

Comment Response Document for Knight Run and Nickel Mines Run ARPs

Knight Run ARP Review by PA DEP Chesapeake Bay Restoration Division, 1/13/2026

Comment 1: This restoration plan is a positive step toward restoring the water quality and habitat of Knight Run and downstream waterbodies. However, this ARP development approach described within the plan deviates from DEP protocols. The concerns associated with this as well as potential solutions will be discussed below.

Response 1: The positive and constructive feedback is appreciated. This comment does not identify the specific Pennsylvania Department of Environmental Protection (PADEP) protocols being referenced. Based on other comments, the U.S. Environmental Protection Agency (EPA) assumes the commenter may be concerned that the advance restoration plan (ARP) relied on a modeling tool other than Model My Watershed (MMW) and interpreted DEP's narrative water quality standards into numeric targets by means other than a reference watershed approach. The EPA is aware of PADEP's Continuing Planning Process (CPP) for Water Quality Management (December 1999) which describes the process for developing total maximum daily loads (TMDLs). This document states, "When PA has no instream criteria for the pollutants of concern in a TMDL, a reference watershed is used to set allowable loading rates in the affected watersheds. The reference watershed approach is used to estimate the necessary loading reduction of pollutants such as phosphorus and sediment that would be needed to restore a healthy aquatic community and allow the streams in the watershed to achieve their designated uses. The reference watershed approach is based on selecting a non-impaired watershed with similar land use characteristics and determining the current loading rates for the pollutants of interest. This is done by modeling the loads that enter the stream, using precipitation and land use characteristic data. For this analysis the AVGWLF model (the Environmental Resources Research Institute of the Pennsylvania State University's ArcView based version of the Generalized Watershed Loading Function model developed by Cornell University) is used. This modeling process uses loading rates in the non-impaired watershed as a target for loading reductions in the impaired watershed. The impaired watershed is modeled to determine the current loading rates and determine what reductions are necessary to meet the loading rates of the nonimpaired watershed." Model My Watershed is the updated version of the original AVGWLF referenced in the 1999 CPP. The EPA is not aware of any other document that discusses the protocols for TMDLs or ARPs.

Although MMW is commonly used for ARPs since PADEP began developing them in 2017, the 1999 CPP document does not specifically set protocols for ARPs. These pilot ARPs are follow-up to an earlier contract for which EPA developed a Hydrologic Simulation Program—FORTRAN (HSPF) for the Octoraro Creek Watershed. Both GWLF and HSPF are models referenced in EPA guidance for use in developing sediment and nutrient TMDLs.¹ Model My Watershed is typically used by PADEP in small

¹ EPA guidance documents include *Protocol for Developing Sediment TMDLs* (October 1999) and *Protocol for Developing Nutrient TMDLs* (November 1999) found on EPA's website at <https://www.epa.gov/tmdl/tmdl-support-documents>.

watersheds. The Octoraro Creek Watershed is 209 mi² with a reservoir making the hydrology more complex. HSPF is a more complex water quality model. The Scenario Application Manager (SAM) decision-support tool can be used to run the HSPF at a subwatershed scale or for the whole watershed. The EPA worked in close partnership with PADEP's TMDL Development Section and the Octoraro Source Water Collaborative on the development of the HSPF model and selection of numeric targets over the course of several years with the specific intent of using the water quality model to develop this ARP. The ARP provides background on the modeling approach in Section 2. The HSPF model tracks hydrology and water quality parameters on a sub-daily basis which allows the evaluation of the numeric thresholds set in Pennsylvania's current eutrophication cause methodology. This is the first model in Pennsylvania to utilize these thresholds for ARP development. MMW does not have this capability to evaluate water quality parameters sub-daily for dissolved oxygen. This approach also evaluated TN to protect the potable water supply designated use which does have a numeric criterion (although a lower numeric target was selected based on site-specific concerns). More discussion on the numeric targets used to develop the ARPs can be found in Section 5. The EPA believes that there was flexibility in how these ARPs were developed because there of the collaboration with PADEP, reliance on a scientifically defensible water quality model, and took into account PADEP's current science on nutrients that was not available in 1999 when the protocols were established. Ultimately, PADEP has the authority to determine if these ARPs are appropriate for use in their state Water Quality Management programs.

Comment 2: Introduce a short subsection in Section 1 (Introduction) titled "*Definition and Limitations of Rapid Restoration*" that explicitly distinguishes: Rapid planning and mobilization VS long-term ecological recovery and delisting timelines.

This additional detail can help align expectations with ecological reality, while reducing risk that stakeholders interpret the ARP as overpromising outcomes within a 10–15 year window. It will also provide a defensible rationale if interim monitoring does not show immediate biological response.

Consider replacing unqualified uses of "*rapid restoration*" with phrasing such as:

- "accelerated implementation"
- "front-loaded restoration investment"
- "near-term actions with long-term recovery trajectories"

Response 2: There was no intent on our part to give the impression that restoration was anticipated to be rapid, which is subjective terminology. Edits were made in Section 1 (Introduction) to clarify that it is the implementation schedule is for 10 years and ecological recovery may take longer. While land management actions will be accelerated in the near term, this window accounts for implementation delays and lag-time for best management plan (BMP) practices reduction efficiencies to reach anticipated levels of reductions and the stream to respond to the reduced loadings. The goal of the plan is to remove or "delist" the siltation cause of impairment in Knight Run with nutrient reductions to improve downstream water quality. Full restoration of the aquatic life use may take longer than 10-15 years projected given the habitat alterations and cause unknown listings may still remain and impact the biological community. Monitoring will track embeddedness and sediment deposition scores to determine if BMPs implementation is achieving the desired effect. In addition, the document was searched for use of the term "rapid" to make clarifying edits when unqualified and ensure the Rapid

Stream Delisting Strategy or (the “RSD Strategy”) was consistent so that “rapid” is only referenced in the official name used by the Chesapeake Conservancy.

