

T-VSSI Evaluation Survey Summary Report
October 27, 2008
Prepared by Lynn Mandarano, PE, PhD

To assess the effectiveness of the Temple-Villanova Sustainable Stormwater Initiative (T-VSSI) at achieving its grant outcomes, the T-VSSI has conducted several evaluation surveys at its public outreach events. The intent of the surveys is to assess the effectiveness of educational opportunities and to document the need for additional educational programs related to the implementation of sustainable stormwater best management practices (BMPs) in southeastern Pennsylvania.

The evaluation of the educational opportunities programs offered by the T-VSSI, reveals that the T-VSSI is delivering effective programs that are resulting in improved understanding of the need to implement BMPs and willingness to do so. Educational programs offered by the T-VSSI include the PA Stormwater Symposium 2007, which consisted of a Municipal Workshop (October 16) and Technical Sessions (October 17 and 18), and BMP Inspection and Monitoring Seminar and Tour (August 14, 2008). The latter was developed in direct response to technical education needs revealed from the analysis of survey data collected at the PA Stormwater Symposium 2007.

The T-VSSI will continue to use findings from the evaluation surveys to develop educational programs targeting respondents' technical needs. For example, the Call for Papers for the PA Stormwater Symposium 2009 will include a statement requesting papers in the areas identified as technical education needs (see list below). In addition, the T-VSSI will prepare future BMP Seminar and Tour events to provide more detailed information and/or hands-on training in these areas.

- BMP design – new and retrofit
- BMPs for areas where infiltration is not practical
- Subsurface investigations
- How to monitor/assess performance of BMPs
- How to maintain BMPs

The following summarizes the results of the separate evaluations conducted to date. Copies of the full summary reports are appended to this document.

PA Stormwater Symposium 2007 Municipal Workshop and Technical Sessions (October 16-18 2007)

The T-VSSI received 69 survey responses evaluating the Municipal Workshop on October 16, 2007, which preceded the Technical Sessions. Local governments (43%) and private businesses (23%) were the two largest segments of the regional population represented by the survey respondents. With respect to the Technical Sessions, the T-VSSI received 42 responses, the majority of which were private businesses (52%). The percentage of respondents responsible for overseeing or implementing BMPs was very high at each event: 81% and 83% respectively.

There was relatively strong agreement that the material presented was clear and understandable (1.48 mean and 1.31 mean for the two events) and at an appropriate technical level (1.30 mean and 1.38 mean). In addition, the respondents indicated that the program improved learning in the following areas: understanding the need to implement BMPs (1.12 mean and 1.22 mean), how to

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implement BMPs (0.99 mean and 0.98 mean) and ability to implement BMPs (0.72 mean and .86 mean). These results are based on a scale with a range of -2 strongly disagree to 2 strongly agree.

The survey also polled participants to understand potential education needs and collected data on technical, financial and regulatory needs. With respect to technical needs there is a strong demand for understanding how to assess performance/monitor BMPs (46% and 77%) and how to maintain BMPs (41% and 46%). With respect to funding, there is a strong demand for funds to construct BMPs (62% and 46%), to monitor BMPs (59% and 35%) and to maintain BMPs 54% and 38%). Finally, with respect to regulatory needs, respondents indicated a strong need on how to establish a stormwater utility or capital improvement program (56% and 50%) and learning about the impact of government regulations (51% and 12%).

Inspection and Monitoring Seminar and Tour (August 14, 2008)

Based on the feedback received from the PA Stormwater Symposium evaluation surveys, which indicated the strongest technical needs involve understanding how to assess performance/monitor and maintain BMPs, the T-VSSI hosted a topic specific technical seminar and BMP tour.

The T-VSSI received 29 responses evaluating this event. The largest segment of the population represented was private businesses (31%) with all government sectors adding up to 54%. 76% of the respondents were responsible for overseeing or implementing BMPs.

As with the PA Stormwater Symposium, there was strong agreement that the material presented at the technical seminar and follow-up BMP tour was clear and understandable (1.38 mean and 1.21 mean) and at an appropriate technical level (1.31 mean and 1.29 mean). In addition, the results indicate that the seminar improved learning in the following areas: understanding the need to implement BMPs (1.03 mean), how to implement BMPs(0.89 mean), ability to implement BMPs (0.81) and increased willingness to inspect and monitor BMPs (0.76 mean). These results are based on a scale with a range of -2 strongly disagree to 2 strongly agree.

