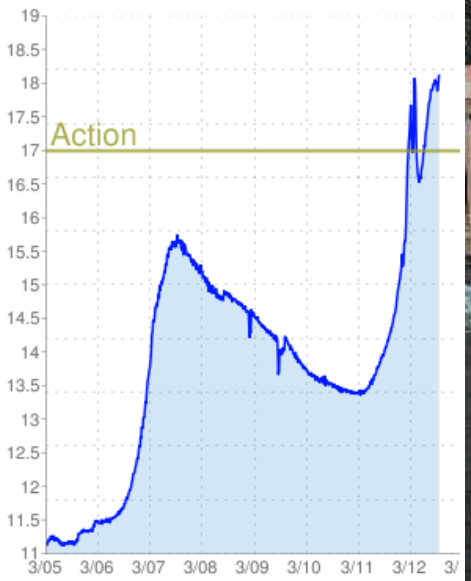
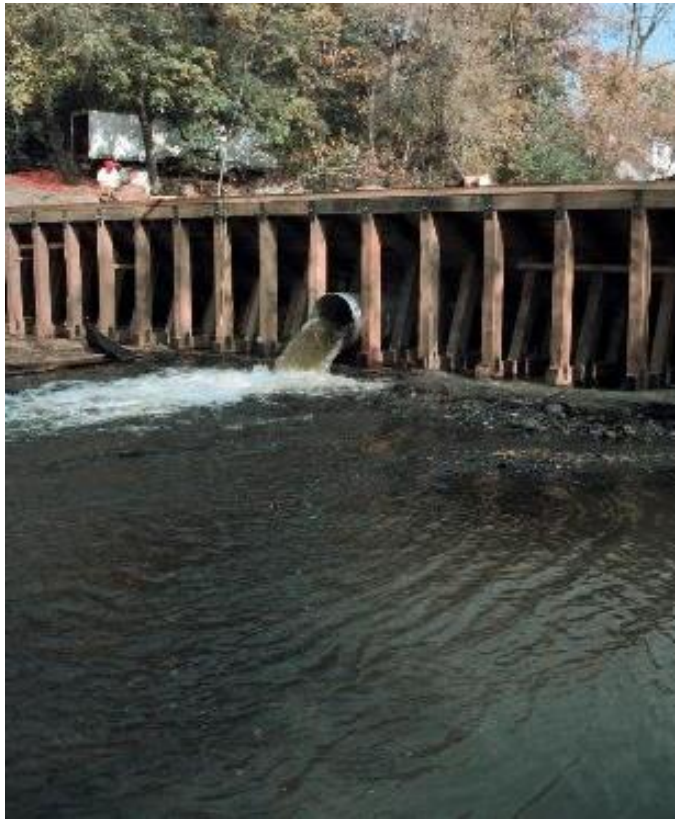
Enabling Best Practices for Stormwater

Through a Standards Based Framework





LHCSD - Southeast New York Stormwater Conference, 10/17/2018

What I'll cover

- Motivation
- Goals and requirements
- Initial accomplishments

Stormwater Challenges

System expansion and maintenance

BMPs/Storm control measures.

Floodplain management. CRS credit tracking.

Hazard mitigation. New mapping justifications.

EPA/DEC, illicit discharges, MS4 permit reporting /renewal.

Culvert upgrade EFC funding, DPW coordination.

Framework Goals

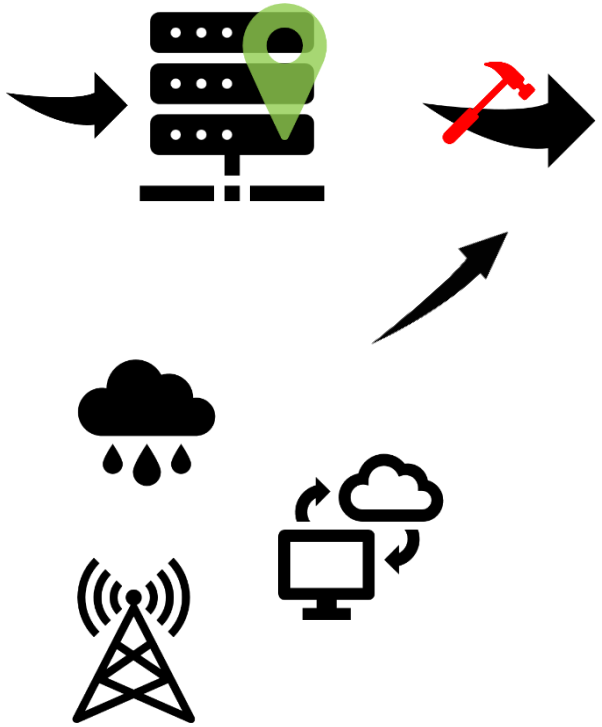
- Organize stream, stormwater and landscape Information to…
- Enable workflows apps that…
- Provide **all** involved entities with common knowledge and…
- Assists in task performance and internal/external communications.