Comment 3: Figure 2 Land Cover, indicates 70% agriculture and only 17% forest making this watershed not ideal for rapid restoration as it will be a heavy lift requiring substantial effort to the point of extending the timeline beyond what would be considered “rapid”. The goal is to find readily restorable watersheds with minimal issues to resolve in a reasonable amount of time. Other less impaired watersheds within the Octoraro Creek watershed lend themselves better to the rapid delisting approach.

An analysis of anthropogenic change in relation to natural areas as well as an analysis of IBI and habitat scores should have been done on all watersheds to determine the most appropriate ones to begin rapid delisting work on. Starting with a higher level of natural areas and high IBI and habitat scores will result in more rapid restoration than starting with highly anthropogenic and highly impaired watersheds.

Considering that the success of this ARP hinges on the participation of landowners and local partners, it would be good to have preliminary discussion, maps, and/or tables of parcels, aggregated landownership data, and inventory of ongoing restoration projects/efforts in the watershed. The milestone schedule, education section, and appendices address assessment of parcels and stakeholder engagement as part of implementation of the plan; however, considering the importance of landowner willingness for implementation, some initial data sources should be compiled or summarized as part of the ARP. This also reduces risk that modeled BMP acreage targets are infeasible due to ownership patterns or unwilling landowners. For a preliminary implementation feasibility summary early in the document (end of Section 4), it could include:

- Parcel count by land use
- Approximate % of watershed under single vs. multiple ownership
- Known conserved lands or easements
- Ongoing or recently completed BMP projects

Data sources to reference

- County parcel data
- Conservation District project records
- CREP/REAP enrollment summaries
- Existing WIP or MS4-funded projects

Response 3: EPA interprets this comment as a critique of the selection process of Knight Run because it does not utilize same selection criteria used in the RSD Strategy for larger areas such as Central Pennsylvania or Lancaster County. To be clear, Knight Run is not one of the streams targeted by the Chesapeake Conservancy or the Lancaster Clean Water Partners. There are seven catchments in the Lancaster County portion of the Octoraro Creek Watershed that are part of these other efforts. To reiterate, the ARP builds on the RSD Strategy by incorporating key aspects such as involvement of partners focused on common goals, the structure of how partners coordinate their efforts so that they do not duplicate efforts, working at the farm level, keeping the focus on one catchment at a time to build momentum and keep momentum going as partners progress downstream catchment by catchment, and tracking implementation consistently.

Appendix D was added to include background on the engagement efforts and discussions with the Octoraro Source Water Collaborative (OSWC) local partners to select one subwatershed in both Chester and Lancaster Counties to develop ARPs. The OSWC was formed in 2016. The OSWC is focused on improving the water quality of the Octoraro Reservoir. There is a total of 37 subwatersheds that ultimately drain to the Octoraro Reservoir that were considered for ARP development. Many factors were considered including IBI and habitat scores, maps of the modeled pollutant loads, and location of point sources. There are limitations to what information may be shared outside of agencies. The EPA incorporated subjective ways for local partners (including Chester and Lancaster County Conservation Districts) to share their knowledge of current level of best management practice implementation rather than providing specific data at such small scales.

Knight Run is within the Muddy Run-East Branch Octoraro Creek (020503061403). According to the Grants Reporting and Tracking System (GRTS), the Lancaster County Conservation District received \$428,344 (2001) and \$198,000 (2003) of Clean Water Act Section 319(h) funding for BMP implementation within the East and West Branches of Octoraro Creek which includes Muddy Run-East Branch Octoraro Creek (020503061403). More refined information for Knight Run has not been made available to the EPA for inclusion in this document.

Comment 4: Page 22 Sediment Export to Downstream Waters – Knight Run contributes the most sediment of the watersheds making it not ideal for rapid delisting.

Response 4: A restoration plan for 10-15 years seems reasonable for a watershed of this size (9.1 mi² with 17.1 miles of impaired streams). Lancaster Clean Water Partners (LCWP) estimates 10-12 years for delisting for smaller catchment areas.² However, LCWP also has 57 catchments that they are actively working in. This ARP is focused on approximately 4 adjacent catchments. The area covered by the ARP is comparable to other DEP-developed ARPs which include a 12-year timeframe with the first 9 years focused on the implementation phase and the 3 years of lag time. The 15 years also accounts for the implementation delays that may occur as the OSWC partners balance their work in other parts of the Octoraro Creek Watershed, including the seven catchments selected for the RSD Strategy and the ARP for Nickel Mines Run. The size of this ARP is smaller than many watershed-based plans thus concentrating efforts for maximum impact in a small subwatershed.