The survey also polled participants on their preference of education opportunities offered by the T-VSSI. Results show a strong preference for a targeted seminar and tour - an event similar to August 14 (2.17 mean), PA Stormwater Symposium Technical Sessions (2.09 mean) and PA Stormwater Symposium Workshop (1.95 mean). These results were scaled from 0 (no preference) to 3 (strongly prefer).

In the open ended responses on the seminar and tour, the most valuable comments received include “more seminars with less emphasis on the results of monitoring and more emphasis on inspection and maintenance activities” and “add tours of other types of BMPs or same types but at other locations”. The first comment indicates that there remains an unmet demand for ‘hands on’ training for inspection and monitoring activities.

This survey also included an open ended response for suggestions for other educational programs, which provides the T-VSSI with a wealth of information to develop other topic specific learning opportunities.

Appendix 1
PA Stormwater Symposium: Municipal Workshop
T-VSSI Evaluation Survey Results

The T-VSSI received 69 responses evaluating the Municipal Workshop (Oct 16, 2007). Of which, 81% were responsible for overseeing or implementing BMPs. The majority (see Table 1) of the attendees were local government participants.

Table 1 - Type of Organization

Federal Government	0%
State Government	7%
County Government	13%
Local Government	43%
Private Business	23%
Academia	4%
Non-Profit	9%
Other	0%

There is relatively strong agreement amongst the participants that the Workshop was clear and understandable as well as delivered at an appropriate technical level (see Table 2).

Table 2 – Quality of Educational Program

(Range of values: max 2 (strongly agree) and min-2 (strongly disagree))

Material presented was clear and understandable	1.48 (mean)
Technical level was appropriate	1.30 (mean)

With respect to the level of learning achieved through the Workshop, the Workshop was much better at elevating the participants' understanding of the need to implement BMPs than it was at improving knowledge of how to implement and ability to implement (see Table 3). However, it is important to note that 57% of the respondents indicated that there were other technical, financial and regulatory factors that inhibit their ability to implement BMPs. These concerns are addressed below. In addition, other concerns raised by the respondents were captured in an open-ended question and these results are summarized at the end of this document.

Table 3 – Improved Learning

(Range of values: max 2 (strongly agree) and min-2 (strongly disagree))

Increased understanding of the need to implement BMPs	1.1 2
Increased knowledge of how to implement BMPs	0.9 9
Increased ability to implement BMPs ¹	0.7 2

Tables 4a, 4b and 4c below present the range of technical financial and regulatory needs that inhibit respondents from implementing BMPs. The most often cited needs within each of these categories, respectively include how to assess the performance/monitor BMPs, funding to construct BMPs, and establishing a stormwater utility or capital improvement program.

Appendix 1
PA Stormwater Symposium: Municipal Workshop
T-VSSI Evaluation Survey Results

Table 4a - Technical Needs

How to select sites for BMPs	33 %
How to design BMPs	33 %
How to maintain BMPs	41 %
How to assess performance/monitor of BMPs	46 %
How to prepare a RFP to hire a consultant to design or construct a BMP	26 %

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PA Stormwater Symposium: Municipal Workshop
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Table 4b - Financial Needs

Funding to conduct a study of BMPs	38 %
Funding to design BMPs	46 %
Funding to construct BMPs	62 %
Funding to develop, implement or enforce local regulations	38 %
Funding to maintain BMPs	54 %
Funding to monitor performance of BMPs	59 %
How to prepare a grant proposal to secure funds noted above.	36 %

Table 4c - Regulatory Needs

Learning about government regulations that might impact me	51 %
Learning about the PA Stormwater Manual	46 %
How to write a stormwater ordinance	26 %
How to establish a stormwater utility of capital improvement program	56 %

The following lists highlight, in no particular order, the other concerns that the respondents indicated as inhibiting the implementation of BMPs:

- Out-of-date codes
- Regulation not requiring upgrades of under-performing systems
- Difficulty of budgeting beyond minimum requirements to stay ahead of regulations
- For engineering companies, spending extra time and money does not create profit
- Municipal indifference
- Public opposition/ need of public education
- Difficulty in approaching owners of 187 privately-owned basins in township for retrofits
- Too many retrofits to upgrade
- Weak county role since only advisory force
- Resistance from the Board of Directors
- Dissent between developers and others over designs
- Lack of manpower and funding for both implementation and monitoring
- Few funding alternatives / need to obtain funding without use of bonds
- Too many time and money demands to pay attention to BMP implementation
- Lack of local twp. professionals to implement BMPs but also to educate officials about their usage and importance
- Lack of knowledge in site design

Finally, additional comments and suggestions for other educational programs included:

