW (MWN TMDL, Section 4.1.2.3). Ohio EPA explained that both biosolids and industrial liquid wastes must provide an agronomic benefit and protect human health and the environment. Additionally, treated wastewater must also meet effluent limitations in accordance with Ohio Administrative Code (OAC) 3745-42-13.

Nutrient contributions from atmospheric deposition: Phosphorus and organic material may fall directly onto surface waters (i.e., lakes within the watershed, streams and/or rivers which contribute to the Maumee River) or onto land surfaces in the MRW (MWN TMDL, Section 4.1.1.6). Particulates that fall onto land surfaces may be mobilized into surface waters via precipitation and/or flooding events. Phosphorus can be bound to these particles which may add to the phosphorus inputs to surface water environments and downstream to the Western Basin of Lake Erie.

Nutrient contributions from natural land use sources: Phosphorus, organic material and organic-rich sediment may be added to surface waters by stormwater flows through natural lands (e.g., undisturbed wetland and/or and forested areas) in the MRW (MWN TMDL, Section 4.1.1.5). Storm events may mobilize phosphorus through the transport of decomposing vegetation, soil particles and other organic debris. Ohio EPA noted that very little of the MRW is considered unaltered natural lands, and thus, considers this source to have little to no impact on phosphorus loading to the assessment units in the Western Basin of Lake Erie.

Future Growth:

Ohio EPA explained that population trends in the Ohio portion of the MRW have remained relatively stable over previous decades with some counties experiencing slight decreases in overall population numbers (MWN TMDL, Section 5.6). Ohio EPA cited studies that concluded that it was unlikely for the Ohio portion of the MRW to see large increases in population to Northwestern Ohio in the coming decades. Despite these population trends, Ohio EPA reserved a portion of the overall TMDL loading capacity (MWN TMDL, Table 26, and Table 1A of this Decision Document) to be potentially used in the future by a new or expanding NPDES facility. This allowance for future growth (AFG) provides flexibility to Ohio EPA and its permittees should unforeseen circumstances occur that necessitate recalculation or reconsideration of the WLA assigned to an existing facility.

The WLA and load allocations (LA) for the MWN TMDL were calculated for all current sources and the AFG was added to provide some flexibility for potential changes to those existing, current point sources. Any expansion of point or nonpoint sources will need to comply with the respective WLA and LA values calculated in the MWN TMDL.

EPA notes that Ohio EPA did not include a future growth consideration for CAFOs, either through the WLA or LA (MWN TMDL, Section 5.6). Ohio EPA explained that while animal populations have increased in the watershed, there are also declines in the levels of phosphorus in manure, increased crop yields (increasing TP removal from soils) and declining commercial fertilizer sales. As noted by Ohio EPA, Figure 17 (as well as Figure 16) of the MWN TMDL shows that the phosphorus that was removed through crop removal (i.e., harvesting) in 2012 and 2017 is greater than the phosphorus that was applied via commercial and/or manure fertilizer in the watershed.

EPA has reviewed the submitted MWN TMDL and, for the reasons discussed in Section 1 of this Decision Document, finds that the MWN TMDL identifies the impaired water bodies, pollutant of concern, and pollutant sources that are addressed by this TMDL. EPA finds that the State compiled and reviewed appropriate information, including but not limited to NPDES data, water quality data, and numerous studies to identify the key sources of phosphorus addressed in this TMDL. EPA also finds that Ohio EPA adequately defined how various key terms were used in the MWN TMDL, such as “legacy

phosphorus" and "agricultural stormwater." EPA reviewed numerous studies in addition to the studies cited in the MWN TMDL, including: Chaffin et al, 2021; Yuan and Koropeckyj-Cox, 2022; Meunich et al, 2016; and Williams et al, 2015. See the list of References at the end of the Decision Document for a complete list of studies reviewed by EPA. EPA has concluded that the approaches and assumptions in the MWN TMDL's methodology are compatible with the literature reviewed.

2. Description of the Applicable Water Quality Standards and Numeric Water Quality Target

The TMDL submittal must include a description of the applicable State/Tribal water quality standard, including the designated use(s) of the water body, the applicable numeric or narrative water quality criterion, and the antidegradation policy (40 C.F.R. §130.7(c)(1)). EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

The TMDL submittal must identify a numeric water quality target(s) – a quantitative value used to measure whether or not the applicable water quality standard is attained. Generally, the pollutant of concern and the numeric water quality target are, respectively, the chemical causing the impairment and the numeric criteria for that chemical (e.g., chromium) contained in the water quality standard. The TMDL expresses the relationship between any necessary reduction of the pollutant of concern and the attainment of the numeric water quality target. Occasionally, the pollutant of concern is different from the pollutant that is the subject of the numeric water quality target (e.g., when the pollutant of concern is phosphorus, and the numeric water quality target is expressed as Dissolved Oxygen (DO) criteria). In such cases, the TMDL submittal should explain the linkage between the pollutant of concern and the chosen numeric water quality target.

EPA Review of the MWN TMDL:

Water quality standards (WQS) are the fundamental benchmarks by which the quality of surface waters is measured. Ohio's water quality standards are detailed in the Ohio Administrative Code Chapter 3745-1.[7] Ohio's WQS include three components as noted in Section 3.1 of the MWN TMDL:

- ***Beneficial use designation***: Ohio EPA assigns a description of the existing or potential uses of a water body (e.g., public water supply, recreational use). Beneficial use designations are defined in OAC 3745-1-07 (b).[8];
- ***Narrative or numeric criteria***: Ohio's narrative criteria that are applicable to all surface waters of the state are described in OAC 3745-1-04 (see bullets immediately below for relevant subtopics of OAC 3745-1-04).[9] Numeric criteria are an estimation of chemical concentrations, degree of aquatic life toxicity and/or physical conditions allowable in a water body without adversely impacting the beneficial use(s) of that water body.
    - **OAC 3745-1-04 (A):** *Free from suspended solids or other substances that enter the waters as a result of human activity that will settle to form putrescent or otherwise objectionable sludge deposits, or that will adversely affect aquatic life.*

[7] Ohio Laws and Administrative Rules, https://codes.ohio.gov/ohio-administrative-code/chapter-3745-1, (last visited 9/24/23).
[8] Ohio Laws and Administrative Rules, https://codes.ohio.gov/ohio-administrative-code/rule-3745-1-07, (last visited 9/24/23).
[9] Ohio Laws and Administrative Rules, https://codes.ohio.gov/ohio-administrative-code/rule-3745-1-04, (last visited 9/24/23).

- **OAC 3745-1-04 (B):** *Free from floating debris, oil, scum and other floating materials entering the waters as a result of human activity in amounts sufficient to be unsightly or cause degradation.*
- **OAC 3745-1-04 I:** *Free from materials entering the waters as a result of human activity producing color, odor or other conditions in such a degree as to create a nuisance.*
- **OAC 3745-1-04 (D):** *Free from substances entering the waters as a result of human activity in concentrations that are toxic or harmful to human, animal or aquatic life or are rapidly lethal in the mixing zone.*
- **OAC 3745-1-04 I:** *Free from nutrients entering the waters as a result of human activity in concentrations that create nuisance growth of aquatic weeds and algae.*

- **Antidegradation provision:** From OAC 3745-1-05 I, "*Existing uses, which are determined using the designations defined in rule 3745-1-07 of the Administrative Code, and the level of water quality necessary to protect existing uses, shall be maintained and protected. There may be no degradation of water quality that results in either a violation of the applicable water quality criteria for the designated uses, unless authorized by a water quality standard variance issued in accordance with rule 3745-1-38 of the administrative Code, or the elimination or substantial impairment of existing uses.*"

Under Ohio's WQS, attainment of beneficial uses is based on specific numeric and narrative criteria, and where numeric criteria have not been developed the State can develop project-specific targets. (MWN TMDL, Section 3.1)

Designated Uses:

In OAC 3745-1-31and discussed in Section 3.2 of the MWN TMDL, Lake Erie is designated as: an exceptional warmwater habitat, a superior high-quality water, a public water supply, an agricultural water supply, an industrial water supply and a bathing water.[10] In Table 1 of the MWN TMDL, Ohio EPA identified the impaired water bodies, causes of impairment and impaired uses addressed in this TMDL.

Standards:

Narrative Criteria:

Ohio's narrative criteria that are applicable to all surface waters of the State are described in OAC 3745-1-04. Sections (A) to I of OAC 3745-1-04 are cited above.

Numeric criteria/target:

OAC 3745-1-31 does not include numeric nutrient criteria for Lake Erie. Historically, Ohio EPA has used nutrient and/or biological information included in its *Association Between Nutrients, Habitat and Aquatic Biota in Ohio Rivers and Streams*[11] (Ohio EPA, 1999) (i.e., the *Associations* document) to set nutrient targets and to develop numeric TMDLs for impaired terrestrial watersheds. To date, Ohio EPA has not developed a nutrient TMDL for inland lakes[12] or for Lake Erie. The use of the Associations

[10] Ohio Laws and Administrative Rules, https://codes.ohio.gov/ohio-administrative-code/rule-3745-1-31, (last visited 9/24/23).
[11] Ohio EPA webpage, https://epa.ohio.gov/static/Portals/35/documents/assoc_load.pdf, (last visited 9/24/23).
[12] EPA notes that Ohio EPA has developed TMDLs for reservoirs using lake criteria (e.g., Total Maximum Daily Loads for the Upper Mahoning River Watershed, Ohio EPA, August 17, 2011). (https://epa.ohio.gov/static/Portals/35/tmdl/Mahoning_upper_Report_Final.pdf), (last visited 9/24/23).

document was not considered by Ohio EPA to be appropriate for setting phosphorus targets for the MWN TMDL because the underlying ecosystems that are represented in the Associations document (i.e., terrestrial, inland subwatersheds) are different from the Lake Erie ecosystem (MWN TMDL, Section 3.3.3; Ohio EPA, 2022a Integrated Report).

For the MWN TMDL, Ohio EPA employed the recommended total phosphorus numeric targets developed under the Great Lakes Water Quality Agreement (GLWQA) by the Annex 4 Objectives and Targets Task Team (hereafter, Annex 4 targeting team). The Annex 4 targeting team was tasked with studying harmful algal blooms (HABs) in Lake Erie and devising phosphorus reduction targets to meet Annex 4 Lake Erie ecosystem goals.[13] The Annex 4 targeting team's efforts were finalized in 2015 and detailed in its report, *Recommended Phosphorus Loading Targets for Lake Erie (2015)* (hereafter, the Annex 4 targets document).[14] Ohio EPA used the conclusions, assumptions and total phosphorus targets presented in the Annex 4 targets document to set the numeric total phosphorus target for the MWN TMDL (MWN TMDL, Sections 3.3 and 3.4; Table 2 of this Decision Document).

Ohio EPA explained the linkage between the GLWQA Annex 4 targets and the endpoint of the MWN TMDL:

> The intention of the Maumee Watershed Nutrient TMDL is to attain and maintain the applicable water quality standards, for the criteria described in Section 3.3 (recreation use (algae), drinking water use (algae), and aquatic life use (nutrients)). The phosphorus reduction targets described in the Great Lakes Water Quality Agreement's Annex 4 load reduction recommendations were evaluated relative to these impairments. Ohio EPA has found that the designated uses described in Section 3.3 will be restored when the TMDL allocated loads (Table 26) are reached. (MWN TMDL, Section 3.4 (Linkage analysis and targets) page 14.)

Table 2: Maumee Watershed Nutrient TMDL targets for total phosphorus

Location		**Total phosphorus spring target (March 1 – July 31)**
Name	*Coordinates*	*(metric tons)*
Maumee River at Waterville	41.4998, -83.7140	860.0
Maumee River at mouth/Maumee Bay	41.6937, -83.4682	914.4

Table 2 of this Decision Document includes the two total phosphorus endpoints from the MWN TMDL: one at the United States Geological Survey (USGS) streamflow gage at Waterville, Ohio (USGS #04193500);[15] and the other at the mouth of the Maumee River in Maumee Bay. The endpoint in the mainstem of the Maumee River at the Waterville streamflow gage is important because the USGS has measured discharge at this station since October 1987, and the National Center for Water Quality

[13] EPA webpage, Great Lakes Water Quality Agreement Nutrient Annex 4 Objectives and Targets Development Task Team Multi-Modeling Report – Final (August 2016, https://www.epa.gov/sites/default/files/2016-11/documents/nutrientannex4multimodelingreportfinalappendicessep2016.pdf, (last visited 9/24/23).
[14] Annex 4 (Great Lakes Water Quality Agreement – Nutrient Annex) Objectives and Targets Task Team, *Recommended Phosphorus Loading Targets for Lake Erie*, 2015, https://www.epa.gov/sites/default/files/2015-06/documents/report-recommended-phosphorus-loading-targets-lake-erie-201505.pdf, (hereafter, the Annex 4 targets document), (last visited 9/24/23).
[15] USGS webpage, https://waterdata.usgs.gov/monitoring-location/04193500/, (last visited 9/20/23).

Research (NCWQR) at Heidelberg University has collected water quality data at this same location for more than 30 years. The Waterville monitoring location is the downstream drainage point for approximately 6,306 square miles of the 6,607 total square miles of the MRW.

The Annex 4 targets document explains how the Annex 4 targeting team determined the total phosphorus spring target of 860 MT at the Waterville location. For the purposes of this Decision Document, EPA will summarize some of the assumptions made and how those assumptions factored into the total phosphorus spring target load used by Ohio EPA in the MWN TMDL.

In 2015, the Annex 4 targeting team considered water quality conditions in Lake Erie across a number of years and determined that the 2008 water year would be its baseline year for setting water quality goals for Lake Erie. The 2008 water year was selected because in 2008 the annual total phosphorus load to Lake Erie was estimated to be 10,675 metric tons per annum (MTA) which was very close to a Lake Erie target load of 11,000 MTA set in the GLWQA. Additionally, the Annex 4 targeting team intended to set the total phosphorus loading target where the resultant algal bloom in Lake Erie would be considered a mild bloom (i.e., less than 9,600 MT algal dry weight), which coincided with the blooms observed in 2004 or 2012. The total phosphorus target of 860 MT at the Waterville location is calculated to result in a bloom no greater than the blooms observed in 2004 or 2012, 90 percent of the time (i.e., nine (9) out of ten (10) years).

Ohio EPA reviewed the Annex 4 target document[16] and determined that the Annex 4 TP target will attain the three designated uses determined to be impaired in the Western Basin of Lake Erie (MWN TMDL, Section 3.3). For recreational use, Ohio EPA set an assessment target of less than three 10-day frames from July 1 to October 31 where the average cyanobacteria count is less than 20,000 cells per milliliter (mL) and the bloom does not exceed greater than thirty percent (30%) of the Western Basin of Lake Erie assessment units in two or more years out of six (Ohio EPA 2022 Integrated Report, Section F; MWN TMDL, Section 3.3.1). Ohio EPA's 303(d) assessment approach utilizes a more specific assessment window than the approach used in the Annex 4 target document that specified a bloom no larger than the 2004 or 2012 seasonal bloom in nine (9) out of ten (10) years (Davis et al, 2019).

To assess the drinking water use, Ohio EPA uses cyanotoxins as an indicator for algae (Ohio EPA 2022 Integrated Report, Appendix H). A drinking water source is considered impaired if the cyanotoxin values exceed the drinking water threshold for microcystins (1.6 micrograms per liter (µg/L)) more than twice in a five (5) year period.

To assess the aquatic life use, Ohio EPA reviewed the Annex 4 target document, which considered the impacts of phosphrous on the trophic status of the lake (MWN TMDL, Section 3.4.3). The GLWQA (Annex 4) establishes Lake Ecosystem Objectives that include maintaining a mesotrophic condition in the open waters of the western and central basins of Lake Erie. The Annex 4 target document identified a phosphorus concentration in the lake of 10-15 µg/L, that would likely achieve this goal. The models used to develop the Annex 4 total phosphorus target indicate that the goal of 40% reduction in total phosphorus would likely result in a lake concentration of 12-15 µg/L, thus, attaining the goal of a mesotrophic condition (MWN TMDL, Section 3.4.3; Annex 4 Annex 4 targets document, Table 4).

[16] The Annex 4 targets document, Table 4, pg. 37.

The Annex 4 targeting team also considered the annual variability in streamflow across the MRW. The Annex 4 targets document includes flow-weighted mean concentration targets, for total phosphorus (0.23 micrograms per liter (mg/L)), which provide another benchmark for measuring total phosphorus contributions from the MRW at Waterville.

The Annex 4 targets document includes both total phosphorus and dissolved reactive phosphorus (DRP) targets. The MWN TMDL solely addresses TP and does not include TMDL calculations for DRP. Please see Attachment 2 of this Decision Document for further discussion of EPA's consideration of DRP in the context of the MWN TMDL.

The MWN TMDL focuses on reducing total phosphorus inputs to the Western Basin of Lake Erie during the spring loading period of March 1 to July 31. Ohio EPA stated that reducing total phosphorus loading from the Maumee River Watershed during this critical spring loading period will reduce the severity and size of HABs in the Western Basin of Lake Erie and attain water quality standards.

Ohio EPA further explained how it used the Annex 4 targets document for the MWN TMDL:

> Annex 4 identified the springtime load from the Maumee River watershed as controlling the large western basin of Lake Erie HABs, and Ohio EPAs evaluation for identifying impaired conditions was consistent with the Annex 4 goals. Therefore, Ohio EPA expects meeting the Maumee River targets to restore the impaired uses of the three impaired western Lake Erie assessment units. (MWN TMDL, Section 3.4.1, pg. 16)

The Annex 4 targets document was used by the State of Michigan in its Domestic Action Plan (2018),[17] by the State of Ohio in its Domestic Action Plan (2020),[18] and by the U.S. EPA in its U.S. Action Plan for Lake Erie (2018).[19] In addition, most studies in the Western Basin of Lake Erie utilize the Annex 4 total phosphorus targets in their analysis, including Yuan and Koropeckyj-Cox, 2022; Kast et al, 2021; and Scavia et al.

TMDL Target: Table 6 of the MWN TMDL contains the targets for total phosphorus for the Spring (March-July) for the Maumee River at Waterville (860 metric tons (MT)) and further downstream at Maumee Bay (914.4 MT) (MWN TMDL, Table 26; and Table 2 of this Decision Document). These targets are to be met nine (9) out of ten (10) years (MWN TMDL, Section 3.4.1). Ohio EPA determined that the TMDL target of 914.4 MT loading capacity at the mouth of the Maumee River in Maumee Bay, will address all three beneficial uses. The MWN TMDL states "total phosphorus TMDL allocations for the Maumee watershed are developed to address all applicable Lake Erie impairments." (MWN TMDL, Section 3.5, pg. 41) Therefore, the loading capacity at the mouth of the Maumee River in Maumee Bay, the 914.4 MT per spring season, is the target of the TMDL (MWN TMDL, Table 26; and Table 1A of Attachment 1 of this Decision Document).

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[17] State of Michigan webpage, https://www.michigan.gov/-/media/Project/Websites/egle/Documents/Programs/WRD/AOC/Domestic-Action-Plan-Lake-Erie.pdf?rev=15365322dcf140a798136a01906ccbf5#:~:text=The%20DAP%20lays%20out%20specific,research%20gaps%3B%20and%2C%20an%20adaptive, (last visited 9/24/23).

[18] Ohio Lake Erie Commission webpage, https://lakeerie.ohio.gov/planning-and-priorities/02-domestic-action-plan, (hereafter, the Ohio DAP), (last visited 9/24/23) .

[19] EPA webpage, https://www.epa.gov/sites/default/files/2018-03/documents/us_dap_final_march_1.pdf, (last visited 9/24/23).

The total phosphorus target of 914.4 MT at the mouth of the Maumee River in Maumee Bay was an extrapolated value calculated by Ohio EPA to account for watershed contributions of total phosphorus for the areas (i.e., urban Toledo) downstream of the Waterville gage. Ohio EPA explained its calculative process for extrapolating the 860 MT Waterville total phosphorus target in Section 3.4.1 of the MWN TMDL.

EPA finds that the TMDL document submitted by Ohio EPA adequately identifies the WQSs that are impaired, and the TMDL target needed to attain the impaired designated uses. Ohio EPA derived an interpretation of the narrative standards in OAC 3745-1-04 for recreational use, drinking water use, and aquatic life use. EPA has reviewed Ohio EPA's TMDL target discussion (MWN TMDL, Section 3) and finds that the MWN TMDL target is consistent with the Annex 4 targets document, and the CWA. Ohio EPA has appropriately documented that achieving the TMDL target is reasonably expected to attain the water quality standards for recreational use, drinking water use, and aquatic life use in the impaired water bodies.

3. Loading Capacity – Linking Water Quality and Pollutant Sources

A TMDL must identify the loading capacity of a water body for the applicable pollutant. EPA regulations define loading capacity as the greatest amount of a pollutant that a water can receive without violating water quality standards (40 C.F.R. §130.2(f)).

The pollutant loadings may be expressed as either mass-per-time, toxicity or other appropriate measure (40 C.F.R. §130.2(i)). The TMDL submittal should describe the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources. In many instances, this method will be a water quality model.

The TMDL submittal should contain documentation supporting the TMDL analysis, including the basis for any assumptions; a discussion of strengths and weaknesses in the analytical process; and results from any water quality modeling. EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

TMDLs must take into account *critical conditions* for steam flow, loading, and water quality parameters as part of the analysis of loading capacity (40 C.F.R. §130.7(c)(1)). TMDLs should define applicable *critical conditions* and describe their approach to estimating both point and nonpoint source loadings under such *critical conditions*. In particular, the TMDL should discuss the approach used to compute and allocate nonpoint source loadings, e.g., meteorological conditions and land use distribution.

EPA Review of MWN TMDL:

Linking impairments to TMDL targets:

Ohio's CWA Section 303(d) 2022 Impaired Waters List identified three beneficial use impairments for the assessment units in the Western Basin of Lake Erie; recreational use, public drinking water use, and aquatic life use. Table 1 of this Decision Document includes further detail on the individual assessment units, their impaired beneficial uses, and Ohio EPA's determination of the likely cause of impairment (e.g., algae).

The MWN TMDL identifies pollutant loads necessary to attain and maintain applicable water quality standards in the assessment units of the Western Basin of Lake Erie, specifically criteria for the recreational, public drinking water and aquatic life designated uses. As noted in Section 2 of this Decision Document (*Description of the Applicable Water Quality Standards and Numeric Water Quality Target*), Ohio EPA explained that total phosphorus targets, derived in part from the GLWQA's Annex 4 load reduction recommendations, when achieved will restore the designated uses for recreational, public drinking water, and aquatic life uses (MWN TMDL, Sections 1, 3.3, and 3.4). As Ohio EPA explained, "…total phosphorus TMDL allocations for the Maumee watershed are developed to address all applicable Lake Erie impairments." (MWN TMDL, Section 3.5 pg. 19).

Additional source discussion:

Consideration of DRP:

During the development of the MWN TMDL, Ohio EPA devoted considerable time and effort in assessing the role that DRP has in the growth of HABs in the Western Basin of Lake Erie. Appendix 1 to the MWN TMDL assesses DRP at length and identifies uncertainties surrounding DRP export, instream processing (or cycling), and the ability to model DRP movement. (MWN TMDL, Appendix 1) For these reasons Ohio EPA concluded that "there are numerous knowledge gaps in DRP sources, in-stream cycling, and the ability of existing models to simulate these factors. Uncertainty surrounding DRP sources and transport is large. TMDL allocations cannot capture this uncertainty while remaining meaningful for watershed planning efforts." (MWN TMDL, Appendix 1, pg. 10). Ohio EPA determined that developing allocations for total phosphorus is feasible (MWN TMDL, Section 3.5.1 and Appendices 1 and 2).

Ohio EPA explained that the MWN TMDL could be revised to include DRP as new studies and modeling efforts are completed in the MRW. Revisions to the MWN TMDL to account for DRP contributions to the surface waters of the MRW, to set DRP allocations for point and nonpoint source loads, would be made by Ohio EPA. Ohio EPA recognizes the importance of reducing DRP loadings while continuing to develop the science needed to include DRP in the TMDL allocations. As Ohio EPA stated in the TMDL, "[a] vital role of this TMDL project is to steer nutrient reduction efforts towards identification of DRP sources and implementing practices that reduce DRP." (MWN TMDL, Appendix 1, pg. 13.) Please see Attachment 2 of this Decision Document for further discussion of EPA's consideration of DRP in the context of the MWN TMDL.

