



City of Virginia Beach

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Stormwater Master Plan Update

City Council Briefing – January 8, 2019

Agenda

- Background for Update
- Stormwater Modeling and Calibration
- Visualizations of Results
- Next Steps

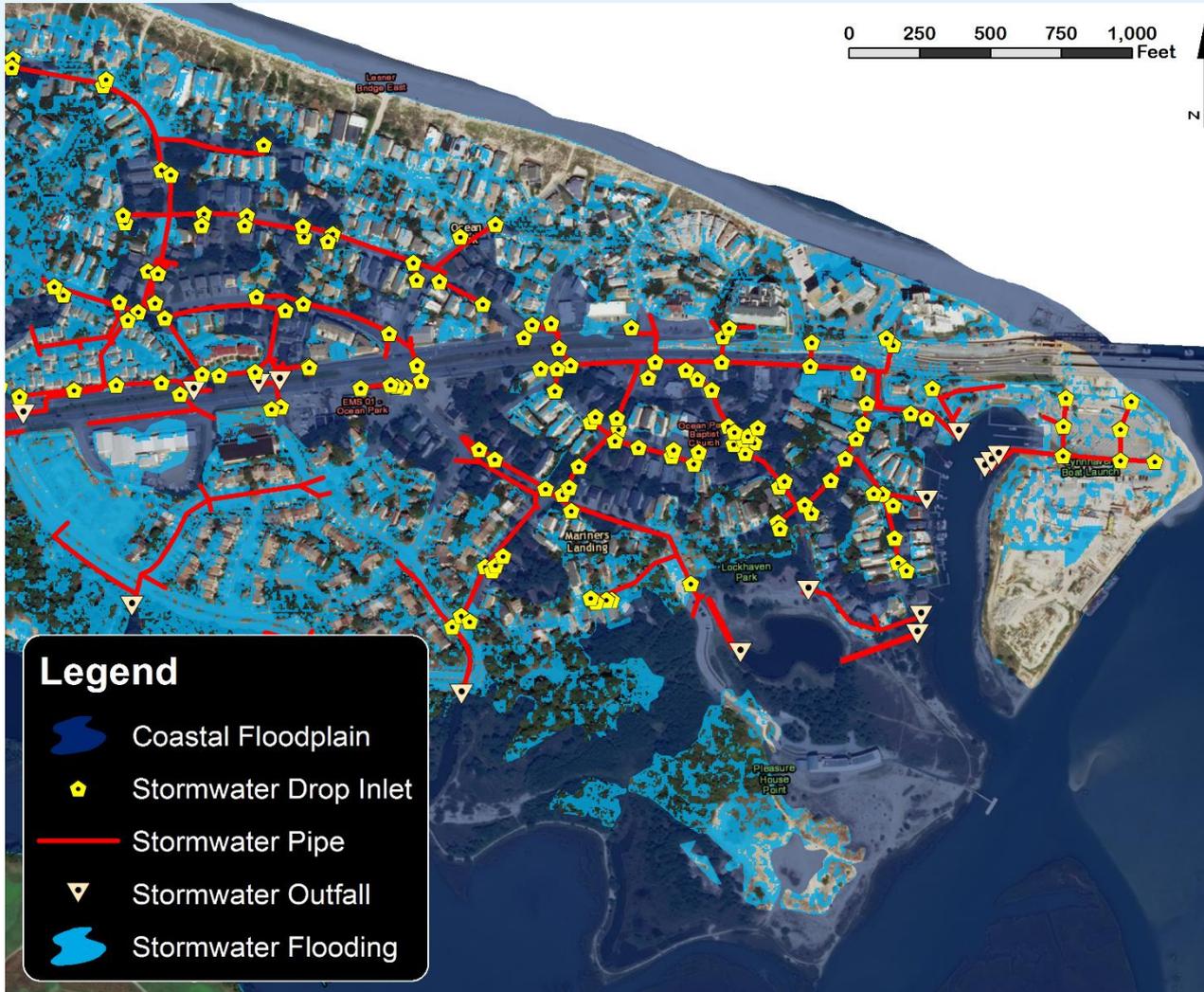
Bond Rating Agency Questions to VB

- Does the existing/future CIP include spending for mitigation or resiliency?
- Has your governing body discussed the capital or financial implications of rising sea levels?
- *Has there been an estimate on potential impacts from rising sea levels or flooding?*
- Please discuss how flooding has impacted the city's budget and may impact future budgets?