Too ambitious?

For *surface waters* apps it has been accomplishing the goals for more than a decade!

Workload & Info Aligned for Efficiency

System expansion and maintenance
BMPs/Storm control measures.
Floodplain management. CRS credit tracking.
Hazard mitigation. New mapping justifications.
EPA/DEC, illicit discharges, MS4 permit reporting /renewal.
Culvert upgrade EFC funding, DPW coordination.

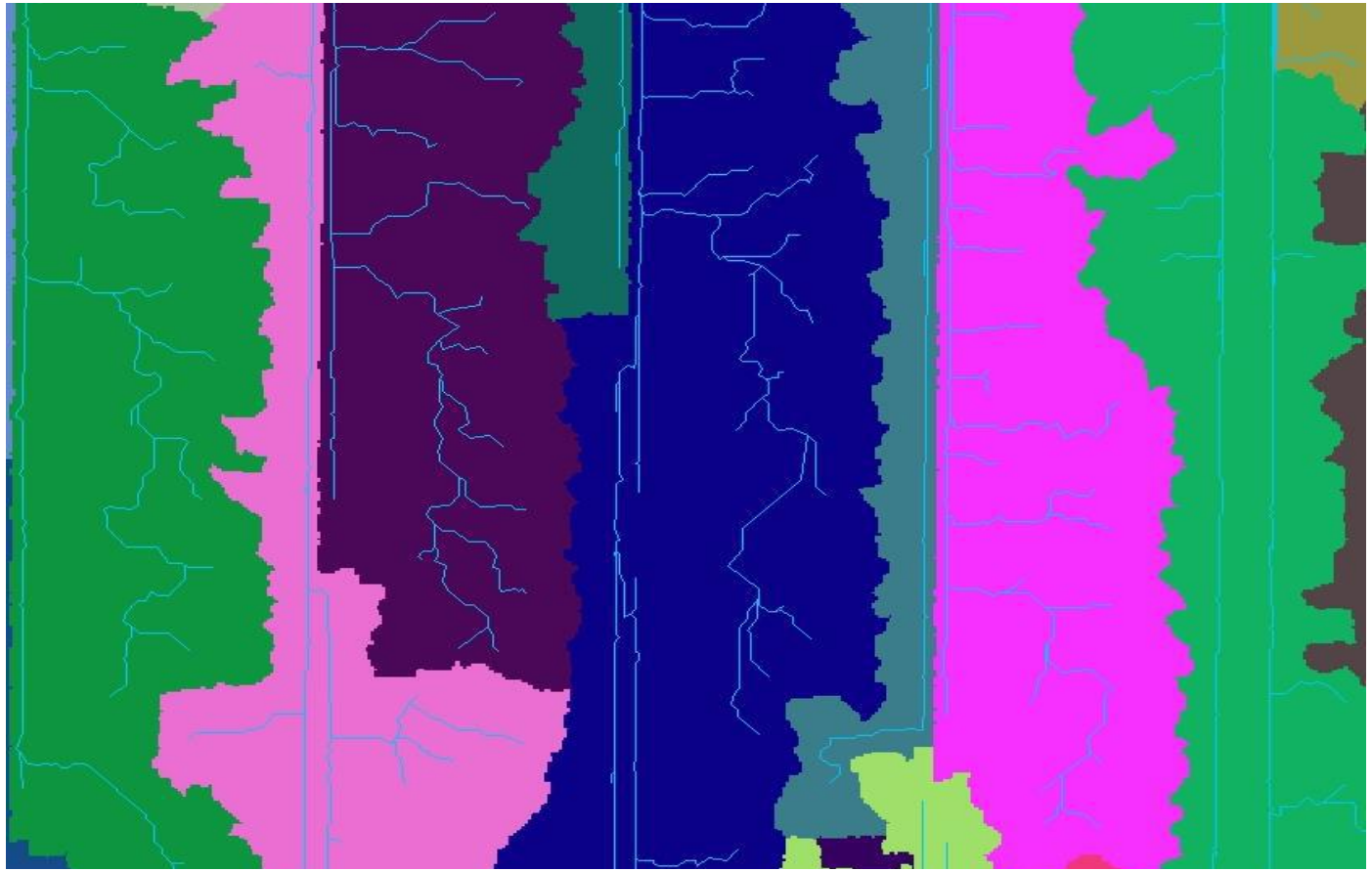


Capacity
Vulnerability
Priority
Inspections
Reporting
Permit renewal
Capacity forecast
CSO SPRTK

Framework Requirements

Significant focused preparatory work is necessary:

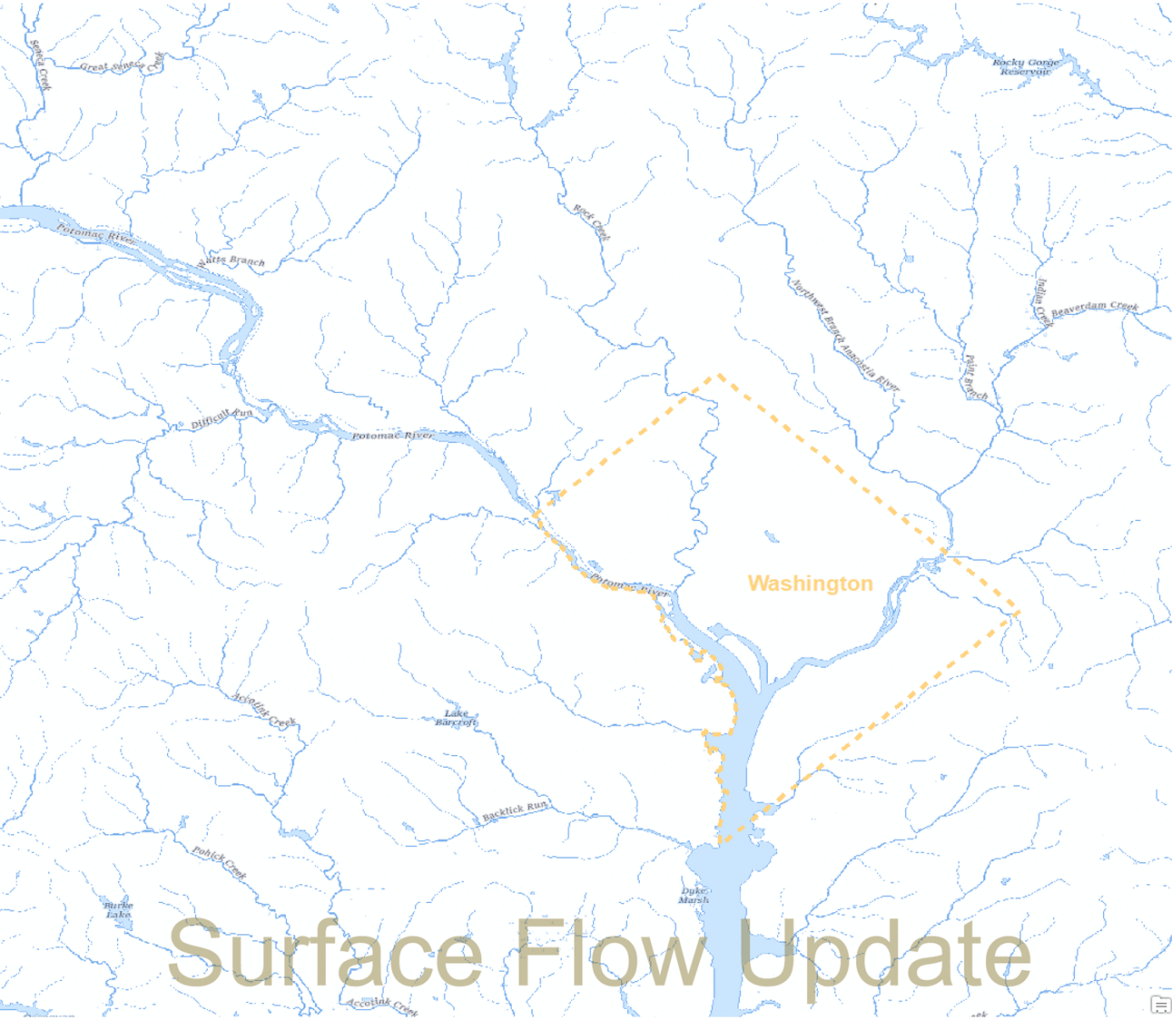
- Create the **where** and **what** for your surface and underground water drainage networks.
- Based on an *adequate* DEM.
- *Integrated* surface and sewer networks.
- Contributing areas accumulated into appropriate catchments.
- Use the framework to *index*, *accumulate* and *aggregate* the rest of your characteristics/assets.