Consideration of total phosphorus contributions from adjacent watersheds:

Ohio EPA considered total phosphorus loading from other Ohio tributaries of the Western Basin of Lake Erie (e.g., contributions from the Portage River, the Ottawa River, and the Cedar-Toussaint River watersheds). Ohio EPA cited the Annex 4 targeting team's acknowledgment that other tributary watersheds do contribute total phosphorus to the assessment units of the Western Basin of Lake Erie and cited evidence that those phosphorus contributions have resulted in smaller cyanobacteria blooms near the mouth of certain tributaries (MWN TMDL, Section 3.4). Figure 1 of the MWN TMDL displays average annual total phosphorus loads (as MTA) from 2009 to 2019 for all contributing subwatersheds to Lake Erie.

Ohio EPA did not allocate a portion of the loading capacity of the MWN TMDL to Ohio tributary subwatersheds outside of the Maumee River Watershed (e.g., Portage River Watershed) as the MWN TMDL focuses on the phosphorus inputs from the MRW. Ohio EPA based this approach on the conclusions of the Annex 4 target document that determined nutrient contributions from the MRW were the overwhelmingly dominant driver of HAB formation in the assessment units of the Western Basin of Lake Erie[20] and that mitigating nutrient inputs from the MRW at the loading levels set by the Annex 4 targeting team would attain the water quality goals in the assessment units of the Western Basin of Lake Erie (i.e., total phosphorus target of 860 MT for the spring period at the Waterville location in nine (9) out of ten (10) years). Ohio EPA determined that in order to attain the TMDL targets, as described in Section 2 of this Decision Document, implementation efforts will primarily focus on controlling the spring load of total phosphorus from the MRW.

Ohio EPA explained that MWN TMDL development efforts are predicated on attaining the total phosphorus goals of the Annex 4 target document (i.e., 860 MT of total phosphorus for the spring targeting period of March 1 to July 31). Ohio EPA extrapolated the Annex 4 target for Waterville downstream to a point near the mouth of the Maumee River and translated the 860 MT total phosphorus target at Waterville to a 914.4 MT total phosphorus target at the mouth of the Maumee River. Ohio EPA determined that attaining the MRW target for total phosphorus, and the existing efforts discussed in the paragraph below, will restore the impaired uses to the three assessment units of the Western Basin of Lake Erie (Table 1 of this Decision Document).

EPA notes that certain tributary watersheds, such as the Cedar-Toussaint River Watershed and the Portage River Watershed, do have existing, approved total phosphorus TMDLs. Ohio EPA developed total phosphorus TMDLs for impaired segments within the Portage River Watershed (August 2011) as well as total phosphorus TMDLs for impaired segments within the Toussaint River Watershed TMDL (July 2006). These total phosphorus TMDLs address near-field impaired river assessment units and do not directly account for downstream water quality conditions in the Western Basin of Lake Erie. These earlier TMDLs employ different assumptions for calculating and assigning allocations for point and nonpoint sources as compared to the assumptions used in the MWN TMDL. For example, one of the earlier TMDLs utilized an annual time scale (i.e., 365 days) versus the MWN TMDL's focus on the spring season (i.e., 153 days). While there are differences in development approaches between these earlier TMDLs and the MWN TMDL, EPA notes that implementation efforts targeting near-field phosphorus contributions in the Portage River and Toussaint River watersheds have resulted in improvements to water quality in these watersheds.

Consideration of changes to watershed hydrology:

The MWN TMDL cites studies that consider the effects of climate change, especially changes to terrestrial and water temperatures and changes to precipitation patterns and intensity of precipitation events (MWN TMDL, Section 4.1.1.7). Precipitation trends in the basin demonstrate that the amount, timing, and intensity has fluctuated over the past 40 plus years (MWN TMDL, Figure 20). The dynamics of how the MRW stores and moves precipitation, and when the MRW does so, are expected to change in response to warmer temperatures and the likelihood of more extreme precipitation in the coming years. The watershed's response to the changing hydrologic conditions could lead to warming temperatures for the assessment units of the Western Basin of Lake Erie as well as increased nutrient inputs, especially from nonpoint sources, to surface waters in the MRW.

[20] The Annex 4 targets document, pg. 33.

Ohio EPA explained that a central tenet of its implementation approach will be to monitor water quality conditions throughout the MRW, to observe any change to hydrologic conditions which may be exacerbated by fluctuations in climate, and to evaluate the success of its on-the-ground implementation efforts. If Ohio EPA determines that it needs to revise the TMDL and/or implementation strategy(ies) in response to changing hydrologic conditions, then it will do so via an adaptive management approach (MWN TMDL, Section 7.6). Ohio EPA's implementation approach also proposes to deploy best management practices (BMPs) that emphasize water management practices (e.g., drainage water management structures, wetlands, two-stage ditches, edge-of-field buffers etc.) that will help to mitigate the hydrologic impacts of extreme precipitation events.

Mass balance water quality modeling approach

Ohio EPA used an empirical data-driven, mass balance water quality model to allocate the 2008 spring season's total phosphorus target (see Table 2 of this Decision Document) to point and nonpoint allocations (MWN TMDL, Section 3.5.2). Ohio EPA chose the spring season of 2008 as its TMDL target in order to align with the goals of the Annex 4 targets document. The spring season is defined as the time period from March 1 to July 31.

When investigating different water quality modeling approaches, Ohio EPA considered two different modeling approaches: data-driven water quality modeling efforts, and process-based water quality modeling efforts. In Table 8 of the MWN TMDL, Ohio EPA outlined pros and cons of each water quality modeling approach. For the MWN TMDL, Ohio EPA chose a data-driven, mass balance method to calculate and assign loads in the TMDL. Ohio EPA acknowledged that since the 1970s, various data-driven, mass balance calculative efforts were used to develop load reduction strategies in the Great Lakes region. Data-driven, mass balance methods have been used more recently by Ohio EPA to study nutrient inputs throughout the State via Ohio EPA's biennial Nutrient Mass Balance Study for Ohio's Major Rivers (editions in 2016, 2018, 2020 and 2022[21]) as well as the Ohio DAP.

Mass balance approaches combined with the use of a robust water quality data set are a practicable method for characterizing phosphorus loading patterns and identifying source reductions. Mass balance approaches were part of the process to determine the initial phosphorus loadings to Lake Erie in the 2012 amendment to the GLWQA (Chapra, et al, 2016). Ohio EPA determined that mass balance methodologies have been used for Lake Erie for many years, thus, allowing easier comparison to pre-existing work and connectivity to observed phosphorus water quality monitoring results in the MRW. Ohio EPA also noted that the mass balance model inherently accounts for instream processes (e.g., phosphorus cycling) and agricultural practices and thus does not require simplifying assumptions to account for these processes. Ohio EPA found that there are some drawbacks with using the mass balance model. The model works better at a larger scale and has been found to be less effective when scaled down to smaller watershed units.

Ohio EPA explained that the process-driven models (such as the Soil and Water Assessment Tool (SWAT)) have been developed in the MRW and will serve a valuable role in refining implementation efforts (Ohio EPA, 2020b). Testing various implementation scenarios will be important in refining the implementation strategy via adaptive management efforts and for attaining the water quality standards in

[21] Ohio EPA webpage, https://epa.ohio.gov/static/Portals/35/documents/2022-NMB-Final.pdf, (last visited 9/24/23).

the Western Basin of Lake Erie. As noted in Section 7.6 of the MWN TMDL, the MWN TMDL can be revised as new information and data become available, including updating the model.

Ohio EPA explained that the mass balance approach used for the MWN TMDL calculates loading to a greater level of detail as compared to the mass balance approaches used in Ohio's biennial Nutrient Mass Balance Studies and the Ohio Domestic Action Plan[22] (MWN TMDL, Section 3.5.2). Ohio EPA's development approach for the MWN TMDL provided greater detail for point and nonpoint source apportionments (e.g., permitted stormwater loading from discharging HSTS loading). Ohio EPA outlined the sources of information it considered when developing its mass balance approach in Table 17 of the MWN TMDL. Information from the 10 different line items in Table 17 of the MWN TMDL all were considered at various junctures in Ohio EPA's MWN TMDL development process.

Ohio EPA's decision to use a mass balance method coupled with the quality and quantity of water data collected at the Waterville, Ohio gage (USGS #04193500) by Heidelberg University's NCWQR, allows Ohio EPA to calculate TMDLs for the downstream endpoint located at the mouth of the Maumee River in Maumee Bay and then allocate that TMDL loading capacity to point source loads (via WLA), and nonpoint source loads (via load allocations) within the Ohio portion of the MRW.

Model verification

Ohio EPA performed analyses of the mass balance approach to determine the model's ability to predict loads throughout the watershed (MWN TMDL, Section 5.4 and 6.2). Ohio EPA noted that typical statistical calibration and validation efforts are not applicable to a data-driven approach as in the mass balance model. Rather, Ohio EPA utilized the numerous water quality monitoring stations in the watershed (MWN TMDL, Figure 28), to calculate phosphorus loadings for some of these smaller (HUC-12) locations using the same mass balance process used for the entire TMDL watershed. This included using the spring flow and water quality data, subwatershed land use data, area yields of phosphorous from land types, etc. Ohio EPA also utilized a simple area-ratio method, by looking at the percentage of the drainage area at the Waterville flow and water quality gage by the drainage area at an upstream gage (MWN TMDL, Section 5.4). In the example used by Ohio EPA, the overall drainage area of the Waterville location is 6,330 square miles and the drainage area of the Ottawa River station is 350 square miles. Dividing the 350 miles by 6,330 miles indicates that the Ottawa River station drains 5.5% of the Waterville drainage area. Ohio EPA utilized 10 different upstream stations to review the model validation.

The results of this analysis are presented by Ohio EPA in Section 6.2 of the MWN TMDL. Ohio EPA did perform some statistical analysis of the model verification results and noted that there was generally good agreement between the verification process and the observed data. One analysis utilized the Nash-Sutcliffe efficiency (NSE), which is widely used in hydrology studies and determines the impacts of "noise" in the fit of the data (Le Duc and Sawada, 2023). Results indicate a very good fit of the data. Ohio EPA also statistically reviewed the impact of bias on the model. Results indicated a good fit of the data. A regression analysis also indicated that the mass balance approach resulted in a better fit ($r^2 = 0.70$), again indicating the mass balance model reasonably represents the watershed, and thus, is a reasonable method for Ohio EPA to use for determining the phosphorus loadings for the Ohio portion of the MRW.

[22] Ohio EPA Maumee Watershed Nutrient TMDL webinar, February 8, 2023, https://www.youtube.com/watch?v=NCkuXd5bomU, (last visited 9/24/23).

Using the Annex 4 targets document, Ohio EPA extrapolated the total phosphorus spring season load of 860 MT, set to the Waterville gage, downstream to the mouth of the Maumee River in Maumee Bay (MWN TMDL, Section 3.4.1; Figure 44; Table 6). The 860 MT target is approximately 39.2 percent of the NCWQR measured 2008 spring season total phosphorus load at the Waterville gage (calculation: 1414.1 MT (1 – (860/1414.1) = 39.2 percent). Ohio EPA's extrapolation calculation used the 2008 spring season total phosphorus load (1414.1 MT) and an estimated downstream contribution for the 2008 spring season (89.5 MT[23]). Areas below the Waterville gage to the mouth of the Maumee River were considered as the downstream areas for this extrapolation calculation.

The downstream total phosphorus loading estimate of 89.5 MT, when added to 1414.1 MT equals 1503.6 MT. Applying the 39.2 percent reduction to 1503.6 MT equals 914.4 MT, the value that Ohio EPA set as the extrapolated total phosphorus target for the mouth of the Maumee River in Maumee Bay. EPA reviewed the calculations and justification and determined that this calculative approach for extrapolating the Annex 4 based total phosphorus target from the Waterville gage (860 MT) to a downstream point in at the mouth of the Maumee River in Maumee Bay (914.4 MT) to be reasonable.

Ohio EPA set the MWN TMDL loading capacity to the downstream total phosphorus extrapolated value of 914.4 MT and allocated that loading capacity to point, nonpoint, margin of safety (MOS), allowance for future growth and out-of-state boundary conditions for Indiana and Michigan.

Calculation of point source TMDL contributions:

Ohio EPA calculated the waste load allocation (WLA) to: municipal wastewater or industrial wastewater treatment facilities via individual NPDES permits and/or general permits (e.g., discharging small sanitary general permit (OHS000005)), facilities or communities with individual stormwater permits, permittees addressed via a general stormwater permit (e.g., Ohio's General MS4 permit (OHQ000004)), and Ohio's construction general permit (OHC000005)), combined sewer overflows, and discharging HSTS (covered via the discharging HSTS general permit (OHK000004)). Ohio EPA applied different assumptions and strategies to each of these point source categories to calculate the WLAs assigned to the individual permittee or to facilities addressed via a general permit. EPA provides an explanation for each WLA category in Section 5 of this Decision Document. Individual WLAs are summarized in Tables 1B, 1C, and 1D of Attachment 1 of this Decision Document.

Calculation of nonpoint source TMDL contributions:

Ohio EPA calculated a total load allocation value and then split that value into two load allocations: the nonpoint source landscape load, and the on-site HSTS nonpoint source load. Ohio EPA's calculation of the total LA was dependent on the summation of the point source loads plus margin of safety plus out-of-state boundary condition loads plus an allowance for future growth, which was then subtracted from the total loading capacity value (914.4 MT) (MWN TMDL, Section 5.3.6). Section 4 of this Decision Document contains further discussion of the process Ohio EPA used to determine the LA portion of the TMDL.

The nonpoint source landscape load was not split into further suballocations (e.g., agricultural, developed, and natural landscape loads) (see Table 28 and Section 5.3.6 of the MWN TMDL; and

[23] Ohio EPA's downstream estimate of 89.5 MT was calculated using a nutrient mass balance method documented in Appendix A of Ohio's 2020 DAP.

(Table 1A of this Decision Document). The onsite HSTS nonpoint source loading calculation was based on assumptions Ohio EPA made regarding 2008 baseline conditions for properly working systems, failing on-site systems, which are assumed to have been repaired (50%), and failing on-site systems, which are assumed to be still discharging at a failing rate (50%) (MWN TMDL, Sections 5.2.4 and 5.3.3).

Calculation of margin of safety:

Ohio EPA applied both implicit and explicit considerations when setting the MOS for the MWN TMDL (MWN TMDL, Section 5.5). Ohio EPA provided a verification of its MWN TMDL mass balance modeling assumptions and described efforts to understand and quantify the extent of calculation error in its mass balance approach (considered implicit MOS as defined in EPA 1991 and EPA 1999). Section 5.5 of the MWN TMDL explains Ohio EPA's rationale for using an explicit MOS of three percent (3%), including how that value is representative of Ohio EPA's accounting for uncertainties and unknowns of the MWN TMDL development process. Section 6 of this Decision Document includes additional discussion of the MOS for the MWN TMDL.

Calculation of allowance for future growth:

Ohio EPA calculated an AFG for any new or expanding NPDES permittees, which may discharge total phosphorus to the Ohio portion of MRW. Ohio EPA set the total AFG at 1.5 MT of total phosphorus per spring season (March 1 to July 31), which was subdivided into separate 1.4 MT and 0.1 MT AFG components. The 1.4 MT AFG component was set aside for major municipal sewage treatment facilities in subgroups GP1 and/or GP2 (see facilities in Table 23 of the MWN TMDL; and Table 1B of Attachment 1 of this Decision Document). The 0.1 MT AFG component was set aside for the minor municipal sewage treatment facilities and other permittees in Table A4.2 of Appendix 4, and Table 1C of Attachment 1 of this Decision Document. The 1.5 MT AFG equates to 9.8 kg/day (MWN TMDL, Table 26; and Table 1A of Attachment 1 to this Decision Document).

Ohio EPA also stated that no AFG has been calculated for CAFOs. As explained in Section 5.6 of the MWN TMDL, Ohio EPA did not assign any WLA to CAFOs (i.e., WLA = 0) in the MRW, as no livestock operations are authorized to discharge non-agricultural stormwater. Ohio EPA noted that there has been little industry interest in pursuing alternative requirements, and therefore, no allocation has been set aside for future operations. The TMDL will have to be revised if a future WLA for a CAFO is required.

Calculation of out of state boundary TMDL contributions:

The mass balance approach required Ohio EPA to calculate contributions from the entire Maumee River Watershed, including areas in Indiana (approximately 20 percent of the total Maumee River Watershed area) and Michigan (approximately 7 percent of the total Maumee River Watershed area) (MWN TMDL, Sections 3.5.3 and 5.3.7). Ohio EPA notes, and EPA agrees, that the TMDL allocations expressed in the MWN TMDL are applicable only to the point and nonpoint source contributions within the State of Ohio. Total phosphorus loads calculated as part of the MWN TMDL for Indiana and Michigan are considered as boundary condition loads and Ohio EPA is not assigning loadings to either Indiana or Michigan as part of this TMDL process.

Ohio EPA's calculative approach for setting the Indiana and Michigan boundary condition loads involved the 2008 baseline load for the entire MRW (1,503.6 MT of total phosphorus) and an estimate

of the proportion contribution of Indiana and Michigan to the 2008 baseline load (MWN TMDL, Section 3.4.1). This same proportional contribution was applied to the MWN TMDL target of 914.4 MT (40% reduction from the entire MRW) that resulted in an estimate of 228.7 MT of phosphorus that needed to be further subdivided to Indiana and Michigan. Ohio EPA determined that Indiana's proportion of the out-of-state load (228.7 MT) was seventy-nine percent (180.7 MT), and Michigan's proportion was twenty-one percent (48.0 MT) (MWN TMDL, Section 5.3.7). Through this calculative process Ohio EPA considered reductions to the baseline agricultural and developed area loads for areas in Ohio as well as estimating loads from out-of-state lands in Indiana and Michigan.

MWN TMDL Tables are found in Attachment 1 to this Decision Document

EPA finds that the MWN TMDL adequately identifies the loading capacity of the MRW to attain the designated uses and provides reasonable justification for the assumptions used. As further discussed in Section 2 above, Ohio EPA documents how the TMDL targets will attain the impaired designated uses. Ohio EPA also provides an explanation of why the TMDL focuses on total phosphorus allocations and provides a detailed discussion of why the use of total phosphorus is reasonable (MWN TMDL, Appendix 1 and 2). EPA reviewed the documentation provided by Ohio EPA and its rationale for using total phosphorus. EPA agrees with Ohio EPA's determination to use total phosphorus as further explained in Attachment 1 to this Decision Document.

EPA concurs with the data analysis and data-driven, mass balance approach utilized by Ohio EPA in its calculation of wasteload allocations, load allocations and the margin of safety for the MWN TMDL. Ohio EPA discussed the various alternative modeling approaches and noted the pros and cons of each, and properly documented the basis for selecting the mass balance approach. EPA finds Ohio EPA's approach for calculating the loading capacity to be reasonable and consistent with the CWA and regulations.

4. Load Allocations (LA)

EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity attributed to existing and future nonpoint sources and to natural background. Load allocations may range from reasonably accurate estimates to gross allotments (40 C.F.R. §130.2(g)). Where possible, load allocations should be described separately for natural background and nonpoint sources.

EPA Review of MWN TMDL:
Ohio EPA determined the LA for the MWN TMDL based on the nutrient target at the mouth of the Maumee River in Maumee Bay (MWN TMDL, Section 3.4.1). In its source discussion (MWN TMDL, Section 4), Ohio EPA identified several nonpoint sources which contribute total phosphorus to the surface waters of the Ohio portion of the MRW. These nonpoint sources include nutrient contributions from: row crop fertilizers; soils from stream environments (e.g., eroding streambanks); non-MS4 urban/residential areas; discharges from HSTS or unsewered communities; and atmospheric deposition.

Ohio EPA's nonpoint source discussion (MWN TMDL, Sections 4.1.1.1 to 4.1.1.6) provides further details regarding studies that Ohio EPA considered during its development of the MWN TMDL. Ohio EPA summarized its understanding of nonpoint source contributions to the watershed and explained its rationale for utilizing certain assumptions when considering the baseline loads from landscape sources

(e.g., agriculture, developed and natural) in the context of the final load allocation for the MWN TMDL equation (MWN TMDL, Tables 26 and 28; and Table 1A of Attachment 1 of this Decision Document).

Ohio EPA calculated a separate load allocation for the on-site HSTS nonpoint source load. The remainder of the potential nonpoint source contributors were not subdivided into separate load allocation values, but instead were aggregated into the nonpoint source landscape load (MWN TMDL, Sections 5.2.5 and 5.3.6 and Table 28; Table 1A of Attachment 1 of this Decision Document). The nonpoint source landscape load was determined after Ohio EPA had previously calculated individual point source loads, MOS, out-of-state boundary condition loads and AFG, and those values were subtracted from the total loading capacity.

Ohio EPA's calculation of the on-site HSTS load allocation was based on assumptions surrounding:

- The estimated load from the 2008 baseline conditions for properly working systems;
- One half of the 2008 baseline load to account for failing on-site systems which are assumed to have been repaired; and
- One half of the 2008 baseline load to account for failing on-site systems which are assumed to be still discharging at a failing rate.

Ohio EPA summed the estimated values for the three bullets immediately above and set that load estimate as the load allocation for on-site HSTS (MWN TMDL, Section 5.3.3).

Comments received by Ohio EPA during the public comment period inquired whether the nonpoint source landscape load value, for non-on-site HSTS nonpoint sources, could be further subdivided into individualized nonpoint source loading estimates. Ohio EPA explained in the Responsiveness Summary for the Draft Maumee Watershed Nutrient TMDL that it elected to not further partition the nonpoint source landscape load value because:

- Uncertainty would likely be introduced to the individual nonpoint source loading estimates because of the TMDL development method employed by Ohio EPA. The nonpoint source inputs to Ohio's mass-balance approach did not differentiate potential nonpoint sources. Therefore, efforts to further split the load allocation would introduce uncertainty to the nonpoint source loading estimates and diminish their relevancy for guiding nonpoint source implementation efforts;
- During the development of the TMDL, Ohio EPA found that nonpoint source phosphorus contributions vary across the Hydrologic Unit Code (HUC) HUC-8 subwatersheds contributing flow and phosphorus loading to the MRW (MWN TMDL, Figure 35 displays the results of SPARROW modeling efforts of the 2002 year). Efforts to simplify the dynamic nonpoint source loading conditions across the Ohio portion of the MRW to a single grouping of nonpoint source contributions (e.g., nonpoint contributions attributed to row crop fertilizers, nonpoint contributions attributed to legacy soils etc.) would be challenging. Additionally, Ohio EPA found that attempting to narrow down a range of percentages for potential nonpoint source contributors was difficult given current state of research regarding appropriate percentages of nonpoint sources in the MRW (e.g., certain studies cited by Ohio EPA were subsequently questioned by commenters who challenged their results and Ohio's consideration of those studies in the development of the TMDL);
- Ohio EPA's strategy for providing flexibility to nonpoint source implementation efforts. Calculating a set of subdivided nonpoint source loads to very specific nonpoint sources could be interpreted by members of the watershed community as setting unalterable load allocation target

values. These potential stringent loads could present difficulties in future nonpoint source implementation efforts, especially if the estimated amount of those individual nonpoint source contributions were found, via future research efforts, to have changed over time.

Ohio EPA provided significant discussion on the general nonpoint source load breakdown in the MRW in Section 4.1.1.1 through 4.1.1.6 of the MWN TMDL. For example, Ohio EPA noted that commercial fertilizer contributes an average of 42 percent of the total phosphorus load delivered to Maumee Bay, and that manure fertilizer contributes 8 percent of the total phosphorus load. Ohio EPA discussed similar study results in the other nonpoint source sections of the TMDL. However, these are noted as estimates of contributions, usually averaged over a multi-year period. As noted in Kast et al, 2021, and Martin et al., 2021, as well as in Appendix 2 of the MWN TMDL, the nonpoint sources are precipitation-driven, and therefore, vary widely depending upon the amount, severity, and timing of rainfall/precipitation event. Determining a specific load for a unique set of hydrologic and meteorologic conditions would not have the flexibility that is required to appropriately address phosphorus loading in the MRW.

