Integrated Stormwater Management (iSWM) Subcommittee Meeting

- Staff Planner: Katie Hunter
- October 14, 2025

iSWM™

North Central Texas Council of Governments

Welcome and Introductions

- Please use the function to add your name and organization for attendance.
- Please keep microphone muted unless you're speaking.
- The meeting agenda, presentation and handouts are located on the iSWM Implementation Subcommittee Webpage

AGENDA

Action Items

Discussion Items

Information Items

General Information Items & Roundtable Discussion.

1. Welcome and Introductions
2. Approval of July 15, 2025, Meeting Summary.
3. iSWM Implementation Documentation Review Process
4. Recent Advances in SWMM- Mitch Heineman
5. Sticky Dot Exercise Results Summary and Discussion
6. Public Work Council Has Approved the FY26 Work Plan
7. Regional Public Works Program Update.
8. TMDL Program Update
9. Upcoming Events and Conferences
10. Upcoming NCTCOG Meetings
11. Future Agenda Items and Schedule for Next iSWM Meeting
12. Roundtable Discussion

Adjournment

Welcome & Introductions

Action Items

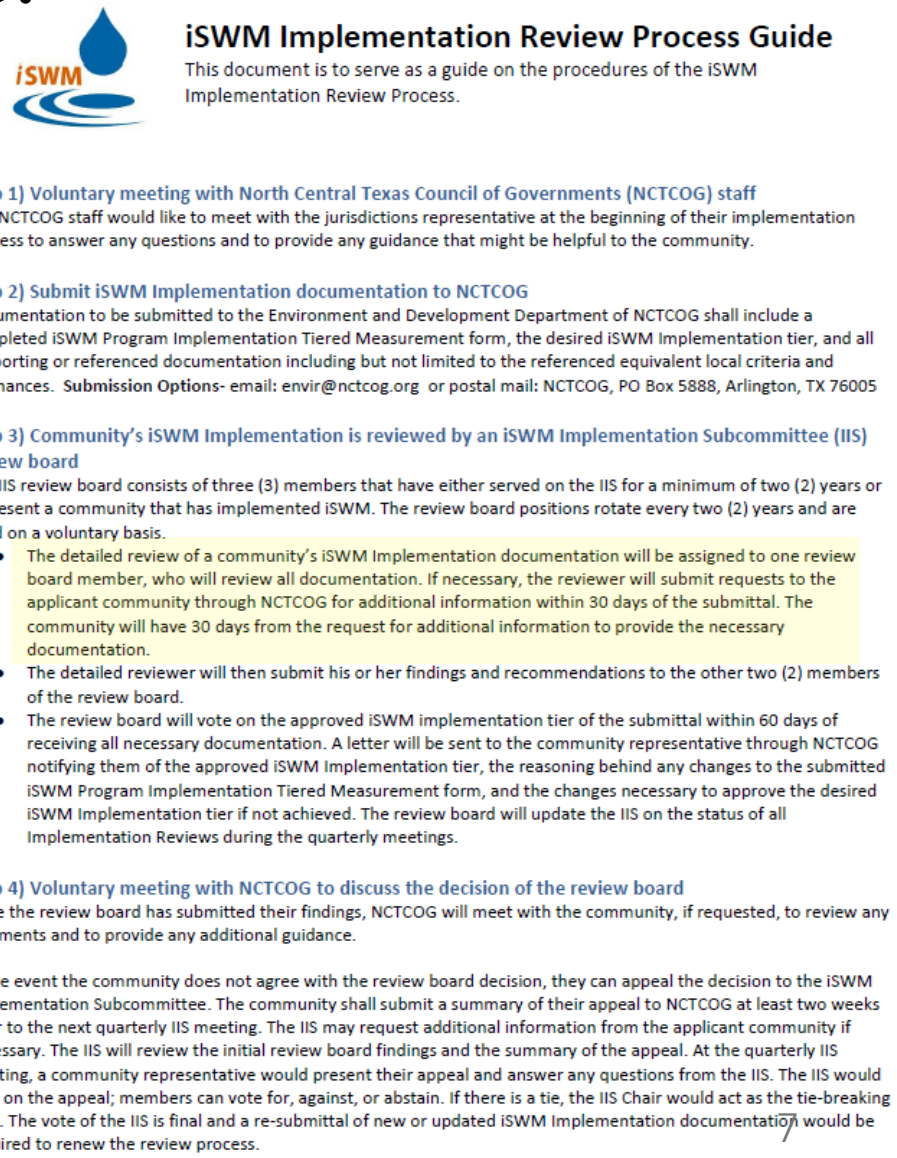
2. Approval of July 15, 2025, Meeting Summary.

- Summary located on the iSWM Implementation Subcommittee Webpage

- iSWM Subcommittee will vote to approve the summary

3. iSWM Implementation Documentation Review Process Vote to lengthen from 30 to 60 Days.

- “If necessary, the reviewer will submit requests to the applicant community through NCTCOG for additional information within 30 days of submittal.”



iSWM Implementation Review Process Guide

This document is to serve as a guide on the procedures of the iSWM Implementation Review Process.

Step 1) Voluntary meeting with North Central Texas Council of Governments (NCTCOG) staff

The NCTCOG staff would like to meet with the jurisdictions representative at the beginning of their implementation process to answer any questions and to provide any guidance that might be helpful to the community.

Step 2) Submit iSWM Implementation documentation to NCTCOG

Documentation to be submitted to the Environment and Development Department of NCTCOG shall include a completed iSWM Program Implementation Tiered Measurement form, the desired iSWM Implementation tier, and all supporting or referenced documentation including but not limited to the referenced equivalent local criteria and ordinances. **Submission Options**- email: envir@nctcog.org or postal mail: NCTCOG, PO Box 5888, Arlington, TX 76005

Step 3) Community’s iSWM Implementation is reviewed by an iSWM Implementation Subcommittee (IIS) review board

The IIS review board consists of three (3) members that have either served on the IIS for a minimum of two (2) years or represent a community that has implemented iSWM. The review board positions rotate every two (2) years and are filled on a voluntary basis.

- The detailed review of a community’s iSWM Implementation documentation will be assigned to one review board member, who will review all documentation. If necessary, the reviewer will submit requests to the applicant community through NCTCOG for additional information within 30 days of the submittal. The community will have 30 days from the request for additional information to provide the necessary documentation.
- The detailed reviewer will then submit his or her findings and recommendations to the other two (2) members of the review board.
- The review board will vote on the approved iSWM implementation tier of the submittal within 60 days of receiving all necessary documentation. A letter will be sent to the community representative through NCTCOG notifying them of the approved iSWM Implementation tier, the reasoning behind any changes to the submitted iSWM Program Implementation Tiered Measurement form, and the changes necessary to approve the desired iSWM Implementation tier if not achieved. The review board will update the IIS on the status of all Implementation Reviews during the quarterly meetings.

Step 4) Voluntary meeting with NCTCOG to discuss the decision of the review board

Once the review board has submitted their findings, NCTCOG will meet with the community, if requested, to review any comments and to provide any additional guidance.

