



A Seminar Series on  
Innovative and Comprehensive  
Stormwater Management  
to Produce Multiple-Benefits  
in the Appalachian Plateau

**FINAL REPORT**

IRISE-24-P22-01-01  
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**PITT | IRISE**

CENTER FOR IMPACTFUL RESILIENT  
INFRASTRUCTURE SCIENCE & ENGINEERING

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<b>16. Abstract</b> Stormwater management in Southwestern Pennsylvania is challenging due to rugged terrain, complicated hydrogeology, and a long history of human modifications. Drainage of transportation infrastructure contributes substantial amounts of stormwater runoff, and therefore presents a unique opportunity to address stormwater, as this infrastructure spans jurisdictions and creates regional benefit. A symposium to share collective and emerging knowledge about storm water control technologies and effective cross-jurisdictional strategies was held at the University of Pittsburgh in November 2023. This report documents the planning process, the symposium content, and post-symposium attendee feedback.					
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## **IRISE**

The Impactful Resilient Infrastructure Science & Engineering consortium was established in the Department of Civil and Environmental Engineering in the Swanson School of Engineering at the University of Pittsburgh to address the challenges associated with aging transportation infrastructure. IRISE is addressing these challenges with a comprehensive approach that includes knowledge gathering, decision making, design of materials and assets and interventions. It features a collaborative effort among the public agencies that own and operate the infrastructure, the private companies that design and build it and the academic community to develop creative solutions that can be implemented to meet the needs of its members. To learn more, visit: <https://www.engineering.pitt.edu/irise/>.



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## **Disclaimer**

The views and conclusions contained in this document are those of the authors and should not be interpreted as representing official policies, either expressed or implied, of the Pennsylvania Department of Transportation, the Pennsylvania Turnpike Commission, Allegheny County, Golden Triangle Construction, Michael Baker International, the Constructors Association of Western Pennsylvania or CDR Maguire.

## 1.0 Introduction

Stormwater management in Southwestern Pennsylvania is challenging due to rugged terrain, complicated hydrogeology, and a long history of human modifications. Recent shifts in precipitation patterns toward increased precipitation volume and intensity amplify these challenges. Further, regulatory structures continue to evolve and require sometimes novel designs to meet these technical and regulatory challenges. Transportation stormwater control infrastructure manages substantial runoff volumes, and therefore presents a unique opportunity to address stormwater management, in particular, it spans jurisdictions and effective management therefore requires coordination and cooperation.

The IRISE (Impactful Resilient Infrastructure Science and Engineering) Consortium, in collaboration with the Pittsburgh Water Collaboratory convened a stormwater symposium on November 30, 2023, at the University of Pittsburgh. This symposium featured presentations and panel discussions from agency, consultant, and elected officials on a wide range of stormwater topics developed during an agenda setting meeting of stormwater experts held September 11, 2023.

This report documents vital aspects of the symposium and the symposium planning process. In particular, we outline a set of potential next steps to encourage and enrich the conversation regarding regional stormwater management. The planning process is briefly summarized, followed by documentation of meeting outcomes. The final portion of the report outlines potential next steps generated by discussions that occurred throughout the process.

## 2.0 Process

The symposium was organized as follows:

- 1) In conjunction with IRISE leadership, an advisory board representing organizations in the IRISE consortium and the wider professional community was organized. This board provided ideas, feedback, and perspective from the beginning of the project, meeting approximately monthly during the planning period.
- 2) To develop symposium content, the project team, in coordination with the advisory board, called an agenda setting meeting of stormwater experts. Experts were invited through the IRISE and Pittsburgh Water Collaboratory networks, and wider distribution of these invites was encouraged. This meeting occurred on September 11, 2023. Prior to the meeting a brief survey was sent to invitees and the feedback received was used to develop the meeting discussion themes. Based on the discussions during that meeting a list of important topics was generated for use in setting the symposium agenda.
- 3) Based on the agenda developed during the stakeholder meeting, a set of thematic sessions were developed. In some cases, there simply wasn't enough time to convene an entire session, so in several cases a single presentation was meant to cover specific topics. Speakers were invited from the planning team's network.

- 4) On November 30, 2023 the Symposium was held. To offset operating costs, a group of generous groups sponsored the symposium. Seventy-five people registered for the event and 60 people attended the symposium.

Thank you to all who made this event possible, especially the board, agenda setting participants, symposium speakers, and event moderators!