Comment 5: This ARP is using a different method and model than DEP to develop load reductions for nonpoint sources of pollution. DEP's reference watershed approach was not used. Because of this deviation, there are concerns that this new method will not adequately define accurate pollution reduction endpoints. This new method is also using a model that DEP does not use to develop TMDLs/ARPs or to track BMP implementation so a direct comparison to the modeling cannot be made while attempting to numerically demonstrate attainment of numeric load reduction goals resulting from BMP implementation. This will cause a gap in future modeling and make progress tracking challenging. Who will conduct future modeling of this watershed?

Response 5: The SAM Tool is a companion tool to the HSPF model that can run various scenarios to calculate reductions to achieve water quality targets for planning purposes. However, it can also be used to calculate reductions based on other scenarios such as an "as-built" scenario that includes the current level of BMPs for tracking reductions achieved. The SAM Tool has an easy user interface and training materials that can be used by a non-modeler to run scenarios using the calibrated HSPF model

² <https://www.chesapeake.org/stac/wp-content/uploads/2024/09/Dean-Delisting-summary-9.10.24.pdf>

for planning and reporting purposes. The EPA will provide technical support to the OSWC partners for use of the SAM Tool.

Comment 6: Recommend consulting with DEP and employing additional model results in order to build out a table with comparisons of the results of different models.

Response 6: Mike Morris with PADEP’s TMDL Section recommended Marsh Creek in Chester County as a reference watershed for Knight Run. The EPA also ran MMW for Knight Run and the reference watershed. See model comparisons in Tables 1-3.

Table 1: Comparison of modeled sediment loads in Knight Run.

Source	MMW Sediment Load (tons/yr)	Percent of Total Load	HSPF Sediment Load (tons/yr)	Percent of Total Load
Hay/Pasture	72	1.91%	496	37.78%
Cropland	3,498	93.19%	587	44.71%
Forest and Shrub/Scrub	1	0.03%	7	0.53%
Wetland	0.1	0.00%	0.2	0.02%
Herbaceous/Grassland	0.0	0.00%	70	5.33%
Low Intensity Mixed Development	2.8	0.07%	143	10.89%
Medium Intensity Mixed Development	1.6	0.04%		
High Intensity Mixed Development	0.4	0.01%		
Bare Rock	0	0.00%	0	0.00%
Stream Bank Erosion	178	4.74%	11	0.84%
Point Sources	0.1	0.00%	0.1	0.01%

Table 2: Comparison of modeled total phosphorus loads in Knight Run.

Source	MMW Phosphorus Load (lbs/yr)	Percent of Total Load	HSPF Phosphorus Load (lbs/yr)	Percent of Total Load
Hay/Pasture	237	2.24%	3,733	40.41%
Cropland	7,942	75.07%	4,820	52.18%
Forest and Shrub/Scrub	4	0.03%	30	0.32%
Wetland	1	0.01%	4	0.04%
Herbaceous/Grassland	0	0.00%	55	0.60%
Low Intensity Mixed Development	15	0.14%	400	4.33%
Medium Intensity Mixed Development	6	0.06%		
High Intensity Mixed Development	2	0.01%		
Bare Rock	0	0.00%	0	0.00%
Stream Bank Erosion	93	0.88%	0.1	0.00%
Farm Animals	1,312	12.40%	0	0.00%
Subsurface Flow	937	8.85%	0	0.00%
Septic Systems	0	0.00%	163	1.76%
Point Sources	32	0.30%	32	0.35%

Table 3: Modeled reduction targets for sediment and total phosphorus in Knight Run.

Model	Baseline Sediment Load (tons/yr)	Target Sediment Load (tons/yr)	Sediment Reduction (%)	Baseline Phosphorus Load (lbs/yr)	Target Phosphorus Load (lbs/yr)	Phosphorus Reduction (%)
HSPF	1313	546	58%	9,238	5,543	40%
MMW	3754	1,058	72%	10,579	5,398	49%

In order for all water quality targets to be achieved, the final scenario may aim to achieve higher reductions for a particular pollutant. In Knight Run, sediment is the driver for reductions thus the expected phosphorus reduction in the ARP is 62% rather than 40% shown in Table 3 which exceeds the MMW reduction target.

MMW uses the National Land Cover Database (NLCD) 2019 which uses 30-meter resolution. The HSPF model used the Chesapeake Bay Land Use/Land Cover (LULC) Database 1-m high-resolution land cover layer from the Chesapeake Conservancy representing 2017 and 2018. MMW did not identify any point sources; whereas development of the HSPF model included data from facility discharge monitoring points. Manure from animal livestock was considered in developing the loads from agricultural lands. There are many differences but that is to be expected. More information about the HSPF model in RESPEC’s Water Quality Modeling to Support Source Water and Aquatic Life Protection, Octoraro Creek, Pennsylvania and Maryland Final Modeling Report.

Comment 7: Adding a comparative screening table summarizing why Knight Run was selected over other Octoraro subwatersheds could help demonstrate that selection was intentional and transparent, potentially with the following attributes:

- % natural land cover
- % agriculture
- Existing IBI scores
- Habitat scores (embeddedness + sediment deposition)
- Modeled sediment export rank

Consider adding a short paragraph acknowledging that Knight Run represents a “high-effort/ high-impact” watershed, rather than the least constrained opportunity.

Response 7: Appendix D was added to address the factors considered in the selection process and the level of engagement with the diverse partners that make up the OSWC.

