Phase III Watershed Implementation Plan
Water Quality Planning Targets

Summary of Major Partnership Decisions Informing Development of Phase III WIP Planning Targets (2016–2018)

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Major Decisions Informing Phase III WIP Planning Targets

This document provides a record of the major decisions made by the Chesapeake Bay Program (CBP) to establish the Phase III Watershed Implementation Plan (WIP) planning targets. The planning targets defined the maximum allowable loads of nitrogen, phosphorus, and sediment that each jurisdiction and source sector were supposed to have practices in place by 2025 to meet water quality standards in the Chesapeake Bay and its tidal tributaries.

The decisions documented here were reached through a multi-year deliberative process involving the Principals' Staff Committee (PSC), the Water Quality Goal Implementation Team (WQGIT), the Modeling Workgroup, the Wastewater Treatment Workgroup, Agriculture Workgroup, Urban Stormwater Workgroup, Forestry Workgroup, Land Use Workgroup, and the Climate Resiliency Workgroup. The process built directly on the methodological framework established for the 2010 Chesapeake Bay Total Maximum Daily Load (TMDL), updated with the Phase 6 suite of modeling tools and refined scenario assumptions.

Each of the eight major decision areas below is organized by subsection. Within each subsection, individual meeting entries identify what was agreed to (in italics) and provide a paragraph describing the substantive discussion that informed the decision. Entries are presented in chronological order within each subsection.

1. Critical Period and Hydrologic Averaging Period

The critical period and hydrologic averaging period define the hydrologic conditions against which loads are evaluated when developing the Bay TMDL and planning targets. Decisions made in 2009 for the original Bay TMDL were carried forward and applied to the Phase III WIP planning targets without revision. More information on the hydrologic averaging period and critical period can be found in Appendix F and Appendix G of the Chesapeake Bay TMDL.

1.1 Hydrologic Averaging Period

Water Quality Steering Committee (WQSC) Conference Call – April 22, 2008

Decision: *The Water Quality Steering Committee tentatively decided to use the* ***1991–2000 hydrologic averaging period*** *in the development of the Bay TMDL, retaining extreme events which occurred during the period.*

Key discussions that informed this decision include:

- *Length of period: 10 years was long enough to provide contrast in different hydrology types and representative of long term flow characteristics. Periods greater than 10 years were found to not improve representativeness and introduced greater computational burdens on modeling resources.*

- *Capturing of extreme events: partners agreed that extreme events should not be dropped from the hydrologic averaging period given their common occurrence during a ten year period, excluding them would mean excluding them from the modeling simulations, and that excluding them may constitute a non-conservative assumption, counting against the recommended implicit margin of safety in the TMDL.*
- *Range of considered years: 1985-2005 was the period of record for choosing a hydrologic averaging period since those were the years of model simulation.*
- *Normalizing by basins: to minimize differences between basins, periods with the tightest statistical measures over both long term and 30-year flow periods were weighted higher.*

Water Quality Steering Committee (WQSC) Conference Call – January 12, 2009

***Decision:** The Water Quality Steering Committee reaffirmed its prior decision to use the **1991–2000 hydrologic averaging period** in the development of the Bay TMDL, confirming it as the most representative, fair, and inclusive 10-year period across all major basins.*

Phase III WIP Context (2016–2018) – Carried Forward

*The **hydrologic averaging period of 1991–2000** was carried forward without revision for Phase III WIP planning targets, consistent with the treatment of the critical period.*

Questions were raised at the January 2017 WQGIT meeting about whether the influence of changing environmental conditions required an adjustment to the hydrologic averaging period and no definitive answer was provided. Ultimately the PSC decided to account for changing environmental conditions differently, but this was a consideration at the time.