In the event the community does not agree with the review board decision, they can appeal the decision to the iSWM Implementation Subcommittee. The community shall submit a summary of their appeal to NCTCOG at least two weeks prior to the next quarterly IIS meeting. The IIS may request additional information from the applicant community if necessary. The IIS will review the initial review board findings and the summary of the appeal. At the quarterly IIS meeting, a community representative would present their appeal and answer any questions from the IIS. The IIS would vote on the appeal; members can vote for, against, or abstain. If there is a tie, the IIS Chair would act as the tie-breaking vote. The vote of the IIS is final and a re-submittal of new or updated iSWM Implementation documentation would be required to renew the review process.

Discussion Items

4. Recent Advances in SWMM

- Mitch Heineman, P.E. BC.WRE, BCEE, Principal Developer of CDM Smith's NetSTORM Software for Precipitation Frequency Analysis

Recent Advances in SWMM

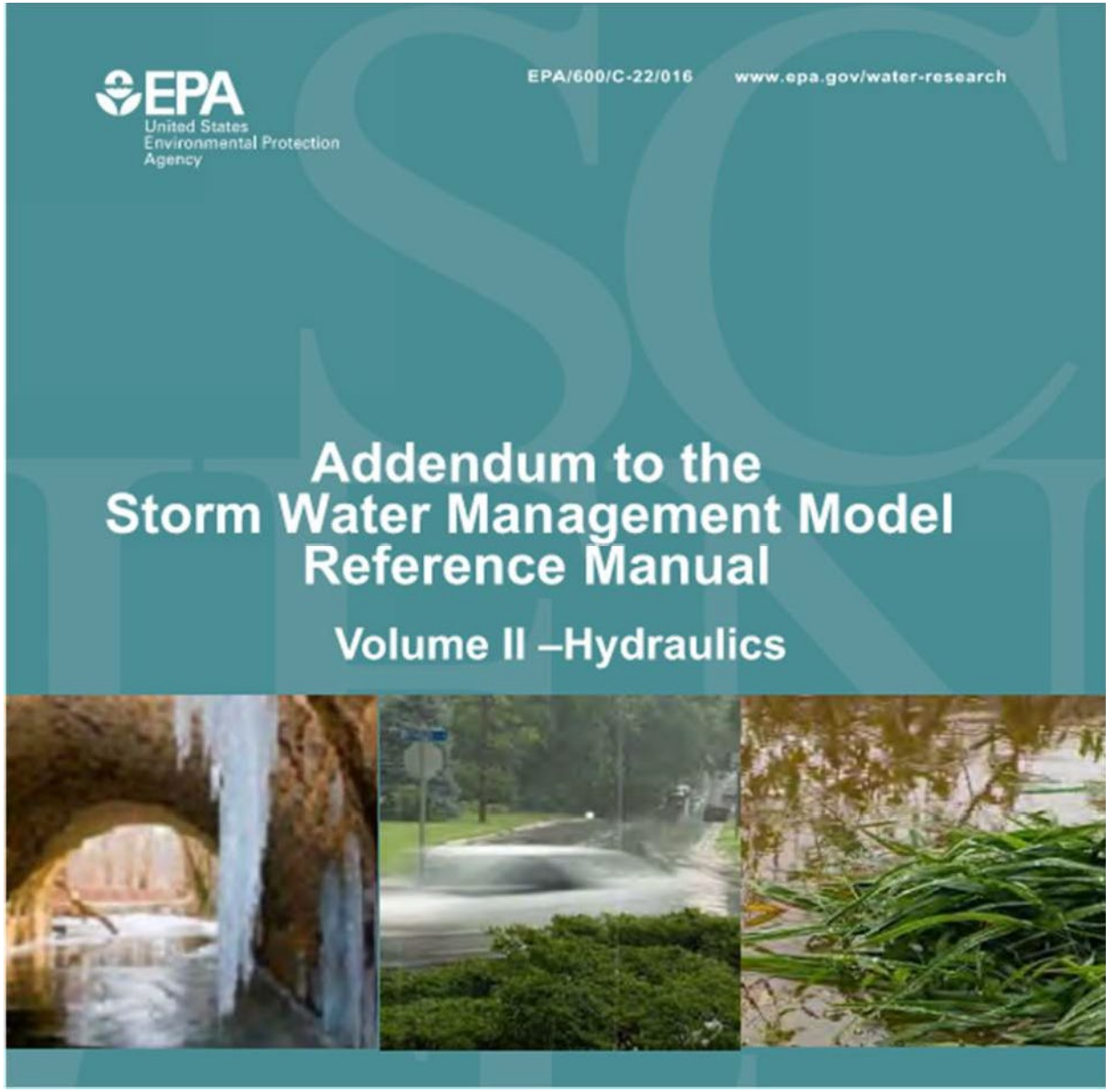
Mitch Heineman, P.E. BC.WRE, BCEE

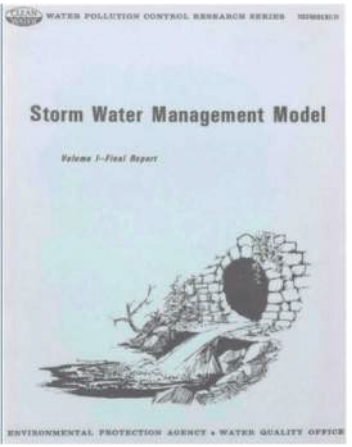
October 14, 2025

CDM Smith

Topics

- SWMM overview