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PA Stormwater Symposium: Municipal Workshop
T-VSSI Evaluation Survey Results

- Instruction on implementing BMPs (besides greenroofs) in completely developed municipalities
- Additional case studies
- Simple homeowners manual about BMPs
- Cost-cutting measures
- How to persuade developers to design more creative systems
- How to calculate TMDI reduction requirements
- Retrofit design, performance standards
- Helping township engineers with plan reviewing and consultation

Appendix 2
PA Stormwater Symposium: Technical Sessions
T-VSSI Evaluation Survey Results

The T-VSSI received 42 responses evaluating the Symposium Technical Sessions (Oct 17-18, 2007). Of which, 83% were responsible for overseeing or implementing BMPs. The majority (see Table 1) of the attendees were private businesses providing consulting and/or construction services to governmental organizations.

Table 1 - Type of Organization

Federal Government	5%
State Government	5%
County Government	12%
Local Government	17%
Private Business	52%
Academia	2%
Non-Profit	5%
Other	2%

There is relatively strong agreement amongst the participants that the Symposium Technical Sessions were clear and understandable as well as delivered at an appropriate technical level (see Table 2).

Table 2 – Quality of Educational Program

(Range of values: max 2 (strongly agree) and min-2 (strongly disagree))

Material presented was clear and understandable	1.31 (mean)
Technical level was appropriate	1.38 (mean)

With respect to the level of learning achieved through the technical sessions, the sessions were much better at elevating the participants’ understanding of the need to implement BMPs than they were at improving knowledge of how to implement and ability to implement (see Table 3). However, it is important to note that 62% of the respondents indicated that there were other technical, financial and regulatory factors that inhibit their ability to implement BMPs. These concerns are addressed below. In addition, other concerns raised by the respondents were captured in an open-ended question and these results are summarized at the end of this document.

Table 3 – Improved Learning

(Range of values: max 2 (strongly agree) and min-2 (strongly disagree))

Increased understanding of the need to implement BMPs	1.2 2
Increased knowledge of how to implement BMPs	0.9 8
Increased ability to implement BMPs ¹	0.8 6

Tables 4a, 4b and 4c below present the range of technical financial and regulatory needs that inhibit respondents from implementing BMPs. The most often cited needs within each of these

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PA Stormwater Symposium: Technical Sessions
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categories, respectively include how to assess the performance/monitor BMPs, funding to construct BMPs, and establishing a stormwater utility or capital improvement program.

Table 4a - Technical Needs

How to select sites for BMPs	35 %
How to design BMPs	42 %
How to maintain BMPs	46 %
How to assess performance/monitor of BMPs	77 %
How to prepare a RFP to hire a consultant to design or construct a BMP	22 %

Table 4b - Financial Needs

Funding to conduct a study of BMPs	15 %
Funding to design BMPs	23 %
Funding to construct BMPs	46 %
Funding to develop, implement or enforce local regulations	38 %
Funding to maintain BMPs	38 %
Funding to monitor performance of BMPs	35 %
How to prepare a grant proposal to secure funds noted above.	23 %

Table 4c - Regulatory Needs

Learning about government regulations that might impact me	12 %
Learning about the PA Stormwater Manual	23 %
How to write a stormwater ordinance	27 %
How to establish a stormwater utility or capital improvement program	50 %

The following lists highlight, in no particular order, the other concerns that the respondents indicated as inhibiting the implementation of BMPs:

- Public resistance
- Private sector resistance
- Municipal resistance
- Conflict between local codes/ordinance and implementation of BMPs
- Conflicts between local and county or state requirements
- DEP permitting process

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PA Stormwater Symposium: Technical Sessions
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Finally, additional comments and suggestions for other educational programs included:

- Training on BMP design and pre-and post-modeling, monitoring
- Training on SWMM
- Online cost calculator, and model specifications for BMP design
- Training on natural channel design and sedimentation modeling
- Education programs for planners, architects, builders... the ones designing development plans
- Education for communities
- Education for municipal legislators
- Evaluation of proprietary methods
- Methods of understanding infiltration rates
- Understanding the need for soil amendments or remediation for bio-infiltration
- BMPs for areas where infiltration is not practical
- Training on the need for subsurface investigations to test the feasibility of particular BMPs

Appendix 3
BMP Inspection and Monitoring Seminar and Tour, August 2008
T-VSSI Evaluation Survey Results

The T-VSSI received 29 responses evaluating the BMP Inspection and Monitoring Seminar and Tour (August 14, 2008). Of which, 76% were responsible for overseeing or implementing BMPs. The majority (see Table 1) of the attendees were private businesses providing consulting and/or construction services to governmental organizations.

