

# Non-Intrusive BMP Verification Review and Update



*BMP Analysis utilizing aerial imagery, GIS, and digitized reporting forms for completion of non-intrusive field verification within partnership counties.*



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# Methodology Recap



## Non-Intrusive BMP Verification Standard of Procedure

- Completed in six counties within Pennsylvania
- Presented to the Agricultural Workgroup on July 20<sup>th</sup>, 2023

# Abstract

Non-Intrusive Best Management Practice (BMP) verification is the process of using publicly accessible data and observation methods to identify and verify the functionality of targeted agricultural conservation practices, also known as BMPs, without intruding on the privacy of landowners. The methodology for this program uses publicly accessible data, remote imagery interpretation, historical practice implementation documents, and observations from public roadways to confirm and identify a BMP is present and functioning as intended. By using this methodology, certain BMPs can be collected and verified in a reduced timeframe and at a reduced financial cost, while also not requiring any release of private records by the landowner.

# Scope



Multiple Conservation Districts within the Northern Tier of Pennsylvania have identified a need for the creation of a BMP verification program that can be conducted with non-invasive methods.

Conservation Districts within Clinton, Potter, Lackawanna, Luzerne, and Susquehanna Counties recognized this priority through the adoption of the Commonwealth of Pennsylvania's initiative to document, verify, and report implemented BMP projects for enhanced accuracy of environmental nutrient and sediment reduction calculations.

This pilot program contains an established focus to limit the amount of additional staff time dedicated towards the identification, collection, and documentation while also limiting the reporting of private information required for BMP verification completion.

# Targeted Practices



Targeted Resource Improvement Practices as outlined within Appendix H consisted of:

- RI-7 & 8 – Grass Nutrient Exclusion Area or Buffer on Watercourse
- RI-9 & 10 – Forest Nutrient Exclusion Area or Buffer on Watercourse
- RI-16 Barnyard Clean Water Diversion
- RI-18 Water Trough

# Pilot Program Procedure



# Qualified Professionals



Qualified individuals to complete this process consist of Group 1 and Group 2 professionals outlined within the On-Site BMP Verification Guidelines for Counties provided by the DEP Chesapeake Bay Office Ag Compliance Section.

As the utilization of Group 1 and Group 2 professionals varies within the execution of this methodology, the chart to the right depicts the responsible parties for the completion of the outlined pilot program.

Group 1 professionals are tasked with making all final determinations of practices while utilizing this methodology.

Responsibility	Group 1 Qualified Professional	Group 2 Qualified Professional	Responsible Party for SOP Completion
Utilize Aerial Imagery Platform to identify possible BMP locations.	X	X	CCD, LDG
Record possible BMP locations within the Aerial Imagery Platform.	X	X	CCD, LDG
Complete Non-Intrusive Field Verification efforts from publicly accessible roadways.	X	X	CCD, LDG
Completed BMP Verification Windshield Survey and report collected data into Practice Keeper Database.	X	X	CCD, LDG
Review and approval of Practice Keeper Database entries for final submittal.	X		CCD, PADEP
Program Management and Oversight	X		CCD, LDG, PADEP



# Pilot Program Cost Analysis



Non-Intrusive BMP Methodology

Task	Time Requirement – Per 50 BMP's	Comments
Database Development	24 Hours	Only needed at start of the program
Complete Aerial Review	4-hour average	Can differ based on concentration of farming operations. Includes base data collection
Complete Driving Routes	3 hours	
Windshield Survey	11-hour average	Includes drive time and form completion
Data Entry and Review	12-hour average	
Total	54 Hours – 30 hours without Data base development	

Traditional Field Inspection

Task	Time Requirement – Per 50 BMP's	Comments
Landowner Notification – Mailings, email, or calls	18 hours	Average 15 minutes per parcel with 50% needing a follow up communication.
BMP Identification	16 hours	Plan review or previously implemented BMP
Complete Inspections with Landowner	80 hours	Assume a 1.5-hour drivetime per day and 15 minutes between operations. Assuming 2 BMPs per site and 10 per day. Variable can occur and reduce number of site visits.
Data Entry and Review	12-hour average	
Total	126 hours	



# Independent Review



Independent review was completed by Jon Harcum, PhD, of Tetra Tech on behalf of the Chesapeake Bay Program Office

- Tetra Tech was present at the July 20<sup>th</sup> presentation for the methodology.
- Follow-up meeting was held on July 27<sup>th</sup> with the Pennsylvania team, LDG, and Tetra Tech to discuss their preliminary findings.
- Between July 27<sup>th</sup> and August 8<sup>th</sup>, revisions to the methodology based on Tetra Tech's preliminary findings were made and submitted to the Ag Workgroup for final review.

# Document Revisions



- Added clarification for training requirements for Group 1 and Group 2 professionals.
- Made distinction that Group 1 professionals are responsible for all final decisions.
- Added clarification to pre-screening sites including distance from observation point and practice obstructions.
- Added aerial imagery age range to document with oldest aerial imagery used dating 1994.
- Added clarification to the length of RI-practice determination by utilizing the measuring tool within the Aerial Review Platform.
- Added all online data forms with all visual indicator fields to the document.

# Document Revisions



- Added base data of identified practices, verified practices, and on-site inspected practices for each RI level.
- Completed statistical analysis to include Hit Rate, Critical Success, False Alarm Ratio, and Confidence Intervals.

RI Practice Type	Critical Success (CS)	False Alarm Ratio (FAR)	Hit Rate (HR)	Post Agreement Rate (PAG)	Proportion Correct (PC)	Frequency Bias (FB)
RI-7	0.76	0.24	1.00	0.76	0.76	1.32
RI-8	0.32	0.00	0.32	1.00	0.32	0.32
RI-9	0.38	0.62	1.00	0.38	0.38	2.61
RI-10	0.86	0.14	1.00	0.86	0.86	1.17
RI-16	0.93	0.00	0.93	1.00	0.93	0.93
RI-18	0.28	0.00	0.28	1.00	0.28	0.28

Confidence Interval for Proportions									
Practice Type	p=Critical Success Index		Margin of Error	p=False Alarm Rate		Margin of Error	p=Hit Rate		Margin of Error
	Low	High		Low	High		Low	High	
RI-7	0.6224	0.8976	14%	0.1024	0.3776	14%	0.9579	1.0221	3%
RI-8	0.219	0.4271	10%				0.219	0.4271	10%
RI-9	0.2932	0.4668	9%	0.5332	0.7068	9%	0.9722	1.0078	2%
RI-10	0.8303	0.8852	3%	0.1148	0.1148	3%	0.9821	0.9979	1%
RI-16	0.8821	0.9779	5%				0.8821	0.9779	5%
RI-18	0.07258	0.4874	21%				0.07258	0.4874	21%

# Critical Components



- This program is a site-specific verification method where all sites need to be visited and meet all visual indicators as outlined within Appendix H in order to be appropriately verified. This program can not be extrapolated.
- This program can be utilized in any state or region.
- The developed program relies on qualified Group 1 professionals making all final determinations.
- This methodology shows a considerable cost and time savings when compared to traditional methods.





# Thank You

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