- Timeline
- SWMM 5.2 features
- Best practices

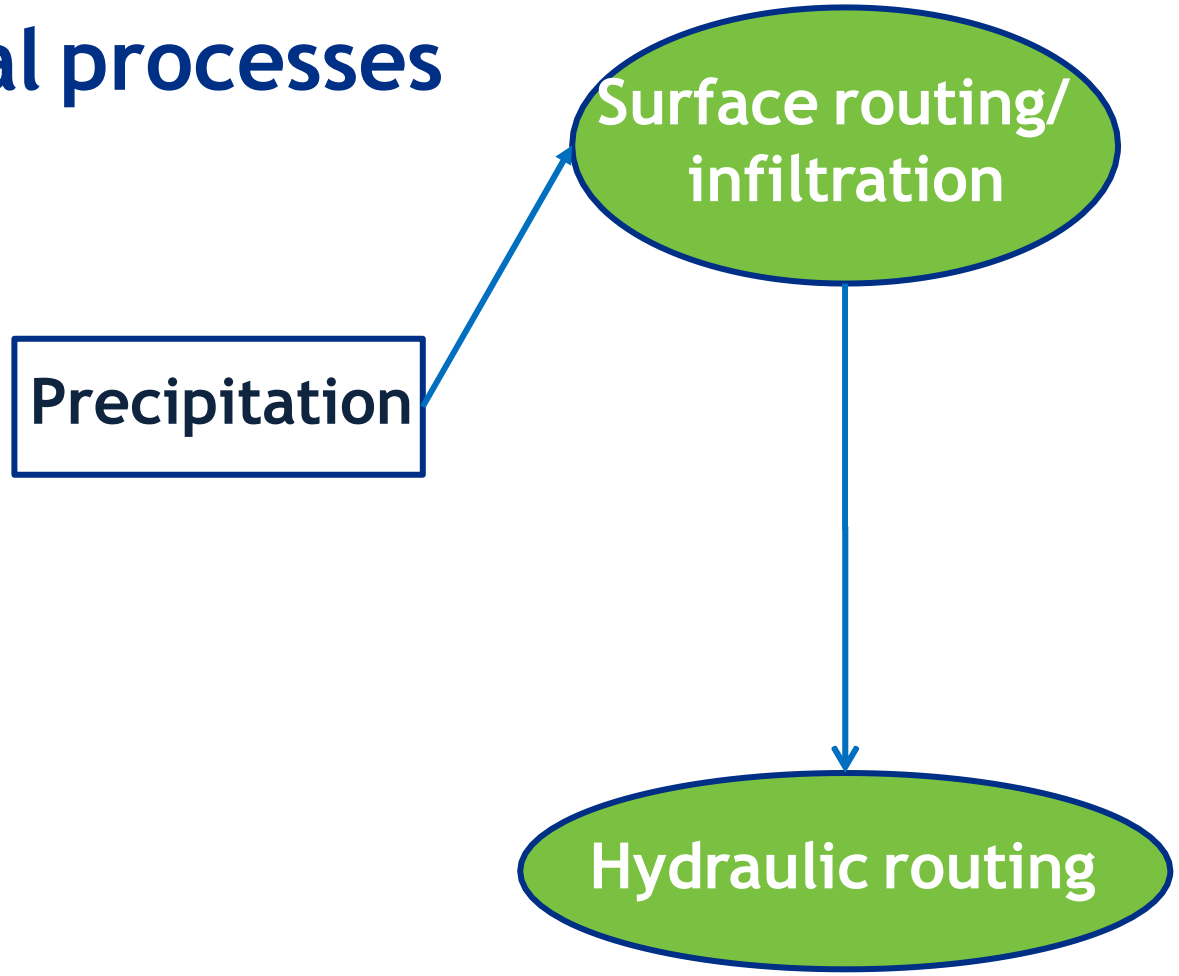




EPA Storm Water Management Model

- Dynamic urban rainfall-runoff simulation model
  - event or continuous simulation
  - runoff quantity and quality
- Runoff component operates on a collection of subcatchments that receive precipitation and generate runoff and pollutant loads
- Routing component conveys flow through pipes, channels, storage/treatment devices, pumps, and control structures
- During multiple time step simulation, model tracks:
  - quantity and quality of runoff within each subcatchment
  - discharge, depth, and quality of water in hydraulic elements

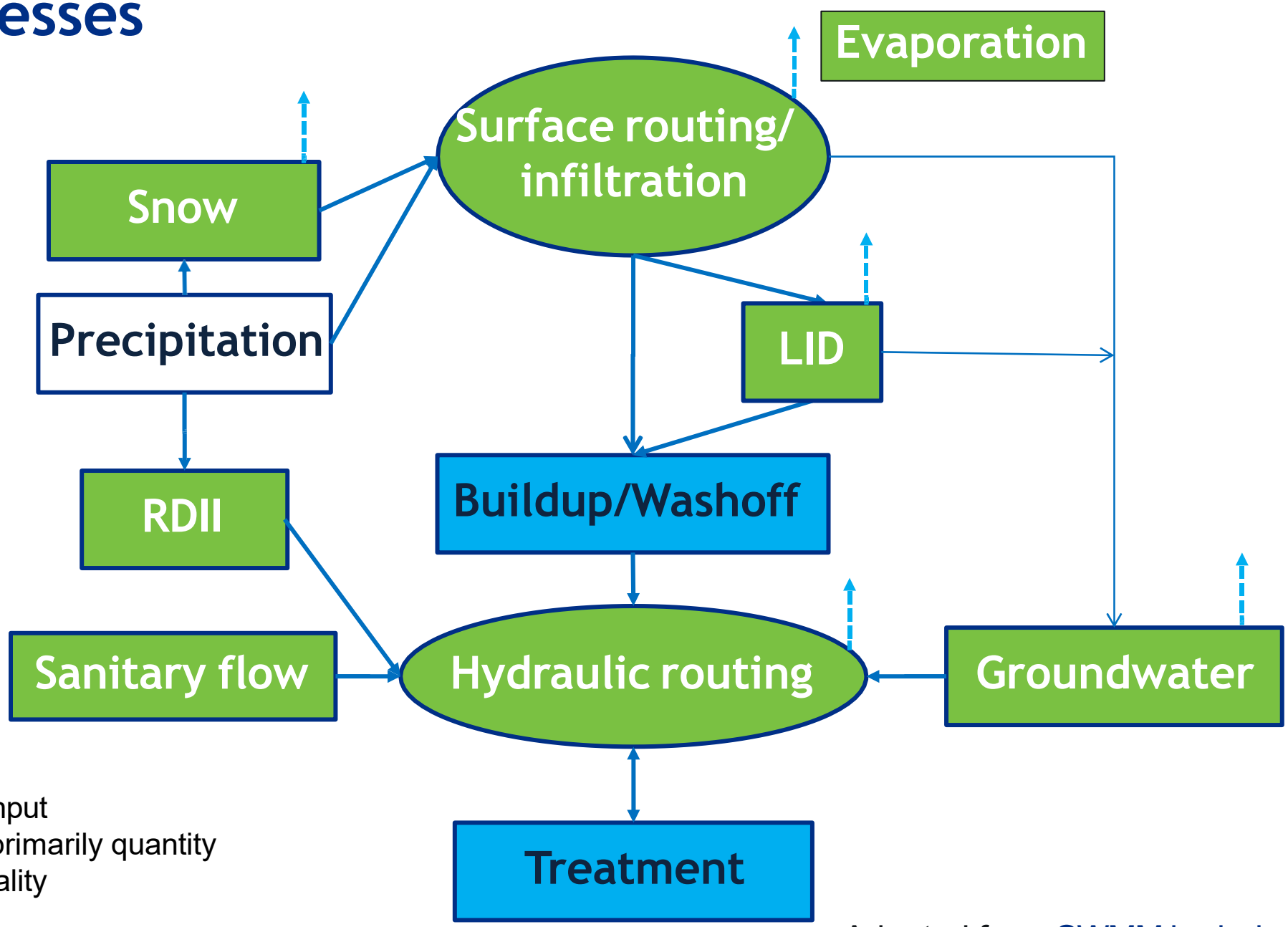
Typical processes



White – input
Green – primarily quantity
Blue - quality

Adapted from SWMM hydrology manual Figure

All processes



White – input
Green – primarily quantity
Blue - quality

Adapted from SWMM hydrology manual Figure

2004 - 2020 Improvements

- Version 5.0 (2004-2011)
  - Hargreaves evaporation (5.0.016)
  - LID (5.0.019)
- Version 5.1 (2014-2020)
  - Green roof and rain garden LIDs (5.1.001)
  - Conduit evaporation and seepage (5.1.001)
  - Adjustments (5.1.007)
  - Events (5.1.011)