***Advisory Board***

Jason Baguet  
Dan Bain  
Sarah Cordek  
Gary Euler  
Megan Guy  
Richard Heineman  
Jim Kaiser  
George Kapral  
Justin Kerns  
Jason Koss  
Meghan Sexton  
John Stephen  
Joseph Szczur  
Dana Vidic

***Stormwater Expert  
Meeting Participants***

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Matt Gordon  
Tony Igwe  
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Lori Musto  
Kyla Prendergast  
Eric Raabe  
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***Symposium Speakers &  
Moderators***

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Hank Bradish  
Jonathan Burgess  
Sarah Cordek  
Mark Fiely  
Sean Furjanic  
Rich Heineman  
Caitlin Hulle  
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Tyler Mercer  
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### 3.0 Stormwater Experts Agenda Setting Meeting

On September 11, 2023, a group of stormwater experts met to identify a range of topics to include in the symposium. Prior to the meeting, a survey was distributed to the attendees to gather information and seed conversation. Survey results are summarized below.

<b>What is the number one challenge in stormwater management in your daily work?</b>
Achieving an acceptable /required level of service given site constraints (r/w, utilities, etc.) and client budget constraints.
Fractured and competing levels of government; lack of regional coordination.
Dealing with the repercussions due to the lack of storm water management and maintaining existing storm water management facilities that were not constructed with future maintenance in mind.
Correct construction of stormwater BMPs to ensure proper functioning.
The regulatory requirements for stormwater management have increased over the past decade at all levels of government - local, state, Federal - including within the City of Pittsburgh. While I support these measures as a means of addressing stormwater impacts of development, the increased regulatory burdens and design/permitting costs to smaller or more resilient-focused projects are starting to outpace the economic benefit or ability to pay for these Owners. There are not enough mechanisms for right-sizing the regulatory requirements, waiving certain aspects, or providing flexibility. It is getting to the point where elective stormwater projects are becoming cost infeasible simply because of the permitting requirements.
Having stakeholders understand the direct tie between funding and level of service provided.
Designing systems that are cost effective, meet permitting requirements, and are easily maintained.
Long term operation and maintenance. Designing facilities that are easy to maintain and then maintaining them with limited resources and personnel.
Stormwater management crosses jurisdictional boundaries, between municipalities and involving multiple public agencies (e.g. DEP, DOT) and aging infrastructure.
As the owner of the ROW in the City of Pittsburgh, stormwater is very challenging. We have narrow rights-of-way that generally have little to no opportunity for stormwater detention. Therefore, all stormwater must be dealt with and we often find that the stormwater sewer system is over-capacity and cannot easily accept new flow.
We also have challenges with water runoff from private parcels that impact the ROW but cannot easily be put into the stormwater sewer system.
Fractured municipal government and system ownership
Maintenance and funding of existing facilities
High expectations for maintenance level. Too many different species of plants in same structure making it difficult to weed out.
Using a construction company that has little to no experience building green infrastructure is something we see all the time. Usually, this means that the GI cells are limited in their function (either bc. sediment comes in a clogs it, or water is running next to it, instead of into it.
Stormwater runoff that creates flooding.

**If you could inform everyone in the stormwater management field of ONE thing, OR change ONE rule governing the implementation process what would it be?**

Stormwater management needs to be considered early on in the project. If you attempt to shoe-horn it into the project as an after-thought, it will be much more difficult. This often leads to stormwater management being seen as a burden to a project instead of a vital component.

I would change how water projects are funded and programmed or implemented; as I work for an MPO, my bias is to recommend something like our TIP funding framework (Transportation Improvement Program) to apply formula funding on a variety of regional projects voted upon by representative local officials. It seems to me that the current funding apparatus across all-of-government (local, state and federal) is fractured, massively underfunded, underprioritized and not adequately modernized in a way that supports current needs.

The requirement of communities to evaluate their storm water management and requirements for a comprehensive storm water plan moving forward. New regulations have helped but we are still dealing with the sins of the past and current systems cannot handle the development that has occurred.

Inform - there is an enormous amount of stormwater control infrastructure already on the ground and funds/capacity for long term O&M is scarce.

For regulations, requirement of pre-treatment would be a meaningful improvement.

I would advocate for dual path for any stormwater permitting process, whether at local, state or Federal levels. One would be for conventional development projects where a more pervious site is proposed to be converted to a less pervious one, for example, and the risks of stormwater rate, volume, and pollution impacts need to be mitigated by law. The other path would be for restorative, regenerative, or reclamation type stormwater projects where the overall intent of the project IS stormwater. This second path could be much faster in review, less costly to permit, and could be linked to any number of grant and cost share opportunities / incentives. Treating these like all other development projects is absolutely preventing widespread implementation of better watershed practices and projects in our region.