Requirements: DEM

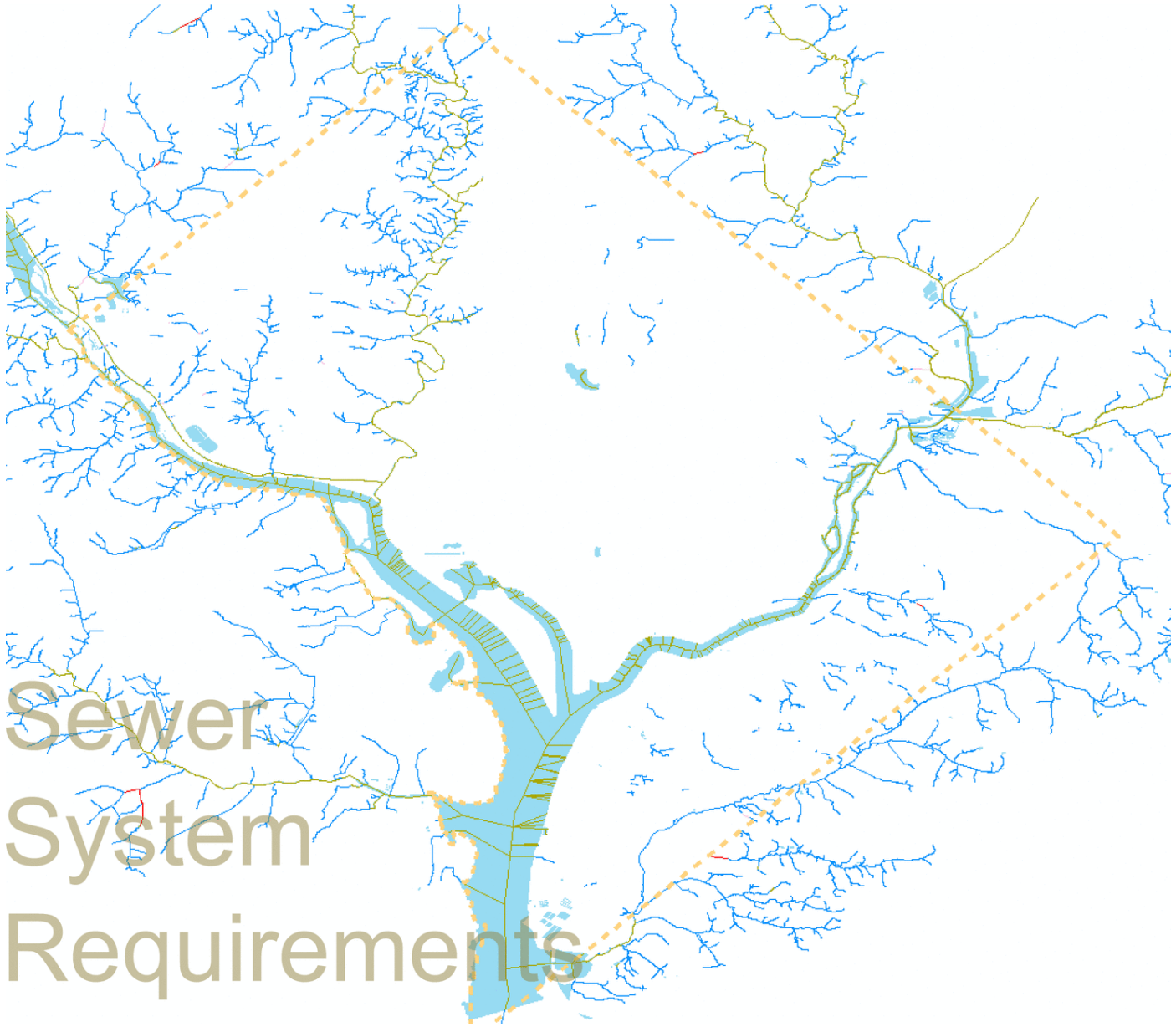
- LiDAR for 1’ contours (QL 2) is sufficient
- ArcGIS still comes out ahead
- Prepare the surface!
  - Prepare the surface
    - Prepare the surface
      - Prepare the surface
- Workflow is iterative
- Save 20+ years.
- Save 70-80% of manual labor.

Benjamin Houston, Urban Drainage Modeling for Storm Water Design using USGS QL2 LiDAR Data, 2016 SENYSC, plenary presentation.