1.2 Critical Period

WQGIT Conference Call – September 9, 2009

*WQGIT members were briefed on the hydrologic flow analysis for determining the critical period, with the majority trending toward **1993–1995** as approximately a 10-year return period flow event consistent with EPA Region III TMDL practices; no formal decision was made.*

Key discussions that informed this decision include:

- *10-year return period: selected because it was a balance between extreme events and ensuring attainment during more frequent critical events, it is a commonly applied period for application of 7Q10 low flow conditions, and it is consistent with the critical periods selected for other TMDLs developed and published by the Chesapeake Bay watershed jurisdictions.*
- *Select from within the hydrologic averaging period: important because of the need to be representative of long-term hydrology, within model calibration period, facilitate the ease of model operations.*
- *Three year period: Three years was important to match the criteria assessment period.*
- *1993-1995: 1996-1998 was too extreme, while 1993-1995 represented more typical hydrologic conditions for a 10-year return period.*

WQGIT Conference Call – September 21, 2009

*Additional analysis on the critical period was presented; **no formal decision was made**, but the majority trend toward **1993–1995** was confirmed.*

WQGIT Face-to-Face Meeting – September 29–30, 2009

Decision: *The WQGIT unanimously approved* ***1993–1995 as the critical period*** *for assessing compliance with Chesapeake Bay water quality standards in the Bay TMDL, representing approximately a once-in-10-years streamflow event.*

Phase III WIP Context (2016–2018) – Carried Forward

The ***critical period of 1993–1995*** *was carried forward without revision for Phase III WIP planning targets; neither the critical period nor the hydrologic averaging period was revised when the Phase 6 suite of models was adopted.*

Questions were raised at the January 2017 WQGIT meeting about whether the influence of changing environmental conditions meant the critical period no longer represented a 10-year return period and no definitive answer was provided. Ultimately the PSC decided to account for changing environmental conditions differently, but this was a consideration at the time.

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2. Finalizing Scenario Base Year, E3, and No Action Scenarios

Three closely related scenario decisions are required to run the planning target methodology: (1) a scenario base year that establishes the management conditions from which loads are calculated, (2) an Everything Everywhere by Everyone (E3) scenario representing a theoretical best-case possible situation, where a certain set of possible BMPs and available control technologies are applied to land, given the human and animal populations, and wastewater treatment facilities are represented at highest technologically achievable levels of treatment regardless of costs, and (3) a No Action scenario representing a theoretical worst case loading situation in which no controls exist to mitigate nitrogen, phosphorus, and sediment loads from any sources. Decisions on all three were finalized through WQGIT between 2016 and 2017.

2.1 Scenario Base Year

WQGIT Face-to-Face – September 25–26, 2017

WQGIT approved using 2010 as the scenario base year for establishing the Phase III WIP planning targets, consistent with the approach used in the Bay TMDL.

2.2 E3 and No Action Scenario

WQGIT Conference Call – June 27, 2016

WQGIT tasked each sector workgroup with developing recommendations on updates to the E3 and No Action scenario components for the Phase 6 model by the October 2016 face-to-face meeting.

WQGIT Face-to-Face – October 24–25, 2016

Decision: *WQGIT approved the* ***updated Phase 6 E3 and No Action scenario components*** *submitted by the Urban Stormwater, Agriculture, and Wastewater Treatment Workgroups, with outstanding components (shoreline management, in-situ BMPs) to be defined.*

WQGIT Conference Call – August 14, 2017

The Phase 6 E3 and No Action Scenario was presented, consolidating all sector workgroup inputs; WQGIT confirmed its approval of the E3 and No Action assumptions.

WQGIT Conference Call – November 13, 2017

WQGIT discussed the appropriate No Action and E3 value settings for shoreline management and oyster aquaculture practices, which had not been addressed in earlier workgroup submissions.

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3. Accounting for Growth – 2025 Current Zoning Conditions

Planning targets must account for the nutrient and sediment loads that will result from population growth and associated land development between the scenario base year and the implementation deadline, which in the case of the Phase III WIPs was 2025. The partnership debated whether to use forecasted 2025 conditions or some other future land use scenario, and ultimately adopted the "current zoning" approach to project growth-related loads.