Streamline regulatory reviews that impact cost and implementation timelines.

Be sure to understand all aspects of stormwater. In other words, if you are a designer, be sure to be in the field when it is being constructed as well as be involved in the inspection and maintenance side to fully understand the ramifications of some of the designs.

Not require infiltration on BMP's. Infiltrating BMP's are problematic from a maintenance standpoint and have a high probability of failure.

There are multiple entities involved in stormwater management, from private property owners to municipalities, to the DEP and ultimately to highway owners such as PennDOT, PA Turnpike, Allegheny County, and others. Developments upstream can have major effects on downstream communities, perhaps there be an overall regional entity in charge.

Ability to create a county Act 167 Plan with teeth, and funding to make changes.

Create funding opportunities that allow for the money to be used for maintenance.

Anyone building green infrastructure should go through a training program so that they understand how GI works.

Unknown at this time. Good question.

**What uncertainties in stormwater design/operations keep you up at night?**

Geotechnical and infiltration performance is highly variable.
Climate change vs. massively underfunded, underprioritized legacy infrastructure!
Ability of systems to handle future development and what seems like increased precipitation events. Our ability to maintain facilities.
Similar to earlier answer on challenge - there are already an enormous amount of stormwater controls structures on the ground around the county and Commonwealth. Like any infrastructure, regular inspection and maintenance is needed for proper function. The resources for this are scarce, so there's loss of function to varying degrees scattered across these structures.
Whether permit hiccups / time-to-review holds up the project schedule is probably on the top of my list, as this is our day-to-day reality. During and after construction, the items that keep me up vary by projects. I do not have many global concerns about stormwater and GSI construction / operations, realizing that issue can occur with even the best designed and constructed projects.
There is always a bigger storm than the one we designed for.
The costs associated with maintaining them. As we continue to expand our transportation systems there will be more PCSM's constructed and overall costs to maintain them will continue to rise.
infiltrating BMP's and whether they will function as designed or be a continuous maintenance headache.
Changes in stormwater concentrations and flows impacting slopes that support highways, causing landslides and road closures and hitting already tight budgets.
lack of integrated solutions between municipalities
How to overhaul and modernize our existing stormwater infrastructure before more disasters like the Washington Blvd flooding occur again.
That we are not doing it enough.

**What are you doing different to prepare for changes in precipitation patterns expected in the region?**

We are largely reliant on client design guidance and requirements. Many design guidance manuals are increasing design rainfall depths and rates.
We (SPC) have applied for funding to develop a regional Resiliency Improvement Plan and have already received funding to develop a regional Climate Action Plan. These two combined efforts will help us to identify and prepare for increased risks, but it is only the beginning of what we need to be doing NOW to transform from our current state.
We seem to be having the 100-year storms on more frequent basis. Design of systems need to take this into consideration. Retention ponds and devices to slow the discharge of the water should be considered.
As regulator, we follow ordinances and regulations. However, reviewers prefer conservative calculations for stormwater design - thus over controlling rate, volume, water quality for multiple reasons including increased precipitation. This can be communicated through permit review process.
Also, per draft PA PCSM manual, designers will be required to use 95% CI for 2 year 24 hour storm - essentially a required conservative modifier for modeling rainfalls, developments, and required stormwater BMPs. This hasn't gone into effect statewide yet.
For conventional development project, there are very few municipalities across the state that reasonably update the rainfall design requirements, based on changes to precipitation patterns. The

City of Pittsburgh has addressed this with their most recent code update, but I do not think they codified a regular revisit of the requirements every 5- to 10-year, for example. For more elective GSI projects - such as those we have worked on with watershed associations or PWSA - we have had more flexibility to consider going above-and-beyond.

Looking at ways to combine as many different practices as possible to handle stormwater. The idea of "Sponge Cities" is interesting.

Statewide manuals are being updated in an effort to address the issue.

For bridge design Hydraulics we are taking a more conservative approach to flows and sizing of hydraulic openings. We have also voluntarily installed Stormwater BMP's in areas of localized flooding to try and alleviate some of the problems.

Investing in upgrades to highway drainage systems to ensure they are capable of handling anticipated flows. Reviewing private and public stormwater connections to ensure systems are properly sized when permitting.