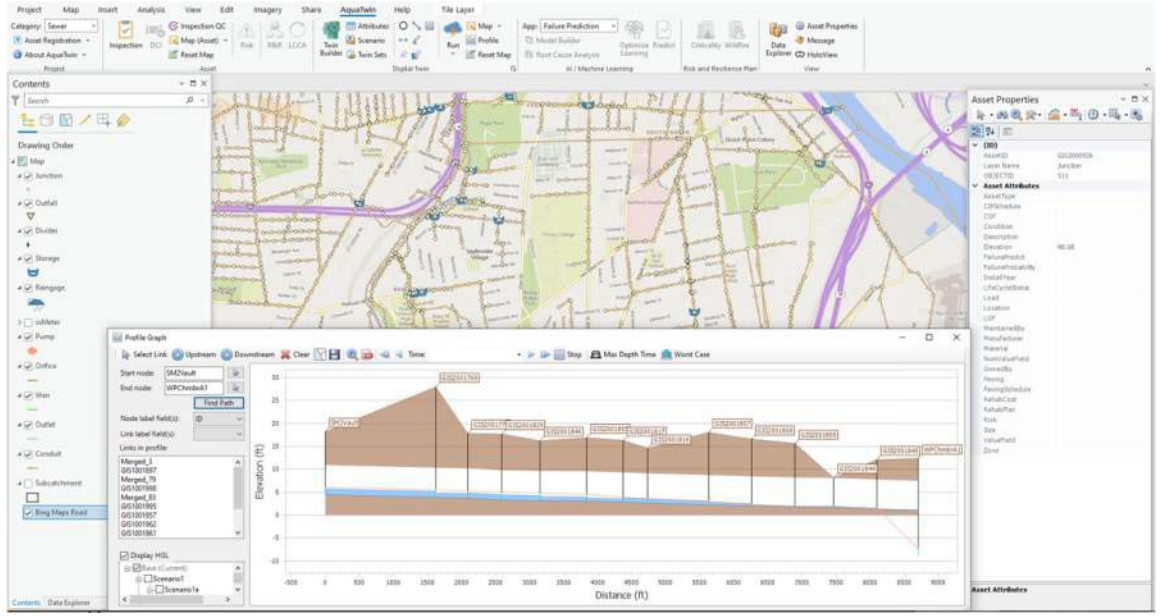
2021-2023 Improvements

- Version 5.2.0 (2021-2023)
  - Streets and inlets
  - Affinity law-compliant pumps
  - Additional control rule options
  - Additional API functions
- Proprietary GUIs
  - Autodesk InfoWorks ICM SWMM (2019)
  - DHI MIKE URBAN replaced with MIKE+ and Microsoft SQL Server database architecture (2019)
  - CHI PCSWMM architecture revised from shapefiles to SQLite (2021)
  - Aquanuity AquaTwin introduced (2023)

New Proprietary GUIs

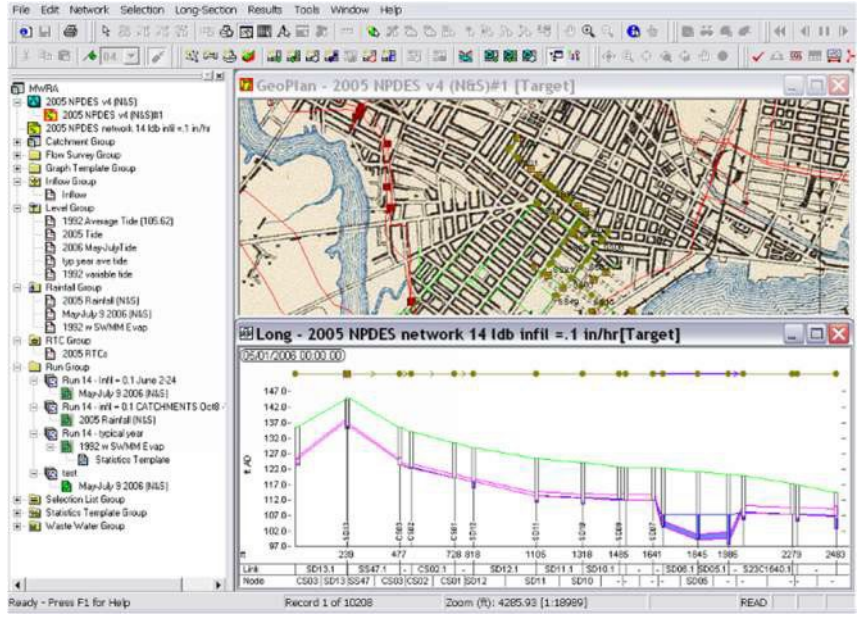
Aquanuity AquaTwin

- Company formed 2022
- Supports SWMM 5.2.4
- Extension within ArcGIS Pro
- Esri file geodatabase



Autodesk InfoWorks ICM SWMM

- InfoWorks software acquired by Innovyze from Wallingford Software (UK) in 2009. Autodesk purchased Innovyze in 2021
- Built upon former InfoSWMM engine
- Proprietary database



Version 5.2

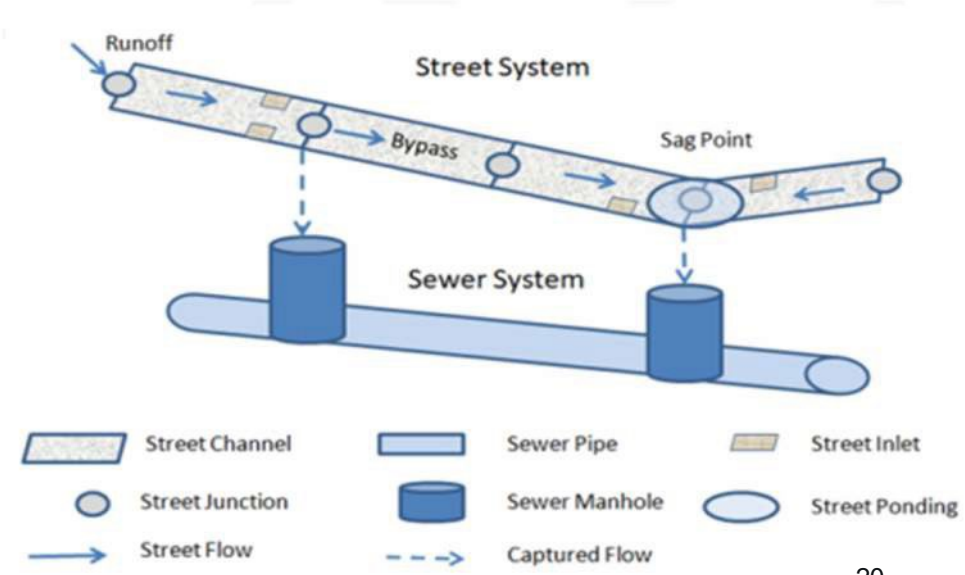
- HEC-22 analysis of street and channel inlet drains
  - STREET cross section shape supports HEC-22 inlet analysis
  - STREET summary table displays results for each Street conduit; INLET added to the list of Summary Reports
- Storage curves for truncated elliptical cones and rectangular pyramids
- Type 5 pump curve resembles Type 3 (head versus discharge) curve except that its setting, which can be adjusted by control rules, alters curve's shape
- Additional quantities, e.g., rainfall, added to list of attributes that can be compared against in control rule condition clauses
- Control rules support named variables and arithmetic expressions
- GUI dialog added to help user select Culvert Code number for conduits based on culvert's shape and inlet design
- Status Report lists most frequent non-converging nodes

Version 5.3 (dormant)

- Linux and MacOS support for engine
- Expanded unit and regression testing
- Expanded API
- Python bindings
- Consolidating documentation; live web versions of manuals and source documentation
- Improved I/O including CSV support