- *Have there been any zoning /long-term planning adjustments downtown and along the waterfront to mitigate future flooding impacts?*
- What is management's current view on the potential impact/vulnerabilities in your community from rising sea levels and a heightened risk of extreme weather events?



Combined Impact on Stormwater Analysis

- Higher coastal water levels diminish stormwater system performance



- Coastal Flooding
- Stormwater Conveyance
- Combined Flooding

CDM
Smith

Last Approved Stormwater Master Plan

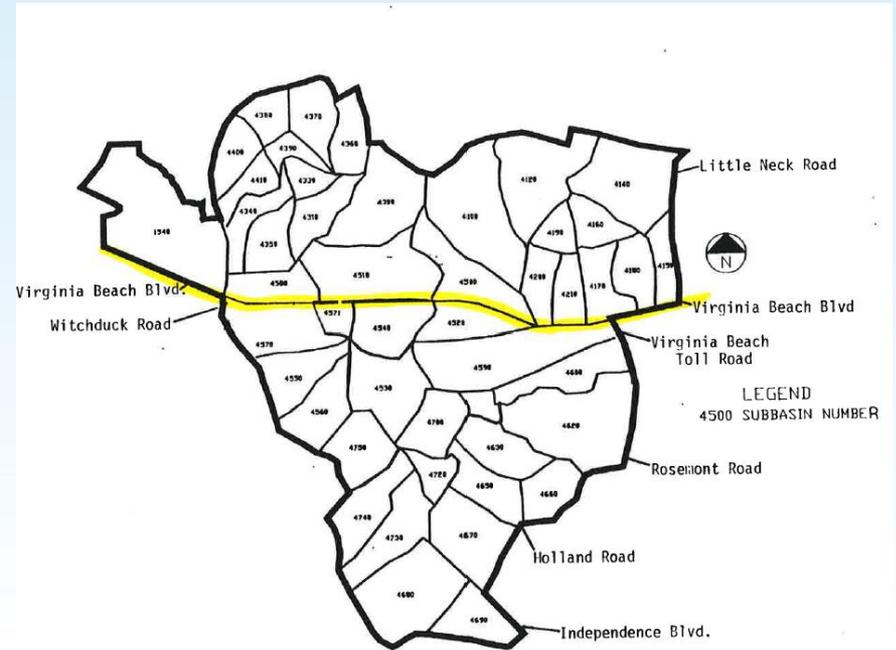
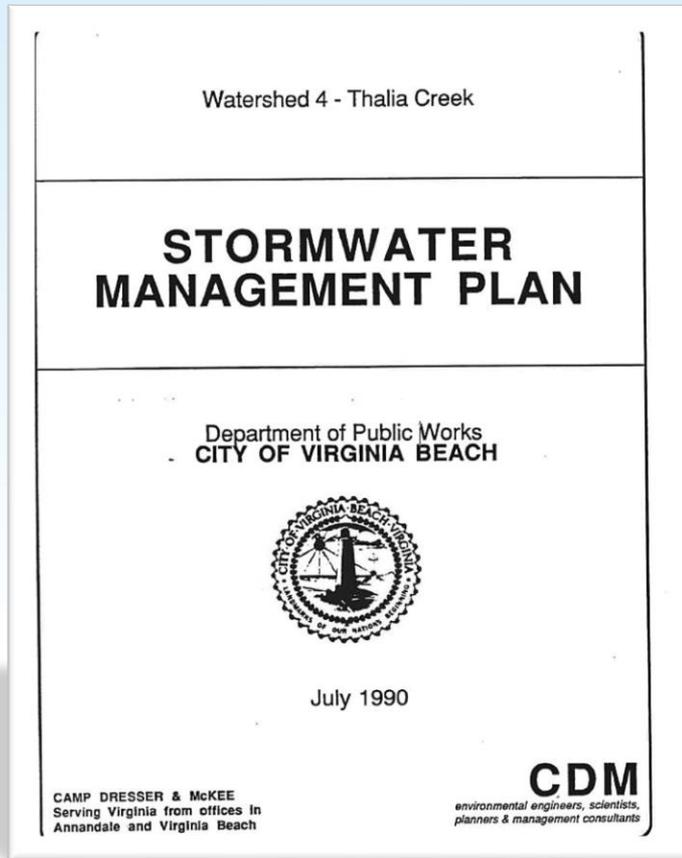