We are a technical service provider, resiliency and watershed scale planning are core values at the heart of our work.

Introducing policies to factor climate change modeling into stormwater facility design.

Including future climate projections including precipitation quantity in calculations or modeling exercises when developing flood risk management plans.

**Can you identify examples of innovative approaches to stormwater management that should be more widely adopted?**

Embracing infiltration and evapotranspiration whenever possible. Coordinate stormwater management with other infrastructure upgrades to reduce construction costs through enhanced cost-sharing.

Regional MS4 monitoring, smart sensor networks for at-risk storm grates; would like to see something like the Whole Home Repair Program but for funding residential-level stormwater manager; cohesive regional zoning and SALDO coordination on stormwater management; better regional high-quality H&H modeling.

Working with maintenance forces to ensure storm water management facilities are maintainable. For example..Access around retention ponds, gates to allow entry, slopes that can be transversed by equipment.

For regulations, more strict requirements for modeling are helpful.

Ultimately, all stormwater BMP approaches seek to manage volume, rate, water quality, or some combination.

I think economical BMPs that maximize ease of maintenance and therefore likelihood of long term function and viability are most important.

I wouldn't say these would necessarily be considered innovative any longer, but practices / designs that minimize impervious surfaces, maximize pervious land ability to absorb/infiltrate/evapotranspire (higher organic soils, trees and shrubs and meadow vs lawn) and easily maintained pre treatments for structural controls.

Ounce of prevention worth pound of cure! Applies to SWM.

Does innovation necessarily mean improvement? I'd say any approach that ensures long term function, ease and economy of maintenance should be preferred.

Approaches that add benefits outside of stormwater management (aesthetics, reduce urban heat island, add habitat) are nice too.

1) Integration of stormwater management more holistically into DPW / PWSA policy and operations. Example of successful implementation: Chicago Green Alley program; or New York / San Francisco's

stormwater - where inline stormwater planters, green inlets, pocket rain gardens, etc. are broadly implemented into any sidewalk / right-of-way improvements just as matter of day-to-day operations, with minimal design / permitting required.

2) Stronger incentives to "supercharge" stormwater on conventional developments - in particular, larger ones with key locations in watersheds. The design, permitting and construction mobilization costs are already sunk and provided by the Developer. Additional money could be added to the project by the City, foundations, etc. to increase the stormwater footprint and positive outcomes beyond regulatory minimums. This type of Benefit Fund should support multiple funding stakeholders, with a project application and technical review process that supports both these large, conventional development projects and smaller, non-conventional stormwater projects.

3) Real-time monitoring, controls, and decision-making visualization - both related to storm / sanitary sewer systems and individual stormwater facilities. Very recent advances in AI and Machine Learning - neural networks, large language models, virtual twins, etc. - could be transformative with regard to our understanding of these complex systems and the recurring impacts of our design decisions and non-decisions.

Making use of vacant/open spaces for stormwater control and recreational use like New York DEP is piloting,

Develop an internal Stormwater Committee with different disciplines to review designs, constructability, and maintenance aspects of PCSM's.

The use of specialized products for seeding and soil supplements to obtain vegetative cover in problematic soils. We have used a blend of biotic soil amendment and bonded fiber matrix in a hydroseeding mix to accelerate vegetative growth to stabilize BMP's so that they can establish faster.

Permeable pavements and rain gardens incorporated into more highway projects.

MD Stormwater management plans.

Whiteman Park and surrounding stormwater management

Treating green infrastructure like other forms of infrastructure with establishment periods, long term funding, well funded maintenance, and data management.

Combining stormwater management with recreational activities is something you see all over Europe. The US should take a look at what goes on in Europe.

E.G.

<https://theindexproject.org/post/rabalder-parken>

<https://www.glifberglykke.com/htc>

Widespread dispersed detention: Green infrastructure, blue roofs, stormwater storage under roads.

**Do you know of examples where jurisdictions have collaborated under the umbrella of a transportation infrastructure project to solve cross-jurisdictional storm water challenges?**

I believe Pennsylvania communities can coordinate with PennDOT to implement MS4 permit measures. Both PennDOT and the local communities can apply these improvements toward their PADEP MS4 permit requirements. I have not personally been involved in a project like this.