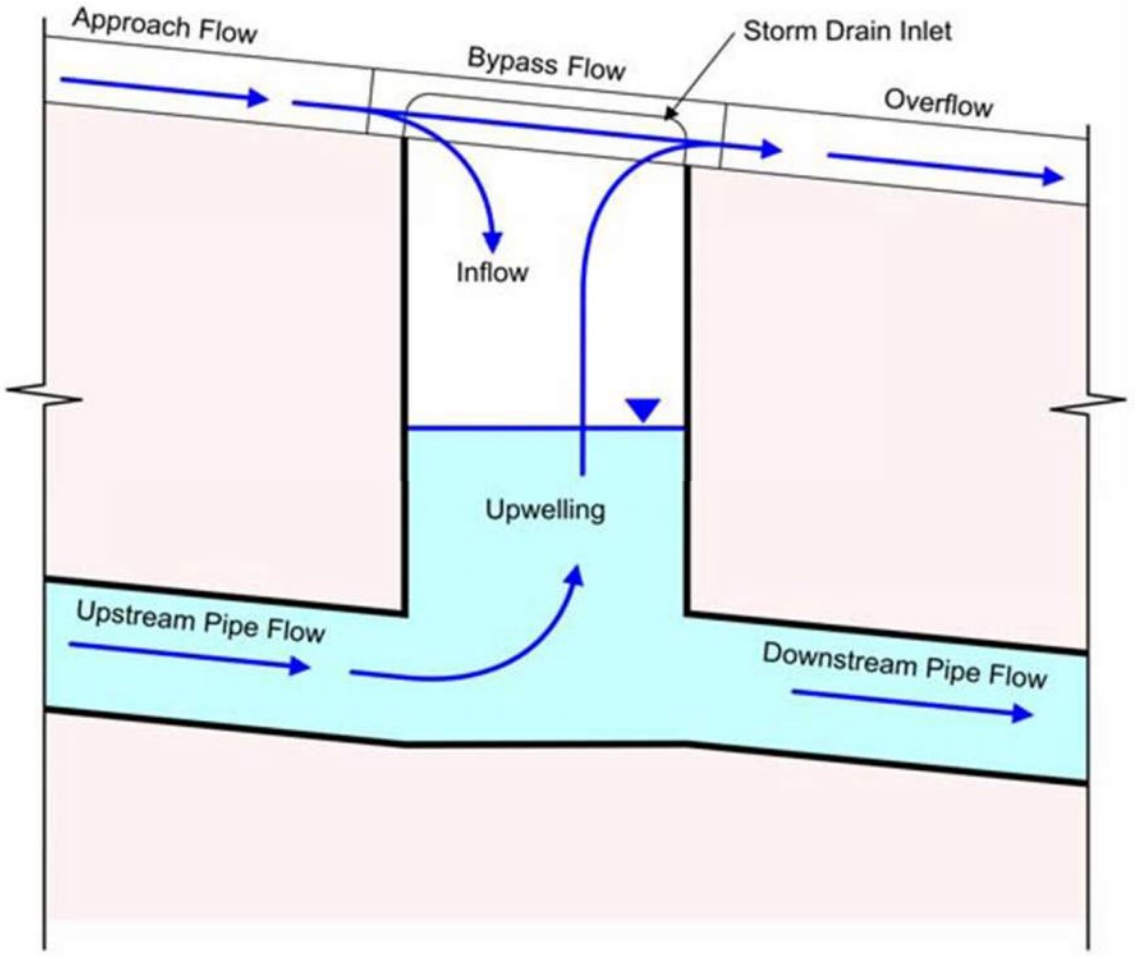
Streets and Inlets

- Uses FHWA "Urban Drainage Design Manual" (HEC-22) methods
- Streets conduit type added
- Inlets are non-spatial objects associated with conduits
  - Standard inlets can be assigned to streets, rectangular or trapezoidal conduits
  - Custom inlets can be assigned to any conduit shape

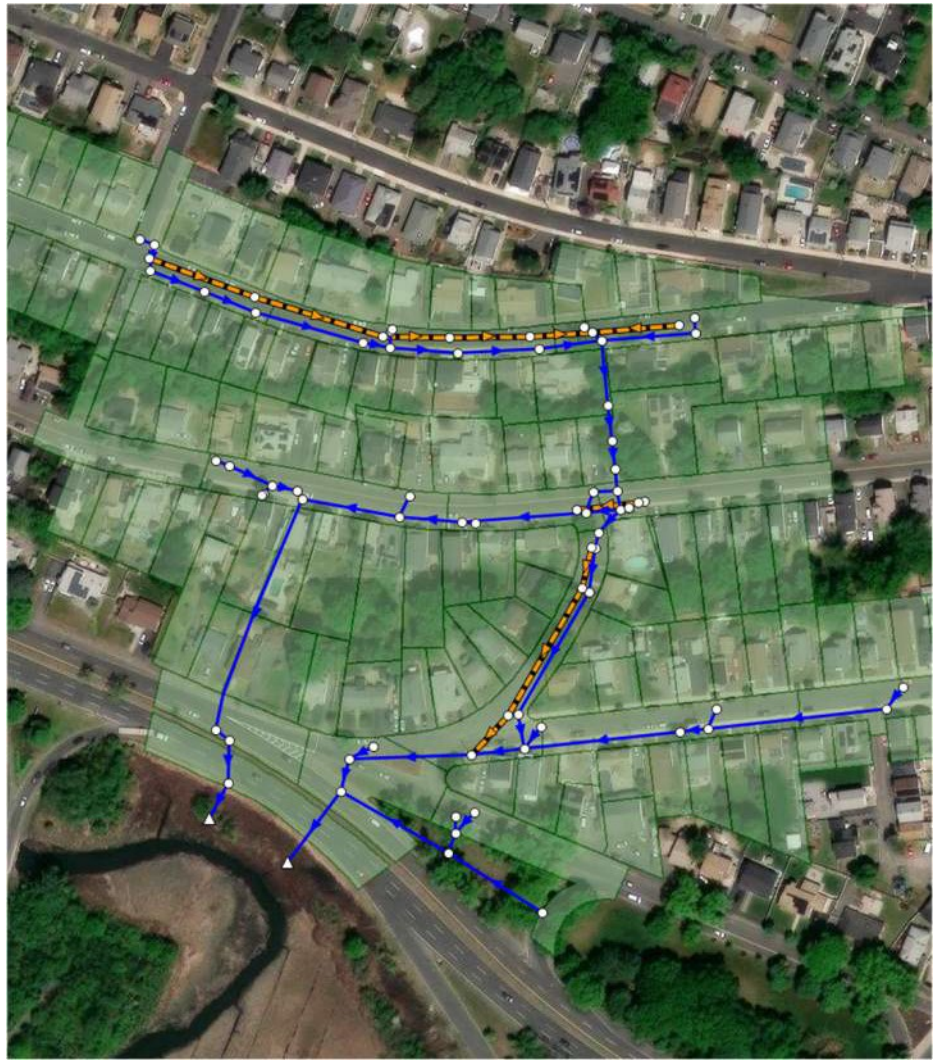


Inlet Analysis

- At each flow routing time step:
  - Compute each inlet's flow capture (Qc) using HEC-22 methods
  - Add Qc to sewer node's lateral inflow
  - Subtract Qc from lateral inflow to inlet's street node
  - Add any sewer node overflow to street node's lateral inflow
  - Apply usual flow routing procedure