Comment 8: The modeled sediment load for streambanks is significantly lower than the modeled load from Model My Watershed (MMW), which is the model used by DEP for local TMDL/ARP development as well as tracking numeric load reductions from BMP implementation. The ARP states Streambanks are responsible for only 0.8% of the sediment load in Knights Run while MMW has streambanks loading at 5% of the sediment load for the watershed. This is of significant

concern as there are known legacy sediments within this watershed that are not being accounted for. Thus, pollutant loading is inaccurate making the suite of BMPs to reduce pollution inaccurate as well. This is made evident in Table 8, page 40, as streambanks are not listed as a priority source for targeted reductions.

A field investigation of legacy milldams and legacy sediments should be conducted to identify targeted areas for Legacy Sediment/Floodplain Restoration BMP implementation. Here is a link to a map with known mill dams: [BWEW PA Historic and Breached Dams | PA GeoData](#)

It is important to note that this map captures only a fraction of the suspected mill dams that were historically in place in PA, meaning that if a dam is not on the map in an area with other known dams, there is a high likelihood that historic dams were present but not documented.

Of significant concern to BMP implementation and based on experience, existing legacy sediments must be treated and floodplains restored prior to implementing BMPs in those areas. If this is not done, streambanks will continue to rapidly erode while newly established riparian buffers erode with them resulting in time and money wasted as that new BMP washes downstream as a part of unmitigated erosion. The same can be said for livestock exclusion fencing. It is highly concerning that legacy sediments were not evaluated, and that streambanks and floodplains are not priorities for treatment in an area known to be significantly impacted by legacy sediments. This will negatively impact BMP installation and viability while potentially wasting taxpayer money.

Suggest adding a dedicated subsection addressing the uncertainty and potential underestimation of streambank and legacy sediment sources. You could acknowledge discrepancies between the Octoraro Watershed Model outputs and MMW streambank loading estimates and/or include a side-by-side comparison table showing % sediment attributed to streambanks under each model, along with implications for BMP prioritization.

Response 8: Both models agree that upland agricultural sources are the highest loads. HSPF actually attributes more sediment loading to development than streambank erosion. Impervious surfaces increase stormwater flow which can cause increased bank erosion due to sheer stress on the streambanks. Streambank erosion can be reduced by a variety of BMPs. The commenter makes a valid point that legacy sediment/floodplain restoration BMPs should be considered. However, there are no known mill dams on Knight Run based on the resource provided in the comment. As more information is gathered during field visits with landowners, opportunities may come to light and should be considered. Selection of BMPs in the ARP were optimized to achieve the needed reductions in the most cost-effective manner for agricultural sources. Addressing upland sediment loads will not be a waste of public and/or private investment. These BMPs aim to first reduce and/or treat pollutants before entering the stream. Any in-stream practice could potentially fail if the upland loads are not controlled first. Once upland sources are addressed, stream restoration should be considered. As the ARP is implemented, adjustments may be needed to reflect landowner decisions for which BMPs are actually selected and the site-specific conditions that could not be accurately reflected based on available data. The ARP can be updated during the implementation period if planned BMPs are different from actual BMPs and take into account new scenarios using the SAM Tool to evaluate other BMPs. Based on this comment, the ARP was updated to reflect that other BMPs beyond the scope of the planned BMPs that can be considered.

Comment 9: Suggest explicitly integrating IBI and habitat scores into Calculation of Allowable Loading Rates (and Section 8.6 Effectiveness Monitoring), as well as defining interim biological

benchmarks, such as incremental IBI improvements (e.g., 34 → 40 → 45 → 50) and reductions in embeddedness and sediment deposition scores. Please clarify how these biological indicators will be used alongside modeled load reductions to justify delisting. Additionally, a simple decision tree or flow chart in Section 8 might help to show what happens if BMP implementation targets are met but biology does not respond or how monitoring results trigger reassessment of sources or BMP selection.

Response 9: PADEP's Assessment Section has not established linkages between incremental IBI improvements associated with incremental improvements in embeddedness and sediment deposition scores. The goal is a "cause removal" whereby siltation is removed or delisted from Pennsylvania's 303(d) list. Embeddedness and sediment deposition scores will be monitored for incremental improvement and will also help document seasonal/annual variability. Because there are multiple stressors (habitat alterations and unknown) IBI scores may not be sufficient alone to evaluate process if one stressor is more dominant than another. For example, embeddedness and sediment deposition scores above 24 will be sufficient to delist the siltation impairment. It is the embeddedness and sediment deposition score that should be the basis for interim decision making. However, once the implementation team has completed outreach to the landowners in the catchment area and conducted site visits to evaluate the resource concerns, the implementation should reassess the BMP selection. This reassessment has been incorporated into the ARP.

Comment 10: Page 43. Please include Legacy Sediment BMP/Floodplain Restoration as a priority BMP for the reduction of sediment, nitrogen and phosphorus as well as the restoration of critical habitat and green infrastructure that increases the assimilative capacity of the watershed to mitigate storm surge and flooding. An added benefit of Legacy Sediment BMP/Floodplain Restoration is the restoration of wetlands in these areas that serve to reduce nitrogen through anaerobic microbial digestion resulting in nitrogen being released to the atmosphere.

Please include Animal Waste Management Systems into the suite of BMPs as those are highly effective at reducing nutrients associated with livestock.