<https://www.senatoreldervogel.com/2023/04/12/southwest-butler-stormwater-planning-commission-receives-local-government-excellence-award/>

<https://stormwaterdistrict.org/>

These guys are the GOAT: <a href="https://atlantaregional.org/natural-resources/water/metropolitan-north-georgia-water-planning-district/">https://atlantaregional.org/natural-resources/water/metropolitan-north-georgia-water-planning-district/</a>
The department is currently working with legislatures and multiple municipalities to develop a storm water management plan and solution to the flooding that occurs along SR 51 in Pleasant Hills. In order to solve this flooding issue multiple municipalities need to work together on a comprehensive storm water plan and project.
Larger projects (Turnpike expansion, eg) that cross multiple different jurisdictions (counties and municipalities) are reviewed to ensure compliance with local ordinances and requirements.
Most DOTs and Public Works Roadway Divisions are not terribly in-tuned with stormwater issues, except to keep water off the road and address whatever minimal DEP requirements exist - MS4, NPDES for new construction projects, etc. There was a recent project where PWSA and PennDOT collaborated on an MS4 reduction Design-Build in Saw Mill Run. But such projects are rarely transformational and are often very budget-constrained. Similar projects have occurred across municipalities.
There have been recent projects between PWSA and the City of Pittsburgh DPW (both Parks and Roadways) that have been good examples of meaningful cross-jurisdictional collaboration... Wightman Park, for example. This project included large-scale storage at the park, with the addition of a networked system of stormwater planters and enhanced gutters to bring additional stormwater to the park, far outside of the previous contributing area.
PennDOT has partnered with Pittsburgh Water and Sewer Authority, PA Turnpike and local municipalities to combine funding to build pollution reduction projects to meet MS4 permit requirements.
It is common for land development projects to tie stormwater into another agency's highway drainage system. Typically, this involves on site detention and controlled release, but is something that is coordinated with between the highway owner, municipality and property owner, among others.
I do not but this is a very important topic as Pittsburgh is often down-stream of other municipalities and we are impacted by stormwater flows coming from their jurisdictions.
Etna / Sharpsburg
Plum watershed

<b>What difference in cross-municipality storm water management regulations are most important to stream line?</b>
Managing expectations and understanding the proper design guidance.
Zoning/local ordinances; each county should ideally have an IWRM plan with regional coordination and Act 167 plans in-place. That said, we have some regional authorities dumping raw sewage into our rivers...so what do we focus on first?
As development continues municipalities need to look at and device storm water management systems taking into consideration what that development does to downstream municipalities. We are getting better with new development but again the sins of the past need looked at corrected.
Meaningfully staffing and following inspections and O&M at local level universally across municipalities.
Resources are scarce and importance and attention to stormwater management really varies widely across municipalities.

A number of years ago, York County PA organized their municipalities under one, consolidated MS4 permit and work together under the County leadership to meet the annual stormwater MS4 needs. The Delaware River Basin Commission has also been transformative in promoting and creating opportunity for cross-municipality cooperation for stormwater. Here in Allegheny County, we have substantial challenges to emulating these successes and partnerships, as our municipalities are excessively fractured and operate at very different economic scales and political perspectives. The County, the County Conservation District, Southwest Pennsylvania Commission, and various Councils of Government (COGS) have tried over the years to encourage these, but lack any kind of regulatory framework to make such cooperation necessary or beneficial. We really need a DRBC on this side of the state, and the existing Ohio River focused commission-like orgs (ORSANCO, ORBA) cover too much geographic area, stretching all the way down to Huntsville, AL and all the way up to New York. Speaking only for the Pittsburgh region, we need a Ohio River River Basin Commission that matches the Army Corp Pittsburgh District extents to be effective.

Not sure I understand the question

Consistency in the regulations

Consistency with Stormwater fees and how they are implemented.

Blanket edicts to disconnect stormwater from municipal sanitary system, while effective, can leave property owners with no choice but to direct water towards the adjacent highway. This can cause maintenance issues with ponding/icing, or in the most extreme cases, landslides over time due to new flow patterns and an existing system not designed to handle.

Unsure what this question is asking.

**What information on stormwater maintenance would be most valuable in your daily operations?**

The performance of stormwater management features is heavily reliant on operation and maintenance procedures. Maintenance is often neglected leading to premature failure of stormwater systems.

I want to know where we have maintenance issues on all local assets BEFORE they fail catastrophically in a major storm event!

What characteristics of BMP lead to reduced maintenance.

We need Big Data for stormwater maintenance... a centralized Work Order system or NASSCO-like coding protocol that municipalities, sewer authorities and others adopt for GSI / stormwater maintenance. Such as system would provide a framework for tracking work orders (labor and materials) to maintain stormwater features, but also would track geospatial rain events, facility design components, aggregated data, and similar. The end goal should be to draw trends and insights from long-term aggregated data, so that we can make informed decisions on ongoing and future O&M budgeting needs, failure mechanisms, risks, etc.