While Ohio EPA is utilizing only a nonpoint source landscape value and an on-site HSTS nonpoint source contribution for this TMDL effort, Ohio EPA is committing to refining the data and information in the TMDL through the adaptive management process as discussed in Sections 7 and 8 of the MWN TMDL, and in Section 8 of this Decision Document. Ohio EPA will provide a Biennial Report on the progress of implementation actions (MWN TMDL, Section 7.5), and will be able to revise and adjust the implementation strategy via an adaptive management process.

EPA believes it is reasonable for Ohio EPA to use a load allocation value for the nonpoint source landscape load and the on-site HSTS nonpoint source contributions (MWN TMDL, Table 28: Table 1A of Attachment 1 of this Decision Document). The MWN TMDL demonstrates that there is enough specific information on the types of sources contributing phosphorus and their relative contributions to reasonably assure that the load allocations in the MWN TMDL are sufficient and that the TMDL provides the flexibility needed to adjust implementation efforts to attain WQS and meet designated uses. EPA notes the MWN TMDL is consistent with 40 C.F.R. 130.2(g) which states in part, *"Load allocations are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading.*"

Based upon the availability of field-level data and modeling efforts regarding the variable nature of precipitation-driven loadings, the necessity of flexibility for implementation activities at the field scale, the use of an adaptive management approach to further refine implementation actions/strategies in the watershed, and the knowledge Ohio EPA has demonstrated regarding relative source contributions of phosphorus, EPA agrees it is reasonable for Ohio EPA to utilize a load allocation value for the nonpoint source landscape load and the on-site HSTS nonpoint source contributions. As noted in Section 7.6 of the MWN TMDL, the TMDL can be revised as new data and information become available.

5. Wasteload Allocations (WLAs)

EPA regulations require that a TMDL include WLAs, which identify the portion of the loading capacity allocated to individual existing and future point source(s) (40 C.F.R. §130.2(h), 40 C.F.R. §130.2(i)). In some cases, WLAs may cover more than one discharger, e.g., if the source is contained within a general permit.

The individual WLAs may take the form of uniform percentage reductions or individual mass based limitations for dischargers where it can be shown that this solution meets WQSs for the TDML.

EPA Review of the MWN TMDL:
Ohio EPA summarized point source contributors by delineating whether the point source is part of a wastewater treatment facility, a regulated stormwater discharger, or a regulated HSTS (MWN TMDL, Section 5.3.1, Table 9 and Table 25).

Section 5.3.1 of the MWN TMDL and in Ohio EPA's Response to Comments on the Draft MWN TMDL, Ohio EPA discussed its plan for employing a watershed general permit for the facilities discharging great than 1 million gallons per day (MGD). EPA's action approving the MWN TMDL does not address and is not an approval of Ohio's proposed use of a watershed general permit or any potential permit conditions or group WLAs under such a general permit. For the purposes of this TMDL approval, EPA is approving the individual WLAs assigned to the facilities in Table 1B of Attachment 1 of this Decision Document. As part of its review and decision, EPA is not approving any future watershed general permit loading value (e.g., a cumulative WLA value that covers the facilities in Table 1B of Attachment 1 of this Decision Document).

NPDES permitted facilities – municipal sewage treatment facilities (major facilities, 1 MGD or more): Ohio EPA reviewed all NPDES facilities in the Ohio portion of the MRW and sorted the facilities based on design flow (MGD). For the purposes of the MWN TMDL, Ohio EPA designated facilities with a design flow greater than 1 MGD as "major" facilities. Furthermore, Ohio EPA established two subgroups of the major facilities by grouping facilities with a design flow greater than 10 MGD into a major facility subgroup, GP1, and major facilities with a design flow between 1 MGD and 10 MGD into a second major facility subgroup, GP2. Ohio EPA employed two different calculation strategies for assigning WLAs to these two major facility subgroups (MWN TMDL, Section 5.3.1.1).

- *Facilities with a design flow greater than 10 MGD (GP1)*[24]*:* Individual WLAs were set based on the average design flow for each individual facility and a total phosphorus concentration of 0.37 mg/L for the 153 days of the spring season (March 1 to July 31).
    - **Note:** The total phosphorus concentration of 0.37 mg/L was based by Ohio EPA on an expected long-term discharge concentration average if the facilities were to have monthly limits of 0.5 mg/L (MWN TMDL, Table 22).
- *Facilities with a design flow between 1 MGD and 10 MGD (GP2)*[25]*:* Individual WLAs were set based on each individual facility's average design flow and a total phosphrous concentration of 0.43 mg/L for the 153 days of the spring season (March 1 to July 31). Each GP2 individual facility's average design flow was based on a calculation of the individual facility's design flow divided by the sum of all GP2 facilities design flows after accounting for the other grouped permit tiers (MWN TMDL, Section 5.3.1.1).
    - **Note:** The total phosphorus concentration of 0.43 mg/L was based on an expected monthly concentration limit of approximately 0.59 mg/L (MWN TMDL, Table 22).

[24] Table 23 of the MWN TMDL and Table 1B of Attachment 1 of EPA's Decision Document include a list of GP1 designated facilities.
[25] Table 23 of the MWN TMDL and Table 1B of Attachment 1 of EPA's Decision Document include a list of GP2 designated facilities.

NPDES permitted facilities – municipal sewage treatment facilities (minor facilities, less than 1 MGD but greater than 0.5 MGD): For the purposes of the MWN TMDL, Ohio EPA designated facilities with a design flow between 0.5 MGD and 1 MGD as "minor" facilities (denoted as GP3 designated facilities in MWN TMDL, Table 23; and Table 1B of Attachment 1 to this Decision Document). Individual WLAs were based on permitted averge design flow for each individual facility and a total phosphorus concentration of 0.73 mg/L for the 153 days of the spring season (March 1 to July 31) (MWN TMDL, Section 5.3.1.1).

- **Note:** The total phosphorus concentration of 0.73 mg/L was based on an expected long-term average discharge concentration where a 1.0 mg/L monthly discharge limit exists (MWN TMDL, Table 22).

NPDES permitted facilities – individual industrial facilities: Ohio EPA identified nine facilities denoted as GPX designated facilities in Table 23 of the MWN TMDL, and Table 1B of Attachment 1 of this Decision Document. Ohio EPA employed different methods for calculating the WLAs for each GPX facility, based upon the 153 days of the spring season (March 1-July 31) (MWN TMDL, Section 5.3.1.1).

- *Toledo HBI Facility (2ID00018):* The WLA assigned to this facility was based on long-term average total phosphorus concentration of 0.73 mg/L and a flow value of 1.03 MGD. Using the average total phosphorus concentration of 0.73 mg/L was assumed by Ohio EPA to be consistent with meeting a 1.0 mg/L monthly limit for this facility.
- *PCS Nitrogen Ohio LP (2IF00004):* The WLA assigned to this facility in the MWN TMDL was based on long-term average total phosphorus concentration of 0.73 mg/L and a flow value of 4.33 MGD. Using the average total phosphorus concentration of 0.73 mg/L was assumed by Ohio EPA to be consistent with meeting a 1.0 mg/L monthly limit for this facility.
- *Lima Refinery (2IG00001):* The WLA in the MWN TMDL assigned to this facility was based on a flow volume of 400 million gallons discharged over the 153 days of the spring season (March 1 to July 31) at a concentration of 0.37 mg/L. EPA notes that the total phosphorus concentration of 0.37 mg/L is the same concentration target used for facilities in the GP1 category but that the Lima Refinery is not a GP1 facility.
- *Campbell Soup Supply Company (2IH00021):* The WLA in the MWN TMDL for this permittee was set similar to GP2 facilities. The WLA was set based on a total phosphrous concentration of 0.43 mg/L for the 153 days of the spring season (March 1 to July 31) and flow value of 10 MGD.
- *Cooper Farms Cooked Meats Van Wert (2IH00110):* The WLA assigned to this facility was based on the second greatest spring seasonal load that the individual facility has discharged over the 2017-2021 spring seasonal time period.
- *G.A. Wintzer and Son Co. (2IK00002):* The WLA assigned to this facility was based on permitted averge design flow and a total phosphorus concentration of 0.73 mg/L for the 153 days of the spring season (March 1 to July 31).
- *McDowell/Bowling Green WTP (2IW00010):* The WLA assigned to this facility was based on a long-term total phosphorus average concentration of 0.73 mg/L to meet a monthly average discharge limit of 1.0 mg/L.
- *Delta WTP (2IW00070):* The WLA assigned to this facility was based on a long-term total phosphorus average concentration of 0.73 mg/L to meet a monthly average discharge limit of 1.0 mg/L.

- *Napoleon WTP (2IW00190):* The WLA assigned to this facility was based on a long-term total phosphorus average concentration of 0.73 mg/L to meet a monthly average discharge limit of 1.0 mg/L.

Individual WLAs for major facilities in GP1, GP2, GP3 and GPX are summarized in Table A4.1 of Appendix 4 of the MWN TMDL, and Table 1B of Attachment 1 of this Decision Document. WLAs are expressed as a spring seasonal total phosphorus load (metric tons (MT)) and as a daily total phosphorus load (kilograms per day (kg/day)). The daily load calculation applies to the 153 day time period of March 1 to July 31. EPA notes that its TMDL approval applies to Ohio EPA's daily total phosphorus load (kg/day) calculations for the individual permittees expressed in Appendix 4 and Tables 1B to 1D of Attachment 1 of this Decision Document.

Ohio EPA identified six previously EPA-approved near-field total phosphorus TMDLs in the Ohio portion of the Maumee River Watershed (MWN TMDL, Appendix 5). These near-field TMDLs address aquatic life use impairments in terrestrial stream environments in several subwatersheds of the Ohio portion of the Maumee River Watershed. The impairments are in part due to excessive nutrient contributions to these subwatersheds. As part of the development of these near-field TMDLs, Ohio EPA calculated and assigned WLAs to certain point sources in the TMDL subwatersheds. Ohio EPA has summarized individual NPDES permitted facilities with existing total phosphorus WLAs from the near-field TMDLs in Table A5.1 of Appendix 5 of the MWN TMDL.

Ohio EPA explains, and EPA agrees, that total phosphorus WLAs from earlier approved near-field TMDLs are not impacted by the MWN TMDL and the approved WLAs, summarized in Table A5.1 of Appendix 5 of the MWN TMDL, are still applicable under 40 C.F.R. 130.7 and must be considered during the development and/or revision of an NPDES permit (see footnote 1 on pg. 104 of the MWN TMDL), consistent with 40 C.F.R. 122.44(d)(1)(vii)(B). Therefore, in the event that there exists a WLA from an earlier developed near-field TMDL (e.g., the Ottawa WWTP (2PD00028) from the Blanchard River Watershed TMDL Report (May 2009)) and the MWN TMDL (e.g., the Ottawa WWTP (2PD00028)) both WLAs are applicable and must be considered during the development and/or revision of a NPDES permit. Additionally, if the timing conditions (e.g., the WLA is applied on an annual, 365-day, basis) applicable to the WLA from the earlier, near-field TMDLs and the WLA from the MWN TMDL overlap, then the conditions of the NPDES permit for that overlapping time must be consistent with the more stringent WLA.

NPDES permitted facilities – minor municipal sewage treatment facilities and other permittees which are not GP1, GP2, GPX, or GP3 designated facilities and whose WLAs are presented in Table A4.2 of Appendix 4 of the MWN TMDL: Ohio EPA explained that individual WLAs for a majority of the facilities identified in Table A4.2 of Appendix 4 of the MWN TMDL were set based on existing flows and existing concentrations measured during the second greatest spring seasonal load (i.e., March 1 to July 31) that the individual facility has discharged over the 2017-2021 spring seasonal time period. WLAs were set on an individual facility basis for those permitted facilities within this subset of facilities (MWN TMDL, Section 5.3.1.2).

Ohio EPA states that in some instances, a small number of selected wastewater treatment plants listed in Table A4.2 of Appendix 4 of the MWN TMDL did not report effluent data for the 2017-2021 spring seasonal time period. Ohio EPA explained that there are some facilities that are permitted but the

construction of the facility has not been completed or the facilities are very small and have not discharged but expect to discharge at some point in the future, therefore, they do not have any reported/recorded flow values which Ohio EPA could have considered when setting the WLA for these facilities. In these cases, Ohio EPA employed certain assumptions (e.g., the flow values used to estimate the WLA were based on 80% of the design flow of the facility) to estimate a discharge value from the facility and used that discharge value to calculate a WLA for that facility.

Combined Sewer Overflow communities: In Section 5.3.1.3 of the MWN TMDL, Ohio EPA explained that there are 24 CSO communities within the Ohio portion of the Maumee River Watershed. All 24 CSO communities have approved Long-Term Control Plans (LTCP) that were used by Ohio EPA to determine the WLAs for CSOs for these communities. Of those 24 CSO communities, 12 communities have plans in place to separate storm and sanitary sewers and therefore, received a WLA of 0 kg/day of total phosphorus (MWN TMDL, Table 24 and Table A4.3 of Appendix 4). The remaining 12 CSO communities were split into two separate groups of 6 facilities, based upon the type of LTCP and expected discharges.

The first group of six communities (see the first six facilities listed in Table 24 of the MWN TMDL) are those facilities that had hydraulic modeling completed for their individual community to estimate a typical year's CSO discharge at those facilities' completed level of control. Ohio EPA explained that it anticipates discharge events at these six facilities and therefore, allocated a portion of the loading capacity to account for these discharge events. The WLAs calculated for these facilities were based on a typical year's flow rate multiplied by an estimated total phosphorus concentration of 0.75 mg/L (MWN TMDL, Section 5.2.3), then multiplied by 5/12 (to account for the 5 months of the spring period), and finally multiplied by a conversion factor (MWN TMDL, Section 5.3.1.3).

The second group of six communities (see the second six facilities listed in Table 24 of the MWN TMDL) are those facilities that are anticipated to discharge, but these six facilities have no hydraulic modeling completed as part of their LTCP. Ohio EPA explained that the flow rate for these six facilities is unknown at this time. Therefore, to calculate an individual WLA for these six facilities, Ohio EPA reduced the 2008 baseline CSO load by 80 percent. The baseline CSO load was based upon the current CSO flows multiplied by the 0.75mg/L estimated total phosphorus concentration. The 80 percent reduction assumption was based on Ohio EPA's review of CSO communities with hydraulic modeling and similar levels of implementation (MWN TMDL, Section 5.3.1.3). WLAs calculated for individual CSO facilities are found in Table A4.3 of Appendix 4 of the MWN TMDL in and Table 1D of Attachment 1 of this Decision Document.

Permitted industrial stormwater facilities – industrial stormwater WLAs for individual permittees and permittees covered by the multi-sector stormwater general permit (OHR000007): Ohio EPA used geographic information system (GIS) analyses to identify and delineate 41 individual permittees with permitted industrial stormwater controls and 250 facilities with industrial stormwater controls regulated under a general permit in the Ohio portion of the MRW. The 250 facilities are to be covered by the Ohio multi-sector stormwater general permit (OHR000007). To calculate the WLAs for the permitted stormwater facilities, Ohio EPA calculated the land area covered under the permit and subtracted that from the developed land area portion of the total landscape area as illustrated in Figure 45 of the MWN TMDL (MWN TMDL, Section 5.2.6 and Table 27; Table 1A of Attachment 1 to this Decision Document).

Discharging small sanitary systems (under Ohio's Small Sanitary General Permit): Ohio EPA calculated a single WLA for the 11 dischargers (i.e., small sanitary facilities such as small package plants/restaurants and/or mobile home parks) covered under the Ohio's NPDES Small Sanitary General Permit (OHS000005) (MWN TMDL, Section 5.3.1.2). Ohio EPA explained that facilities covered under the Small Sanitary General Permit must have an average design flow of less than 25,000 gallons per day (gal/day) and that the State's analysis determined that most of the 11 facilities discharge significantly less than 25,000 gal/day. In its calculation of a WLA to assign to the Small Sanitary General Permit, Ohio EPA assumed a daily discharge flow rate of 12,500 gal/day and a total phosphorus effluent concentration of 2.5 mg/L for the 11 facilities covered under the Small Sanitary General Permit. The WLA is contained in Table 27 of the MWN TMDL; Table 1A of Attachment 1 of this Decision Document.

Ohio EPA explained that it was aware that many small sanitary treatment systems across the state are currently unpermitted and that Ohio is committed to bring these unpermitted facilities into compliance either by permitting them under the Small Sanitary General Permit or by connecting those treatment systems to existing WWTPs. Because of the potential for additional plants to be covered by the Small Sanitary General Permit at some time in the future, Ohio EPA apportioned part of the AFG for these facilities (MWN TMDL, Section 5.3.1.2).

Discharging HSTS general permit (Ohio's General Permit for discharging HSTS): Ohio EPA considered discharging HSTS as a point source and calculated a WLA for these systems (MWN TMDL, Section 5.3.3 and Table 27; Table 1A of Attachment 1 of this Decision Document). The WLA for discharge HSTS is covered via Ohio's General Permit (OHK000004) and was established using the baseline HSTS conditions (Section 5.2.4 of the MWN TMDL). The baseline HSTS conditions were calculated using a HSTS population estimate, a literature value for the per capita nutrient yield in home wastewater and an estimate of discharging HSTS in the northwestern district (see Table 19 of the MWN TMDL). The methodology employed by Ohio EPA to estimate HSTS loads is similar to the method used in Ohio's Nutrient Mass Balance Study for Ohio's Major Rivers (Ohio EPA 2022c) (see Section 2.3 of this report).[26]

City of Toledo MS4 (2PI00003) and the Small MS4 General Permit (OHQ000004): Ohio EPA used GIS analyses to identify and delineate MS4 areas from non-MS4 areas in the developed land use category from the baseline analysis in the Ohio portion of the MRW (MWN TMDL, Section 5.2.6 and Table 17). The MS4 areas were further split into an individual MS4 permit for the City of Toledo (2PI00003) and small MS4 areas which are covered by the Ohio Small MS4 General Permit (OHQ000004). Ohio EPA calculated a baseline total phosphorus load for MS4 communities in the MRW and used that baseline load to set WLAs for the City of Toledo and the Small MS4 General Permit. Both the WLA for the City of Toledo and the Small MS4 General Permit were set based on a 20 percent reduction from baseline conditions (MWN TMDL, Section 5.3.2). The WLAs are found in Table 27 of the MWN TMDL and in Table 1A of Attachment 1 to this Decision Document.

Construction stormwater general permit: As explained in Section 4.1.2.2 of the MWN TMDL, construction sites with a areal footprint of 1 or more acres must be covered under Ohio's Construction General Permit (OHC000005). Additionally, construction sites with a areal footprint of less than 1 acre

[26] Ohio EPA webpage, https://epa.ohio.gov/static/Portals/35/documents/2022-NMB-Final.pdf, last visited (9/24/23).

that are part of a larger development plan or sale must also have a permit to discharge stormwater. In order to estimate the number of acres that were covered under the Construction General Permit and ultimately set the WLA attributed to the Construction General Permit, Ohio EPA reviewed construction permits and land use information in the Ohio portion of the MRW from the previous five years (2017-2021)(MWN TMDL, Section 5.2.6). This annual average acreage estimate was compared against the total acreage of the Ohio portion of the MRW to calculate an areal percentage of acreage covered by the Construction General Permit which was then multiplied by the developed land use category from the baseline analysis to calculate the WLA assigned to construction stormwater. The WLA for facilities regulated under the Construction General Permit were set based on a 20 percent reduction from baseline conditions (MWN TMDL, Table 25). The WLA is found in Table 27 of the MWN TMDL and in Table 1A of Attachment 1 of this Decision Document.

Concentrated Animal Feeding Operations (CAFOs): Ohio EPA identified the presence of CAFOs in the Ohio portion of the MRW in Sections 4.1.1.1 and 5.3.4 of the MWN TMDL. Ohio EPA explained that CAFO facilities must be designed to contain all surface water runoff (i.e., have zero discharge from their manure-handling facilities) and have a current manure management plan. Ohio EPA explained that these facilities are not authorized to discharge non- agricultural stormwater effluent and therefore, CAFOs were not assigned a portion of the total phosphorus WLA (WLA = 0).
Please see Attachment 3 of this Decision Document for further discussion of EPA's consideration of CAFOs and the MWN TMDL.

Allowance for future growth: Ohio EPA calculated an allowance for future growth that is intended to be used for new or expanding NPDES permittees which may discharge total phosphorus to the Ohio portion of the MRW at some point in the future. An AFG of 1.4 MT of total phosphorus per spring season was reserved for the major municipal sewage treatment facilities in subgroups GP1 and/or GP2 (see facilities in Table 23 of the MWN TMDL and Table 1B in Attachment 1 of this Decision Document). An AFG of 0.1 MT of total phosphorus per spring season is reserved for the minor municipal sewage treatment facilities and other permittees of Table A4.2 of Appendix 4 and Table 1C in Attachment 1 of this Decision Document. The total AFG for the MWN TMDL is (1.4 MT + 0.1 MT = 1.5 MT) 1.5 metric tons of total phosphorus per spring season and 9.8 kg/day.

EPA finds that the TMDL document submitted by Ohio EPA appropriately identifies the WLAs for the MWN TMDL to attain the impaired designated uses of the WQSs, and provides reasonable justification for the assumptions used. EPA also finds that Ohio EPA has properly identified the regulated point sources consistent with Federal statutes and regulations, calculated allocations for these dischargers, and identified those dischargers with already existing WLAs (MWN TMDL, Appendices 4 and 5). EPA finds Ohio EPA's approach for calculating the WLA for the Maumee Watershed Nutrient total phosphorus TMDL to be reasonable and consistent with the CWA and regulations.

6. Margin of Safety (MOS)

The Clean Water Act, § 303(d)(1)(c), and 40 C.F.R. 130.7(c)(1) require that TMDLs include a margin of safety (MOS) "which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality." EPA's 1991 TMDL Guidance explains that the MOS may be implicit, i.e., incorporated into the TMDL through conservative assumptions in the analysis, or explicit, i.e., expressed in the TMDL as loadings set aside for the MOS. If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS must be described. If the MOS is explicit, the

loading set aside for the MOS must be identified. The MOS may include both explicit and implicit components.

EPA Review of MWN TMDL:

The margin of safety is the portion of the TMDL equation that accounts for a lack of knowledge concerning the relationship between the WLAs and LAs and water quality (CWA § 303(d)(1)(c) and 40 C.F.R. 130.7(c)(1)). The MOS is intended to account for these potential uncertainties in a manner that is conservative from the standpoint of environmental protection. The MOS can be demonstrated through two approaches: the use of an implicit MOS based on conservative assumptions in the calculative or modeling processes that derive the TMDL allocations; and/or the use of an explicit MOS, which is a calculative approach for apportioning a part of the TMDL loading capacity.

EPA acknowledges that there is no standard number or specific value (e.g., 5% or 10% or 20%) required for the MOS. TMDL writers should consider their TMDL development approach and any assumptions that were employed to account for uncertainty of the relationship between pollutant loads and the water quality of the water body (i.e., the assessment units of the Western Basin of Lake Erie), and exercise best professional judgment in selecting the MOS employed for the TMDL equation. Also, TMDL writers must provide their rationale of why they employed an implicit, explicit or combination of both as the MOS for their TMDL equation.

Ohio EPA incorporated both an explicit and implicit MOS in its calculation of the loading capacity for the MWN TMDL (MWN TMDL, Section 5.5). For the implicit MOS, Ohio EPA explained that "[o]verall, conservative assumptions are made through TMDL development and implementation. Most importantly, this is a data-driven process using continuously collected monitoring data to calculate the TMDL." (MWN TMDL, Section 5.5, pg. 115)

Ohio EPA provides a detailed discussion of the conservative assumptions in the MWN TMDL, including:

- Ohio EPA's confidence in the calculation of the total phosphorus target (860 MT) at the Waterville gage which was completed by the Annex 4 targeting team. The Annex 4 targeting team employed an ensemble modeling effort[27] to determine the total phosphorus target of 860 MT. This value was subsequently reviewed and verified by a binational group of scientists/experts, and prior to publishing was scrutinized by an extramural science advisory board from the U.S. federal government. Additionally, the total phosphorus target has been cross-checked against recent water quality data in the MRW and Western Basin Lake Erie HAB size and density data on an annual basis.
- Ohio EPA's use of a mass balance model that is based on a robust and high-quality water quality data set and streamflow data set collected at the Waterville gage (via the USGS Waterville gage (USGS #04193500)) and efforts of Heidelberg University's NCWQR. Additionally, Ohio EPA cited its consideration of water quality data from other USGS streamflow gages and NCWQR water quality monitoring stations in the MRW (Figure 28 of the MWN TMDL).