Figure 4. Watershed 4 - Subbasin Delineation

Current Master Plans date from the late 1980s to early 1990s

Stormwater Master Plan – Why update?

- Update stormwater system inventory
- Create computer models of the current stormwater system utilizing readily available software
- Assess performance of stormwater system
 - Flood control
 - Stormwater quality
- Identify deficiencies in the stormwater system
- Determine needed improvements
- Provide information for project designs
- Create Comprehensive Stormwater Management Plans where possible

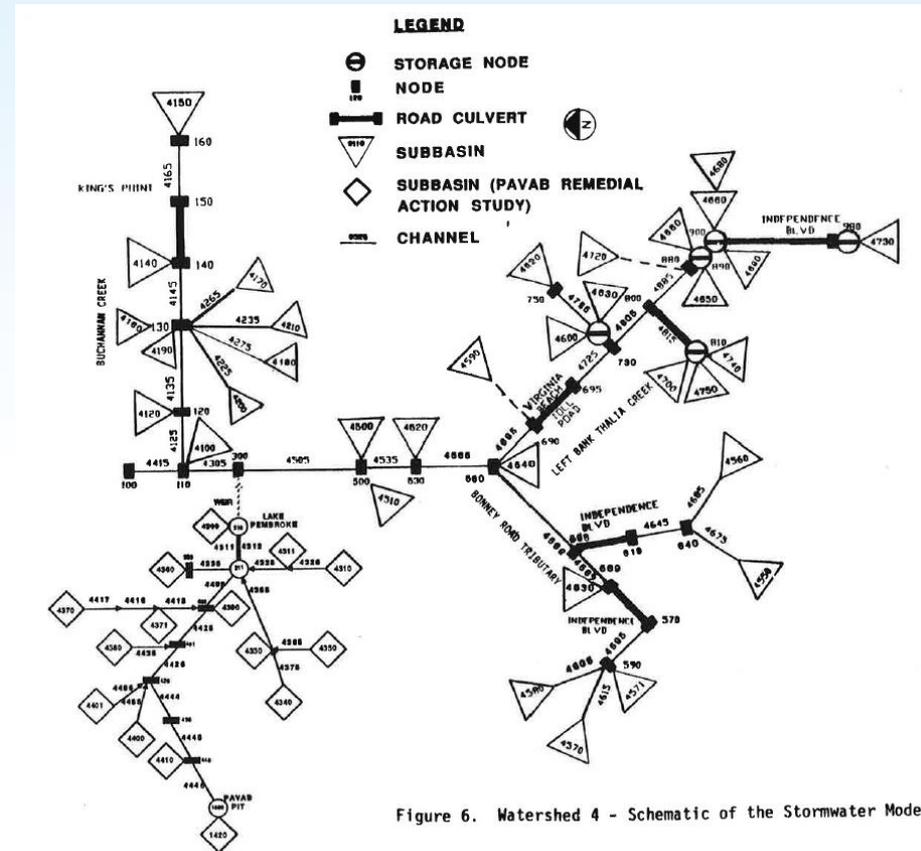
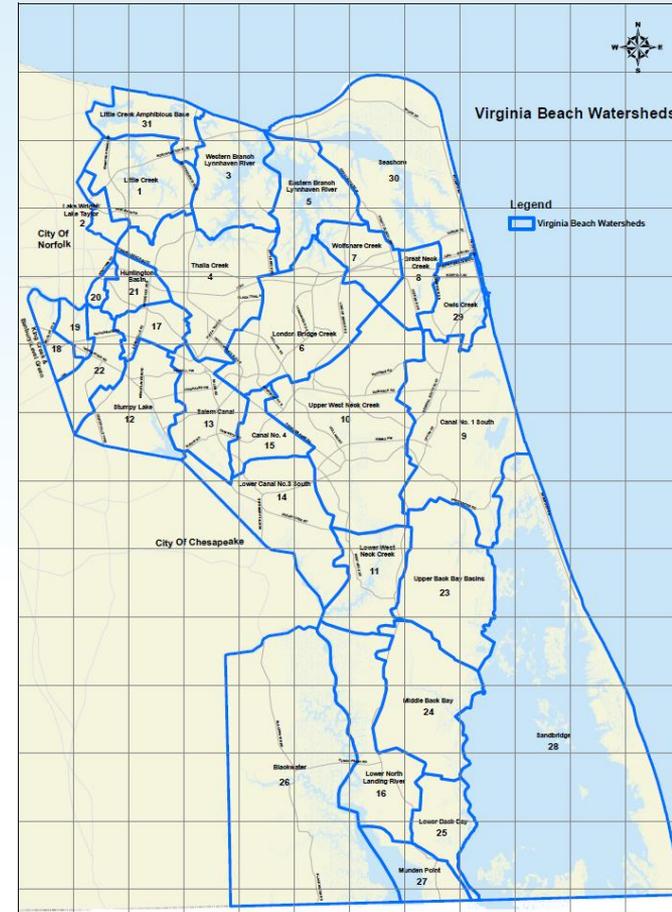