Knowing the state of the stormwater control measure (visual and performance) information.

More details on maintenance costs associated with different PCSM designs.

Easily maintained BMP design. Managing invasives while maintaining vegetative cover.

Any innovative maintenance treatments to preserve the life of existing structures.

Which municipalities are planning upgrades, have dedicated staff for GI maintenance and O&M

How to integrate GI maintenance into traditional public works systems.

Build-as plans that are up to date.

<b>When working on stormwater, what pollutant are you most concerned about?</b>
Sediment can have the most detrimental impact on the long term performance of a stormwater management facility.
PFAS and fracking by-products
contaminated mine drainage / runoff.
TSS
Depends on the watershed really... Sediment is, by far, the biggest issue in urban areas. In agricultural areas, it is sediment plus nutrients.
At this point emphasis is on volume and flow rate.
Sediment loads as opposed to actual pollutants.
Sediment
PH and N, heavy metals in legacy sediment.
Sediment
Sediment clogging up inlets, rendering the Gi structures useless.
TDS

There was wide-ranging discussion during the meeting (meeting notes can be made available upon request). The generated a list of topics that were considered highest priority for the symposium. Those topics are listed below:

- Maintenance of stormwater control measures
- A student presentation on stormwater research
- A presentation on the basics of stormwater regulations, planning processes, etc.
- Case studies on stormwater control efforts
- Water quality dimensions of stormwater control
- Coordination across Design-Construction-Maintenance phases of a stormwater control measure lifecycle
- Vegetation in stormwater control (and maintenance implications)
- Modeling of stormwater processes and control systems
- Standardization of stormwater regulations
- Interactions between development and transportation (transport brings development that then impacts transportation infrastructure)
- Funding for stormwater management

#### 4.0 Stormwater Symposium Agenda

Based on the information emerging from the stormwater expert meeting in September, speaker availability, and program length, the symposium was organized as follows:

## 2023 University of Pittsburgh IRISE Stormwater Symposium Agenda

9:00 AM – 9:10 AM Opening Remarks: Joe Szczur, Director—IRISE

9:10 AM – 9:20 AM Overview/Logistics: Dan Bain

### Emerging Stormwater Regulations – Justin Kerns (Moderator)

9:20 AM – 9:35 AM *Draft PCSM Manual Update:* Sean Furjanic, PE, Environmental Program Manager, PA DEP [Remote]

9:35 AM – 9:50 AM *An Overview of the City of Pittsburgh Stormwater Design Manual:* Kyla Prendergast, City of Pittsburgh, Department of City Planning

9:50 AM – 10:00 AM Emerging Stormwater Regulations Panel Discussion

10:00 AM – 10:15 AM Break

### Maintenance – Sarah Cordek (Moderator)

10:15 AM – 10:30 AM *Stormwater Retrofits and Maintenance for Water Quality:* Jim Pillsbury, PE Hydraulic Engineer and Hank Bradish, Hydrologic Technician, Westmoreland County Conservation District

10:30 AM – 10:45 AM *PennDOT Maintenance Programs:* Rich Heineman, Roadway Programs Manager, PennDOT

10:45 AM – 11:00 AM *Coordination Across the Design, Construction, and Maintenance Phases:* Tyler Mercer & Caitlin Hulle, PennDOT District 11

11:00 AM – 11:15 AM Maintenance Panel Discussion

### Special Topics – Dan Bain (Moderator)

11:15 AM – 11:35 AM *Vegetation in Stormwater Control Measures:* Mark Fiely, Horticulturist, Ernst Conservation Seeds

11:35 AM – 11:55 AM *Funding Stormwater Infrastructure:* Catherine Tulley, Southwestern Pennsylvania Commission

12:00 PM – 1:00 PM Lunch

### Cross-Jurisdictional Coordination – Megan Guy (Moderator)

1:00 PM – 1:15 PM *County-level Participation in Municipal Stormwater Management:* Matt Trepal, Planning Division Manager, Allegheny County Economic Development

1:15 PM – 1:30 PM *Sharpsburg Stormwater Management and Cross Jurisdictional Coordination:* Brittany Reno, Mayor of Sharpsburg

1:30 PM – 1:45 PM *Etna Stormwater Management and Cross Jurisdictional Coordination:* Mary Ellen Ramage, Manager Borough of Etna