[27] EPA webpage, Great Lakes Water Quality Agreement Nutrient Annex 4 Objectives and Targets Development Task Team Multi-Modeling Report – Final (August 2016, https://www.epa.gov/sites/default/files/2016-11/documents/nutrientannex4multimodelingreportfinalappendicessep2016.pdf, (last visited (9/24/23).

- The conservative assumptions employed in the Ohio 2022 Nutrient Mass Balance Study (Ohio EPA 2022c) [28] should also be acknowledged as Ohio EPA used analyses from this Mass Balance Study to inform its decision-making for setting point and nonpoint source loads in the MWN TMDL (e.g., assumptions for wet weather and home sewage loads that were carried forward into the development of the MWN TMDL, assumptions for landscape loading (i.e., agricultural, developed, natural areas), etc.). The Ohio Nutrient Mass Balance Study incorporated conservative assumptions in its calculations and analyses, e.g., the conservation of nutrient mass/no loss in nutrient loading occurs from the source of the loading to the outlet of the subwatershed.
- The Annex 4 targeting team employed conservative considerations and used a multi-modeling approach[29] to set the total phosphorus water quality target of 860 MT at Waterville. The multi-modeling approach was intended to reconcile differences among the modeling platforms and outputs via the use of differing models with varying complexities. The results of the multi-modeling approach provided insight on sources and processes impacting the Maumee River/Western Basin of Lake Erie ecological system, and reduced the risk associated with decision-making intended to have positive environmental outcomes.[30] The Annex 4 total phosphorus target at Waterville (860 MT for the spring season) was a foundational value for establishing the loading capacity of the MWN TMDL.

Ohio EPA states, "[a]n overall explicit MOS of 3 percent accounts for the unknown factors in both calculating baseline conditions and uncertainty in the relationship between sources receiving a load allocation and a wasteload allocation. This load is reserved as a proportion of the total loading capacity. Therefore, it reduces the loading capacity available for allocations. Unless an approved TMDL is officially reevaluated, the load reserved for MOS will remain unallocated in perpetuity." (MWN TMDL, Section 5.5, pg. 117.)

Ohio EPA explained that the explicit MOS of three (3) percent of the loading capacity[31] was also set to account for unknown factors in calculating baseline conditions and uncertainties in assigning nonpoint source loads (via the nonpoint source landscape load allocation) and point source loads (via the wasteload allocation) (Table 1A of Attachment 1 to this Decision Document). Further explanation is provided in Sections 5.5 and 6.2 of the MWN TMDL. Ohio EPA, via its model verification analysis discussed in Section 6.2 of the MWN TMDL, estimated that approximately 3.4 MT of total phosphorus for areas downstream of the Waterville gage could be considered as a reasonable estimate of MOS for those areas downstream of the Waterville gage. This reserve of 3.4 MT of total phosphorus is attributed to modeling uncertainty downstream of the Waterville gage area.

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[28] Ohio EPA webpage, https://epa.ohio.gov/static/Portals/35/documents/2022-NMB-Final.pdf, (last visited 9/24/23).
[29] EPA notes that a multi-modeling approach has been used by other projects to help inform decision-making for large ecosystems, e.g., Gulf of Mexico – studying load and response relationships for hypoxia, North Carolina - nutrient TMDL for the Neuse River Estuary, Lake Ontario – comparison of different mass balance models for improving understanding of PCBs response.
[30] EPA webpage, Great Lakes Water Quality Agreement Nutrient Annex 4 Objectives and Targets Development Task Team Multi-Modeling Report – Final (August 2016, https://www.epa.gov/sites/default/files/2016-11/documents/nutrientannex4multimodelingreportfinalappendicessep2016.pdf, (last visited 9/24/23).
[31] *NOTE:* The MOS calculation includes the subtraction of the boundary condition loads for Michigan (180.7 MT) and Indiana (48.0 MT) from the total loading capacity. E.g., 914.4 MT – (180.7 + 48.0) = 685.7 * 0.03 = 20.571 MT, approx. 20.6 MT.

Projecting the assumptions used by Ohio EPA to estimate a 3.4 MT MOS for the area downstream of the Waterville gage to the remainder of the watershed (i.e., upstream of the Waterville gage) was challenging in light of the implicit (i.e., non-quantifiable), conservative assumptions employed upstream of the Waterville gage area and the use of a mass balance model for this same area (i.e., the portion of the watershed upstream from the Waterville gage). Ohio EPA ultimately determined a three (3) percent explicit MOS was appropriate. The MWN TMDL states, "[c]onsidering these factors and using 3.4 MT as an anchor point, a reasonable value was determined to be greater than five times this amount of load and less than 10 times. The load that results from an explicit MOS of 3 percent, or 20.6 MT, meets these criteria." (MWN TMDL, Section 5.5, pg. 117)

As noted in *Natural Resources Defense Council v. Muszynski*, 268 F.3d 91 (2d Cir. 2001), there is no standard or guideline for choosing a specific amount of margin of safety. In that case EPA's approval of eight phosphorus TMDLs submitted by New York was challenged under the Administrative Procedures Act. The court agreed with EPA's position on MOS that, ""'there is no `standard' or guideline for choosing a specific margin of safety, best professional judgment and the available information are used in setting [it].'"" *Natural Resources Defense Council v. Muszynski*, 268 F.3d 91, 102. Similarly, Ohio EPA determined that the mass balance model reasonably represents the phosphorus loadings in the MRW (as further discussed in Section 3 "*Model Verification*" of this Decision Document; and MWN TMDL, Sections 5.4 and 6.2).

EPA notes that if additional data become available that better inform the TMDL equation and the assumptions and considerations underlying the selection of the approach used to derive the MOS, the TMDL should be reexamined and potentially revised to incorporate these additional data. This approach should be considered by Ohio EPA in consultation with EPA (MWN TMDL, Section 7.6). For example, an adaptive, iterative approach was used by New York in the phosphorus TMDLs that EPA approved and that were upheld by the court in *NRDC v. Muszynski*. As the court stated, "it is worth noting that approval of the Phase I MOS was based, in part, on the limited information available. The EPA approval contemplates revision of the MOS as more information becomes available: 'As additional reservoir data and loading data become available, Phase I model assumptions are being reexamined under Phase II.'" *NRDC v. Muszynski*, 268 F.3d at 103.

Ohio EPA received comments during its public notice process for the MWN TMDL that Ohio EPA could have employed a different MOS value for the TMDL. EPA considered whether Ohio EPA could have set the explicit MOS at a greater value than the 3% of the loading capacity than Ohio EPA used in the MWN TMDL. Additionally, EPA considered whether Ohio EPA could have set the explicit MOS at a lower value than the 3% of the loading capacity. EPA found that Ohio EPA used its best professional judgment in setting the explicit MOS at 3% of the loading capacity. Ohio EPA's decision on the appropriate level for the explicit MOS is based in part on conservative assumptions in the implicit MOS. Ohio EPA's use of a robust data set and use of modeling to set the MOS for the MWN TMDL is supported by the record.

EPA finds that the MWN TMDL reasonably determined a MOS necessary for the assessment units in the Western Basin of Lake Erie to meet the loading targets called for in the MWN TMDL and to attain WQS. Ohio EPA considered both implicit and explicit MOS in its TMDL development approach. Ohio EPA appropriately considered several conservative assumptions in its TMDL modeling methodology

and its TMDL development process and documented its approach for setting an explicit MOS that, together with the implicit MOS, reasonably assure the needed phosphorus reductions will occur.

7. Seasonal Variation

The statute and regulations require that a TMDL be established with consideration of seasonal variations. The TMDL must describe the method chosen for including seasonal variations. (CWA §303(d)(1)I, 40 C.F.R. §130.7I(1)).

EPA Review of MWN TMDL:

Ohio EPA explained in Section 5.7.2 of the MWN TMDL that the critical condition is the spring season (March 1 to July 31), which is consistent with the assumptions of the Annex 4 targets document. The Annex 4 targets document explains that controlling nutrient inputs, especially during the critical spring months (i.e., March through July), will directly impact the size and severity of the HABs observed in the Western Basin of Lake Erie (MWN TMDL, Section 5.7.2). Ohio EPA agreed with the conclusions presented by the Annex 4 targets team. Studies undertaken by Stumpf[32] and Obenour[33] have confirmed that springtime runoff due to snowmelt or precipitation events are correlated with Western Basin of Lake Erie HABs occuring in the summer and fall seasons. Consistent with the Annex 4 target document, Ohio EPA explained that while the HABs can and do occur in mid to late summer, controlling phosphorus loadings and related flows are most critical during the spring season. Ohio EPA notes that total phosphorus loadings can and will occur year-round, therefore, implementation efforts (i.e., best management practices) should be adaptable to a variety of stormwater and streamflow conditions. Ohio EPA also noted that the implementation actions identified in Sections 7 and 8 of the TMDL and discussed further in Sections 8 and 10 of this Decision Document, will occur throughout the year. In one example noted by Ohio EPA, cover crops are planted in the fall and begin to provide benefits shortly after sprouting, reducing pollutant loads beyond the critical spring season.

In general, nutrient loading to surface waters varies depending on surface water flow, land cover and climate/season. Spring is typically associated with large flows from snowmelt, the summer is associated with the growing season as well as periodic storm events and receding streamflows, and the fall brings increasing precipitation and rapidly changing agricultural landscapes. In all seasons, nutrient inputs to surface waters typically occur primarily through precipitation driven stormwater events.

Critical conditions that impact loading, or the rate that nutrients are delivered to surface waters, were identified by Ohio EPA as those periods where large precipitation events coincide with periods of minimal vegetative cover on fields. Large precipitation events and minimally covered land surfaces can lead to large runoff volumes, especially to those areas which are underlain by agricultural drainage tiles. The conditions generally occur in the spring and early summer seasons.

Ohio EPA accounted for this critical condition by utilizing the results of the Annex 4 target document, which determined that the spring total phosphorus loads were the most critical to generating algal blooms. The spring loading events, driven by snowmelt and precipitation in the watershed, were targeted

[32] Stumpf, R.P., Johnson, L.T., Wynne, T.T., Baker, D.B. 2016. *Interannual Variability of Cyanobacterial Blooms in Lake Erie*, PLOS One 7(8), e42444. (2012).
[33] Obenour, D.R., Gronewold, A.D., Stow, C.A., Scavia, D. 2014. *Using a Bayesian hierarchical model to improve Lake Erie cyanobacteria bloom forecasts*. Water Resour Res. 50(10):7847-7860. (2014).

by Ohio EPA via its selection of certain BMPs that focus on nutrient erosion and water management (MWN TMDL, Sections 7 and 8; Section 10 of this Decision Document).

EPA finds that the MWN TMDL is reasonable in accounting for seasonal variation within the MRW to attain WQS. Ohio EPA considered seasonal variation in the context of the MRW by employing the results and assumptions of the Annex 4 target document, as well as developing allocations specifically for the critical spring phosphorus loading period (March 1 to July 31). Ohio EPA explained that many of the nonpoint source practices that have been deployed are currently in use or will be installed in the future to target phosphorus loadings during the critical spring period (March 1 to July 31). Ohio EPA also noted that these practices will impact phosphorus loading to the Ohio portion of the MRW outside of the spring period (i.e., on a year-round basis), helping to reduce phosphorus inputs to surface waters throughout the year.

8. Reasonable Assurance

When a TMDL is developed for waters impaired by point sources only, the issuance of a NPDES permit(s) provides the reasonable assurance that the wasteload allocations contained in the TMDL will be achieved. This is because 40 C.F.R. 122.44(d)(1)(vii)(B) requires that effluent limits in permits be consistent with, "the assumptions and requirements of any available wasteload allocation" in an approved TMDL.

When a TMDL is developed for waters impaired by both point and nonpoint sources, and the WLA is based on an assumption that nonpoint source load reductions will occur, EPA's 1991 TMDL Guidance states that the TMDL should provide reasonable assurances that nonpoint source control measures will achieve expected load reductions in order for the TMDL to be approvable. This information is necessary for EPA to determine that the TMDL, including the load and wasteload allocations, has been established at a level necessary to implement water quality standards.

EPA Review of MWN TMDL:

Section 8 of the MWN TMDL discusses reasonable assurance and Ohio EPA's determination that the nonpoint source load allocations in the TMDL will be met. Section 7 of the MWN TMDL describes the implementation strategy to meet the load and wasteload allocations needed to restore the impaired conditions of the Western Basin of Lake Erie. The MWN TMDL explains the regulatory and non-regulatory actions that will be applied to attain the point and nonpoint source allocations.

Figure 50 of the MWN TMDL provides the estimated reductions, in metric tons, necessary to attain the TMDL loading targets. Ohio EPA has broken out the necessary reductions into three categories:

- Point Sources: ~ 5 MT reduction;
- Enhanced nonpoint source sinks: ~ 92 MT reduction; and
- Improve nonpoint source management: ~ 366 MT reduction.

These reductions sum to ~ 463 MT reduction which includes an additional ~ 21 MT reserved for the MOS.

For the assessment units in the Western Basin of Lake Erie to attain the nonpoint source water quality targets described in the MWN TMDL, and for those targets/goals to be maintained into the future, Ohio EPA states its intent to complete the following actions:

- Ohio EPA and its implementing partners will follow a two-year iterative approach for BMP deployment and for tracking the success/efficiency of BMPs or suites of BMPs to target nonpoint source total phosphorus inputs in the MRW. The iterative approach will allow Ohio EPA and its partners to monitor the success or failure of BMP deployment strategies across the landscape, to employ lessons learned either from recent research findings or from experience gained over that two-year time-period, and to strategize on how best to adjust the current implementation strategy to maximize the available implementation resources to generate the greatest water quality gains in the watershed.
    - This approach will be documented, every two years, via Ohio EPA's MWN TMDL Biennial Report. The first of these Biennial Reports is anticipated to be submitted in 2024.
- Ohio EPA and its implementing partners continue to build coalitions and forge new collaborative partnerships in the MRW and leverage resources (e.g., funding, relationships with producers, expertise, equipment) from those existing and new partnerships to get BMPs on-the-ground in critical areas[34] to amplify nonpoint source reductions and water quality improvements in the watershed. Targeting critical areas is especially important because it allows Ohio EPA and its implementing partners to identify areas across the Ohio portion of the MRW that are disproportionately contributing phosphorus loads to surface waters. Identifying these sources for mitigation efforts through targeted BMPs will reduce nonpoint source phosphorus inputs and lead to water quality improvements in the downstream waters of the Western Basin of Lake Erie.
    - There is a lot of positive implementation activity underway in the Ohio portion of the MRW via a variety of different existing or potential partners (e.g., U.S. Department of Agriculture's (USDA) Farm Service Agency (FSA), USDA's Natural Resources Conservation Service (NRCS), U.S. EPA's Great Lakes Restoration Initiative (GLRI)). Working with these other partners to ensure that the existing, and especially future, implementation efforts are all on the same tack and following a collective strategy to decrease nutrient inputs to the surface waters in the MRW, is an essential part of Ohio EPA's strategy toward meeting the TMDL's loading targets.
- Stakeholders and interested parties allow Ohio EPA and its implementing partners time to ramp up/accelerate nonpoint source implementation efforts in critical areas across the Ohio portion of the MRW and ideally, build positive momentum that can encourage/motivate more growth in BMP adoption. Ohio EPA acknowledges that attaining the nonpoint source reduction goals of

[34] EPA expects that Ohio EPA and its implementing partners will prioritize HUC-12 subwatersheds that demonstrate higher landscape phosphorus yields (i.e., pounds of phosphorus runoff per acre) for planning (e.g., NPS-IS development) and implementation. Figure 30 of the MWN TMDL shows landscape phosphorus yield information for all HUC-12s in the Ohio portion of the MRW. Figure 30 demonstrates that areas south of the mainstem of the Maumee River, especially the southwestern areas in the Ohio portion of the MRW, have the highest pound of phosphorus runoff per acre measurements. It is reasonable to consider that these HUC-12 subwatersheds would have a higher priority for planning and implementation than other areas of the watershed. Ohio EPA notes that much planning and implementation efforts will be necessary in all HUC-12 subwatersheds of the MRW, including those that have lower land phosphorus yield estimates (i.e., HUC-12 subwatersheds north of the mainstem of the Maumee River).

the MWN TMDL will take time. Ohio EPA, within its Responsiveness Summary document[35] for the public comment draft MWN TMDL, described an aspiration goal that by 2032, implementation planning efforts (e.g., Ohio Nonpoint Source Pollutant Implementation Strategies (NPS-IS)) would be completed for the entire Ohio portion of the MRW. Additionally, by 2032, there will be a sufficient footprint of on-the-ground BMPs targeted to address loadings from agricultural nonpoint sources to enable the attainment of the water quality goals of the MWN TMDL.[36] Changing behaviors, building partnerships, getting BMPs installed in critical areas to address nonpoint source inputs, adjusting implementation strategies to incorporate lessons learned/new research is all part of the process forward that takes time, and expectations of a quick fix should be tempered. As Ohio EPA stated, "implementation actions do not immediately translate to water quality improvements." (MWN TMDL, Section 7.2, pg. 128.)

  - Ohio EPA acknowledges that there may be an ecosystem lag time for nonpoint source implementation activities. Namely that potential improvements observed in water quality may not seamlessly align with on-the-ground implementation efforts. Figure 51 of the TMDL includes different ecosystem processes and the different factors which may impact the performance of landscape BMPs.
  - Adjustments to the TMDL will be necessary to recalibrate or reset strategies based on new data and information As one example, Ohio EPA recognizes the challenges presented by changing climatic conditions, such as variability in precipitation amounts, increasing air and water temperatures, unpredictability of weather forecasting. These variables necessitate a flexible and nimble approach to adjust implementation strategies. Ohio EPA will use such an approach via adaptive management, tracking real-time water quality conditions via the monitoring network deployed and the two-year check-in/reconsideration process through the MWN TMDL Biennial Reporting task.

- Ohio EPA and its implementing partners deploy suites of BMPs across the landscape and target the placement of those BMPs to the most critical areas which are contributing disproportionately high loads of nonpoint source derived total phosphorus. Implementation efforts across the watershed are not a one-size fits all solution and need to be tailored to the unique landscape characteristics of each HUC-12 subwatershed. Ohio EPA's development of HUC-12 scale NPS-IS provide details on nonpoint sources and critical loading areas within the subwatershed, suggest which BMPs should be used in those critical locations, provide timelines and milestone check-in points for implementation actions, and provide important implementation specific information to local watershed managers to effectively address nutrient inputs on smaller, HUC-12, areal scales.
  - The Ohio Domestic Action Plan (2020) includes efficiency and effectiveness information for a selection of BMPs that the Ohio DAP identifies for use in the Ohio portion of the MRW. Improving water quality conditions in the watershed will require a suite of different BMPs targeted to address nonpoint source loading locations (i.e., critical areas). There won't be one select BMP that solves all of the existing water quality challenges, rather, there will need to be many different BMPs that are strategically placed and work collaboratively to hold water on the landscape and reduce

[35] Ohio EPA webpage, Division of Surface Water, *Responsiveness Summary* document for the Maumee Watershed Nutrient public comment draft TMDL, https://epa.ohio.gov/static/Portals/35/tmdl/MaumeeNutrient/Maumee-Watershed-Nutrient-TMDL-Official-Draft-Responsiveness-Summary.pdf, (last visited 9/24/23).

[36] Ohio EPA, Division of Surface Water, *Responsiveness Summary* document for the Maumee Watershed Nutrient public comment draft TMDL, https://epa.ohio.gov/static/Portals/35/tmdl/MaumeeNutrient/Maumee-Watershed-Nutrient-TMDL-Official-Draft-Responsiveness-Summary.pdf, (last visited 9/24/23).

opportunities for nutrient and sediment loss without negatively impacting agricultural yields.
    - There will need to be a ramping up of on-the-ground BMPs to address nonpoint source contributions across the Ohio portion of the MRW. The NPS-IS development process will help target the placement of BMPs in critical areas. To support the installation and upkeep (i.e., operation and maintenance) of those BMPs, Ohio EPA and its implementing partners will need to utilize a variety of funding vehicles (e.g., H2Ohio funds, EPA CWA Section 319 funds, USDA-NRCS/USDA-FSA funds) and leverage other funding opportunities to get BMPs installed in critical areas.
- Ohio EPA and implementing partners continue to support a robust water quality monitoring program throughout the MRW. The existing water quality sampling network of twenty-nine stream gage locations throughout the watershed (MWN TMDL, Figure 28) will provide real-time water quality data and/or weekly/monthly/annual data for watershed managers to evaluate whether progress is being made toward attaining the total phosphorus water quality goals of the MWN TMDL. These water quality data are vital for Ohio EPA's adaptive management approach and for understanding whether changes need to be made to current implementation strategies.

EPA understands that Ohio EPA is committing through this adaptive management process to identify critical areas that contribute the greatest loads of total phosphorus to the landscape, to deploy suites of BMPs to mitigate those source contributions, to use water quality data to measure the effectiveness of implementation efforts, and adaptive management to evaluate and hone implementation strategies, in coordination with its implementing partners (e.g., Ohio Department of Agriculture (ODA), ODNR, local Soil and Water Conservation Districts (SWCD), etc.) to ensure a robust, iterative process for meeting the total phosphorus water quality goals of the MWN TMDL.

Federal, state and local partnerships and agreements to address nutrient loading to the Western Basin of Lake Erie

Ohio EPA described historical actions and partnerships fostered in the mid-2000s between state, federal and international partners in response to the reemergence of HABs in the early 2000s (MWN TMDL, Figure 52 and Section 7.2). These historical efforts centered on the participants motivation to reduce phosphorus loading in the MRW. The importance of these relationships and agreements are that they have established a foundation of cooperation and scientific understanding regarding the water quality challenges facing the MRW and cultivated science-based restoration and protection strategies for implementation planning and action.

Since the mid-2000s, Ohio EPA has allied with various local, state and federal partners to devise collaborative approaches to mitigate nutrient loading to the waters of the Western Basin of Lake Erie. Partnerships and agreements between state and federal entities morphed into two iterations of a Phosphorus Task Force (2007 and 2012), which set total phosphorus targets and developed policy and management recommendations to address deteriorating water quality conditions in the Western Basin of Lake Erie. The Great Lakes Water Quality Agreement (amended in 2012) set goals and targets for Lake Erie and established objectives, programs and actions for the United States and Canada to take to address HABs; and in 2015 a binational task team of scientists and water quality modelers developed the total phosphorus targets which serve as the foundation of the MWN TMDL (Section 2 of this Decision Document).

In 2015, the governors of Ohio and Michigan and the premier of Ontario, Canada, signed the Western Basin of Lake Erie Collaborative Agreement that was subsequently followed in 2016 by a framework document, which described the various actions that each of these parties would undertake to implement the agreement. In 2018, the United States (led by U.S. EPA's Great Lakes National Program Office), Canada-Ontario (led by Environment and Climate Change Canada), Ohio (led by Ohio Lake Erie Commission, Ohio EPA, and other Ohio State Agencies), Michigan (led by Michigan Department of Environment, Great Lakes and Energy (MEGLE) and other Michigan State Agencies) and Indiana (led by Indiana Department of Environmental Management (IDEM) and other Indiana State Agencies) all developed Domestic Action Plans to guide phosphorus reduction activities to reduce nutrient inputs to Lake Erie. Subsequent Ohio programming, such as Ohio's H2Ohio program, launched in 2019, followed Ohio's Domestic Action Planning efforts and began to provide funding for planning and nutrient mitigation practices (e.g., wetlands, cover crop etc.).

The programs, partnerships and agreements developed over the previous 15 years demonstrate the interest and commitment from the State of Ohio and its local, state, federal and international partners to implement long-term strategies for reducing point and nonpoint source phosphorus inputs to the surface waters which drain into the Western Basin of Lake Erie. EPA acknowledges these historical efforts because many TMDLs developed for other watersheds, in other states, do not have such a strong foundation of interested parties who possess the knowledge and experience to guide and inform restoration approaches, the funding and the commitment to address the water quality challenges as the MWN TMDL does. EPA believes that the previous implementation efforts and lessons learned from those efforts in the MRW are a significant asset to Ohio EPA and other stakeholders who will be needed to carry forward the actual, on-the-ground actions on a year-to-year basis.