WQGIT Face-to-Face – October 24–25, 2016

WQGIT agreed on the Land Use Workgroup's process for deciding whether to use 2025 forecasted land use conditions in Phase III WIPs; EPA confirmed this approach would meet expectations for accounting for growth.

WQGIT Face-to-Face – September 25–26, 2017

WQGIT recommended using 2025 growth projections based on the "current zoning" land use scenario as the principal scenario for Phase III WIP development.

PSC 2-Day Retreat – December 19–20, 2017

***Decision:** PSC approved basing Phase III WIP development on **2025 projected conditions using the current zoning scenario** to account for growth, with the LUWG's Current Zoning as the principal scenario.*

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4. Adoption of Phase 6 Suite of Modeling Tools

The Phase 6 suite of models — including the Phase 6 Chesapeake Bay Watershed Model, the Chesapeake Bay Water Quality and Sediment Transport Model (Phase 6), and the Chesapeake Bay Airshed Model — replaced the Phase 5.3.2 suite for all management applications beginning with the Phase III WIP planning targets. The Phase 6 suite was developed over approximately five years and underwent extensive internal and external peer review before PSC adoption.

Phase 6 Approval Process – Ongoing 2012–2017

The Modeling Workgroup, WQGIT, and PSC collectively oversaw the development, review, and approval of the Phase 6 suite over a multi-year process that included independent peer review coordinated through STAC.

Modeling Workgroup – April through June 2017

A series of Modeling Workgroup webinars reviewed Phase 6 performance for sediment simulation, nutrient inputs, tributary loads, and physical transport to support the workgroup's readiness recommendation.

PSC 2-Day Retreat – December 19–20, 2017

***Decision:** PSC formally adopted the **Phase 6 suite of modeling tools** for finalizing the draft Phase III WIP planning targets and for management application in Phase III WIPs and two-year milestones through 2025.*

5. Determining the Bay's Assimilative Capacity

The Bay's assimilative capacity — the total allowable loads of nitrogen and phosphorus that the Bay can receive while still meeting water quality standards — forms the outer boundary within which all jurisdiction-level planning targets must fit. Determining the correct assimilative capacity under Phase 6 model conditions required resolving how to account for Conowingo Dam infill and changing environmental conditions, both of which were new considerations relative to the 2010 Bay TMDL.

WQGIT Face-to-Face – September 25–26, 2017

WQGIT directed the CBPO Modeling Team to analyze assimilative capacity under six scenarios combining Conowingo infill and changing environmental conditions variables, providing the analytical basis for the PSC decision.

PSC Meeting – October 3, 2017

PSC was briefed on the outcomes of the WQGIT September 2017 face-to-face meeting; the PSC acknowledged that final Phase 6 model calibration was needed before the assimilative capacity could be determined.

PSC 2-Day Retreat – December 19–20, 2017

Decision: *PSC approved an interim Bay assimilative capacity of* ***195 million pounds of nitrogen and 13.7 million pounds of phosphorus*** *(including a 6% restoration variance for Maryland's CB4 deep channel segment), pending additional Phase 6 calibration analyses.*

PSC Meeting – March 2, 2018

Decision: *PSC approved the final Bay assimilative capacity at* ***196.5 million pounds of nitrogen and 13.75 million pounds of phosphorus****, replacing the December 2017 interim figures.*

6. Wastewater Treatment Decision Rules and Adoption of the Planning Target Methodology (Hockey Stick)

Two interrelated decisions govern how nitrogen, phosphorus, and sediment loads are allocated among jurisdictions and across source sectors: the planning target methodology — commonly called the "hockey stick" — and the specific wastewater treatment concentrations that define the point source decision rules embedded within the hockey stick. The hockey stick methodology was originally adopted in the 2010 Bay TMDL; its application to Phase III WIP planning targets and the associated wastewater treatment decision rules were confirmed through a series of WQGIT and PSC decisions in 2016 and 2017.