1:45 PM – 2:00 PM *Influence of Industrialization/Commercialization on Transportation Stormwater Management:* Sarah Cordek, Transportation Engineer for the Federal Highway Administration, PA Division

2:00 PM – 2:15 PM Cross-Jurisdictional Coordination Panel Discussion

2:15 PM – 2:30 PM Break

2:30 PM – 3:00 PM Open Discussion of Symposium Content and Next Steps – Dan Bain

#### 4.1 Symposium Open Discussion Summary

During the open discussion, several themes emerged in both training and research:

##### Training

- How to interact with the public and raise awareness
- Teach students how to run and use charettes
- How to activate/interact with students (including upping their participation in the symposium)
- Incorporate green infrastructure into engineering training
- Teach how to tell the watershed story rather than the industry or sector story
- Train folks on regulations in conjunction with DEP/DCNR/etc.
- Training in stream hydraulics and conveyance
- Making connections between people, streams, and transit
- Using the updated soil survey

##### Research

- Model stormwater ordinances (effectiveness, how to make more uniform)
- Assessment of regionalization efforts (what has been done, what worked what didn't, how can we improve)
- How to balance routine flows with local flood events in comprehensive stormwater management strategies
- Effective stream daylighting
- Long term changes in soil infiltration
- Can the ALCOSAN tunnel data be used to otherwise improve stormwater management
- We need an annual to quarterly meeting to continue this coordination.

#### 5.0 Post Symposium Survey of Attendees Summary

**On a scale of 1 to 10, please rate each row where 1=Very Dissatisfied and 10= Very Satisfied**

	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>Count</i>
Meeting Preparation (RSVP, agenda, reports, communications, etc.)	7	10	8.9	13
Symposium Content	5	10	8.3	15
Panel Discussions	4	10	8	15
Overall satisfaction with this meeting	5	10	8.5	15

**How likely are you to attend future IRISE Stormwater Symposia?**

	%	Count
Extremely likely	73%	11
Somewhat likely	27%	4
Neither likely nor unlikely	0%	0
Somewhat unlikely	0%	0
Extremely unlikely	0%	0
Total	100%	15

**How did you hear about this meeting?**

	%	Count
Social Media	0%	0
Webpage	0%	0
Collaboratory Mailing List	47%	7
Other	0%	0
Word of Mouth	40%	6
IRISE Mailing List	13%	2
Total	100%	15

**This meeting format was based on short presentations and panel discussions. Do you have suggestions for potential future meeting format?**

One participatory format that could work for this symposium is to adopt the TransportationCamp "unconference" strategy. (Check out: <http://transportationcamp.org/>) Participants are given sticky notes on arriving and asked to add their desired subject areas to a white board. The moderator sorts the notes into loose breakout groups, then attendees move to breakout groups with a moderator to track the discussions. Attendees report back to the main group after a session. It's a fun way to workshop ideas and get participation. There's also some "live data-sorting" activities where questions are asked of the group in a large room, and attendees move to one or another side of the room based on their response. Like a live scatterplot. :) Ppl get a kick out of it...TranspoCamp usually is popular with students and young urbanists.

Nope, I enjoyed this format

It would be nice to interact more one-on-one with other attendees. Maybe small group sessions.

I found the time allotment really good

Thought the format worked very well.

I think that the format was great and allowed for a lot of topics to be explored in a short amount of time. I liked the common threads for topics as well.

I enjoyed the format as it was

I liked the presentation grouping and subsequent panel discussions.

No, I appreciated the format. It allowed for a lot of different presentations, which kept it engaging and interesting.

Nope!

Panel discussions were very helpful and a unique feature of this symposium. It was nice to have presentations and then have a separate Q&A session after the specific topics.

**Do you have ideas for other topics for potential future IRISE Stormwater meetings? If so, please list below**

Oh gosh, where do I start! Water workforce, utility cybersecurity, regionalization, cooperative purchasing agreements, regional technical skills training for water authorities, capacity-building workshops (need to think on this more), creative ways that we can work around regulatory or financial roadblocks, working with foundations to develop innovative regional financing ideas, regional cooperation on green stormwater infrastructure...I could keep going!

More public transit and pedestrian content would be great. I know IRISE is focused heavily on highways systems, but I know there's a lot of interest in how we manage SW while weighing the needs of all types of transit. Bus stop or busway GSI could be an interesting topic. PRT is trying to start having more GI at their busway stops, so maybe they could share their experiences with that.