Requirements: DEM derived surface flow

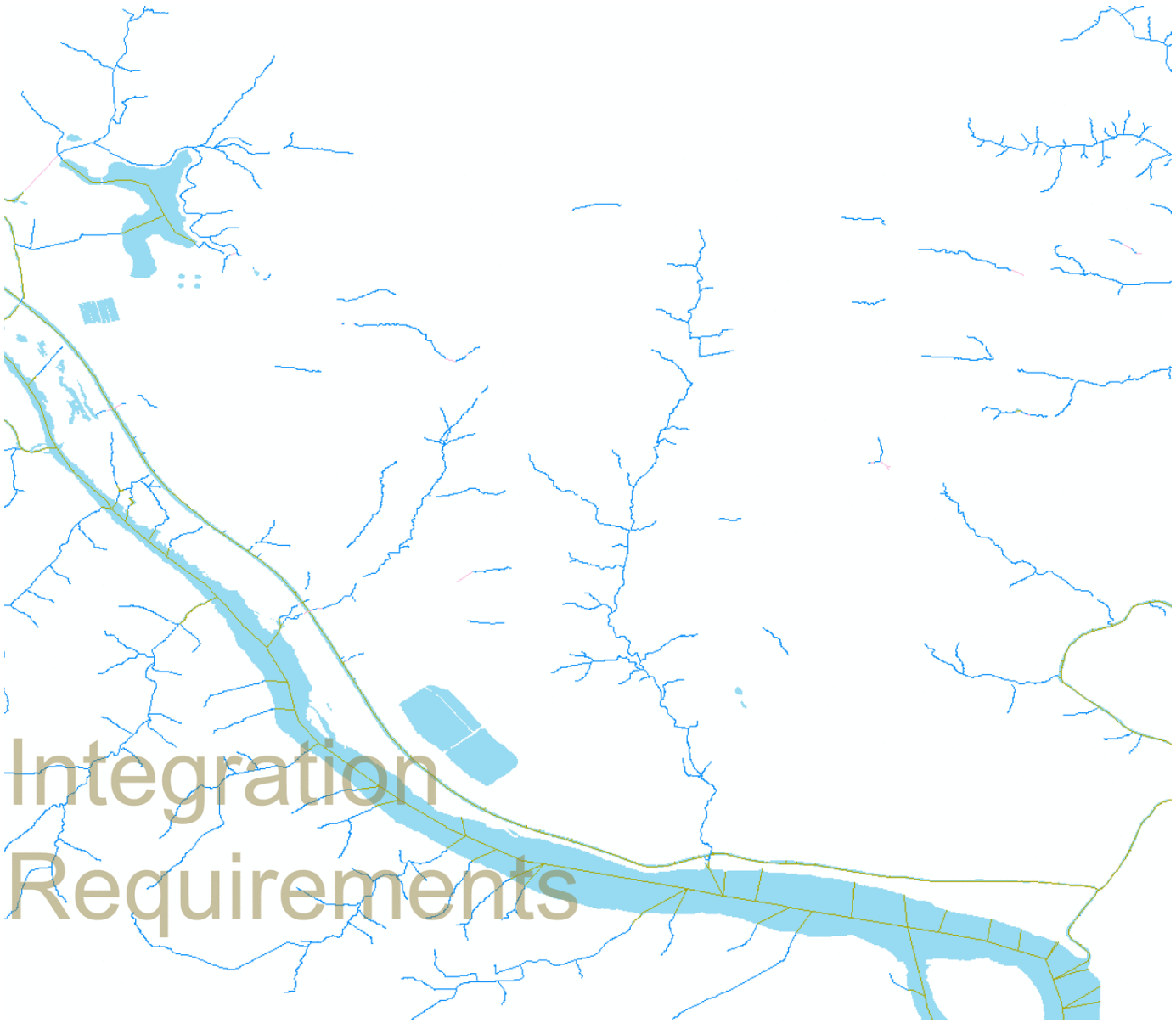
- Covers all 12-digit Hus in AOI
- All current NHD streams are updated.
- Derived for an agreed threshold flow concentration (min contributing area).
- New ephemeral drainage represented *on bare ground* where there is *evidence of channel-forming erosion*.