Ohio TMDL and point and nonpoint source efforts in the Maumee River Watershed

The objective of a TMDL is to determine the loading capacity of the impaired water body(ies) and to devise an allocation scheme to distribute that load among different pollutant sources (i.e., point sources and nonpoint sources) so that the appropriate control actions can be taken, and water quality standards achieved. The TMDL process is important for improving water quality because it connects the goals of water quality standards to post-TMDL implementation efforts designed to attain those standards.

Pollutant allocations assigned to point sources (i.e., wasteload allocations) are generally implemented through EPA's National Pollutant Discharge Elimination System permits under CWA section 402. If, after analyzing the effect of a discharge on the receiving water, a permit writer finds that technology-based permit limits are not sufficiently stringent to meet water quality standards, the CWA and EPA regulations require the development of water quality-based effluent limits (WQBELs) that are more stringent and designed to ensure that water quality standards are met.[37] Under EPA's permitting regulations, water quality-based discharge limits in NPDES permits must be "consistent with the assumptions and requirements" of wasteload allocations in EPA-approved TMDLs. 40 C.F.R. § 122.44(d)(1)(vii)(B).

Nonpoint source load reduction efforts are implemented through a wide variety of programs at the state, local and federal level. These programs may be regulatory, non-regulatory or incentive-based (e.g., a cost-share program). Additionally, water body restoration efforts can be assisted by voluntary actions on

[37] Clean Water Act § 301 (b)(1)(C) and 40 C.F.R. § 122.55(d)(1).

the part of citizen and/or organizations. The EPA Section 319 Nonpoint Source Management Program[38] provides grant money to states, territories and Tribes to fund specific projects aimed at reducing the nonpoint source pollution.

Historical TMDL development: Ohio EPA has developed six near-field TMDL projects in subwatersheds of the Ohio portion of the MRW (MWN TMDL, Appendix 5). These near-field TMDLs address water quality impairments for the aquatic life designated use due to excessive total phosphorus in the stream/river environment. Each TMDL has an implementation plan, specific to that TMDL, that outlines total phosphorus reductions for point and nonpoint sources contributing to the impaired condition. Final TMDL loading calculations and assumptions used to derive those calculations are typically carried forward into implementation planning such as Ohio's (NPS-IS) documents. NPS-IS utilize nonpoint source loading targets and estimated nonpoint source loading reductions from a TMDL document, if a TMDL document exists for the watershed the NPS-IS is being written to address.

Ongoing and future TMDL development: Ohio EPA submitted the MWN TMDL to EPA on June 30, 2023. Ohio EPA identified unaddressed beneficial use impairments in other subwatersheds in the Ohio portion of the MRW which do not have a preexisting near-field TMDL. Impairments without TMDLs will need to be addressed by a TMDL at a point in the future. Two examples include, nutrient and bacteria impairments in the Ohio portion of the St. Joseph River Watershed in the headwaters of the MRW, and nutrient and bacteria impairments in the Ohio portion of the Tiffin River Watershed. Ohio EPA, in Section 8.3.4 of the MWN TMDL, states that TMDL development is underway for watersheds that are contributing to Lake Erie and do not currently have an EPA approved TMDL. Impairment information can be found on Ohio's 2022 Clean Water Act Section 303(d) impaired waters list.[39] Ohio EPA's biennial Integrated Report (Section J)[40] identifies TMDL project efforts that have been prioritized by Ohio EPA for near-term development.

Historical nonpoint source planning efforts in the Maumee Watershed: Ohio EPA explained that NPS-IS are the main planning documents that detail what specific nonpoint source implementation efforts need to occur to address impaired conditions and/or nonpoint source loading targets from a TMDL in Ohio. The NPS-IS are developed by Ohio watershed planners (e.g., county level SWCDs or contractors hired by county or cities) under the CWA Section 319 Program. The methodology for writing an NPS-IS uses a watershed-based planning approach. This approach is designed to address water quality problems in a holistic manner by fully assessing the potential contributing causes and sources of pollution, then prioritizing restoration and protection strategies to address these problems.[41] Nine Element Source Implementation Strategies are reviewed by the EPA CWA 319 program. EPA CWA 319 program review includes the consideration of whether or not the strategy includes the "nine elements" of a watershed-based plan (see Appendix C of EPA's Nonpoint Source Program and Grants Guidelines for States and Territories, April 12, 2013).[42] Approved Ohio Nine Element Nonpoint Source Implementation Strategies include a discussion of each of the nine elements at a sufficient level to successfully address the pollutant source load reductions described in the strategy. An EPA approved Ohio EPA NPS-IS is a necessary starting point for Ohio EPA to apply for CWA Section 319 funding

[38] EPA webpage, https://www.epa.gov/nps/319-grant-program-states-and-territories, (last visited 9/24/23).
[39] Ohio EPA webpage, https://epa.ohio.gov/divisions-and-offices/surface-water/reports-data/ohio-integrated-water-quality-monitoring-and-assessment-report, (last visited 9/24/23).
[40] Ohio EPA webpage, https://epa.ohio.gov/static/Portals/35/tmdl/2022intreport/Section-J.pdf, (last visited 9/24/23).
[41] EPA webpage, https://www.epa.gov/sites/default/files/2015-09/documents/319-guidelines-fy14.pdf, (last visited 9/24/23).
[42] EPA webpage, https://www.epa.gov/sites/default/files/2015-09/documents/319-guidelines-fy14.pdf, (last visited 9/24/23).

that can be used to support on-the-ground implementation activities in a HUC-12 scale subwatershed. [43] EPA notes that there are 194 HUC-12 subwatersheds in Ohio's portion of the MRW and that each HUC-12 subwatershed is approximately 26 square miles (17,000 acres) in size.

Ohio EPA NPS-IS are important documents for watershed planning purposes because NPS-IS:

- Describe/identify critical areas to target for on-the-ground implementation activities;
- Set local water quality goals (e.g., total phosphrous loading targets for the localized plan that are consistent with the landscape loads of the MWN TMDL) and objectives for conservation practice implementation;
- Identify local implementers and funding opportunities to support implementation activities (e.g., CWA Section 319 funds, H2Ohio funds, Water Pollution Control Loan Fund, GLRI funds, Great Lakes Commission funds, USDA-NRCS funds, etc.) for local stakeholders;
- Are useful tools to assist in organizing stakeholders and driving collaboration among interested parties; and
- Aid in developing "shovel-ready" projects to be deployed efficiently in the HUC-12 subwatershed.[44]

Ohio EPA noted that NPS-IS are, "rooted in the best science available; located in areas that will address the worst problems; and that have the administrative, evaluation, and educational components needed to ensure that the water resources will maximize long-term benefits." (MWN TMDL, Section 8.3.2).

The key components of a NPS-IS are: designation of critical areas (i.e., areas within the HUC-12 which are the "hot spots" for nonpoint source loading and to prioritize placement of structural practices to attain loading reduction targets efficiently); discussion of potential implementation efforts[45] (i.e., on-the-ground BMPs) that could be deployed to address loading in those critical areas; and their iterative process for monitoring and adaptive management to ensure that the right suite of BMPs are being targeted to the most effective locations within the HUC-12 subwatershed.

As reported in the MWN TMDL, thus far Ohio EPA had developed forty-five NPS-IS (of 194 HUC-12s) in the Ohio portion of the MRW, which include far-field total phosphorus targets.

Ongoing and future nonpoint source planning efforts in the Maumee River Watershed: Ohio EPA explained that there are sixteen new NPS-IS in development for HUC-12 subwatersheds in the MRW (MWN TMDL, Figure 54). Additionally, there are twenty-two existing NPS-IS for HUC-12 subwatersheds that are being revisited to update those previous NPS-IS with far-field total phosphorus targets. Ohio EPA stated that it plans to continue to write NPS-IS for those subwatersheds in the MRW which do not currently have an NPS-IS. Ohio EPA anticipates that in approximately 10 years (i.e., by 2032, MWN TMDL, Figure 53), the entire Ohio portion of the MRW will have an NPS-IS at the HUC-12 scale.

Incorporating the MWN TMDL landscape loading targets (i.e., the nonpoint source contributions) on a HUC-12 by HUC-12 basis will introduce greater rigor for determining whether individual HUC-12

[43] EPA notes that implementation efforts of a NPS-IS can be supported by a variety of local, state and/or federal funding programs (e.g., H2Ohio funds, GLRI funds, USDA-NRCS funds etc.). Also, local watershed managers can leverage funding opportunities to obtain additional monetary resources for implementation efforts identified in their NPS-IS.
[44] The Ohio DAP.
[45] The Ohio DAP, Appendix B.

subwatersheds are helping to meet the MWN TMDL nonpoint source loading goals. Additionally, setting HUC-12 nonpoint source loading targets allows Ohio EPA and its implementing partners the ability to more easily track where they have made implementation progress and areas that still require attention/implementation efforts.

Using information in Appendix A of the Ohio Domestic Action Plan (2020) to inform loading targets described in NPS-IS and targeting BMPs at the HUC-12 scale: The Ohio DAP outlines the collaborative nutrient reduction efforts of Ohio EPA, the Ohio Department of Agriculture, the Ohio Department of Health (ODH) and the Ohio Department of Natural Resources to attain nutrient reduction targets established under the GLWQA and Annex 4. These total phosphorus nutrient reduction targets, 860 MT of total phosphorus during the spring season (March 1 to July 31), align with the water quality targets employed by Ohio EPA for the MWN TMDL (Section 2 of this Decision Document). These collaborative efforts focus on:

- Establishing science-based priorities for agricultural BMPs and state programming (e.g., H2Ohio) that support and/or encourage farmers to implement projects;
- Recognizing the importance of wetland restoration and ODNR's efforts to create, restore, and enhance wetlands for nutrient reduction as part of H2Ohio;
- State programming (e.g., H2Ohio) that supports home sewage treatment system remediation;
- Integrating the role of watershed planning at the local level for siting projects in critical areas to reduce nutrients efficiently.

Given the majority of total phosphorus loading to the Ohio portion of the MRW is derived from nonpoint source contributions, Ohio EPA and its state partners will have to utilize a variety of nonpoint source specific implementation programming across a large area of the MRW. The Ohio DAP contains detailed nonpoint source information that can assist watershed managers write individual NPS-IS and prioritize BMP strategies for HUC-12 scale subwatersheds. Appendix A of the Ohio DAP presents nonpoint source loading information (i.e., landscape loads for agriculture, developed and natural lands) for all 194 individual HUC-12s in the Ohio portion of the MRW (see Tables A5 to A11 of the Ohio DAP).

The landscape loading estimates on the HUC-12 scale provide valuable information to local governments, watershed managers and landowners for: estimating nonpoint source loading contributions from different landscape sources, for tailoring specific BMPs to land use conditions within individual HUC-12 subwatersheds; identifying and prioritizing HUC-12 subwatersheds that are contributing greater phosphorus runoff loads; and establishing nonpoint loading targets for NPS-IS.

Section 5.3.6 of the MWN TMDL explains that the components that comprise the landscape load (i.e., agricultural + natural + developed) can be thought of as a nonpoint source landscape load. Later in Section 7.2.1 of the MWN TMDL (Milestones for first biennial progress report (2024)), Ohio EPA explains that the assumptions and requirements for calculating the nonpoint source landscape load for the MWN TMDL differed from those assumptions used by Ohio to estimate landscape loads for Tables A5 to A11 in Appendix A of the Ohio DAP. For example, summing the estimated landscape loads from all 194 HUC-12s in Tables A5 to A11 can provide an estimate of the total landscape load the mouth of the Maumee River in Maumee Bay, but that summed value does not equal the MWN TMDL load allocation value at the same location.

Ohio EPA states, "[t]o ensure DAP-facilitated planning is consistent with the goals of the TMDL, the HUC-12 far-field targets will be updated to match the TMDL." (MWN TMDL, Section 7.2.1, pg. 132.) The Ohio DAP will be updated in 2023[46] and those revisions will include updating the HUC-12 landscape loading calculations in Appendix A to be consistent with the assumptions employed to calculate the MWN TMDL. Once this effort is complete, the far-field total phosphorus targets of the MWN TMDL will be reflected for each of the 194 HUC-12 subwatersheds. As cited earlier in Section 8 of this Decision Document, Ohio EPA explained that forty-five NPS-IS already include far-field phosphorus targets, twenty-two NPS-IS are being revised to update those previously EPA approved[47] NPS-IS with far-field phosphorus targets and an additional sixteen NPS-IS are in development and those will include far-field phosphorus targets.

Additionally, the planned 2023 updates to the Ohio DAP will ensure that DAP implementation planning efforts are harmonious with implementation efforts described in the MWN TMDL. Ohio EPA explained that it would describe the updates to the 2023 Ohio DAP in its 2024 MWN TMDL Biennial Report.

EPA recognizes that the landscape based, nonpoint source loading estimates in Tables A5 to A11 of Appendix A of the Ohio DAP are approximations of nonpoint loadings and that these estimates could be further refined by additional watershed modeling efforts (e.g., Soil and Water Assessment Tool modeling). Further refinement of nonpoint source loading estimates, with more time and funding, could be initiated at a future date if deemed necessary by Ohio EPA, EPA or if there was interest from stakeholders.

EPA agrees that incorporating the landscape loading estimates from the MWN TMDL to individual HUC-12s and developing specific implementation strategies (i.e., NPS-IS) for those HUC-12s will be very valuable for watershed managers and landowners as those parties consider appropriate mitigation measures. Subdividing the estimated total landscape load from the mouth of the Maumee River in Maumee Bay into HUC-12 subwatershed landscape total phosphorus targets will greatly improve Ohio EPA's and its implementing partner's abilities to target local scale mitigation efforts, to track the effectiveness of those efforts and, if necessary, adjust its implementation approach to maximize total phosphorus reduction efforts.

Historic nonpoint source implementation efforts in the Maumee River Watershed: Ohio EPA is actively utilizing CWA Section 319 funding to bolster is nonpoint source implementation efforts in the MRW. To demonstrate this, EPA queried nonpoint source project information from its Grants Reporting and Tracking System (GRTS)[48] from 2015 to 2022 and found that Ohio EPA's Nonpoint Source Program had completed nine nonpoint source implementation grant projects[49] in the Maumee River Watershed. The total funds expended for those nine projects was approximately $3.4 million dollars with $1.6 million dollars of that sum coming from the CWA Section 319 project funds. Those nine projects are estimated to reduce phosphorus inputs to surface waters in the Ohio portion of the MRW by 9800 lbs of phosphorus per year (~ 4.4 MT). Additionally, between 2015 and 2022 Ohio EPA utilized CWA Section

[46] The Ohio DAP.
[47] EPA notes that Ohio's NPS-IS are reviewed by the EPA CWA 319 program.
[48] U.S. EPA webpage, https://www.epa.gov/nps/grants-reporting-and-tracking-system-grts, (last visited 9/24/23).
[49] EPA is using the term *NPS implementation grant project* in this instance to refer to Ohio EPA nonpoint source implementation projects that utilize CWA Section 319 project funds to support a portion of the total project costs. E.g., The Turtle Creek Nutrient Trapping project in Ottawa County has total project costs of approx. $300,000 with $164,000 of the $300,000 coming from CWA Section 319 funds.

319 funds to modernize existing NPS-IS to incorporate updated phosphorus watershed targets and update necessary reporting elements in the NPS-IS.

Ongoing nonpoint source implementation efforts in the Maumee River Watershed: Ohio EPA has seven nonpoint source implementation grant projects underway in the Ohio portion of the MRW that are receiving CWA Section 319 project funds. The estimated total project costs of those seven projects is $2.7 million dollars and anticipated phosphorus reductions on an annual basis is approximately 400 lbs of phosphorus per year. These seven nonpoint source implementation grant projects are at varying stages of development and most are expected to be completed sometime in 2023 or 2024.

Specific implementation efforts of these 16 projects (i.e., the nine projects completed from 2015 to 2022 and the seven projects currently underway) encompasses: streambank stabilization, floodplain restoration, wetland restoration, installing two-stage ditches, sustainability programming for producers and nutrient BMP incentive programming for producers. BMPs deployed via these project efforts will improve local water quality via slowing and holding stormwater runoff, reducing potential nonpoint source contributions and reducing the transmission of nutrients from settling and or trapping nutrients and sediment.

Ohio EPA cannot use CWA Section 319 funds for nonpoint source implementation project work unless that project area (i.e., HUC-12 subwatershed) has an EPA approved NPS-IS or an alternative plan.[50] Therefore, all of the individual project efforts that are supported with CWA Section 319 funds are located in a subwatershed with an EPA approved and Ohio EPA authored NPS-IS or an alternative plan. As Ohio EPA expands its coverage of EPA approved NPS-IS in the MRW, as discussed earlier in Section 8 of this Decision Document, there will be a larger area in the watershed with more opportunities for Ohio EPA to utilize CWA Section 319 funding to support nonpoint source implementation activities.

EPA notes that the total number of individual nonpoint source implementation grant projects in the Ohio portion of the MRW has increased on an annual basis. From 2015 to 2018, Ohio EPA had five nonpoint source implementation grant projects in the Maumee River Watershed (1.25 projects/year). In 2019, 2020 and 2021, Ohio EPA had 12 individual nonpoint source implementation grant projects (four projects/year). EPA considers the increased nonpoint source implementation grant project work to be a positive development and demonstrative of Ohio EPA ramping up its efforts to address nonpoint source contributions in the MRW.

In 2021, Ohio EPA also started a $2.7 million dollar project in Auglaize County near the City of St. Marys. This project entails constructing an approximate 39-acre wetland to intercept and treat Miami and Erie Canal segments that flow through the city. This wetland will reduce elevated nitrogen and phosphorus concentrations and sediment within the canal water and improve water quality to the St. Marys Aqueduct and the Maumee River. This project is noted because of the large appropriation, that is solely from Ohio funds and Ohio's motivation for utilizing those state funds to address water quality challenges in an extreme, upper headwater subwatershed to the Maumee River.

The City of St Marys is immediately eastern/northeastern of Grand Lake St Marys, a water body that historically has also experienced HABs and water quality deterioration. Ohio very easily could have

[50] EPA webpage, https://www.epa.gov/sites/default/files/2015-09/documents/319-guidelines-fy14.pdf, (last visited 9/24/23).

allocated these funds toward implementation activities to the contributing watershed of Grand Lake St Marys. Instead, Ohio earmarked these funds to address water quality issues in a headwater subwatershed to the St. Marys River and the Maumee River (potentially the most extreme upper end of contributing headwaters to the Maumee River). EPA considers this project effort, along with other Ohio EPA targeted implementation work in the MRW, a demonstration of Ohio's commitment toward improving water quality in the Ohio portion of the MRW.

Future nonpoint source implementation efforts in the Maumee River Watershed: Ohio EPA will continue to receive CWA Section 319 funding to support NPS implementation grants.[51] EPA anticipates that Ohio EPA will continue to allocate a portion of these funds to implementation activities in the Ohio portion of the MRW. Ohio EPA has stated that it will continue to develop NPS-IS in the MRW in the coming years and by 2032, the entire Ohio portion of the MRW will have a NPS-IS completed (MWN TMDL, Figure 53). Increasing the overall footprint of NPS-IS coverage in the MRW will offer Ohio EPA greater opportunities to utilize CWA Section 319 funds to deploy nonpoint source specific implementation grant projects.

H2Ohio Program

In 2019, the H2Ohio program was started with its central purpose being to provide funding for implementation efforts to ensure clean and safe drinking water in Lake Erie (and other waters throughout Ohio). H2Ohio programming in the MRW has focused on planning, via the development of Voluntary Nutrient Management Plans (VNMP) for landowners, and implementation of agricultural BMPs (e.g., subsurface phosphorus placement, overwintering cover crop, manure incorporation, conservation crop rotation, etc.), wetland restoration and improvements to wastewater infrastructure.

The Ohio General Assembly awarded $172 million dollars to H2Ohio to support project work in 2020-2021. This funding award was subdivided among the Ohio Department of Agriculture, the Ohio Department of Natural Resources (ODNR), and the Ohio EPA that applied its funding amounts toward various project specific efforts, such as wetland focused programming designed to reduce nutrient loading from surface waters (an ODNR focus). ODA's H2Ohio goals are focused on preventing nutrient runoff via nutrient management, water management and erosion management implementation efforts. ODNR's H2Ohio objectives revolve around wetland restoration and enhancement opportunities. Ohio EPA's H2Ohio goals involve improving Ohio's water and wastewater infrastructure, replacing failing HSTS, reducing lead exposure in communities, and researching technologies for water quality improvements.[52]

In 2020, ODNR was awarded $28.9 million dollars to support wetland implementation efforts under H2Ohio. In 2021, ODNR received $27.7 million dollars for wetland implementation and in fiscal year 2022, ODNR received $25 million dollars to continue wetland specific implementation work. From 2020 to 2022, ODA has received H2Ohio funding in the approximate $30-$40 million dollar range to support its H2Ohio programmatic goals. Ohio EPA has received H2Ohio funding in the $8-$11 million

[51] EPA notes that future 319 funding awards from EPA to Ohio EPA assumes continued congressional appropriations to support the CWA Section 319 program as well as a determination by EPA, that Ohio EPA is continuing to make satisfactory progress in meeting the schedule of relevant annual milestones specified in Ohio's Nonpoint Source Management Program (see Nonpoint Source Program and Grants Guidelines for States and Territories, April 12, 2023, https://www.epa.gov/sites/default/files/2015-09/documents/319-guidelines-fy14.pdf).

[52] H2Ohio 2022 Annual Report, https://h2.ohio.gov/wp-content/uploads/2022/09/H2Ohio-Annual-Report-FY22-Final.pdf, (last visited 9/24/23).

dollar range to support its H2Ohio programmatic goals over that same period. The H2Ohio funding has remained relatively consistent through the first three plus years of funding. In July 2023, the Ohio Assembly approved a state budget that included additional funding to support H2Ohio initiatives via ODA, ODNR, Ohio EPA and the Ohio Lake Erie Commission (OLEC) related project work.

The H2Ohio Annual Reports share the status of H2Ohio funded wetland projects in the MRW. The 2022 Annual Report, on page 20, reports that twenty-one wetland projects funded by H2Ohio funds had been completed in the Ohio portion MRW and that an additional twenty-nine wetland projects are in development in the Ohio portion of the MRW. Ohio EPA cited two H2Ohio funded wetland success stories in Section 8.4.1.2 of the MWN TMDL that describe project specifics, upstream acreage treated, additional BMPs deployed nearby to the wetland project and partnering stakeholder groups.

Ohio EPA referenced the use of H2Ohio grant funds (a portion of $4.2 million dollars) to construct or improve nine two-stage ditch projects in the MRW. Two-stage ditches are a BMP designed to provide additional water storage capabilities in stream channels, to adsorb nutrients and help stabilize streambanks and stream channel bottoms from erosion during high flow events. These projects are anticipated to start sometime in the summer of 2023 and project work is expected to conclude in the Fall of 2024. Additionally, Ohio EPA cited the use of H2Ohio grant funds to replace failing HSTS in small communities or at individual properties in order to prevent the release of sewage in local surface waters (MWN TMDL, Section 8.4.1.3).

H2Ohio programming encourages interested landowners/producers to work with their county level Soil and Water Conservation District to develop a Voluntary Nutrient Management Planning document for eligible lands if those parties are interested in participating in H2Ohio cost-share support. A producer must have an approved VNMP on file with their county SWCD to be eligible to sign up for cost-share. The H2Ohio VNMP Fact sheet explains that producers will receive up to $10 per acre per year for verified implementation of their VNMP for the following H2Ohio supported practices: variable rate phosphorus application, subsurface phosphorus placement, manure incorporation, conservation crop rotation (small grains and/or forages), overwinter cover crops and or drainage water management.[53] Producers participating in H2Ohio are responsible for recording all nutrients applied to every acre that is enrolled in H2Ohio and for reporting that information on an annual basis to their county SWCD. An additional stipulation of participation is that producers must also complete soil testing to determine nutrient concentrations. The H2Ohio 2022 fiscal year summary report estimated that nearly 1.5 million acres of agricultural lands in the Western Basin of Lake Erie (of approximately 2.68 million acres of agricultural lands[54]) are enrolled in VNMPs.