Figure 6. Watershed 4 - Schematic of the Stormwater Model

Stormwater Modeling

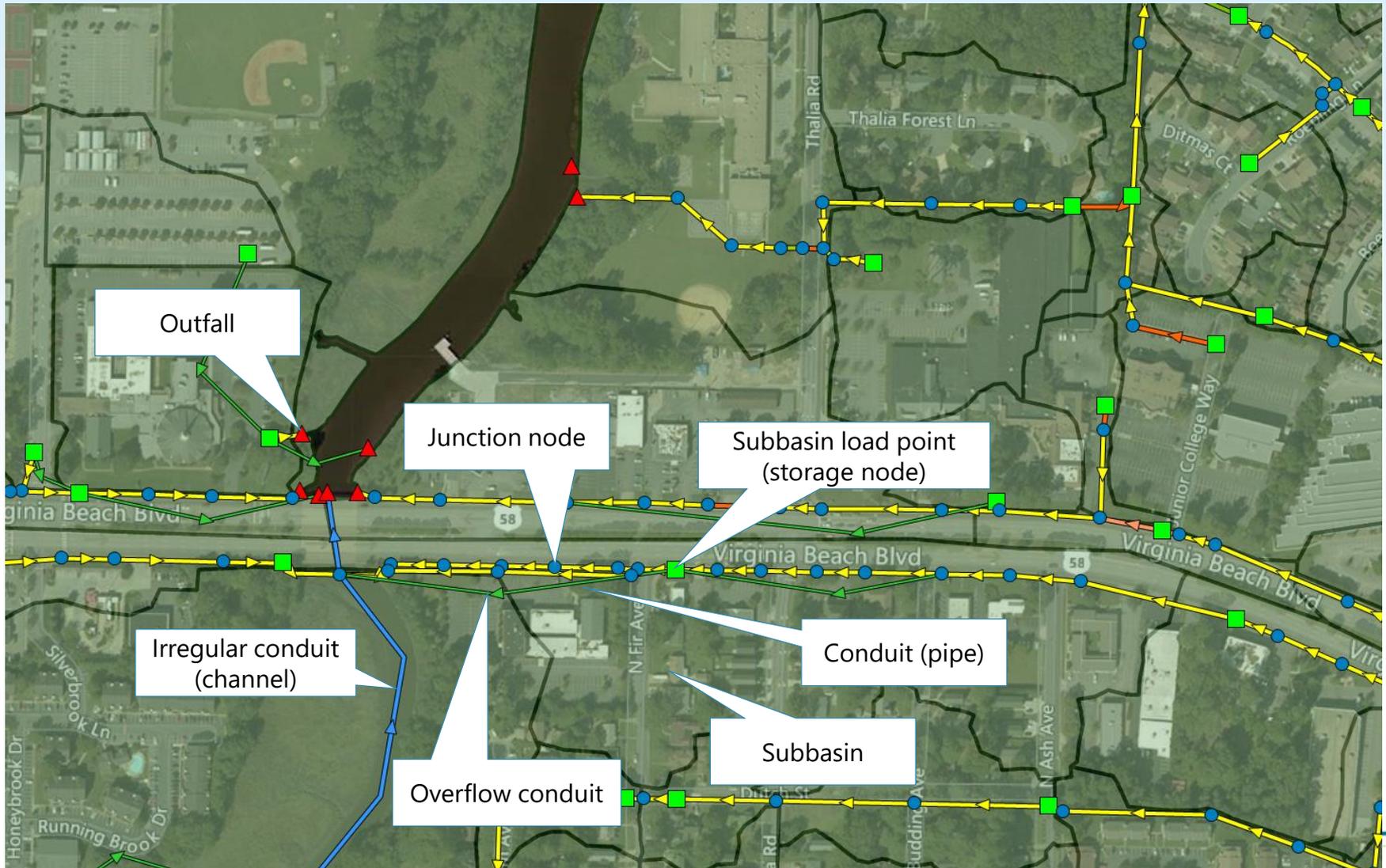
- Modeling effort being performed in all 31 drainage basins.
- Models, with the exception of the Lower Southern Rivers, are being prepared in PCSWMM, the “gold standard” for modeling. PCSWMM uses EPA SWMM as its engine.
- Models for the Lower Southern Rivers are being prepared in the MIKE suite of programs which allows for the inclusion of the effects of wind into the modeling parameters.