Streets/inlets example model



```
[STREETS]
;;Name           Tcrown    Hcurb     Sx        nRoad     a         W         Sides     Tback     Sback     nBack
;;-------------- --------- --------- --------- --------- --------- --------- --------- --------- --------- ---------
22Ft             11        0.5       2         0.016     0         0         1         0         0         0
26Ft             13        0.5       2         0.016     0         0         1         0         0         0
30Ft             15        0.5       2         0.016     0         0         1         0         0         0

[INLETS]
;;Name           Type            Parameters:
;;-------------- --------------- -----------
Grate            GRATE           2         2         P_BAR-50
Combination      GRATE           2         2         P_BAR-50
Combination      CURB            2         0.5       VERTICAL

[INLET_USAGE]
;;Conduit        Inlet           Node            Number    %Clogged  Qmax      aLocal    wLocal    Placement
;;-------------- --------------- --------------- --------- --------- --------- --------- --------- ---------
Fenno1           Grate           UNKSWMH-1       2         0         0         0         0
Fenno2           Combination     SWMH4262        1         0         0         0         0
PennSt1          Grate           DMH-4           1         0         0         0         0
PennSt2          Grate           DCB07341        1         0         0         0         0
Ridge1           Grate           SWCB2928        1         0         0         0         0
Ridge2           Grate           SWCB2931        1         0         0         0         0
Ridge4           Grate           SWCB2933        1         0         0         0         0
Ridge5           Grate           SWCB2935        1         0         0         0         0
Ridge7           Grate           SWCB2935        1         0         0         0         0
```

Control Rule Enhancements

Control rule premise clauses expanded to include:

- Additional control parameters
  - rain gage current rainfall & next rainfall
  - node full depth, volume, head
  - conduit length, slope, full depth, full flow, velocity
- Named variables as aliases for Object - ID - Property

```
Variable N23 = Node 23 Depth
```

- Math expressions containing named variables

```
Expression HGL = abs(H23.1-H23.2)/L23
```

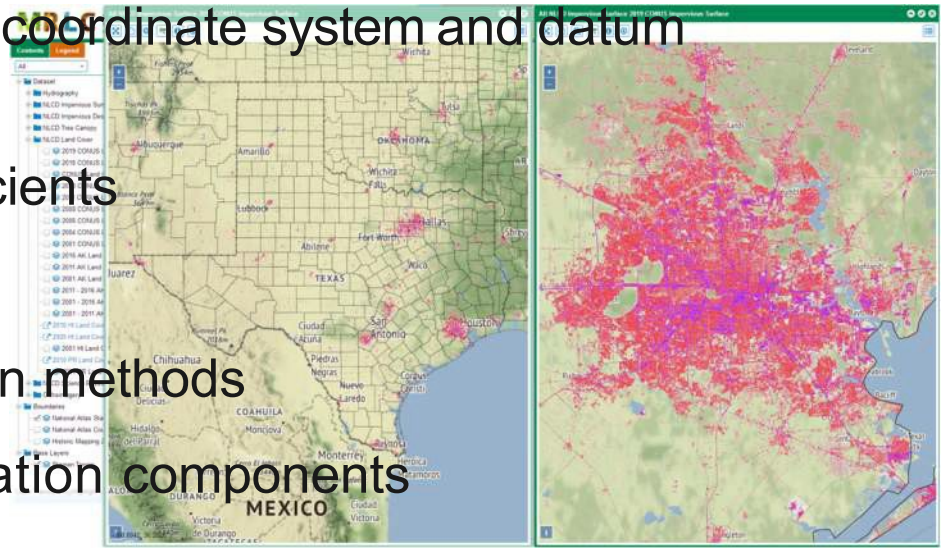
Control Rule Examples using Variables and Expressions

```
[CONTROLS]
VARIABLE CTRiverNAVD = NODE ConnRiver50.0 HEAD
EXPRESSION CTRiverNGVD =  CTRiverNAVD + 0.9

; Maintain 120 mgd flow to wet weather disinfection tank
RULE WPCFWetWeather
IF LINK WpcfEffluentWeir FLOW <> 120
THEN ORIFICE WpcfToWDT SETTING = PID -1 0.5 0

RULE 01WpcfEffluentPS
IF CTRiverNGVD > 7.0
OR SIMULATION MONTH >= 5
AND SIMULATION MONTH <= 9
AND CTRiverNGVD > 4.0
THEN PUMP WpcfEffluentPS STATUS = ON
ELSE PUMP WpcfEffluentPS STATUS = OFF
```

```
[CONTROLS]
Variable Q1 = Link SMH005429 Flow
Variable Q2 = Link SMH007913 Flow
Variable Q3 = Link SMH006947 Flow
Variable Q4 = Link MCCKSiphonInf Flow
Variable Q5 = Link MMCK36SiphonInf Flow
Variable Q6 = Link MMCK48SiphonInf Flow
Expression WWTPinflow = Q1 + Q2 + Q3 + Q4 + Q5 + Q6

;South Bank Control / wet: upstream modulation to maintain 105 mgd
Rule SystemControl_S
If   Pump SystemControlDummy Setting = 1
And Orifice Mermck_Control Setting < 0.47
And  WWTPinflow <> 105
Then Orifice Mermck_Control Setting = PID 0.5 0.5 0.0
Priority 1
```

Best Practices

- Good internal and external documentation including coordinate system and datum identification
- NLCD imperviousness with Sutherland routing coefficients
- NRCS soil infiltration rates
- Modified Horton or Green-Ampt, not legacy infiltration methods
- Dry weather flow partitioning into sanitary and infiltration components
- Conduit lengthening
- Subcatchment routing coefficient and width calibration to CIWEM guidelines
- Replacement of SCS hyetographs with Atlas 14 or other appropriate shapes



INSIGHT

How SWMM Changed the Way Cities View Water

How a pioneering software model and the engineers behind it transformed U.S. urban water quality over the course of a half-century.

In the late 1960s, water quality in American cities was in crisis. Polluted water degraded urban infrastructure, ecosystems, and quality of life. Cleveland's Cuyahoga River caught fire at least 13 times before 1969, contaminated so severely with industrial waste that even leeches and sludge worms had no chance at survival. In a **1969 *Time* article** on American sewer systems, a Cleveland citizen joked grimly, "Anyone who falls into the Cuyahoga does not drown. He decays." Philadelphia's waterways turned the **paint of ships brown** when they docked or traveled through. A dip in Miami's Biscayne Bay became hazardous in the