Response 10: Selection of BMPs in the ARP were optimized to achieve the needed reductions in the most cost-effective manner for agricultural sources and did include wetland restoration as a priority BMP in addition to the BMPs to address upland sources. As the ARP is implemented, adjustments may be needed to reflect landowner decisions for which BMPs are actually selected. The implementation team will need to take into account new information collected during on-site visits with landowners to meet the site-specific resource concerns. The ARP in no way limits the breadth of BMPs that could be considered. To support this flexibility, other BMPs identified in this comment were added to the ARP for consideration during implementation. The ARP can be updated if planned BMPs versus actual BMPs are different.

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Comment 11: This restoration plan is a positive step toward restoring the water quality and habitat of Nickel Mines Run and downstream waterbodies. However, this ARP development approach described within the plan deviates from DEP protocols. The concerns associated with this as well as potential solutions will be discussed below.

Response 11: See Response 1.

Comment 12: Introduce a short subsection in Section 1 (Introduction) titled “*Definition and Limitations of Rapid Restoration*” that explicitly distinguishes: Rapid planning and mobilization VS long-term ecological recovery and delisting timelines.

This additional detail can help align expectations with ecological reality, while reducing risk that stakeholders interpret the ARP as overpromising outcomes within a 10–15 year window. It will also provide a defensible rationale if interim monitoring does not show immediate biological response.

Consider replacing unqualified uses of “*rapid restoration*” with phrasing such as:

- “accelerated implementation”
- “front-loaded restoration investment”
- “near-term actions with long-term recovery trajectories”

Response 12: See Response 2

Comment 13: Land Cover is highly anthropogenic making this watershed not ideal for rapid restoration as it will be a heavy lift requiring substantial effort to the point of extending the timeline beyond what would be considered “rapid”. The goal is to find readily restorable watersheds with minimal issues to resolve in a reasonable amount of time. Other less impaired watersheds within the Octoraro Creek watershed lend themselves better to the rapid delisting approach.

An analysis of anthropogenic change in relation to natural areas as well as an analysis of IBI and habitat scores should have been done on all of the watersheds to determine the most appropriate ones to begin rapid delisting work on. Starting with a higher level of natural areas and high IBI and habitat scores will result in more rapid restoration than starting with highly anthropogenic and highly impaired watersheds.

Considering that the success of this ARP hinges on the participation of landowners and local partners, it would be good to have preliminary discussion, maps, and/or tables of parcels, aggregated landownership data, and inventory of ongoing restoration projects/efforts in the watershed. The milestone schedule, education section, and appendices address assessment of parcels and stakeholder engagement as part of implementation of the plan; however, considering the importance of landowner willingness for implementation, some initial data sources should be compiled or summarized as part of the ARP. This also reduces risk that modeled BMP acreage targets are infeasible due to ownership patterns or unwilling landowners. For a preliminary implementation feasibility summary early in the document (end of Section 4), it

could include:

- Parcel count by land use
- Approximate % of watershed under single vs. multiple ownership
- Known conserved lands or easements
- Ongoing or recently completed BMP projects Data

sources to reference

- County parcel data
- Conservation District project records
- CREP/REAP enrollment summaries
- Existing WIP or MS4-funded projects

Response 13: EPA interprets this comment as a critique of the selection process of Nickel Mines Run because it does not utilize same selection criteria used in the RSD Strategy for larger areas such as Central Pennsylvania or Lancaster County. Nickel Mines Run includes a catchment already targeted by the Chesapeake Conservancy or the Lancaster Clean Water Partners. There are seven catchments in the Lancaster County portion of the Octoraro Creek Watershed that are part of these other efforts, the headwater portion of Nickel Mines Run being one of them. Restoration efforts are already underway. To reiterate, the ARP builds on the RSD Strategy by incorporating key aspects such as involvement of partners focused on common goals, the structure of how partners coordinate their efforts so that they do not duplicate efforts, working at the farm level, keeping the focus on one catchment at a time to build momentum and keep momentum going as partners progress downstream catchment by catchment, and tracking implementation consistently.

Appendix D was added to include background on the engagement efforts and discussions with the Octoraro Source Water Collaborative (OSWC) local partners to select one subwatershed in both Chester and Lancaster Counties to develop ARPs. The OSWC was formed in 2016. The OSWC is focused on improving the water quality of the Octoraro Reservoir. There is a total of 37 subwatersheds that ultimately drain to the Octoraro Reservoir that were considered for ARP development. Many factors were considered including IBI and habitat scores, maps of the modeled pollutant loads, and location of point sources. There are limitations to what information may be shared outside of agencies. The EPA incorporated subjective ways for local partners (including Chester and Lancaster County Conservation Districts) to share their knowledge of current level of best management practice implementation rather than providing specific data at such small scales.

Nickel Mines Run is within the West Branch Octoraro Creek (020503061501). According to the Grants Reporting and Tracking System (GRTS), the Lancaster County Conservation District received \$428,344 (2001) and \$198,000 (2003) of Clean Water Act Section 319(h) funding for BMP implementation within the East and West Branches of Octoraro Creek which includes West Branch Octoraro Creek (020503061501). More refined information for Nickel Mines Run has not been made available to the EPA for inclusion in this document.