6.1 Wastewater Treatment Decision Rules

WQGIT Meeting – September 21 & 29, 2009

Decision: *WQGIT approved the wastewater treatment hockey stick lines with* ***maximum reductions of 90% (relative to E3) for nitrogen at 4.5 mg/L and 96% (relative to E3) for phosphorus at 0.22 mg/L****, and approved presenting Options 1 and 3 to the PSC for the original Bay TMDL allocation methodology.*

PSC Meeting – October 23, 2009

Gary Shenk and Bob Koroncai presented the two WQGIT-approved options (Options 1 and 3) to the PSC for a decision on initial working target loads. ***Decision: The PSC unanimously adopted Option B (the hockey stick methodology) and its associated, non-binding, working target loads for nitrogen and phosphorus****, to allow jurisdictions to move forward with development of their Watershed Implementation Plans.*

WQGIT Conference Call – November 14, 2016

WQGIT reviewed the technical documentation from the 2010 TMDL specifying the wastewater treatment hockey stick concentration thresholds and associated minimum and maximum reduction percentages.

WQGIT Conference Call – November 28, 2016

Decision: *WQGIT agreed to retain the* ***2010 TMDL wastewater treatment hockey stick concentrations*** *for Phase III WIP planning targets.*

6.2 Adoption of the Planning Target Methodology (Hockey Stick)

PSC Meeting – October 23, 2009 (Original Bay TMDL)

Decision: *The PSC adopted* ***Option 3 — the "hockey stick" methodology*** *— as the framework for allocating nitrogen, phosphorus, and sediment loads across jurisdictions in the 2010 Bay TMDL, applying a two-line approach with a 20% spread between most and least effective basins.*

WQGIT Face-to-Face – October 24–25, 2016

WQGIT agreed to recommend that the Partnership apply the same hockey stick methodology to the Phase III WIP planning targets as was used in the 2010 Bay TMDL, with updated No Action and E3 inputs and revised relative effectiveness estimates.

PSC Meeting – December 2016

Decision: *PSC approved applying the* ***same hockey stick planning target methodology*** *to establish Phase III WIP planning targets as was used for the 2010 Bay TMDL allocations, with updates to the No Action and E3 scenarios and relative effectiveness estimates.*

WQGIT Face-to-Face – September 25–26, 2017

WQGIT confirmed retention of the 20% spread between most effective and least effective basins for the all-other-sources hockey stick line and confirmed that the point source effectiveness curve would remain identical to the 2010 TMDL curve; any additional load from Phase 5 to Phase 6 transition, changing environmental conditions, or Conowingo would be added to the all-else line.

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7. Special Cases, Adjustments, and Approval of Phase III WIP Planning Targets

Once the planning target methodology and assimilative capacity were established, the partnership moved through a formal four-month review process that gave jurisdictions the opportunity to raise special cases and request adjustments. This process culminated in PSC approval of the final planning targets in July 2018.

7.1 Special Cases and Ad Hoc Adjustments

PSC 2-Day Retreat – December 19–20, 2017

Decision: *PSC approved* ***special case draft planning target adjustments for West Virginia and New York*** *consistent with section 6.4.5 of the 2010 Bay TMDL (additional 1M lbs N and 100K lbs P to NY; additional 2M lbs N to WV), and approved the process for the 4-month Partnership review.*

PSC Meeting – March 2, 2018

PSC approved West Virginia's contingency language, approved WV's request to reduce its nitrogen target from 2 million to 1.5 million pounds, and approved the approach for accounting for additional pounds provided to NY and WV in the final assimilative capacity calculation.