RELATED CAPABILITIES

Water

Water Resources

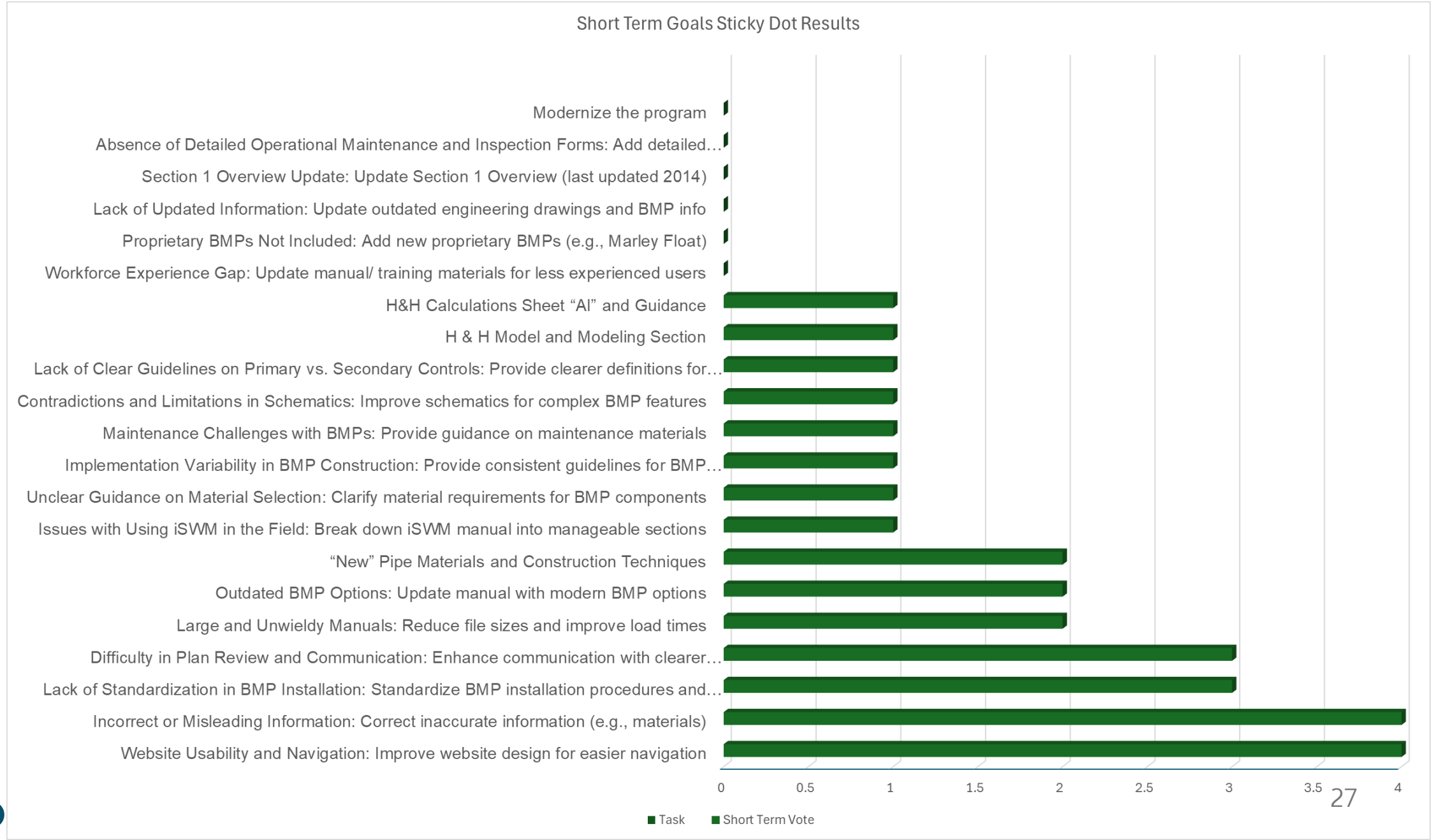
One Water

CDMSmith.com/SWMM

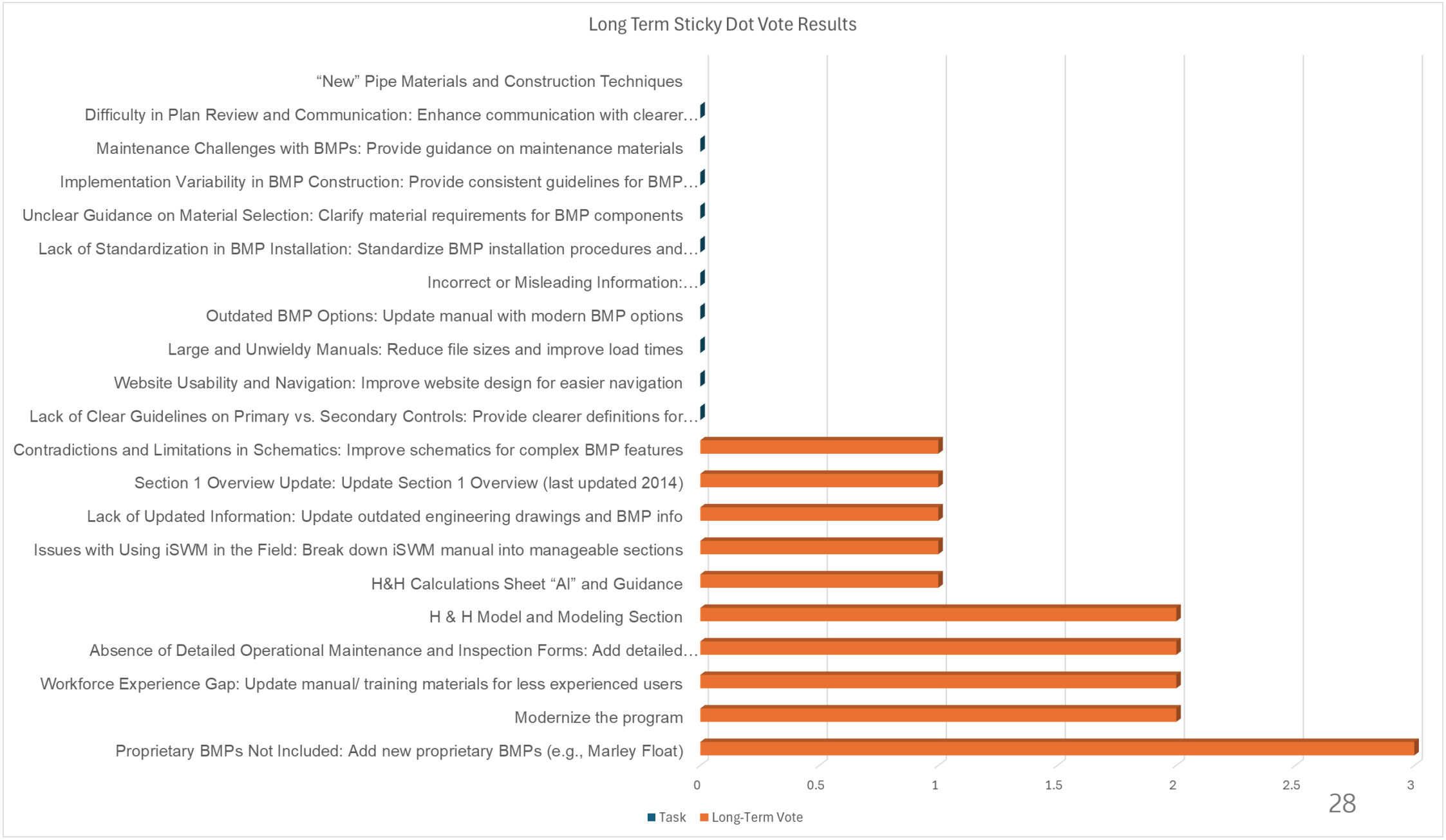
Dynsystem.com/NetSTORM

Linkedin.com/in/Mitch-Heineman

5. Sticky Dot Exercise Results



5. Sticky Dot Exercise Results



5. Sticky Dot Exercise Results Discussion

- Do the results of the Sticky Dot exercise accurately reflect our group's priorities?