Sewer System Requirements

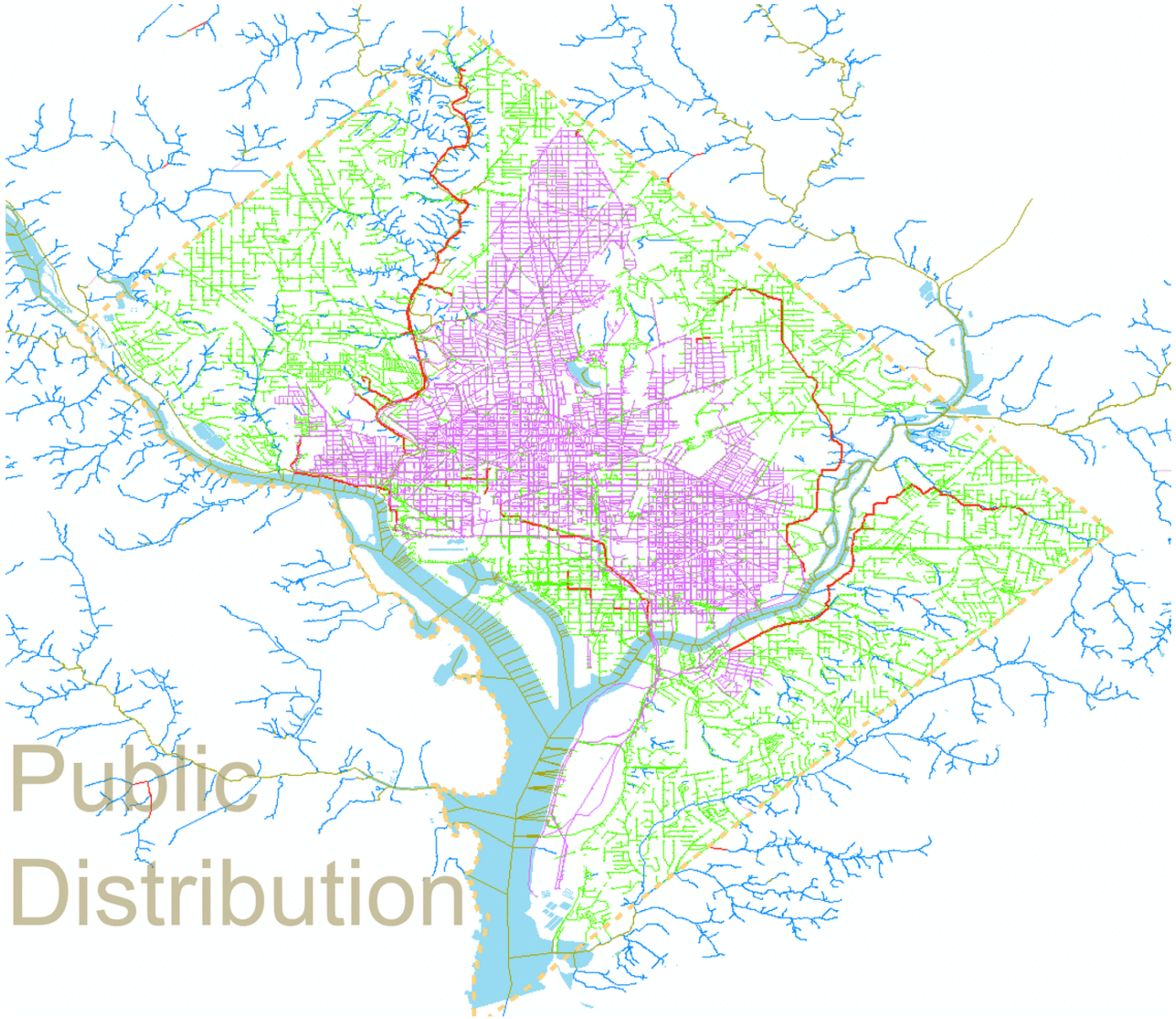
Requirements: SSS network

- MS4,
- Combined,
- Main sanitary lines,
- Many-to-many inlet to outfall network routing,
- In/outlets **aligned with DEM**.