EPA agrees with Ohio EPA's conclusion that H2Ohio implementation efforts in the Ohio portion of the MRW are making positive strides toward improving water quality. EPA acknowledges that the number and areal coverage of implementation activities will need to accelerate moving forward in order to attain the water quality targets of the MWN TMDL. EPA notes that H2Ohio funding for Ohio fiscal years 2024 and 2025 was passed in July 2023. The continued support of the H2Ohio program by the Governor

[53] H2Ohio webpage, Voluntary Nutrient Management Plan Implementation – Fact Sheet, https://h2.ohio.gov/wp-content/uploads/2022/05/Voluntary-Nutrient-Management-Plan-Implementation-Fact-Sheet-Fillable-1-scaled.jpg, (last visited 9/24/23).

[54] Ohio EPA estimates that approximately 80.5% of the total land area in the Ohio portion of the MRW is agricultural, which equates to (0.805 * 5,204 miles^2 = 4189.22 miles^2 => approx. 2.68 million acres).

and the Ohio General Assembly demonstrates that Ohio is committed to seeing improvements to water quality across Ohio and in the Western Basin of Lake Erie. This continued monetary support is a very positive outcome for Ohio EPA and its implementing partners toward addressing nonpoint source inputs and ultimately improving water quality in the assessment units of the Western Basin of Lake Erie.

Great Lakes Restoration Initiative

The Great Lakes Restoration Initiative (GLRI) was launched in 2010 as a non-regulatory program to accelerate efforts to protect and restore water quality in the Great Lakes and the subwatersheds that contribute to those water bodies. Since 2010, there have been numerous GLRI supported projects in the Ohio portion of the MRW that target the goals of different GLRI focus areas.[55] One of the focus areas of the 2020-2024 GLRI Action Plan involves nonpoint source pollution impacts on nearshore health.[56] Solely focusing on project work in the Ohio portion of the MRW, from 2020 to 2022, the GLRI project database returns twelve different projects that target measuring or mitigating nutrient and/or sediment contributions to the Western Basin of Lake Erie. The summed GLRI funds supporting these twelve individual projects is approximately $8.7 million dollars. EPA notes that there are many other GLRI funded project efforts that focus on nutrient mitigation efforts in the Ohio portion of the MRW from 2010 to 2019.

In the summer of 2023, Ohio EPA was awarded an additional $1.4 million dollars (from GLRI's nonpoint source pollution impacts on nearshore health) to support nutrient load reduction practices in agricultural areas that contribute to the Blanchard, Auglaize and St. Marys River watersheds in Defiance, Mercer, Williams and Wyandot counties in the southern half of the Ohio portion of the MRW. The project efforts will target nutrient and sediment inputs in approximately 3.6 miles of channelized streams using a suite of BMPs including: wetlands, saturated riparian buffers, floodplain storage and stormwater retention practices. Ohio EPA projects that these phosphorus mitigation efforts will reduce phosphors contributions to surface waters by 570 pounds. Additionally, in the fall of 2019, EPA awarded approximately $14 Million in GLRI funding to grant awardees in the Ohio portion of the MRW for those awardees to address agricultural nutrient runoff to surface waters (e.g., Two Stage Ditch Renovation in Van Fleet Ditch, Lucas County, Ohio).

Ohio EPA highlighted other GLRI supported project efforts in Section 8.4.2 of the MWN TMDL. EPA notes that since 2010, GLRI funds have been used in the Ohio portion of the MRW to complete various projects addressing nonpoint source nutrient contributions. EPA is confident that Ohio EPA and its implementing partners will continue to utilize GLRI funding to further target nutrient and sediment inputs to the subwatersheds that ultimately drain to the assessment units of the Western Basin of Lake Erie. EPA acknowledges that previous, ongoing and potential future GLRI funded project efforts in the Ohio portion of the MRW have made, are making and will make a positive contribution toward reducing nonpoint source contributions of total phosphorus to the Western Basin of Lake Erie.

[55] Great Lakes Restoration webpage, https://www.glri.us/projects, (last visited 9/24/23).
[56] The Great Lakes Restoration Initiative Action Plan III: Fiscal Year 2020 – Fiscal Year 2024, October 2019, https://www.epa.gov/sites/default/files/2019-10/documents/glri-action-plan-3-201910-30pp.pdf, (last visited 9/24/23).

USDA-NRCS Environmental Quality Incentives Program (EQIP) & USDA-FSA Conservation Reserve Program (CRP)

Ohio EPA, and its federal, state and local partners, should identify opportunities for leveraging implementation programming and funding to target appropriate[57] implementation activities in critical areas in the MRW. Ohio EPA cited efforts via the USDA-NRCS Environmental Quality Incentive Program (EQIP) (hereafter EQIP) and USDA-FSA Conservation Reserve Program (CRP) (hereafter CRP) and the Western Lake Erie Basin project to accelerate conservation actions and reduce phosphorus loading in the MRW (Section 8.4.3 of the MWN TMDL). EQIP provides technical and financial assistance to producers for practices aimed at improving agricultural operations and natural resource conservation. Conservation practices under EQIP that target reducing phosphorus inputs (e.g., via the use of variable rate fertilization and/or subsurface placement of fertilizers), reducing erosion (e.g., via the use of cover crops) and better manage water quantity (e.g., via drainage water management).

CRP is a program which provides funding to producers that remove environmentally sensitive land from agricultural production areas and install conservation practices (e.g., riparian buffers, wetlands, etc.). The goals of the CRP are to improve water quality, prevent soil erosion and reduce loss of wildlife habitat. Ohio EPA in the MWN TMDL advocates the deployment of BMPs that reduce phosphorus sources/promote nutrient retention, reduce erosion and improve water quantity storage on the landscape in critical subwatersheds the MRW. Conservation programming that aligns with these goals should be leveraged and expanded as much as possible in the watershed.

USDA-FSA Conservation Reserve Enhancement Program (CREP): The USDA-FSA's CREP is a component of the USDA-FSA's CRP and designed to address conservation activities on agricultural lands in specific geographic ares, such as the MRW. CREP is administered in Ohio through incentives offered by ODA and/or ODNR. These incentives encourage landowners to enroll new acres or maintain existing acres in conservation practices (e.g., filter strips, saturated buffers, wetlands and wooded riparian buffers). Ohio's CREP efforts require the participation of a local landowner or local partner organizations and target nutrient and sediment loading from riparian areas into the Lake Erie Watershed and complement H2Ohio activities.

EPA acknowledges the importance of implementation programming supported by USDA-NRCS that target nutrient and sediment nonpoint source inputs to the Western Basin of Lake Erie. USDA-NRCS efforts, such as CRP or CREP, that support the deployment of BMPs in the MRW will aid in the improvement of water quality to local surface waters, as well as water quality downstream in the assessment units of the Western Basin of Lake Erie.

Localized, smaller scale implementation program efforts

Ohio EPA highlighted, smaller scale, more localized implantation programming in Section 7.3.3.3 of the MWN TMDL. Local communities, via initiatives from local governments, local county partners, nonprofit organizations (e.g., Black Swamp Conservancy) and/or park districts,[58] have engaged in efforts to improve water quality and manage phosphorus inputs to surface waters in the MRW. Ohio EPA explained that while the big dollar value implementation programming efforts (e.g., H2Ohio,

[57] Implementation activities that focus on reducing phosphorus sources/promote nutrient retention, reducing erosion from riparian and near-riparian areas and improving water quantity storage on the landscape.

[58] Henry, Tom, *Metroparks and others are collaborating with Ducks Unlimited on major Lake Erie wetlands work*, The Blade (Toledo, Ohio), July 19, 2023, (https://www.toledoblade.com/local/environment/2023/07/19/metroparks-ucks-unlimited-major-lake-erie-wetlands-work/stories/20230719123), (last visited 9/24/23).

NRCS programming etc.) oftentimes are given greater recognition in the media, the smaller dollar, more localized implementation programming is just as valuable, especially for its ability to engage in with smaller landowners and connect them to implementation resources through outreach and educational efforts.

Landowners in smaller communities are typically aware of actions and practices employed by their neighbors/peers. There are opportunities, in these smaller communities, to gain participation in phosphorus management BMPs, especially if those practices are accepted by other neighbors/peers. When multiple landowners in small communities adopt practices and can demonstrate economic and environment benefits for their efforts, there is an opportunity for others to observe their success and want to become engaged in using the same strategies. If these types of scenarios take root, there is a possibility for smaller-scaled efforts to accumulate and sum to greater water quality improvements for their local subwatershed, and the MRW.

Ohio legislative efforts that affirm commitment to improving water quality in the Maumee River Watershed

Over the previous 5 to 10 years, the State of Ohio has allocated funding to support various initiatives and passed bills that were intended to improve water quality in the MRW (Section 8.4.5 of the MWN TMDL). EPA recognizes these efforts and highlights the following programs as demonstration that the State of Ohio is increasing its efforts to address HABs in Lake Erie. EPA notes that these programs and subsequent other programming initiatives will aid in the attainment of the water quality goals of the MWN TMDL.

- *Ohio Clean Lakes Initiative (2012):* Also known at the Healthy Lake Erie Fund, administered by ODNR and Ohio EPA to award grants to reduce nutrient runoff in the Western Basin of Lake Erie.
- *Ohio Senate Bill 150 (130th General Assembly, 2013-2014):* As of September 1, 2017, any person that applies fertilizer for the purposes of agricultural production must be certified on handling and applying fertilizer. Also, SB 130 authorizes a person who owns or operates agricultural land to develop a VNMP or request that one be developed for him or her.
- *Ohio House Bill 64 (131st General Assembly, 2015-2016):* The Ohio Department of Agriculture's Division of Soil and Water Conservation has authority rules/regulations regarding the application of manure at farming and animal feeding operations. The Ohio Revised Code 939.08, explains that in the Ohio portion of the Western Basin of Lake Erie, no person shall surface apply manure under the following circumstances: on snow covered or frozen soil; when the top 2 inches of the soil are saturated from precipitation; when the weather forecast in the application area calls for greater than 50 percent chance of rain exceeding one-half inch in a 24 hour period;[59] etc. See ORC 939.08 for additional details. [60]
- *Ohio Senate Bill 299 (132nd General Assembly, 2017-2018):* Provided $36 million dollars to support a Soil and Water Phosphorus Program for Lake Erie whose goal was to reduce HABs in the lake. The Soil and Water Phosphorus Program included: purchase of equipment for subsurface nutrient placement, purchase of equipment for nutrient placement using geographic information system data, soil testing, implementation of variable rate technology, purchase of equipment for implementing manure transformation and manure conversion technologies,

[59] Ohio Department of Agriculture webpage, https://agri.ohio.gov/divisions/soil-and-water-conservation/resources/manure_application, (last visited 9/24/23).
[60] Ohio Revised Code 939.08, https://codes.ohio.gov/ohio-revised-code/section-939.08, (last visited 9/24/23).

tributary monitoring, water management and edge-of-field drainage management and an agricultural phosphorus reduction loan program. Approximately $3.5 million dollars of the $36 million dollars was allocated to fund SWCDs in counties within the Western Basin of Lake Erie with staffing, soil testing, nutrient management plan development, BMPs (e.g., enhanced filter strips) and other support for conservation activities.

- *Ohio House Bill 7 (133rd General Assembly, 2019-2020):* Established the Statewide Watershed Planning and Management Program administered by ODA's Division of Soil and Water Conservation (DSWC) that subdivides the State in seven regions (HUC-6 scale, Region 1 is the Western Lake Erie Basin) where each region will have an appointed watershed manager who will engage in watershed planning, source identification (i.e., nutrient loading), identification of areas of water quality impairment, engage in watershed planning, restoration and planning activities, develop and implement new conservation efforts in the region and support existing conservation activities.

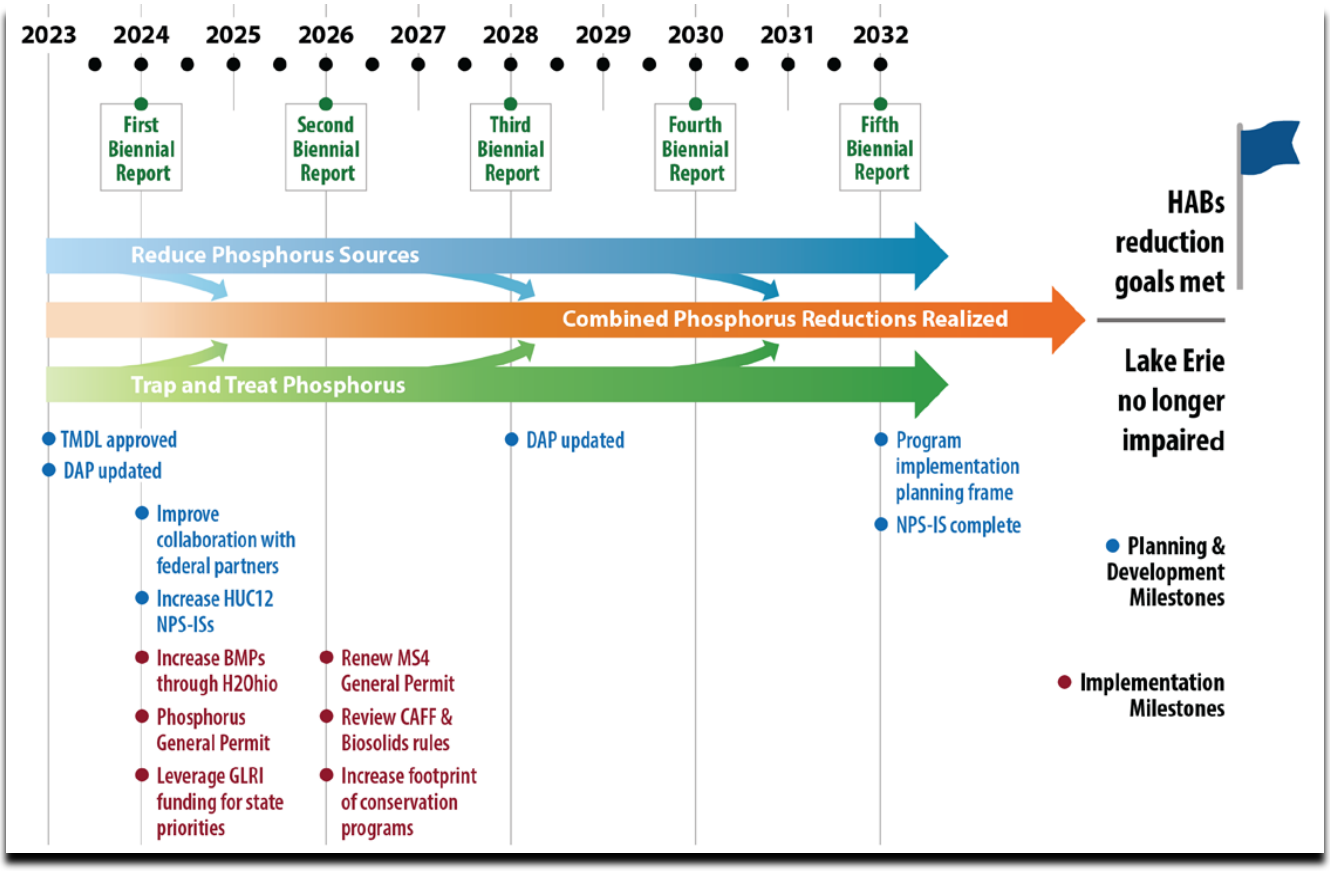
EPA recognizes that the programs and efforts summarized above do not encompass all historical or ongoing actions to date in the watershed. The acknowledged programs and projects only represent a sample of the work completed by Ohio EPA and its local, state, federal and international partners to address nutrient sources which contribute to HABs in the Western Basin of Lake Erie.

SCHEDULES AND MILESTONES TO ACHIEVE LOAD ALLOCATIONS:

Milestones to achieve load allocation:

Ohio EPA provided a timeline and milestones for attaining the total phosphorus loading targets of the MWN TMDL in Figure 53 of the MWN TMDL. Milestones in Figure 53 are identified as either planning and development milestones or implementation milestones (Section 7.2 of the MWN TMDL). Ohio EPA explained that its achievement of certain milestones will depend on collaborative efforts with federal, state and local partners as Ohio EPA does not administer all of the programming necessary to attain the water quality goals of the MWN TMDL. Ohio EPA's attainment or non-attainment of milestones will be evaluated every two years and documented in the MWN TMDL Biennial Reports (see more discussion of MWN TMDL Biennial Reporting later in Section 8 of this Decision Document).

Figure 53: Establishing milestones give implementation programs opportunities review effectiveness and make adjustments where progress is not meeting expectations (*Maumee Watershed Nutrient TMDL, June 2023*)



Ohio EPA included specific milestones for the 2024 and 2026 Biennial Reports (see Figure 53 and Sections 7.2.1 and 7.2.2 of the MWN TMDL) and aspirational goals for the 2028 and beyond Biennial Reports (MWN TMDL, Figure 53 and Sections 7.2.3 and 7.2.4). EPA notes that Ohio EPA, within its Responsiveness Summary document for the public comment on the draft MWN TMDL, described a goal that by 2032, implementation planning efforts (e.g., NPS-IS) would be completed and there would be a sufficient footprint of on-the-ground BMPs that target agricultural nonpoint sources to enable the attainment of the water quality goals of the MWN TMDL.[61]

MONITORING AND TRACKING TO EVALUATE PROGRESS:

Water quality monitoring for tracking and evaluating progress:

Continued water quality monitoring within the basin is supported by Ohio EPA. Additional water quality monitoring results will provide insight into the success or failure of BMPs and programs designed to reduce total phosphorus loading into the surface waters of the MRW. Local watershed

[61] Ohio EPA, Division of Surface Water, *Responsiveness Summary* document for the Maumee Watershed Nutrient public comment draft TMDL, https://epa.ohio.gov/static/Portals/35/tmdl/MaumeeNutrient/Maumee-Watershed-Nutrient-TMDL-Official-Draft-Responsiveness-Summary.pdf, last visited (9/24/23).

managers will be able to review the effectiveness and progress of the various pollutant removal strategies and will have the opportunity to adjust the strategies if observed progress is unsatisfactory.

Ohio EPA described its water quality monitoring resources in Section 7.5 of the MWN TMDL and outlined its plans to collect and analyze water quality data and compare it against different metrics and indicators to evaluate progress made toward attaining the total phosphorus water quality goals of this TMDL. Ohio EPA explained that it will continue to collect and assess water quality information from the three impaired assessment units (Table 1 of this Decision Document) as part of its biennial CWA Section 303(d)/305(b) Integrated Report. This water quality data includes:

- NOAA satellite imagery data to track large scale algal bloom coverage (i.e., location, extent and algae (cyanobacteria) cell count levels) in Lake Erie via Sentinel-3 satellite imagery from the Ocean Land Color Imager (OLCI)[62];
- Water quality data (e.g., cyanotoxins (microcystins, saxitoxins, anatoxin-a and cylindrospermopsin)) collected at public drinking water intakes in the Lake Erie Western Basin Shoreline and Lake Erie Western Basin Open Water assessment units; and
- Fish community data collected via electrofishing efforts in the Lake Erie Western Basin Shoreline and the Lake Erie Islands Shoreline assessment units.

Ohio EPA also detailed the water quality sampling network at twenty-nine different stream gage locations in the MRW (MWN TMDL, Figure 28) that it will query water quality data from in order to evaluate total phosphorus loads and evaluate progress made toward attaining the total phosphorus water quality goals of this TMDL. Ohio EPA referenced the accessibility to the long-term water quality record at several of stream gages, including the Waterville station (USGS 04193500), which will assist in historical and current water quality trend analysis. Water quality progress is anticipated to be studied using flow-weighted mean concentration and flow normalization methodologies to evaluate year-to-year progress made as well as evaluate water quality conditions against baseline and TMDL target water quality goals.

The water quality sampling network in Figure 28 of the MWN TMDL includes stream gages at the outlet points of HUC-8 scale sized watersheds. Ohio EPA may also be able consider water quality data collected at smaller subwatershed scales (i.e., HUC-12 or smaller scales) depending on future research efforts in the MRW. Water quality data collected at finer scales (e.g., HUC-12 or HUC-14 subwatershed scales) would provide Ohio EPA with additional information to consider as it reviews the efficacy of on-the-ground BMP implementation efforts in smaller scaled subwatersheds. Ohio EPA outlined ongoing and future research efforts that it will consider in future MWN TMDL Biennial Reports (MWN TMDL, Section 7.5.3). These research efforts include project work via the USDA's Agricultural Research Service (USDA-ARS), the Harmful Algal Bloom Research Initiative (HABRI)[63] and other federal and university partners (MWN TMDL, Sections 8.4 and 8.4.6).

[62] NOAA, National Centers for Ocean Science website, https://coastalscience.noaa.gov/science-areas/habs/hab-monitoring-system/cyanobacteria-algal-bloom-from-satellite-in-western-lake-erie-basin/, (last visited 9/24/23).
[63] Consortium of university researchers from 13 Ohio Universities (e.g., the University of Toledo, Defiance College, Bowling Green State University, Heidelberg University, Oberlin College, the Ohio State University, etc.), one of the goals of HABRI is to break down research questions into bite-sized chunks that can be researched in approximately 2 years. https://ohioseagrant.osu.edu/research/collaborations/habs, (last visited 9/24/23).

Evaluating and tracking BMPs to measure progress:

In the MWN TMDL's source discussion, Ohio EPA described how greater than 90% of spring seasonal total phosphorus contributions to the MRW originate from nonpoint origins (e.g., nutrient contributions from row crop fertilizers, soils, streambanks etc.). In Section 7.5.4 of the MWN TMDL, Ohio EPA described approaches for tracking progress of BMP implementation efforts via agricultural mass balance calculations that involve estimating total phosphorus inputs from fertilizer usage trends versus total phosphorus removed from the watershed via crop harvests. Additionally, Ohio EPA explained that it would explore consolidating and analyzing soil test phosphorus data to track BMP removal efficiency.

Other sources of information that Ohio EPA will consider for tracking implementation progress in the MRW are data collected and consolidated from the H2Ohio program. The H2Ohio website[64] includes aggregated county level data which summarizes estimated phosphorus reduction data (i.e., number of projects and pounds reduced), agricultural BMP coverage data (i.e., number of producers enrolled in H2Ohio, number of acres enrolled in H2Ohio supported BMP programming, number of acres covered by a VNMP) in the MRW.[65] The H2Ohio data dashboard can query estimates of H2Ohio supported BMP coverage, by county and by crop year, e.g., acres enrolled for overwintering cover crop in Defiance County in the 2021 crop year. Specific BMPs, with summary data by county and by crop year, which are compiled in this dashboard include: subsurface phosphorus placement, overwintering cover crop, manure incorporation, conservation crop rotation (forage and small grain), drain water management structure (with main and without main) and variable rate phosphorus application.

Information queried from the H2Ohio data dashboard can provide Ohio EPA with a general understanding of BMP coverages on a year-to-year basis in the counties of the Ohio portion of the MRW. For example, this data could be used to answer questions such as; is the acreage covered by VNMPs increasing from the previous year? EPA notes that data from this dashboard will likely require some quality assurance/quality control (QA/QC) efforts by Ohio EPA to minimize reporting errors (e.g., double counting of acreage for multiple BMPs).

Appendix 8 describes other potential BMP data resources that Ohio EPA will pursue to track implementation progress in the Maumee River Watershed. Appendix 8 highlights BMP specific data collected as part of the USDA-FSA CRP and the USDA-NRCS EQIP programming that could be requested and analyzed to track BMP implementation in the MRW. Appendix 8 explains that acquiring and synthesizing this BMP information from USDA-FSA and USDA-NRCS will be time and labor intensive but ultimately valuable for understanding BMP implementation trends over time.

BMP implementation efforts will be achieved through voluntary actions and incentive-based programming (i.e., H2Ohio, USDA-FSA CRP and USDA-NRCS EQIP). Data from these programs will inform Ohio EPA as it considers BMP implementation accomplishments and tracks on-the-ground progress/metrics. The assessment of year-to-year progress will be reflected in Ohio EPA's MWN TMDL Biennial Report.

[64] State of Ohio website, https://h2.ohio.gov/, (last visited 9/24/23).

[65] While the H2Ohio dashboard includes statewide information, it can filter specifically for information pulled solely from the Maumee River Watershed.

Utilizing water quality data and BMP effectiveness to inform adaptive management decision making:
Ohio EPA explained that it will use water quality monitoring data (described above in the *Water quality monitoring for tracking and evaluating progress* subsection of Section 8 of this Decision Document), BMP data and trend analyses (described above in the *Evaluating and tracking BMPs to measure progress* subsection of Section 8 of this Decision Document), new lessons learned from research activities (e.g., BMP efficiency studies) as well as other information (e.g., changes to conservation programming) to inform its adaptive management approach. In Section 7.6, Ohio EPA described how it will conduct an evaluation every two years to gauge the progress of implementation efforts. The goal of this analysis will be to accelerate implementation efforts that are having a positive response for improving water quality and to reevaluate and/or move away from implementation efforts which are not producing positive water quality impacts in the MRW.