5. Sticky Dot Exercise Results Discussion

- Based on our top short-term goals, what actionable tasks should we now focus on?

- Website Usability and Navigation: Improve website deign for easier navigations

- Incorrect or Misleading Information: Correct inaccurate information (e.g materials)

- Lack of Standardization in BMP Installation: Standardize BMP installation procedures and materials

- Difficulty in Plan Review and Communication: Enhance communication with clearer schematics and instructions

6. Public Work Council Has Approved the FY26 Work Program Tasks

	Task
1	**Research "Cumulative Impacts" on Small Footprint Developments (continued from FY24)** Research the impact of impervious cover on developments under one acre to assess cumulative drainage effects. Coordinate findings with North Texas communities and develop a memo with research and recommendations for the iSWM subcommittee and NCTCOG, incorporating feedback before finalizing. Led by Halff Associates, reviewed by NCTCOG Staff.
2	**iSWM Promotional Presentation for Partnering Organizations (continued from FY25)** Identify and coordinate potential promotional events with partner organizations. Develop iSWM promotional training, and presentation materials, and present at up to two events. Co-Led by Halff Associates and NCTCOG Staff.
3	**Develop Technical Case Studies (continued from FY25)** Continue research and develop guidance on inlet protection devices. Prepare a draft memo for iSWM subcommittee and NCTCOG review, incorporate feedback, and finalize the memo. Led by Halff Associates, reviewed by NCTCOG Staff.
4	**Stormwater Quality Monitoring Program Development for Existing iSWM BMPs (continued from FY25)** Identify BMPs built to iSWM criteria for monitoring and develop a BMP monitoring program based on national and regional guidance, including EPA/ASCE standards. Finalize the program document following iSWM subcommittee and NCTCOG review. Led by Halff Associates, reviewed by NCTCOG Staff.

6. Public Work Council Has Approved the FY26 Work Program Tasks

	Task
5	**Identify Short- and Long-Term iSWM Manual Updates; Implement Updates to iSWM Manuals** Identify short- and long-term manual updates to be implemented based on feedback received at iSWM subcommittee meetings. Halff Associates will assist NCTCOG staff in implementing short-term updates to the iSWM manuals and provide updated materials to NCTCOG for upload.
6	**Identify Short- and Long-Term iSWM Website Changes; Implement Updates to iSWM Website** Identify short- and long-term website updates to be implemented based on feedback received at iSWM subcommittee meetings. NCTCOG to implement short-term updates to the iSWM website.
7.	**Identify Short- and Long-Term Areas of Modernization for the iSWM program; Implement Updates to the iSWM Program** Identify short- and long-term areas of modernization for the iSWM program through discussions at iSWM subcommittee meetings. Halff Associates to assist NCTCOG staff with short-term modernization of the iSWM program.
8.	**Project Management** NCTCOG staff will lead project management activities, including scheduling meetings, preparing materials, reviewing deliverables and coordinating with work program partners. Halff Associates will provide support services as needed, attend meetings, and assist as the existing budget allows.

Information Items

7. Regional Public Works Program Update

Public Works Roundup

- Held September 4th
- Presentations are posted online at: https://www.nctcog.org/envir/public-works/annual-public-works-roundup/2025-public-works-roundup
- Tentative date for 2026: August 20, 2026

Public Works Council

- FY26 resources (roster, bylaws, work program, cost shares) uploaded to: https://www.nctcog.org/envir/committees/public-works-council
- Next Meeting: November 20 (virtual), 9:30am to 11:30am (Add to your calendar: https://www.addevent.com/event/cq2648912)

7. Regional Public Works Program Update

New NCTCOG Contacts for Public Works

- Crysta Guzman, Senior Planner, cguzman@nctcog.org
- Madisson Dunn, Planner, mdunn@nctcog.org

8. Total Maximum Daily Load Program Update

- Upcoming TMDL Implementation Plan Strategies updates and next steps virtual meeting on November 3, at 1:30-3:30pm

- If interested in participating, you may review the I-plan here:

https://nctcog.org/getmedia/82ffd247-8e79-4894-b69a-4b1d77fea5bd/TrinityIPlan2024-final.pdf

- Contact Joy Douglas for questions or feedback @ jdouglas@nctcog.org

Other Business

9. Upcoming Events, Conferences, and Opportunities

- **Dry Weather Field Screening Workshop**

  October 20, 9:30am - 3:30pm

  Tarrant County Resource Connection- Magnolia Room

  1100 Circle Drive Fort Worth, TX 76119

  Link to Register: https://www.addevent.com/event/Ys26749620

- **SW3P Plan Review and Field Inspector Training Courses**

  (Registration closes Oct. 30)

  Link to register: https://form.jotform.com/251893891180163

  Plan Reviewers: Nov. 13, 8:30am-12:30pm

  Field Inspectors: Nov. 14, 8:30am-12:30pm

9. Upcoming Events, Conferences, and Opportunities

- Research at UTA is being conducted about the current state of practice, identification of opportunities for advancement, and implementation barriers for Nature-Based solutions (NBS).

- If you'd like to participate, please follow the link below:

https://www.nctcog.org/getmedia/c52ada26-81bb-4beb-8d0d-68d6e5090ce7/UtilitySurveyFlyer_July2025.pdf?ext=.pdf

9. Upcoming Events, Conferences, and Opportunities

Model Development and Floodplain Ordinances Workshop

Purpose: To receive feedback on elements such as green stormwater infrastructure and nature-based solutions to incorporate into a model development code and model floodplain ordinance for flood prevention and mitigation.

Intended Audience: Anyone with technical expertise, experience, or interest in the areas of flood prevention or mitigation using development or floodplain regulatory tools.

Thursday, January 29, 2026, 10:00 am-12:00 pm

NCTCOG, 616 Six Flags Drive, Centerpoint II, Arlington, Transportation Council Room

Hybrid meeting format

For more info, visit http://www.nctcog.org/TSI

This effort is part of the Upper Trinity River Transportation and Stormwater Infrastructure (TSI) Project that seeks to reduce future flood risk through the integration of transportation, environmental, and stormwater planning.

10. Upcoming NCTCOG Meetings

- Water Resource Council Meeting: October 15, 10:30am, NCTCOG Offices
- Regional Stormwater Management Coordinating Committee: November 12, 9:30am, NCTCOG Offices
- Public Works Council Meeting: November 20, 9:30am, Virtual
- Trinity River Common Vision Flood Management Task Force Meeting: November 21, 9:30am, NCTCOG Offices

Environment & Development Committees Information
Available at nctcog.org/envir/committees

11. Upcoming iSWM Agenda Topics and Next iSWM Meeting

- Next iSWM Meeting: January 13, 2026 at 1:30pm in person at NCTCOG Offices (Centerpoint III , 3rd floor E & D, Tejas Conference Room B)

- Topic recommendations for the next meeting?

12. Roundtable Discussion

“Now, it is your turn.”

Contact & Connect

Katie Hunter
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