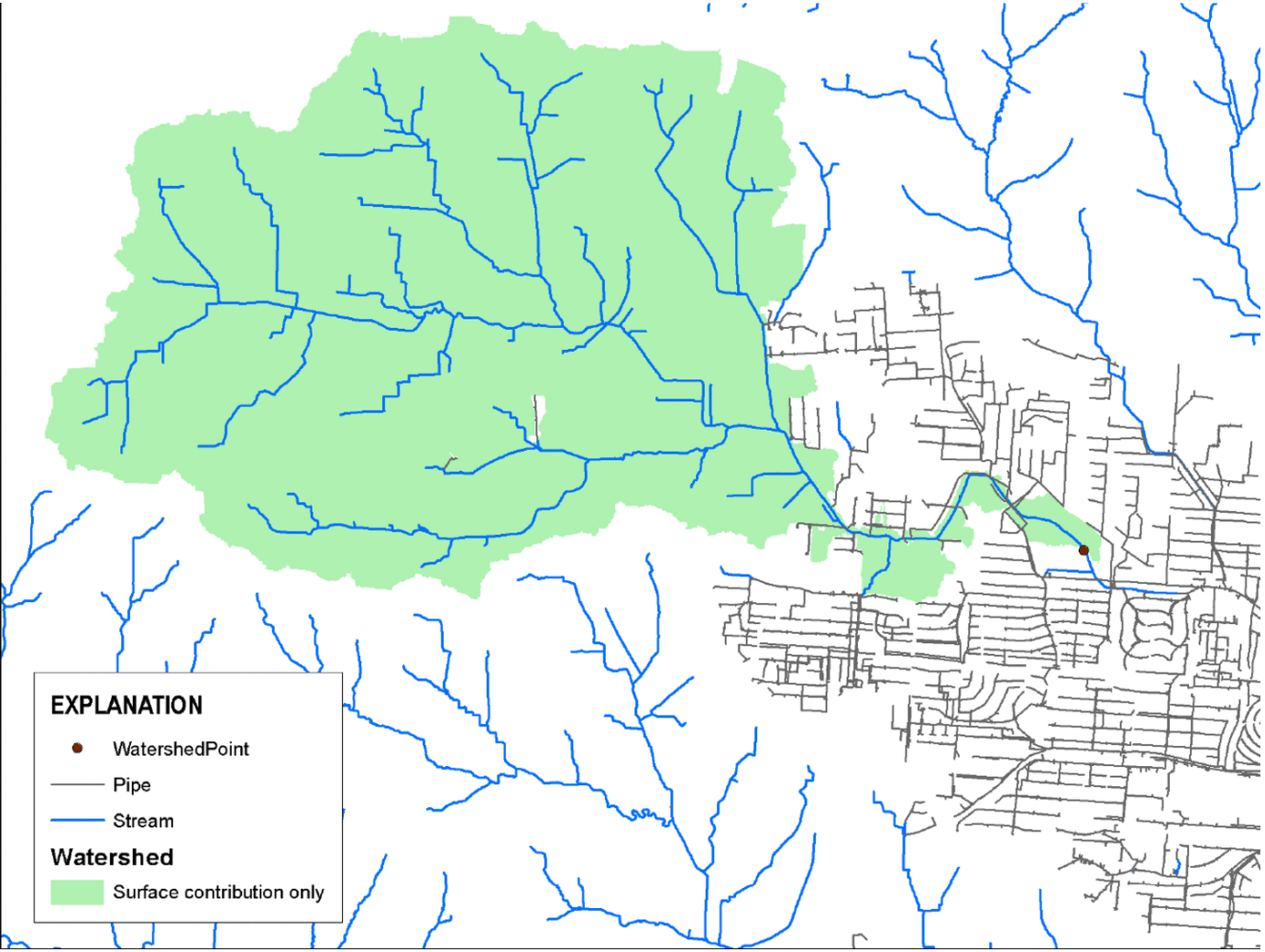
Requirements: Integration

- Only the streams participate in the DEM hydro-conditioning,
- Separate surface/underground geometric networks,
- Underground network has catchbasins integrated into agreed upon 16-digit HUs that…
- Nest within 14-digit Hus, and,
- Also nest within **Updated, Topographic** 12-digit HUs.



Public Distribution

- The stormwater network is thinned out to an agreed upon level.
- Integrated networks, updated 12-digit and newly derived 14 and 16-digit HUs go into the NHD and WBD national databases.
- NHDPlus regular national components are published. A customized portion remains and is controlled by the Stormwater District.



USGS, StreamStats for St. Louis County and the City of St. Louis.

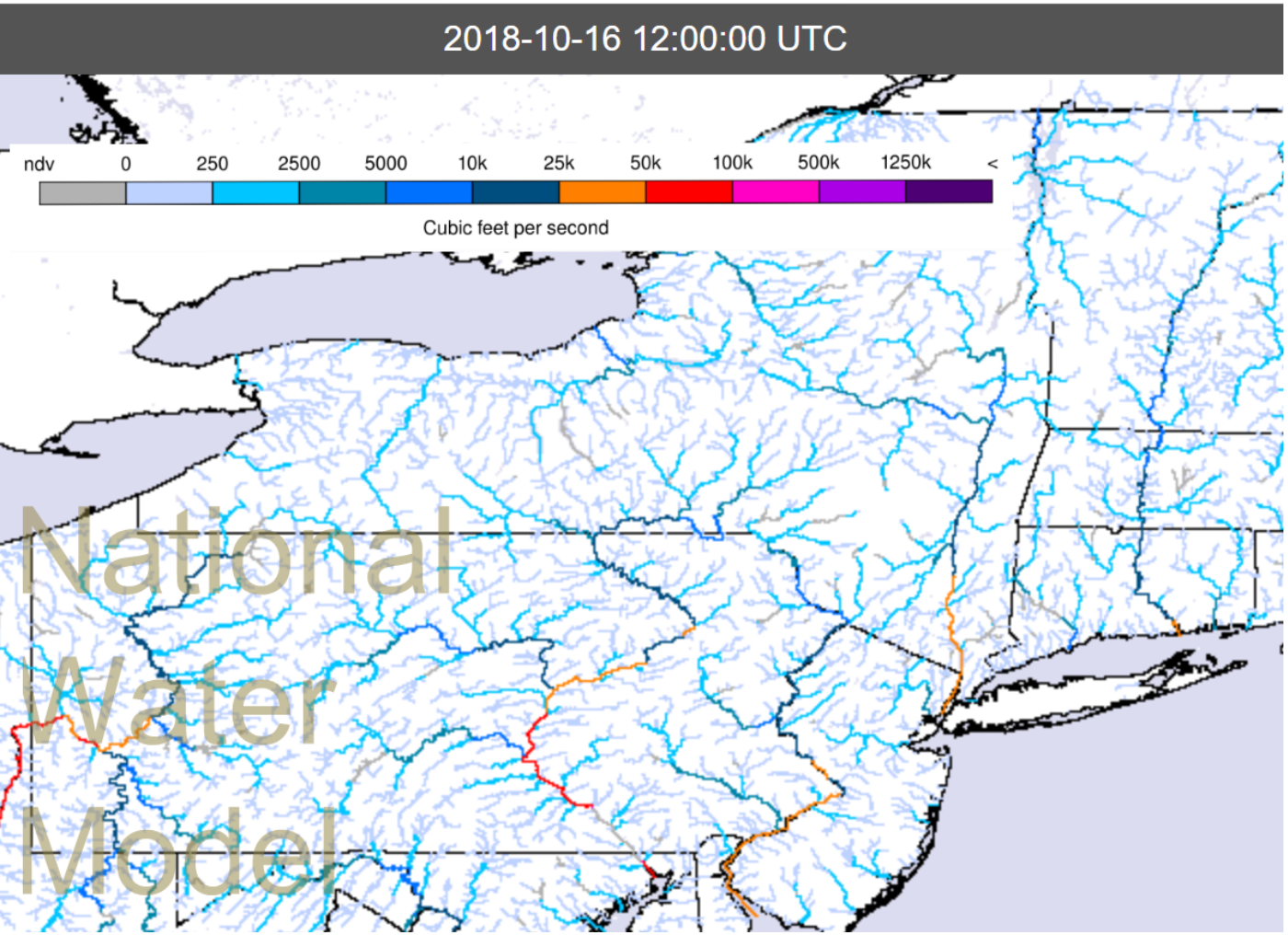
Integrated Dataset ready to reap benefits

Assignment, accumulation and aggregation of catchment characteristics happens at an agreed upon catchment level.