Comment 14: This ARP is using a different method and model than DEP to develop load reductions for nonpoint sources of pollution. DEP's reference watershed approach was not used. Because of this deviation, there are concerns that this new method will not adequately define accurate pollution reduction endpoints. This new method is also using a model that DEP does not use to develop TMDLs/ARPs or to track BMP implementation so a direct comparison to the

modeling cannot be made while attempting to numerically demonstrate attainment of numeric load reduction goals resulting from BMP implementation. This will cause a gap in future modeling and make progress tracking challenging. Who will conduct future modeling of this watershed?

Response 14: See Response 5.

Comment 15: Recommend consulting with DEP and employing additional model results in order to build out a table with comparisons of the results of different models.

Response 15: Mike Morris with PADEP’s TMDL Section recommended Marsh Creek in Chester County as a reference watershed for Knight Run. The EPA also ran MMW for Knight Run and the reference watershed. See model comparisons in Tables 4-6.

Table 4: Comparison of modeled sediment loads in Nickel Mines Run.

Source	MMW Sediment Load (tons/yr)	Percent of Total Load	HSPF Sediment Load (tons/yr)	Percent of Total Load
Hay/Pasture	51	2.61%	161	31.08%
Cropland	1,812	93.47%	227	43.82%
Forest and Shrub/Scrub	0	0.01%	1	0.19%
Wetland	0.0	0.00%	0.04	0.01%
Herbaceous/Grassland	0.0	0.00%	8	1.54%
Low Intensity Mixed Development	1.9	0.10%	112	21.62%
Medium Intensity Mixed Development	2.2	0.11%		
High Intensity Mixed Development	0.3	0.02%		
Bare Rock	0	0.00%	0	0.00%
Stream Bank Erosion	71	3.68%	10	1.93%
Point Sources	0.0	0.00%	0	0.00%

Table 5: Comparison of modeled total phosphorus loads in Nickel Mines Run.

Source	MMW Phosphorus Load (lbs/yr)	Percent of Total Load	HSPF Phosphorus Load (lbs/yr)	Percent of Total Load
Hay/Pasture	237	2.58%	2,950	48.99%
Cropland	4,057	44.27%	2,397	39.80%
Forest and Shrub/Scrub	1	0.01%	5	0.08%
Wetland	0	0.00%	1	0.02%
Herbaceous/Grassland	0	0.00%	7	0.12%
Low Intensity Mixed Development	10	0.11%	458	7.61%
Medium Intensity Mixed Development	8	0.09%		
High Intensity Mixed Development	1	0.01%		
Bare Rock	0	0.00%		0.00%
Stream Bank Erosion	35	0.38%	0.1	0.00%
Farm Animals	3,924	42.82%		0.00%
Subsurface Flow	889	9.70%		0.00%
Septic Systems	0	0.00%	205	3.40%
Point Sources	0	0.00%		0.00%

Table 6: Modeled reduction targets for sediment and total phosphorus in Nickel Mines Run.

Model	Baseline Sediment Load (tons/yr)	Target Sediment Load (tons/yr)	Sediment Reduction (%)	Baseline Phosphorus Load (lbs/yr)	Target Phosphorus Load (lbs/yr)	Phosphorus Reduction (%)
HSPF	518	311	40%	6,022	2,891	52%
MMW	1939	890	54%	9,164	2,955	68%

In order for all water quality targets to be achieved, the final scenario may aim to achieve higher reductions for a particular pollutant. In Nickel Mines Run, total phosphorus is the driver for reductions thus the expected sediment reduction in the ARP is 47% rather than 40% shown in Table 6 with is relatively close to the sediment reductions based on the MMW model. The final scenario also expects as 54% reduction based on the final BMP selection.

MMW uses the National Land Cover Database (NLCD) 2019 which uses 30-meter resolution. The HSPF model used the Chesapeake Bay Land Use/Land Cover (LULC) Database 1-m high-resolution land cover layer from the Chesapeake Conservancy representing 2017 and 2018. MMW did not identify any point sources; whereas development of the HSPF model included data from facility discharge monitoring points. Manure from animal livestock was considered in developing the loads from agricultural lands. There are many differences but that is to be expected. More information about the HSPF model in RESPEC's Water Quality Modeling to Support Source Water and Aquatic Life Protection, Octoraro Creek, Pennsylvania and Maryland Final Modeling Report.

Comment 16: Adding a comparative screening table summarizing why Nickel Mines Run was selected over other Octoraro subwatersheds could help demonstrate that selection was intentional and transparent, potentially with the following attributes:

- % natural land cover
- % agriculture
- Existing IBI scores
- Habitat scores (embeddedness + sediment deposition)
- Modeled sediment export rank

Consider adding a short paragraph acknowledging that Nickel Mines Run represents a “high-effort / high-impact” watershed, rather than the least constrained opportunity.

Response 16: See Response 7.