Ohio EPA stated that it will evaluate progress made on a two year basis and report its findings within a MWN TMDL Biennial Report. The MWN TMDL Biennial Report will be included as part of Ohio EPA's biennial Integrated Report documentation submittal. Ohio EPA's assessment of progress will involve examining data against the metrics described in Figure 56 of the MWN TMDL. Ohio EPA explained that as part of its adaptive management considerations, it may adjust/revise its metrics or implementation approaches as data and analytical results become available. Conclusions derived from ongoing or future research efforts may encourage Ohio EPA to reconsider its metrics or implementation approaches in the MRW. Figure 57 of the MWN TMDL provides examples of adjustments (e.g., conservation programming is not having the desired impact on BMP adoption) that Ohio EPA may employ as part of its adaptive management decision making.

Ohio EPA explains that it will develop a MWN TMDL Biennial Report starting in 2024 that will describe progress made toward the water quality targets of the MWN TMDL. EPA anticipates that Ohio EPA's inaugural MWN TMDL Biennial Report in 2024 will include information that: summarizes progress made toward point and nonpoint source reductions over the previous 2 year period (e.g., tracking on-the-ground BMP implementation), summarizes water quality results for that 2 year reporting period, reports on whether milestones for that 2 year reporting period were accomplished, documents lessons learned and any relevant information learned from the evolving state of the science and discusses adjusting implementation approaches via an iterative adaptive management approach. EPA notes that there will be other topics included in Ohio EPA's 2024 MWN TMDL Biennial Report and subsequent MWN TMDL Biennial Reports besides those summarized immediately above.

Ohio EPA provided a list of anticipated milestones and project updates it intends to include in its 2024 MWN TMDL Biennial Report (MWN TMDL, Section 7.2.1). These project progress updates include *planning and development milestones* and *implementation milestones* (MWN TMDL, Figure 53) and include:

- Updates to Ohio's Domestic Action Plan – Ohio EPA plans to update the HUC-12 loading targets for subwatersheds in the Ohio portion of the MRW to ensure consistency between the Domestic Action Plan and the MWN TMDL;
- Improve collaboration with federal partners – work with federal partners to accomplish nonpoint source reductions (e.g., Water Quality Incentive Program via H2Ohio);
- Increase on-the-ground BMPs through H2Ohio programming – reporting on H2Ohio BMP implementation in the MRW;

- Leveraging GLRI to better implement Ohio priorities – summarize GLRI funded project efforts which target nonpoint source pollution management activities and how those activities contribute to meeting the total phosphorus targets of the MWN TMDL;
- Continue to develop HUC-12 scale nonpoint source pollution implementation strategies (NPS-IS) – reporting on Ohio EPA progress toward increasing the footprint, via the development of an anticipated 26 new NPS-IS in the MRW; and
- Update on Phosphorus General Permit – report on the status of the watershed general permit.

Revisiting the load allocations of the MWN TMDL:
Ohio EPA explained that it would consider revising the MWN TMDL to address changes in loads or allocations as new data become available (MWN TMDL, Section 4.1.1.6). New data could include updated information on atmospheric depositional sources or new research findings related to the impacts of changes to watershed hydrology (e.g., potential future impacts of climate change in the MRW). Ohio EPA outlined how, as part of its adaptive management approach, it will closely track water quality monitoring data in the Maumee River basin and new research findings or updated analysis approaches that may improve assumptions utilized in the development of the MWN TMDL (MWN TMDL, Section 7.6).

Ohio agricultural programming for promoting environmental stewardship:
The Ohio DAP includes a discussion of Ohio, non-NPDES, programming to ensure that agricultural operations have clear standards for environmental stewardship. These programs are administered by ODA with the assistance from SWCDs, Ohio EPA and ODNR.[66] Table 2 of the Ohio DAP outlines a regulatory framework and summarizes authorities for resolving pollution complaints involving non-permitted operations through technical consultation, fines, and ultimately, referral to the permit program (Ohio DAP, pg. 8).

Table 3: Ohio agricultural programming (Table 2: Agricultural Regulatory Programs of Ohio DAP (2020))

Program	Description	Ohio Revised Code (ORC)	Ohio Administrative Code (OAC)
Concentrated Animal Feeding Facility Permit to Operate (PTO)	Assures the proposed facility has developed appropriate best management plans in the areas of manure management, insect and rodent control, animal mortality and emergency response.	903	901:10
Concentrated Animal Feeding Facility Permit to Install (PTI)	Assures the proposed building, its facilities and location will adequately support such an operation.	903	901:10
Agricultural Pollution Abatement	Establishes rules and complaint-based enforcement to prevent sediment and manure runoff from non-permitted agricultural operations.	939	901:13-1-18
Western Lake Erie Basin (WLEB) Manure Management	Establishes additional manure application rules related to weather conditions for operations within the Western Basin of Lake Erie.	939.08 & 939.09	905.326

[66] EPA notes that these regulatory programs are administered by the State of Ohio and are non-NPDES programming. Also, ODA is not the authorized NPDES permitting authority in the State of Ohio, Ohio EPA is the authorized NPDES permitting authority.

Livestock Management Certification	Assures livestock managers and manure applicators receive training and are informed about utilizing livestock waste according to regulations and best practices. This certification is required of farmers and custom applicators at CAFF's exceeding 10,000 animal units and manure brokers or applicators who buy/sell, land apply or transport more than 4,500 dry tons of solid manure or 25 million gallons of liquid manure.	903.07	901:10-1-06

REASONABLE ASSURANCE FOR POINT SOURCES:
Reasonable assurance that the WLAs set forth will be implemented is provided by regulatory actions. Ohio EPA's NPDES and stormwater programs are the main implementing programs for ensuring the WLAs identified in the MWN TMDL (see Tables 1B to 1D of Attachment 1 of this Decision Document) are considered in new or reissued permits. Ohio EPA outlined examples of permitting and enforcement actions for point source contributors in the Maumee River Watershed in Section 8.4.7 of the MWN TMDL.

WLAs for NPDES permitted facilities
Any municipality, industry or other entity that wishes to discharge water to a surface water in the State of Ohio must first obtain a NPDES permit from Ohio EPA's Division of Surface Water. NPDES permits regulate wastewater discharges by limiting pollutants to be discharged and imposing monitoring requirements and other conditions on the permittee. The pollutant limits and/or requirements, described in the NPDES permit, ensure compliance with Ohio Water Quality Standards and Federal Regulations.[67] NPDES permit limits need to be consistent with the assumptions and requirements of a WLA (40 CFR 122.44(d)(1)(vii)(B)).

In certain instances, there are permitted facilities that have a total phosphorus WLA calculated from an earlier developed near-field TMDL effort (MWN TMDL, Appendix 5) and a WLA calculated as part of the MWN TMDL. Ohio EPA explained, and EPA agrees, that the WLAs from the earlier calculated, near-field TMDLs, are not impacted by the MWN TMDL and those WLAs are still applicable and must be considered during the development and/or revision of a NPDES permit (see Footnote 1 on pg. 104 of the MWN TMDL). Additionally, in the event that there exists a WLA from an earlier near-field TMDL (e.g., the Ottawa WWTP (2PD00028) from the Blanchard River Watershed TMDL Report (May 2009)) and the MWN TMDL (e.g., the Ottawa WWTP (2PD00028)) both WLAs are applicable and must be considered during the development and/or revision of a NPDES permit. Additionally, if the timing conditions (e.g., the WLA is applied on an annual, 365-day, basis) applicable to the WLA from the earlier near-field TMDL and the WLA from the MWN TMDL overlap, then the conditions of the NPDES permit for that overlapping time must be consistent with the more stringent WLA.

WLAs for stormwater
Stormwater phosphorus contributions in the MRW are derived from pollutants settling on impervious surfaces (e.g., parking lots, city streets, sidewalks, driveways, rooftops etc.) until precipitation events mobilize those pollutants to the storm sewer system which then discharges the stormwater to surface waters. Typically, stormwater controls have targeted reducing stormwater flow volumes and any solids (e.g., particulate phosphorus) mobilized by those runoff volumes. Ohio EPA explained that management

[67] Ohio EPA webpage, https://epa.ohio.gov/divisions-and-offices/surface-water/permitting/npdes-general-permits, (last visited 9/24/23).

efforts to attain the WLAs assigned to stormwater permittees (i.e., individual MS4 communities, communities covered under the Phase II General Permit, etc.) should focus on:

- Minimizing phosphorus sources on the landscape (e.g., lawn fertilizers, lawn debris, pet waste);
- Employing infiltration and retention BMPs to minimize stormwater discharges from sites; and
- Employing filtration BMPs to mitigate phosphorus concentrations in stormwater discharges.

Individual permits for Phase I MS4 communities (e.g., the City of Toledo MS4 (2PI00003)) and General Permits for Phase II small MS4 communities: All MS4 communities covered under an individual permit (Phase I MS4 community) or the general permit (Phase II communities) are required to develop a Stormwater Management Program (SWMP) that describes the BMPs the MS4 community will employ to meet the six minimum control measures, why those BMPs were selected in light of local water quality issues and discuss performance standards for BMP implementation.[68] Ohio EPA and individual permittees work cooperatively together to implement the requirements of the SWMP to reduce the discharge of pollutants (i.e., total phosphorus) and protect water quality per the requirements of the Ohio Revised Code 6111[69] and the CWA. Additionally, Ohio's NPDES Small MS4 General Permit (OHQ000004) includes certain requirements for small MS4s in TMDL watersheds.[70]

MS4 permits encourage the deployment of green infrastructure BMPs (e.g., bioretention areas, vegetated swales, and permeable pavements, etc.). The City of Toledo's Phase I MS4 permit requires additional measures such as inspecting industrial and commercial stormwater discharges and monitoring outfalls from various land uses to assess BMP performance (MWN TMDL, Section 4.1.2.2).

Multi-sector general permit and individual permits for industrial stormwater: Practices under the multi-sector general permit or individual industrial stormwater permits require installation of BMPs that minimize the discharge of pollutants from the site. Additionally, any industrial activities on site must meet all local government construction stormwater requirements. Certain BMPs employed to minimize nutrients leaving industrial sites include: management of stormwater runoff via erosion and sediment controls, spill prevention and response protocols, employee education/training, dust minimization and procedures to track industrial materials.

Construction General Permit: Ohio's Construction General Permit requires BMPs to control sediment export during construction activities which may disturb soil. Additionally, sites must implement non-sediment pollutant controls for other activities related to construction (e.g., fuel storage, vehicle rinse, fertilizer storage/application, etc.) Practices under the construction general permit which should be implemented at construction sites greater than one acre in size are defined in Ohio's NPDES Construction Stormwater General Permit (OHC000005).[71] Construction activity must also meet all local government construction stormwater requirements. Certain BMPs employed to minimize nutrients

[68] Ohio EPA webpage, Ohio Environmental Protection Agency, Fact Sheet for National Pollutant Discharge Elimination Systems (NPDES) General Permit for Discharges of Storm Water from Small Municipal Separate Storm Sewer Systems (OHQ000004), https://epa.ohio.gov/static/Portals/35/storm/OHQ000004_Final%20Permit%20Fact%20Sheet.pdf?ver=sgmvSd4YuiW1bL0wNnae_A%3d%3d, (last visited 9/24/23).
[69] Ohio webpage, https://codes.ohio.gov/ohio-revised-code/chapter-6111, (last visited 9/24/23).
[70] Ohio EPA webpage, https://epa.ohio.gov/divisions-and-offices/surface-water/permitting/small-municipal-separate-storm-sewer-systems-ms4s--general-permit, (last visited 9/24/23).
[71] Ohio EPA webpage, https://epa.ohio.gov/divisions-and-offices/surface-water/permitting/storm-water-discharges-from-small-and-large-construction-activities--general-permit, (last visited 9/24/23).

leaving construction sites include: management of stormwater runoff via erosion and sediment controls, sediment barriers and diversions, employee education/training and post-construction stormwater controls.

WLAs for CSOs

CSOs are subject to the NPDES permitting program and communities with CSOs must comply with EPA's CSO Control Policy. EPA's CSO Control Policy provides guidance on how CSO communities can achieve CWA goals, defines expectations for regulated communities, state water quality standards authorities and NPDES permitting authorities.[72]

Reducing the occurrence of combined sewer overflow events in the Ohio portion of the MRW will reduce the opportunity for total phosphorus contributions to the Maumee River and the Western Basin of Lake Erie. Ohio EPA uses provisions in NPDES permits, orders and consent agreements to reduce the number of CSO events. Communities may also be required to develop and implement Long Term Control Plans. In the Maumee River Watershed, all CSO communities have an approved LTCP which provides a framework for eliminating or controlling CSOs in accordance with the CWA.

Consent agreements and permitting requirements obligate CSO communities to implement the EPA nine minimum control measures for addressing CSO events.[73] Ohio cited that NPDES permits for Ohio's CSO communities require them to implement the nine minimum control measures (MWN TMDL, Section 8.4.7). In addition to the nine minimum requirements, CSO communities may implement a variety of additional approaches to mitigate potential impacts of CSOs, such as: green infrastructure to treat stormwater, stormwater collection infrastructure (i.e., gray infrastructure) which can direct stormwater to alternative discharge locations and not into collection pipes which route to a treatment facility, and integrated planning approaches for prioritizing capital investments and maximizing water quality objectives.

CAFOs

The MWN TMDL acknowledges that discharges from CAFOs and/or sanitary sewer overflows (SSO) occur in the Ohio portion of the MRW, but such discharges are prohibited by the CWA and associated federal requirements or other state requirements (MWN TMDL, Section 8.4.7; Attachment #3 of this Decision Document). Discharge prohibitions apply to sanitary sewer overflows (SSOs) (MWN TMDL, Section 5.3.1.3) and CAFOs/CAFFs (MWN TMDL, Section 5.3.4). The MWN TMDL does not allocate WLAs to these discharges (WLA = 0) and Ohio EPA explained that it intends to eliminate any discharges from SSOs and CAFOs/CAFFs.

Additionally, Ohio EPA stated that there are currently no NPDES regulated CAFOs in the Ohio portion of the MRW because CAFOs are not authorized to have point source discharges (MWN TMDL, Section 8.4.7). Therefore, no WLAs (WLA = 0) were assigned to existing CAFOs in the Ohio portion of the MRW. Ohio EPA explained that it does have the authority to issue NPDES permits to any CAFO that requires coverage and if that were to occur the MWN TMDL may need to be modified to account for any WLA assigned that NPDES permitted CAFO.

The EPA finds that this criterion has been adequately addressed.

[72] EPA webpage, https://www.epa.gov/npdes/combined-sewer-overflow-control-policy, (last visited 9/24/23).
[73] EPA webpage, https://www3.epa.gov/npdes/pubs/owm0030.pdf, (last visited 9/24/23).

9. Monitoring Plan to Track TMDL Effectiveness

EPA's 1991 document, *Guidance for Water Quality-Based Decisions: The TMDL Process* (EPA 440/4-91-001), recommends a monitoring plan to track the effectiveness of a TMDL, particularly when a TMDL involves both point and nonpoint sources, and the WLA is based on an assumption that nonpoint source load reductions will occur. Such a TMDL should provide assurances that nonpoint source controls will achieve expected load reductions and such a TMDL should include a monitoring plan that describes the additional data to be collected to determine if the load reductions provided for in the TMDL are occurring and leading to attainment of water quality standards.

EPA Review of MWN TMDL:

Section 7.4 of the MWN TMDL discusses monitoring efforts across various landscape scales in the MRW. Water quality monitoring is a critical component of the adaptive management strategy employed as part of the implementation efforts utilized in the MWN TMDL. Water quality monitoring efforts will continue in the MRW into the future and Ohio EPA will continue to utilize water quality monitoring information to evaluate whether implementation efforts are successful or unsuccessful at improving water quality conditions in the Western Basin of Lake Erie. If Ohio EPA determines that certain aspects of its implementation efforts have been underwhelming, then Ohio EPA will adjust it implementation approach to improve effectiveness.

Ohio EPA will continue to evaluate large scale algal bloom coverage (i.e., location, extent, and algae (cyanobacteria) cell count levels) in Lake Erie via Sentinel-3 satellite imagery from the Ocean Land Color Imager. Information provided by the OLCI will allow Ohio EPA to track the extent and duration of HAB events and through the biennial Integrated Report, reconsider the impairment status of the Lake Erie assessment units of the MWN TMDL.[74] Additional, Western Basin of Lake Erie water quality monitoring data (e.g., cyanotoxin, nitrates) is collected at public drinking water intakes in the Lake Erie Western Basin Shoreline and Lake Erie Western Basin Open Water assessment units. This water quality information also informs decision-making (i.e. reassessment) for Ohio EPA's biennial Integrated Report. Ohio EPA anticipates that these data will continue to be collected into the future and will inform its consideration of the effectiveness of implementation efforts in the Ohio portion of the MRW.

Water quality monitoring at the HUC-8 scale will also be important to Ohio EPA as it tracks water quality and quantity in the MRW. The USGS and Heidelberg University's NCWQR[75] collect water quality monitoring data at twenty-nine different tributary stations in the MRW (MWN TMDL, Figure 28). Some of these locations are newer (i.e., installed in 2014) while other stations in the NCWQR's network have been operational for over 40 years. Water quality monitoring at the HUC-8 scale is valued because it can provide insight into long-term water quality trends on the HUC-8 scale. Total phosphorus loading data gathered at the Waterville station (USGS 04193500) will provide Ohio EPA with information for evaluating the total phosphorus loading targets of the MWN TMDL. It is anticipated that water quality monitoring will continue at these locations into the future and that Ohio EPA will use information collected at these locations to track the progress of nutrient reductions in the MRW.

[74] Ohio EPA will consider the impairment status of all Lake Erie assessment units, not solely the Lake Erie assessment units addressed by the MWN TMDL.

[75] National Center for Water Quality Research (Heidelberg University) webpage, https://ncwqr.org/monitoring/, (last visited 9/24/23).

Water quality monitoring efforts at the field and/or project scale is anticipated to occur in the future and will inform the viability of BMP efforts to reduce nutrients on smaller areal scales. Ohio EPA anticipates that water quality monitoring data will be collected from a variety of partners (e.g., researchers, H2Ohio wetland monitoring program, NPDES stormwater permittees, community partners, etc.) allowing it to build on the existing water quality dataset and track changes based on implementation practices employed at these smaller scales. Farm field level monitoring information, such as phosphorus soil test data will also be informative for understanding legacy phosphorus concentrations in soils and identifying field areas where elevated phosphorus concentrations already exist.

Ohio EPA presents metrics, at varying levels of scale, which can be used to evaluate water quality monitoring data (Figure 56 of the MWN TMDL document). Ohio EPA believes that evaluation metrics will allow it to determine whether implementation efforts are making successful progress (e.g., using water quality monitoring data to determine whether the landscape loading goals for a HUC-12 NPS-IS are being attained). In the event that the evaluation metrics are signaling that progress is not being attained, the metrics may provide insight toward how Ohio EPA should change its implementation approach. Ohio EPA shared that adjustments to its implementation strategies will occur in the coming years and that its MWN TMDL Biennial Report will track the implementation efforts of the MWN TMDL via:

- Updating metrics as water quality data is analyzed over that 2-year time period;
- Incorporating updated research results that can better inform implementation approaches and strategies;
- Identifying updates to programs that have occurred over the previous 2-year time period; and
- Updating milestones and progress.

Ohio EPA will employ an adaptive management approach to broaden the deployment of implementation efforts which are having success in the MRW and for those implementation approaches which are not demonstrating the same level of success, evaluate alternatives for improving their performance or pursue other implementation approaches.

Ohio EPA explained that as implementation efforts move forward in time, Ohio EPA will closely monitor: the evolution of conservation programming and whether implementation practices and strategies are having a positive impact to water quality in the Ohio portion of the MRW; water quality monitoring data across the Maumee River basin; any policy change within Ohio agencies and programming and the impact of those changes on state led implementation programming; and new research findings[76] or updated analysis that may improve assumptions utilized in the development of the MWN TMDL (MWN TMDL, Section 7.6). If these considerations indicate that changes to TMDL allocations are warranted, Ohio EPA stated it will revisit and potentially revise the MWN TMDL.[77]

The EPA finds that this criterion has been adequately addressed.

[76] EPA notes an example of potential new research findings that could inform future decision-making could be research efforts conducted by the Harmful Algal Bloom Research Initiative (HABRI), who released their September 2023 research findings/update via https://ohioseagrant.osu.edu/research/collaborations/habs, (last visited 9/24/23).

[77] EPA notes that Ohio EPA explains that "*As new data becomes available, the TMDL could be revised to address changes in loads or allocations.*" (MWN TMDL, Section 4.1.1.6).

10. Implementation

EPA policy encourages Regions to work in partnership with States/Tribes to achieve nonpoint source load allocations established for 303(d)-listed waters impaired by nonpoint sources. Regions may assist States/Tribes in developing implementation plans that include reasonable assurances that nonpoint source LAs established in TMDLs for waters impaired solely or primarily by nonpoint sources will in fact be achieved. In addition, EPA policy recognizes that other relevant watershed management processes may be used in the TMDL process. EPA is not required to and does not approve TMDL implementation plans.

EPA Review of MWN TMDL:

The MWN TMDL outlined an implementation strategy for reducing phosphorus loading to the Western Basin of Lake Erie in Section 7 of the MWN TMDL. Ohio EPA explained its approach for evaluating water quality improvements in the Ohio portion of the MRW based on whether or not Ohio EPA met its milestones for that 2-year period. These considerations would be captured in the Biennial Report..

The Ohio DAP includes efficiency and effectiveness information for a selection of BMPs that the Ohio DAP advocates should be used in the MRW. Improving water quality conditions in the watershed will require a suite of different BMPs targeted to address nonpoint source loading at critical locations within the MRW. There won't be one BMP that is deployed throughout the MRW but rather a grouping of different BMPs (i.e., a suite of practices) that will need to be strategically placed in order to work collaboratively to hold and store water on the landscape and to reduce opportunities for nutrient and sediment loss without negatively impacting agricultural yields.

The MWN TMDL is not the starting point of implementation efforts in the MRW to address HABs. Figure 52 of the MWN TMDL shares actions underway that target nutrient reduction and HAB formation in the Western Basin of Lake Erie. Ohio EPA explained that future implementation actions in the MRW described in the MWN TMDL will continue to build on the previous and ongoing nutrient and sediment reduction efforts. There are a variety of partners (i.e., federal, state, local and university) that have previously completed nutrient reduction implementation efforts or are currently engaged in ongoing nutrient reduction implementation efforts. To account for these efforts, Ohio EPA will need to collaborate with this diverse set of partners, especially when assessing and reporting on progress made toward attaining TMDL goals via implementation efforts.

Milestones:

Ohio EPA will report on the status of implementation efforts in the Ohio portion of the MRW toward addressing TMDL goals in its MWN TMDL Biennial Reports. This report will describe whether Ohio EPA and its implementing partners achieved the short and long-term water quality goals of that particular biennial time period. E.g., Was Ohio EPA and its partners successful at making positive water quality gains toward the end goals of the MWN TMDL? Did Ohio EPA and its partners employ various implementation programming to reduce point and nonpoint source contributions to the Ohio portion of the MRW? What measures can Ohio EPA report on via its MWN TMDL Biennial Report which justify those conclusions? The first progress report is scheduled to be released in 2024 and will accompany Ohio's Integrated Report. In subsequent Integrated Reporting years (i.e., 2026, 2028, 2030, etc) Ohio EPA will continue to develop and make available to the public its MWN TMDL Biennial Reports to track progress toward reducing point and nonpoint total phosphorus loadings and meeting the WQS and designated uses for the Western Basin of Lake Erie.