System analysis, expansion planning, maintenance workplan and workforce deployment tracking and reporting become possible.

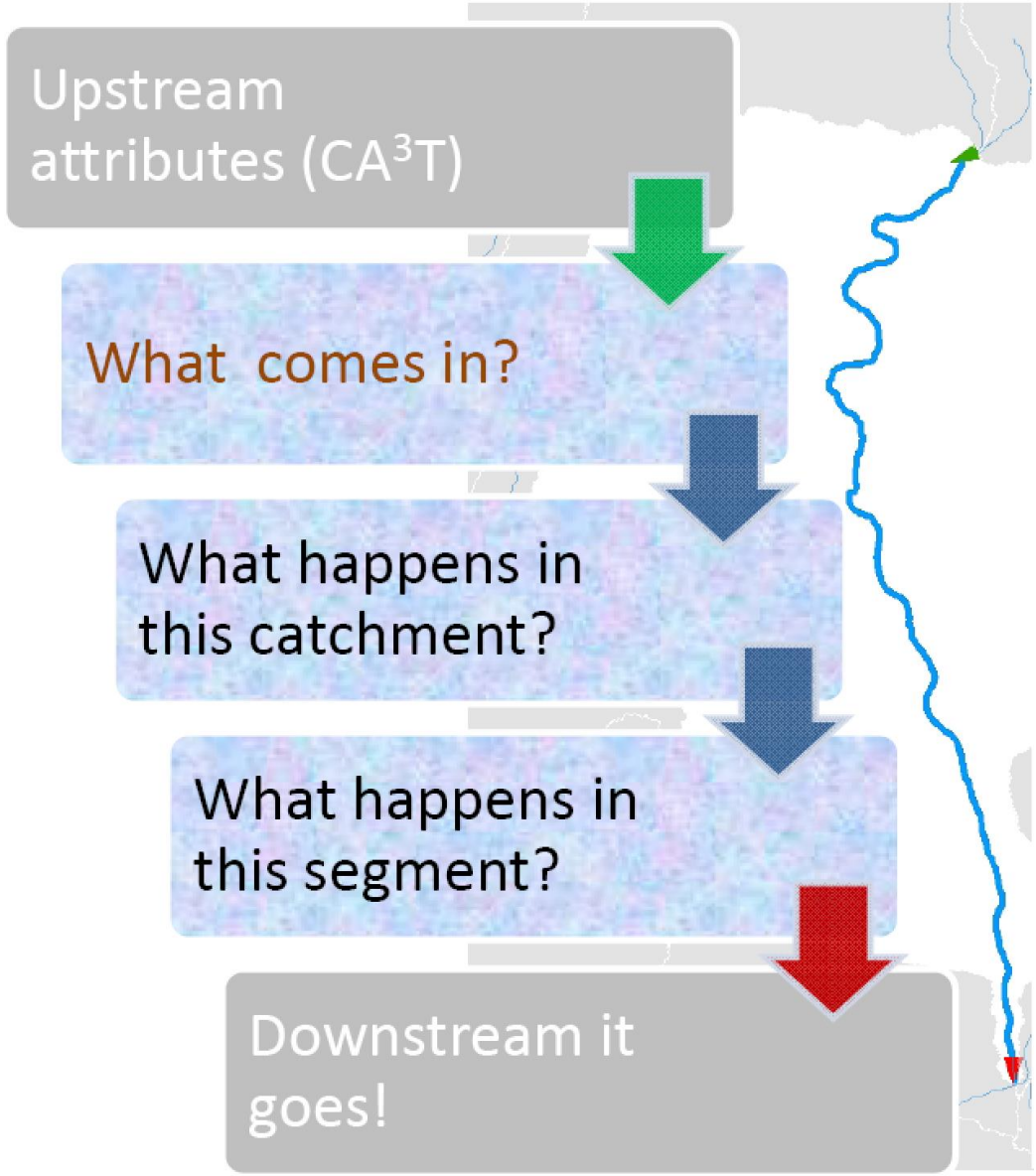
The most basic question can now be answered: What's the sewershed for any point in the network?

From there, all other questions can be tackled.



Attribute accumulation & aggregation

- Attribute accumulation at the catchment level,
- *Aggregation* of upstream attributes at each catchment pour point,
- A *spatial* query becomes a *database* query, thus extremely fast, ready for apps, reports, workflow or modeling.



Example: a modeling data flow.

An app will cycle through all the upstream catchments to come up with an answer for the point of interest.

A selection of apps based on the NHDPlus framework can be found in EPA's online inventory of NHDPlus Applications page.

Thanks!

Questions

LopezTorrijos.Ricardo@gmail.com
518-424-9718