Table 1 - Type of Organization

Federal Government	17%
State Government	10%
County Government	10%
Local Government	17%
Private Business	31%
Academia	0%
Non-Profit	10%
Resident	0%
Other	0%

There is relatively strong agreement amongst the participants that the BMP Inspection and Monitoring Seminar and Tour was clear and understandable as well as delivered at an appropriate technical level (see Table 2a - Table 2b).

Table 2a – Quality of Seminar

(Range of values: max 2 (strongly agree) and min-2 (strongly disagree))

Material presented at the seminar was clear and understandable	1.38 (mean)
Technical level at the seminar was appropriate	1.31 (mean)

Table 2b – Quality of BMP Tour

(Range of values: max 2 (strongly agree) and min-2 (strongly disagree))

Material presented during BMP Tour was clear and understandable	1.21 (mean)
Technical level of the material presented during BMP Tour was appropriate	1.29 (mean)

With respect to the level of learning achieved through the seminar, the seminar was best at elevating the participants' understanding of the need to implement BMPs. The participants showed moderate agreement that the seminar improved knowledge of how to implement BMPs, and willingness to inspect and monitor them (see Table 3a).

Finally, responses indicate that there was relatively strong agreement (1.36) that the BMP Tour, which followed the technical seminar, increased participants' understanding of information presented in the seminar.

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BMP Inspection and Monitoring Seminar and Tour, August 2008
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Table 3a – Improved Learning from Seminar
(Range of values: max 2 (strongly agree) and min-2 (strongly disagree))

Increased understanding of the need to implement BMPs	1.03 (mean)
Increased knowledge of how to implement BMPs	0.86 (mean)
Increased ability to implement BMPs ¹	0.81 (mean)
Increased willingness to inspect and monitor BMPs	0.76 (mean)

Table 4 below presents the types of BMPs that participants are considering to construct or improve through better inspection and monitoring procedures. The most often cited BMPs are bio-infiltration areas/rain gardens, detention basin retrofits, and stormwater wetlands (see Table 4).

Table 4 –BMPs considered by participants for monitoring program or improvement

Stormwater wetland	35%
Porous pavement	21%
Bio-infiltration area/ Rain garden	38%
Green roof	17%
Detention basin retrofit	35%
Other (structural BMPs)	7%

The survey also polled participants on their preference of educational opportunities offered by the T-VSSI. Results show a strong preference for Targeted Seminar and BMP Tour event, as experienced by the group that day, while PA Stormwater Symposium: Technical Sessions and Workshop (see Table 5). This reveals that the T-VSSI audience prefers educational activities incorporating workshops, technical sessions and tours rather than stand alone seminars or tours.

Table 5 – Preference of educational opportunities
(Range of values: max 3 (strongly prefer) and min 0 (no preference))

PA Stormwater Symposium: Workshop	1.95 (mean)
PA Stormwater Symposium: Technical Sessions	2.09 (mean)
PA Stormwater Symposium: Tours	1.70 (mean)
Targeted Seminar and BMP Tour (similar to today)	2.17 (mean)
Targeted Seminar (alone)	1.47 (mean)
Targeted Tour (alone)	1.00 (mean)

The following lists highlight, in no particular order, additional comments and suggestions for other educational programs:

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BMP Inspection and Monitoring Seminar and Tour, August 2008
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- Effects on TDS- treatment in mining scenario/ effective BMPs for karst areas
- Checklists to facilitate monitoring (consider USGS monitoring approaches)
- Consider partnership with conservation districts for monitoring
- Consider topic-specific webinars, online training and certification, teleconferences
- Carbon sequestration in bioretention basins
- General housekeeping techniques
- More on retrofits, especially for basins
- More on requirements, installation and maintenance, evaluation methods
- Session offered during construction phase
- Stormwater BMP certification course for municipal officials
- Additional technical info on wetlands/infiltration techniques
- More research on actual groundwater effects
- Structural BMPs' relationship to "natural" BMPs (pretreatment, reduced maintenance)
- Modeling and calculations for BMPs
- Focus on BMP design
- How to deal with upstream neighbors
- General law and policy
- Pollution prevention for MS4s

Finally, comments or suggestions for the Seminar and BMP Tour:

- More seminars with less emphasis on the results of monitoring and more emphasis on inspection and maintenance activities.
- Prefer doing tour first then the tech session
- Prefer being split up into smaller groups for tour because it was hard to hear and ask questions
- Touring same types of BMPs and other types of BMPs would be useful at sites other than Villanova Campus