For the 2024 and 2026 MWN TMDL Biennial Reports, Ohio EPA described specific planning and implementation milestones which it will be reporting on within each of those documents. For the 2024 MWN TMDL Biennial Report, Ohio EPA will track its progress made on: updating the Ohio Domestic Action Plan (expected in 2023), improving collaboration with federal partners toward nonpoint source load reduction efforts, BMP progress and coverage via H2Ohio programming, NPDES permitting advancements to address WLAs of the MWN TMDL, progress made to increasing NPS-IS coverage in the MRW and efforts toward leveraging funding from state and federal partners (e.g., GLRI). For the 2026 MWN TMDL Biennial Report, Ohio EPA will report progress toward: the anticipated renewal of the MS4 general permit, the anticipated review of the concentrated animal feeding facility (CAFF) and biosolids rule and continued evaluation of the milestones (e.g., BMP progress and coverage via H2Ohio programming) from the 2024 MWN TMDL Biennial Report.

Approaches to address point source contributions:
Ohio EPA acknowledges that implementation efforts to reduce total phosphorus sources to the Western Basin of Lake Erie will involve both point source and nonpoint source reduction activities.

NPDES facility considerations/upgrades – Ohio EPA explained that it would be employing a watershed general permit to cover certain facilities in the MRW (see facilities listed in Table 23 of the MWN TMDL and Table 1B of Attachment 1 of this Decision Document). Additionally, Ohio EPA cited several different optimization efforts which facilities could employ to reduce total phosphorus in their effluent such as: consideration of phosphorus in pretreatment evaluations, continued enhancement of new and existing treatment technologies, side-stream treatment efforts, nutrient recovery and/or spray irrigation of treated effluent (MWN TMDL, Section 7.3.1.2).

Mitigating stormwater nutrient contributions – The challenge of monitoring discharges from typically, a diffuse network of conveyances rather than a single effluent outfall, requires that implementation strategies for stormwater related permittees describe the deployment of BMPs to mitigate phosphorus contributions via stormwater inputs. The main strategies involve managing the source of phosphorus, managing the volume discharged and managing the phosphorus concentration via BMPs.

General Permit for small MS4 communities: MS4 communities covered under the NPDES Small MS4 General Permit are required to develop a Stormwater Management program which employs implementation efforts toward meeting the six minimum control measures[78] for MS4 communities. Ohio's NPDES Small MS4 General Permit (OHQ000004) includes certain requirements for small MS4s in TMDL watersheds.[79]

City of Toledo MS4 permit (2PI0003): The City of Toledo's MS4 permit requires the development of a Stormwater Management Program which employs implementation efforts toward meeting the six minimum control measures for MS4 communities. Those six minimum control measures are:

- Public education and outreach;
- Public participation/involvement;

[78] EPA webpage, https://www3.epa.gov/npdes/pubs/fact2-0.pdf, (last visited 9/24/23).
[79] Ohio EPA webpage, https://epa.ohio.gov/divisions-and-offices/surface-water/permitting/small-municipal-separate-storm-sewer-systems-ms4s--general-permit, (last visited 9/24/23).

- Illicit discharge detection and elimination;
- Management of construction site runoff;
- Management of post construction site runoff (for new development and redevelopment); and
- Pollution prevention, good housekeeping in municipal operations.

Multi-sector general permit and individual permits for industrial stormwater: Practices under the multi-sector general permit or individual industrial stormwater permits require installation of BMPs that minimize the discharge of pollutants from the site. Additionally, any industrial activities on site must meet all local government construction stormwater requirements. Certain BMPs employed to minimize nutrients leaving industrial sites include: management of stormwater runoff via erosion and sediment controls, spill prevention and response protocols, employee education/training, dust minimization and procedures to track industrial materials.

Construction General Permit: Ohio's Construction General Permit requires BMPs to control sediment export during construction activities which may disturb soil. Additionally, sites must implement non-sediment pollutant controls for other activities related to construction (e.g., fuel storage, vehicle rinse, fertilizer storage/application, etc.) Practices under the construction general permit that should be implemented at construction sites greater than one acre in size are defined in Ohio's NPDES Construction Stormwater General Permit (OHC000005).[80] Construction activity must also meet all local government construction stormwater requirements. Certain BMPs employed to minimize nutrients leaving construction sites include: management of stormwater runoff via erosion and sediment controls, sediment barriers and diversions, employee education/training and post-construction stormwater controls.

Home sewage treatment system upgrades – Ohio EPA acknowledged the need to repair and/or replace failing HSTS in the MRW to prevent the release of nutrient laden sewage onto land or directly into surface waters. Providing informational resources to communities which educate the public on proper HSTS maintenance and local HSTS resources available to community members as well as eliminating illicit discharges all serve to reduce the occurrence of HSTS derived nutrient pollution into surface waters of the MRW.

Combined sewer overflows – Reducing the occurrence of combined sewer overflow events in the MRW will reduce the opportunity for phosphorus contributions to the Maumee River and the Western Basin of Lake Erie. Ohio EPA uses provisions in NPDES permits, orders and consent agreements to reduce the number of CSO events. Consent agreements and permitting requirements obligate CSO communities to implement the EPA nine minimum control measures for addressing CSO events.[81] Communities may implement a variety of approaches to mitigate the impacts of CSOs, such as: green infrastructure to treat stormwater, stormwater collection infrastructure (i.e., gray infrastructure) which can direct stormwater to alternative discharge locations and not into collection pipes which route to a treatment facility and integrated planning approaches for prioritizing capital investments and maximizing water quality objectives.

[80] Ohio EPA webpage, https://epa.ohio.gov/divisions-and-offices/surface-water/permitting/storm-water-discharges-from-small-and-large-construction-activities--general-permit, (last visited 9/24/23).
[81] EPA webpage, https://www3.epa.gov/npdes/pubs/owm0030.pdf, (last visited 9/24/23).

Communities may also be required to develop and implement LTCP. In the MRW, all CSO communities have an approved LTCP which provides a framework for eliminating or controlling CSOs in accordance with the CWA.

Approaches to address nonpoint source contributions:

Ohio EPA acknowledged that implementation efforts to reduce total phosphorus sources to the Western Basin of Lake Erie will involve both nonpoint and point source reduction activities. The nonpoint source efforts will focus on retaining and storing water and nutrients on the landscape[82] via practices designed to slow and hold water within the MRW. These BMP efforts are designed to prevent nutrient and sediment loss to surface waters which drain to the Maumee River and eventually to the Western Basin of Lake Erie. Implementation efforts deployed to critical locations in subwatersheds which disproportionately contribute total phosphorus to surface waters will improve water quality conditions in local surface waters (near-field) and downstream waters (far-field) over time.

Agricultural nutrient management efforts – Ohio EPA believes that attaining the load allocation reductions called for in the MWN TMDL can be accomplished via source reduction efforts and enhancing nutrient storage (i.e., nutrient sink) opportunities within the MRW (MWN TMDL, Section 7.3.3). The following BMPs were recommended by Ohio EPA, the ODA, and the Ohio Lake Erie Commission (OLEC) to address nutrient source contributions in the MRW. The BMPs listed in the bullets below were also identified as practices that would receive H2Ohio funding assistance.

- Nutrient management
    - *Soil testing and nutrient management plans*: ODA has provided funding to develop Voluntary Nutrient Management Plans that detail how nutrients will be applied, how nutrient recommendations will be followed and how environmental risk will be reduced via these practices.
    - *Variable rate fertilization and subsurface placement of fertilizer*: These approaches generally adhere to the 4Rs of nutrient management, -s. The injection of fertilizers below the surface (e.g., 3 inches or below the soil surface) improves the opportunity for plants to uptake the fertilizer and reduces the availability of fertilizers to be transported overland during precipitation events.
    - *Manure incorporation*: Manure mixed into soils or placed below the soil surface improves opportunity for plants to uptake the fertilizer and reduces the availability of fertilizers to be transported overland during precipitation events.
- Erosion management
    - *Conservation crop rotation and cover crops*: The deployment of these approaches improves overall soil health by increasing soil organic matter, improves soil moisture storage capacity, improves microbial community health and improves the ability of plants to uptake nutrients.
- Agricultural water quantity management
    - *Drainage water management*: Managing discharge from agricultural tile drainage lines during planting and harvest periods can help store water in the water table beneath fields and reduce discharge to surface waters. Storing water in tile lines may especially be beneficial to agricultural areas during times of minimal precipitation/drought.

[82] EPA notes that atmospheric deposition can be a source of phosphorus to the terrestrial landscape in the Ohio portion of the MRW. BMPs designed to mitigate phosphorus inputs that have been applied to the landscape will help address atmospherically deposited phosphorus inputs in the watershed.

- *Edge-of-field buffers*: Protection of streams and ditches via the planting of vegetation (i.e., grasses, legumes, shrubs or trees) in the adjacent riparian areas can increase water storage in these riparian areas and decrease nutrient and sediment inputs to surface waters. These buffer areas serve to filter stormwater runoff before runoff and any nutrients or sediment the runoff is carrying can enter streams or agricultural ditches.
- *Two stage ditch construction*: These efforts modify the profile of stream channel bottoms by constructing a bench/floodplain adjacent to the existing stream channel. The bench is seeded with vegetation that helps to slow water flow within the stream environment and trap sediment. Slowing water in streams reduces the erosive capabilities of high velocity stormwater driven flows (i.e., reducing shear and/or erosive stresses). Two-stage ditches are beneficial toward improving water quality and helping to restore natural processes in stream environments.
- *Wetland preservation and/or restored wetlands*: The development of wetlands (i.e., constructed wetlands) and/or the restoration/protection of existing wetlands are beneficial for storing water and nutrients on the landscape. Wetlands filter nutrients and sediment from surface waters, increase water storage and provide habitat for wildlife.

Nutrient management efforts in livestock areas – The approaches outlined below are included in Ohio's Concentrated Animal Feeding Facility Permit to Operate (ORC 903, OAC 901:10) and Permit to Install (ORC 903, OAC 901:10) for CAFOs. These practices should also be employed in smaller, non-CAFO, animal operations for reducing the potential for nutrient and sediment nonpoint source contributions from smaller animal operations in the Ohio portion of the MRW.

Manure collection and storage practices: Ohio EPA identified manure as a nutrient rich fertilizer which is commonly spread on agricultural fields in the MRW. Nutrients from manure can be transported to surface water bodies via stormwater runoff and can also leach into groundwater resources. Improved strategies for the collection, storage (e.g., repairing storage facilities/infrastructure, building roofs over storge areas) and management of liquid and dried manure can minimize the potential for nutrients derived from manure to enter into surface and groundwater systems.

Manure management plans: Developing manure management plans can ensure that the storage and application rates of manure are appropriate for soil conditions. Determining application rates that take into account the crop to be grown on that particular field, the soil type and the existing phosphorus concentrations of the fields where the manure is planned to be spread will ensure that the correct amount of manure is spread on a field given the conditions. Spreading the correct amount of manure will reduce the availability of nutrients derived from manure to migrate to surface and groundwaters.

Livestock feedlot runoff controls: Slowing and holding surface stormwater runoff from feedlot areas via diversion structures, holding and/or storage areas, and treating the stormwater runoff via stream buffers or settling/sediment traps can reduce the transmission of nutrients derived from manure to surface waters. Additionally, landowners can consider diverting potential stormwater runoff from non-feedlot areas away from feedlot areas to minimize the introduction of additional stormwater runoff to feedlot areas. Additionally, introducing rotational grazing to increase grass coverage in pastures, and maintaining appropriate numbers of livestock per acre for grazing, can also aid in the reduction of bacteria inputs.

Reducing livestock access to stream environments: Ohio EPA explained that livestock access to stream environments in northwestern Ohio is not a widespread challenge, rather it is localized to small-scale areas in the Ohio portion of the MWR.[83] For areas that do have livestock accessibility issues, livestock managers should be encouraged to implement measures to protect streambank/riparian areas. Managers should install exclusion fencing near stream and river environments to prevent direct access to these areas by livestock. Additionally, installing alternative watering locations and stream crossings between pastures may aid in reducing nutrient and sediment inputs to surface waters.

Wetland restoration and preservation – The creation of wetlands, via man-made or constructed wetlands, and/or the preservation or restoration of existing wetlands is one of Ohio EPA's main strategies for creating nutrient sinks and slowing water transport in the MRW. Wetlands provide nutrient reduction and water quality benefits by slowing the movement of water across the landscape by intercepting and slowing overland runoff. Capturing overland runoff reduces peak flooding and erosion of streambanks during high streamflow events. Wetlands also capture and remove nutrients and sediment from surface waters. Wetland ecosystems are also beneficial in that they provide habitat for fish and other wildlife.

The ODNR is tasked with working to restore, enhance and create coastal, inland and riparian wetlands in the Ohio portion of the MRW. The H2Ohio program prioritized funding to restore wetlands and reconnect floodplains within the MRW. As of March 2023, using H2Ohio funds, Ohio had completed over 20 wetland specific restoration projects in the MRW.

Floodplain reconnection – Restoring and reconnecting floodplain areas aligns with Ohio EPA's goals of creating nutrient sinks and increasing water storage in the MRW. Floodplain reconnection efforts can be through the creation of two-stage ditches within the stream channel or reconnecting wetland areas that are adjacent to streams/rivers to the channel or constructing wetlands in riparian areas to absorb flooding during high streamflow events. Floodplain restoration efforts also can provide improve habitat availabilities for terrestrial wildlife and aquatic species.

Streambank erosion mitigation through restoration – Streambank restoration efforts align with Ohio EPA's goal of minimizing the nutrient sources in the MRW. Ohio EPA recognized that streams and drainage ditches are a source of phosphorus that is added to surface waters through erosion of streambank soils and the remobilization of phosphorus from stream channel bottom sediments. Employing riparian area management practices, such as protecting streambanks via planting vegetation (i.e., grasses, legumes, shrubs or trees) in adjacent riparian areas can stabilize streambanks and mitigate the loss of sediment during high streamflow events. Additionally, vegetated areas adjacent to streams and drainage ditches can help filter overland stormwater runoff.

Identifying actively eroding stream and drainage ditch riparian areas and prioritizing implementation action to address these areas will prevent additional nutrient and sediment inputs into the surface waters of the MRW. Field-scale survey efforts to this level of detail to prioritize and target restoration projects are included in NPS-IS.

[83] Ohio EPA (Josh Griffin), phone conversation with EPA, August 28,2023.

Monitoring efforts and evaluation/adaptation

As part of its implementation process, Ohio EPA will analyze water quality monitoring data collected across the MRW to inform its decision-making regarding whether Ohio EPA needs to adjust its implementation approach (See Section 8 and 9 of this Decision Document). Ohio EPA will use the MWN TMDL Biennial Report to document and track its implementation record. The first MWN TMDL Biennial Report will be developed in 2024 and Ohio EPA will author a subsequent MWN TMDL Biennial Report every 2 years. Ohio EPA will employ an adaptive management approach to broaden the deployment of implementation efforts which are having success in the MRW, and evaluate alternatives if certain approaches are not effective.

Collaborative implementation yields the most enduring outcomes

EPA has found that the most enduring, positive implementation actions occur when partners (e.g., state, federal, local) collaborate to craft solutions to address water quality challenges on the local scale.[84] Upon the completion of a strategy, developed by these partners, ideally, a local stakeholder group will assume ownership of the on-the-ground implementation efforts and the long-term upkeep and maintenance of those BMPs. Since, the majority of total phosphorus loading to the Ohio portion of the MRW is derived from nonpoint source contributions, Ohio EPA and its implementing partners (e.g., SWCDs, ODNR, etc.) will have to utilize a variety of nonpoint source specific implementation programs across a large area in the watershed. Ohio EPA will also need to continually monitor and adjust these implementation efforts to ensure that progress is being achieved toward improving water quality conditions in the Maumee River Watershed and the downstream assessment units of the Western Basin of Lake Erie.

Supplemental BMP efficiency information

Ohio in Appendix C of its Ohio DAP document includes efficiency and effectiveness information for a selection BMPs that the Ohio DAP advocates should be used in the Ohio portion of the MRW. The Ohio DAP explained that the information summarized will assist watershed managers track the expenditure of funding to install the BMP, track the expected nutrient reduction performance, and improve coordination and accountability. The determination of the appropriate number of BMPs and which combination of BMPs should be deployed given available funding and locational needs (i.e., critical area needs) are important considerations for watershed managers. Maximizing the phosphorus removal return for the funding expended will be an important metric as Ohio EPA and its implementing partners review BMP performance data every two-years (via the development and reporting out of the MWN TMDL Biennial Report).

The EPA finds that this criterion has been adequately addressed. The EPA reviews but does not approve implementation plans.

11. Public Participation

EPA policy is that there should be full and meaningful public participation in the TMDL development process. The TMDL regulations require that each State/Tribe must subject calculations to establish TMDLs to public review consistent with its own continuing planning process

[84] The Blade, Tom Henry, Metroparks and others are collaborating with Ducks Unlimited on major Lake Erie wetlands work, July 19, 2023, https://www.toledoblade.com/local/environment/2023/07/19/metroparks-ucks-unlimited-major-lake-erie-wetlands-work/stories/20230719123, (last visited 9/24/23).

(40 C.F.R. §130.7I(1)(ii)). In guidance, EPA has explained that final TMDLs submitted to EPA for review and approval should describe the State's/Tribe's public participation process, including a summary of significant comments and the State's/Tribe's responses to those comments.

Provision of inadequate public participation may be a basis for disapproving a TMDL. If EPA determines that a State/Tribe has not provided adequate public participation, EPA may defer its approval action until adequate public participation has been provided for, either by the State/Tribe or by EPA.

EPA Review of MWN TMDL:

Section 9 of the MWN TMDL outlines the Ohio public participation process during the development and drafting of the MWN TMDL. For the MWN TMDL, Ohio EPA employed a multi-step TMDL development process which included notice and opportunity for public input at numerous stages. Ohio EPA provided the opportunity for the public to share written comments during public comment periods for the Loading Analysis Plan (August 31, 2021, to October 22, 2021), the Preliminary Modeling Results document (June 30, 2022, to August 17, 2022) and draft MWN TMDL (December 30, 2022, to March 8, 2023). Ohio EPA responded to written comments received during these three public comment periods via response to comment summary documents. Ohio EPA's responses to comments received were made available online on the Maumee Watershed Nutrient TMDL webpage, hosted by Ohio EPA.

Ohio EPA also provided information to interested stakeholders through three overview module webinars (held in 2021), periodic project update webinars (held October 2021, to December 2022), and via a Frequently Asked Questions (FAQ) document. Webinar presentation slide decks and the FAQ document were posted on the Maumee Watershed Nutrient TMDL webpage,[85] hosted by Ohio EPA. Recorded webinar presentations were preserved on YouTube and made available to the public. Live webinars provided additional outreach opportunities for the public to ask questions and provide feedback to Ohio EPA outside of the public comment period.

Ohio EPA posted the draft TMDL online at (Maumee Watershed Nutrient TMDL webpage) for the December 30, 2022, to March 8, 2023 public comment period. Ohio EPA received a number of comments from interested parties that requested additional clarification on: MWN TMDL targets, CAFOs, DRP, TMDL allocations, implementation practices, tracking of progress via MWN TMDL Biennial Reports and reasonable assurance.[86]

EPA acknowledges the concerns expressed by stakeholders and shared during the public comment period for the MWN TMDL. Ohio EPA adequately addressed these comments and requests for additional information in the final MWN TMDL, where appropriate. Ohio EPA provided a responsiveness summary document to comments received for the public notice draft TMDL and made that document available to the public.

MWN TMDL targets: Please see Section 2 and 3 of this Decision Document for EPA's consideration of the MWN TMDL's targets.

[85] Ohio EPA webpage, https://epa.ohio.gov/divisions-and-offices/surface-water/reports-data/maumee-river-watershed, (last visited 9/24/23).

[86] EPA notes that the topics listed in this sentence are not an exhaustive list of questions and comments that were shared with Ohio EPA. This listing is merely a grouping of topics.

CAFOs: Please see Attachment 3 of this Decision Document for further discussion of EPA's consideration of CAFOs and the MWN TMDL.

DRP: Please see Attachment 2 of this Decision Document for further discussion of EPA's consideration of CAFOs and the MWN TMDL.

TMDL allocations (i.e., single load allocation): EPA acknowledges stakeholder concerns regarding Ohio EPA's use of a single load allocation value, calculated at the Maumee River Watershed outlet point (the mouth of the Maumee River at Maumee Bay) and whether that single load allocation value would be meaningful for projecting NPS loading targets to smaller subwatershed units upstream from the downstream outlet point. Please see Section 4, *Load allocation*, and Section 8, *Using information in Appendix A of the Ohio DAP to inform loading targets described in NPS-IS and targeting BMPs at the HUC-12 scale* of this Decision Document for additional discussion.

Implementation practices: Please see Section 10 of this Decision Document for EPA's consideration of the MWN TMDL's implementation approach.

Tracking of progress via MWN TMDL Biennial Reports: Please see Section 8 and Section 10 of this Decision Document for EPA's consideration of the MWN TMDL's approach to track implementation progress.

Reasonable assurance: Please see Section 8 of this Decision Document for EPA's consideration of the MWN TMDL's reasonable assurance.

EPA worked closely with Ohio EPA during the development of the MNW TMDL. Numerous conference calls were held between Ohio EPA and EPA TMDL staff to discuss various technical and programmatic issues. EPA provided written comments on the Loading Analysis Plan, Preliminary Modeling Report, and draft TMDL, and the comments were thoroughly discussed between Ohio EPA and EPA.

EPA reviewed the comment letters received by Ohio EPA during the draft TMDL public notice comment period, as well as the Ohio EPA response to comments document that was submitted to the EPA as part of the final TMDL submittal package. EPA finds that Ohio EPA appropriately considered the comments received (including EPA comments) and updated the MWN TMDL document as necessary.

The EPA finds that the MWN TMDL package submitted by Ohio EPA satisfies this eleventh element.

12. Submittal Letter

A submittal letter should be included with the TMDL submittal, and should specify whether the TMDL is being submitted for a *technical review* or *final review and approval*. Each final TMDL submitted to EPA should be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the Clean Water Act for EPA review and approval. This clearly establishes the State's/Tribe's intent to submit, and EPA's duty to review, the TMDL under the statute. The submittal letter, whether for technical review or final review and approval, should contain such identifying information as the name and location of the water body, and the pollutant(s) of concern.

EPA Review of MWN TMDL:

The EPA received the Maumee Watershed Nutrient TMDL document, submittal letter and accompanying documentation from Ohio EPA on June 30, 2023. The transmittal letter explicitly stated that the final TMDLs referenced in Table 1 of this Decision Document were being submitted to EPA pursuant to Section 303(d) of the Clean Water Act for EPA review and approval.

The letter clearly states that the MWN TMDL is a final TMDL submittal under Section 303(d) of CWA. The letter also contains the name of the Lake Erie segments as they appear on Ohio's 303(d) list, and the causes/pollutants of concern. This TMDL was submitted per the requirements under Section 303(d) of the Clean Water Act and 40 CFR 130.

The EPA finds that the TMDL transmittal letter submitted for the Maumee Watershed Nutrient TMDL by Ohio EPA satisfies the requirements of this twelfth element.

13. Conclusion

After a full and complete review, the EPA finds that the MWN TMDL for the three impaired segments of the Western Basin of Lake Erie satisfy all elements for approvable TMDLs. This TMDL approval is for **three TMDLs**, addressing three segments (OHLE041202000201, OHLE041202000301 and OHLE041202000101) for impairments to recreational, public drinking water and aquatic life uses (Table 1 of this Decision Document).

The EPA's approval of the MWN TMDL extends to the water bodies which are identified above with the exception of any portions of the water bodies that are within Indian Country, as defined in 18 U.S.C. Section 1151. The EPA is taking no action to approve or disapprove TMDLs for those waters at this time. The EPA, or eligible Indian Tribes, as appropriate, will retain responsibilities under the CWA Section 303(d) for those waters.

ATTACHMENTS

Attachment #1: Maumee Watershed Nutrient TMDL Tables

- **Table 1A:** Maumee Watershed Nutrient TMDL Table
- **Table 1B:** Individual facilities to be covered under future General Permit, their WLA in the Maumee Watershed Nutrient TMDL and their group tier (*see Table 23 and Table A4.1 of Appendix 4 of the MWN TMDL*)
- **Table 1C:** Individual facilities' WLA in the Maumee Watershed Nutrient TMDL (*see Table A4.2 of Appendix 4 of the MWN TMDL*)
- **Table 1D:** WLAs for Combined Sewer Overflows for the Maumee Watershed Nutrient TMDL

Attachment #2: EPA review of Dissolved Reactive Phosphorus Information

Attachment #3: EPA review of Concentrated Animal Feeding Operation Information

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