Comment 17: The modeled sediment load for streambanks is significantly lower than the modeled load from Model My Watershed (MMW), which is the model used by DEP for local TMDL/ARP development as well as tracking numeric load reductions from BMP implementation. The ARP states Streambanks are responsible for only 2% of the sediment load in Nickel Mine Run while MMW has streambanks loading at 4% of the sediment load for the watershed. This is of significant concern as there are known legacy sediments within this watershed that are not being accounted for. Thus, pollutant loading is inaccurate making the suite of BMPs to reduce pollution inaccurate as well. Streambanks are not listed as a priority source for targeted reductions. A field investigation of legacy milldams and legacy sediments should be conducted to identify targeted areas for Legacy Sediment/Floodplain Restoration BMP implementation. Here is a link to a map with known mill dams: [BWEW PA Historic and Breached Dams | PA GeoData](#). One legacy milldam is identified on the map within the Nickel Mines Run watershed, but it is important to note that this map captures only a fraction of the suspected mill dams that were historically in place in PA, meaning that if a dam is not on the map in an area with other known dams, there is a high likelihood that historic dams were present but not documented.

Of significant concern to BMP implementation and based on experience, existing legacy sediments must be treated and floodplains restored prior to implementing BMPs in those areas. If this is not done, streambanks will continue to rapidly erode while newly established riparian buffers erode with them resulting in time and money wasted as that new BMP washes downstream as a part of unmitigated erosion. The same can be said for livestock exclusion fencing. It is highly concerning that legacy sediments were not evaluated, and that streambanks and floodplains are not priorities for treatment in an area known to be significantly impacted by legacy sediments. This will negatively impact BMP installation and viability while potentially wasting taxpayer money. Suggest adding a dedicated subsection addressing the uncertainty and potential underestimation of streambank and legacy sediment sources. You could acknowledge discrepancies between the Octoraro Watershed Model outputs and MMW streambank loading estimates and/or include a side-by-side comparison table showing % sediment attributed to streambanks under each model, along with implications for BMP prioritization.

Response 17: Both models agree that upland agricultural sources are the highest loads. HSPF actually attributes more sediment loading to development than streambank erosion. Impervious surfaces increase stormwater flow which can cause increased bank erosion due to sheer stress on the streambanks. Streambank erosion can be reduced by a variety of BMPs. The commenter makes a valid point that legacy sediment/floodplain restoration BMPs should be considered. As more information is gathered during field visits with landowners, opportunities may come to light and should be considered. Selection of BMPs in the ARP were optimized to achieve the needed reductions in the most cost-effective manner for agricultural sources. Addressing upland sediment loads will not be a waste of public and/or private investment. These BMPs aim to first reduce and/or treat pollutants before entering the stream. Any in-stream practice could potentially fail if the upland loads are not controlled first. Once upland sources are addressed, stream restoration should be considered. As the ARP is implemented, adjustments may be needed to reflect landowner decisions for which BMPs are actually selected and the site-specific conditions that could not be accurately reflected based on available data. The ARP can be updated during the implementation period if planned BMPs are different from actual BMPs and take into account new scenarios using the SAM Tool to evaluate other BMPs. Based on this comment, the ARP was updated to reflect that other BMPs beyond the scope of the planned BMPs that can be considered.

Comment 18: Suggest explicitly integrating IBI and habitat scores into Calculation of Allowable Loading Rates (and Section 8.6 Effectiveness Monitoring), as well as defining interim biological benchmarks, such as incremental IBI improvements (e.g., 34 → 40 → 45 → 50) and reductions in embeddedness and sediment deposition scores. Please clarify how these biological indicators will be used alongside modeled load reductions to justify delisting. Additionally, a simple decision tree or flow chart in Section 8 might help to show what happens if BMP implementation targets are met but biology does not respond or how monitoring results trigger reassessment of sources or BMP selection.

Response 18: PADEP's Assessment Section has not established linkages between incremental IBI improvements associated with incremental improvements in embeddedness and sediment deposition scores. The goal is a "cause removal" whereby siltation and nutrients are removed or delisted from Pennsylvania's 303(d) list. Embeddedness and sediment deposition scores will be monitored for incremental improvement and will also help document seasonal/annual variability. Because there are multiple stressors (sediment and nutrients) IBI scores may not be sufficient alone to evaluate process if one stressor is more dominant than another. For example, embeddedness and sediment deposition scores above 24 will be sufficient to delist the siltation impairment. Total phosphorus will be monitored to determine if improvements are occurring over time. The modeled load reductions are based on the thresholds in PADEP's Eutrophication Cause Method. The implementation team may consider TP concentrations as a surrogate metric, but ultimately the waterbody would need to meet the benchmarks established in Eutrophication Cause Method to support a cause removal. EPA's recommended ambient water quality standard for the part of Pennsylvania is 0.04 mg/L. This may provide a guidepost for determining if TP concentrations are approaching conditions that warrant a reassessment. It is the embeddedness and sediment deposition scores and total phosphorus concentration levels that should be the basis for interim decision making. However, once the implementation team has completed outreach to the landowners in the catchment area and conducted site visits to evaluate the resource concerns, the implementation should reassess the BMP selection. This reassessment

has been incorporated into the ARP.

Comment 19: Please include Legacy Sediment BMP/Floodplain Restoration as a priority BMP for the reduction of sediment, nitrogen and phosphorus as well as the restoration of critical habitat and green infrastructure that increases the assimilative capacity of the watershed to mitigate storm surge and flooding. An added benefit of Legacy Sediment BMP/Floodplain Restoration is the restoration of wetlands in these areas that serve to reduce nitrogen through anaerobic microbial digestion resulting in nitrogen being released to the atmosphere. Please include Animal Waste Management Systems into the suite of BMPs as those are highly effective at reducing nutrients associated with livestock.

Response 19: See Response 10.