Common issues with installation and/or maintenance of green infrastructure BMPs

Loved the Ernst seed presentation but I wished there was more on the ecological side, mostly infrastructure it seemed

Speakers from other cities - highest performing GI. Smart GI.

Stormwater Fees; stormwater districts

A lot of talk about individual "stormwater ordinances" including the County "model ordinance" - would like to see a deeper dive into how those get developed, reviewed, enacted and what are some strengths and weaknesses (or loopholes) to know about.

I think that including regional leadership would be a nice addition. ALCOSAN's clean water plan would be an interesting panel for next year if possible. Discussing opportunities to manage stormwater upstream before it reaches the proposed tunnels is something we should continue to discuss and focus on.

Another topic of interest is the presence of harmful chemicals in our waterways related to unconventional oil and gas development. How do we regulate those industries and prevent pollution from entering our waterways?

Having a presentation on how to evaluate the performance of GSI's, Upstream Pittsburgh would be a great presenter on what they're doing with data to evaluate. It would also be interesting to hear from PWSA or Alcosan

Nope!

Permitting, WOTUS classification, wetland mitigation/compensation! All of these are big topics in consulting right now and could really benefit the industry.

**What specific training in stormwater management and associated topics would be useful for your work or education?**

I need to learn more about flood insurance, the CRS and elevation certifications, relevant financial instruments for funding stormwater mgmt, introduction to the Floodplain Manager certification, and just generally anything else that would be relevant.

It would be great to hear from folks in Philly about their SW programs. An overview of how to fit SW GI into a complete streets model would be interesting too!

Collaboration between entities (ACCD, municipality, DEP) on stormwater evaluation and design

More detail on what Kyla Prendergast presented

Combined Sewer Systems VS Separate Sewer Systems

stormwater management guidance in urban fill, historic fill. guidance with respect stormwater management and landslide prone areas.

Plugging back into the community and with students at Pitt

Water Permitting is a huge topic now with changing laws, wetland compensation has been a topic for years but with new procedures being rolled out this could be a great opportunity for learning.

**Please provide comments or additional feedback regarding your experience**

It was a great symposium and I think we kicked off some regionally-important conversations and work thanks to this event.

It would be great to get more students and young professionals in attendance.

A lot of prep work went into this - thank you!!

Would have been beneficial if the first session on the PCSM Manual would have included a link to the Draft or at least some more information on what the changes are from a high-level perspective. The remote nature of that session obviously did not help.

The last session with the downstream municipalities, County and FHWA was excellent - really got to the heart of why the issue is so complicated and essentially knows no (municipal) boundaries. Would like to see some discussion between upstream and downstream folks and perhaps more about local government groups (like the council of North Hills) that try to tackle this together and where they are successful and where they are not.

I would have liked to hear more from the DEP.

There was a bit of a heavy focus on transportation during this session, which didn't always have a strong tie back to stormwater discussed.

I really enjoyed the presentation on seed mixes. more on seeding and proper mulching for design performance and takeoff would be nice to see out of this group.

I would like to receive the slideshows from the conference as many of them contained contact information and helpful links.

Overall the symposium was a great experience! I wish there was more stormwater management design related discussion. There was a great array of govt. reps at the meeting but it would have been helpful having more reps from DEP or DCNR

## 5.0 Going Forward

The initial IRISE Stormwater Symposium initiated (or re-initiated in some cases) important conversations about stormwater management in southwestern Pennsylvania, particularly management of stormwater control in transportation systems. While the challenges are substantial and varied, there are several courses of action that rose to the surface.

1. A regular meeting on stormwater management can benefit efforts to meet these stormwater challenges. It is not clear what type of meeting would work best (e.g., shorter quarterly meetings or a single annual/bi-annual symposium) and some iteration is likely necessary to work out the most beneficial format. Nonetheless, striving toward regular meetings is a clear need.
2. There are several very important regional planning efforts occurring over the next several years. This represents a clear opportunity to engage across jurisdiction and sector and infuse the next generation of stormwater management regulation with

updated technical approaches. Engaging in this process likely requires both outreach to local governments and authorities as well as research on stormwater management approach and maintenance.

- a. In particular, making local stormwater management approaches more uniform and effective would provide benefits across sectors and potentially help clarify sticky issues including “stormwater ownership”
- b. We need to develop strategies that allow long term monitoring of stormwater infrastructure. Long-term evolution of these systems is a substantial gap in our understanding of management effectiveness.



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