7.2 Approval of Draft and Final Phase III WIP Planning Targets

PSC 2-Day Retreat – December 19–20, 2017

Decision: *PSC approved the release of* ***draft Phase III WIP planning targets on December 22, 2017*** *as the starting point for the Partnership's four-month+ review period, opening the formal process for special case requests.*

PSC Meeting – July 2018

Decision: *PSC granted* ***final approval of the Phase III WIP planning targets****, incorporating all accepted special case adjustments.*

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8. Additional Planning Target Factors: Conowingo Dam Infill and Changing Environmental Conditions

Two factors presented the partnership with novel challenges not encountered in the 2010 Bay TMDL: the accelerating infill of Conowingo Dam's reservoir and changing environmental conditions affecting Bay hydrology and water quality. Both factors were debated, and decisions on how to address each had direct implications for the stringency of planning targets and the distribution of load reduction obligations.

8.1 Conowingo Dam Infill

WQGIT Face-to-Face – October 24–25, 2016

WQGIT agreed on the Modeling Workgroup's approach to simulating Conowingo Dam infill in Phase 6: trapping set to "on" pre-2000 and "off" post-2000 to reflect the transition to a near-full reservoir.

WQGIT Face-to-Face – September 25–26, 2017

WQGIT recommended that Conowingo loads be addressed separately as a local planning goal rather than being included in the Phase III planning targets; if the PSC did not approve this approach, WQGIT recommended the "Susquehanna + Most Effective Basins" scenario.

PSC 2-Day Retreat – December 19–20, 2017

Decision: *PSC decided to develop a Partnership implementation plan to* ***address Conowingo infill by 2025****, with Conowingo loads addressed as a local planning goal outside the Phase III WIP planning targets.*

8.2 Changing Environmental Conditions

WQGIT Face-to-Face – October 24–25, 2016

WQGIT adopted the Climate Resiliency Workgroup's proposed range of options for factoring changing environmental conditions into the Midpoint Assessment, deferring final decisions to spring 2017.

Climate Resiliency Workgroup – December 19, 2016

The Climate Resiliency Workgroup released a briefing document presenting seven distinct options for addressing changing environmental conditions in Phase III WIPs.

WQGIT Face-to-Face – September 25–26, 2017

WQGIT did not reach consensus on a changing environmental conditions recommendation; revised policy language for both numeric and programmatic options was forwarded to the PSC for decision.

PSC 2-Day Retreat – December 19–20, 2017

***Decision:** PSC adopted a **dual approach to factor changing environmental conditions** into Phase III WIPs: implicitly through changes in assimilative capacity, and explicitly through jurisdictions' levels of effort.*

Key Source Documents

The decisions documented in this report were drawn from the following primary source documents:

- WQGIT October 24–25, 2016 Summary of Actions & Decisions
- WQGIT September 25–26, 2017 Summary of Actions & Decisions
- PSC December 19–20, 2017 Summary of Actions & Decisions
- PSC December 19, 2017 Briefing Presentation (multiple versions)
- PSC March 2, 2018 Adjustments to Bay Assimilative Capacity Presentation
- Partnership Review of Draft Phase III WIP Planning Targets (versions: 9/19/17, 10/11/17, 11/7/17, 12/12/17)
- Phase 6 Approval Process Documentation (versions: 4/1/17, 4/6/17, 5/2/17, 5/9/17, 6/1/17)
- Changing Environmental Conditions Options for Phase III WIPs – CRWG Briefing Document (12/13/16)
- Draft Issue Paper: Establishing Phase III WIPs on a Future 2025 Land Use
- No-Action and E3 Scenario Descriptions (8/10/09)
- Updated Critical Period Assessment (9/21/09)
- Geographic Isolation Runs (Shenk & Tian, 11/28/17)
- WQGIT Planning Targets Year and Point Sources (11/14/16)
- Phase 6 E3 Model Scenario (Sweeney & Shenk, 8/14/17)
- Wastewater Treatment Workgroup Meeting Summary (12/20/16)
- Wastewater Treatment Workgroup Meeting Summary (2/21/17)
- PSC-Approved Midpoint Assessment Schedule (2/8/18)

- EPA Phase III WIP Expectations Document
- WQGIT Changing Environmental Conditions Decision Narrative (2020)