Draft ARP Review by Alexandra Neumann, Alliance for the Chesapeake Bay, 12/23/2025

Comment 20: Does the acreage per BMP in Table 10 (page 40) take into account the total possible acreage? For example, is the conservation tillage goal of 395 acres realistic given the current extent of conservation tillage already adopted - are there more than 395 acres still available to convert to conservation tillage? I'm curious if that data is included in the SAM tool.

Response 20: Yes, the conservation tillage acreage in Table 10 is based on the "available area" for implementation, calculated as total acres of cropland in the model minus acres of cropland with conservation tillage already adopted during the modeling period (estimated from 2013 through 2021 CAST implementation data). For Nickel Mines Run, the available area for conservation tillage is 493 acres. Acreage in Table 10 is equal to the available area multiplied by an assumed landowner participation rate of 80% ($493 * 80\% = 395$ acres).

Comment 21: Why was no cost associated with conservation tillage (pp. 44-45)? Often, farmers need to borrow, rent, or purchase new equipment in order to convert to no-till planting.

Response 21: BMP costs in the draft ARPs and SAM Tool are based on CAST cost data. CAST uses \$0 for conservation tillage (see [CAST - Cost Profiles](#)). Other ARPs developed by PADEP also assume \$0 for conservation tillage. The SAM Tool could be updated to consider scenario with non-zero costs for conservation tillage, if a source for values of capital costs, O&M costs, and lifespan is provided.

Comment 22: Perhaps I missed it, but could you share the geospatial data for the maps printed on pp. 54-55? I would love to zoom in and see what landowner properties have high-ranking opportunities for forest and grass buffers.

Response 22: The geospatial data will be delivered by Cadmus to EPA as part of the contract and shared with the Alliance for the Chesapeake Bay.

Comment 23: For the implementation section, I appreciate the level of detail in the step-by-step implementation process and the table of tasks/responsible parties on page 64. I'm wondering how your team has seen ARPs implemented in other watersheds - who typically takes the role of the ARP Implementation Coordinator? Is that usually someone's main job, or is it tacked on to someone's job? Would the OSWC

Coordinator be an appropriate person to be the ARP Implementation Coordinator as well? (I ask because the Planning Committee is currently revising the scope of work for the OSWC Coordinator, and perhaps we should consider incorporating the ARP into the Coordinator's responsibilities).

Response 23: PADEP has developed several ARPs where there are willing partners to carry out implementation such as county conservation districts or non-profit organizations. ARPs like most watershed-based plans are carried out by a third party rather than PADEP. PADEP's role is to maintain limited oversight whereby PADEP staff reviews progress every three years. To the extent that staff resources are available, EPA will provide limited oversight to evaluate progress and amend the ARP based on information and input from the ARP implementation team. There is an expectation that one of the OSWC partners will serve in a leadership position. In the draft ARPs, the Octoraro Watershed Restoration Coordinator is highlighted as one option to potentially serve as the ARP Implementation Coordinator. Given that county conservation districts and non-profit organizations are often working in many different watersheds and serving various roles, the ARP Implementation Coordinator role is likely not a full-time position but rather a duty assigned amongst other duties. There is much flexibility to how work proceeds within an ARP watershed. The ARP can be updated to reflect roles and responsibilities.

Draft ARP Review by Alexandra Neumann, Alliance for the Chesapeake Bay, 1/30/2026

Comment 24: I heard back from Greg Heigel at the Conservation District about the no-till practice extent. He put together a map, attached, showing no-till practice records from Practice Keeper. In PK they are able to select a watershed, select all the existing farm Conservation Plans in the watershed, and then select the plans that have no-till BMPs in that plan. He then exported this selection to ArcMap and totaled the acreage. It is not too far off from what you have in the ARP.

However, the results are not black and white. For example, if there is just one instance of no-till during a rotation in a plan, it shows up, so it might only be 5% of the farm acreage. Another example: If a farmer has corn, alfalfa, and tobacco in his rotation, plants all the corn and alfalfa no-till, but still plows for tobacco, say 1 year out of 10 - do we want this farm to show up as completely no-till, or to identify the exact # of acres that are tilled? Another example - if the farmer uses tillage for main crops but always does no-till for cover crops (with herbicide termination and not tillage termination), how should that show up in the model?

Response 24: To simulate BMP load reductions, the SAM Tool uses BMP-specific pollutant reduction efficiencies and treated acreages. Treated acreage is entered at the subwatershed scale (not the farm or field scale) for each BMP.

The situations described above, where both conservation and conventional tillage are applied on the same farm over the course of a rotation, could be accounted for in the model by first analyzing conservation tillage patterns for individual farms, then using results of the analysis to calculate the total subwatershed treated acreage to input to the model. For example, if a 100-acre farm uses conservation tillage for 60% of the time during a nine-year period (the duration of the model), and conventional tillage during the remaining 40% of time, then only 60 acres (100 acres * 60%) would be added to the subwatershed total instead of the full 100 acres.

This analysis is beyond the scope of Cadmus' ARP development project, but could potentially be applied during ARP implementation. However, it would require detailed tracking of crop rotations and tillage patterns per individual farm. Further, because of inherent model uncertainty, this approach would be unlikely to provide more accurate load reduction estimates unless the practice of alternating between conventional and conservation tillage is widely used in a subwatershed.