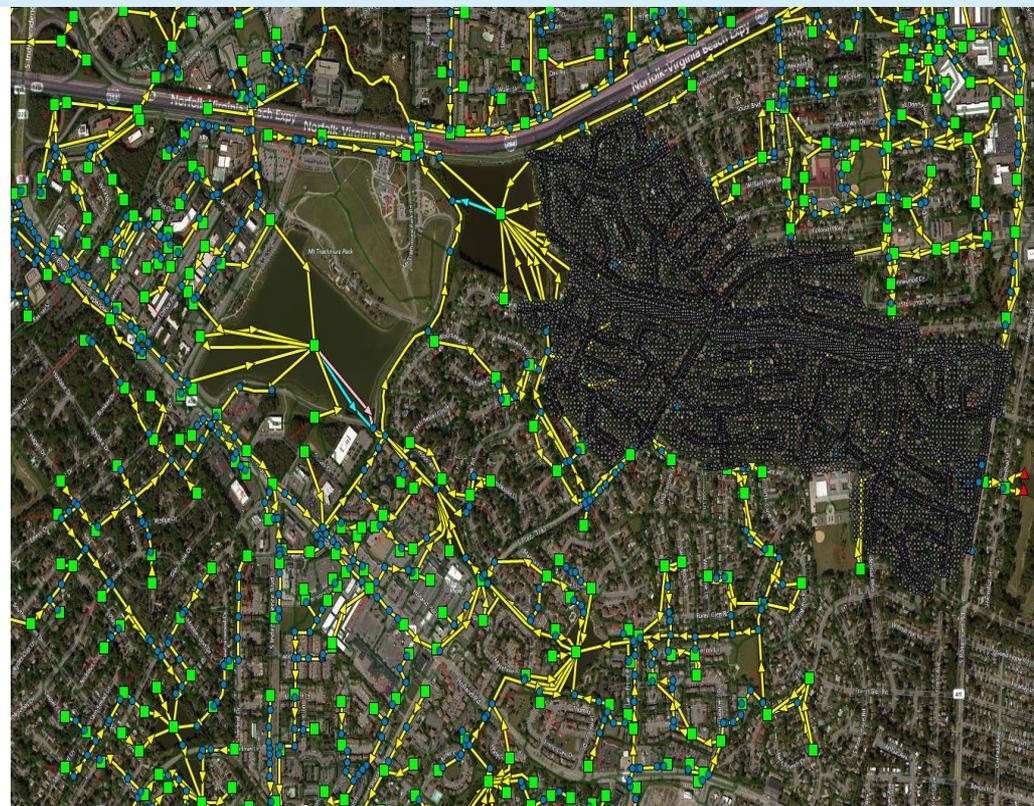
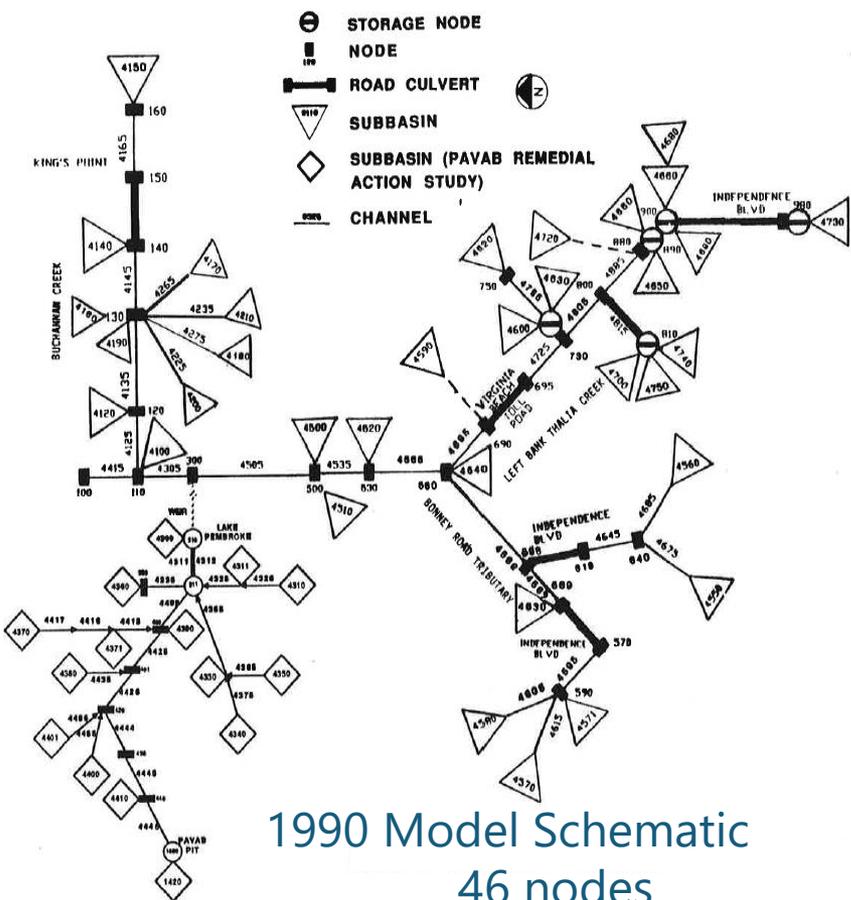
Stormwater Modeling (continued)

- Models include the Primary Stormwater System. Primary stormwater system includes:
 - Stormwater pipes larger than 24-inches in diameter;
 - Stormwater management facilities (ponds and lakes);
 - Natural conveyance systems (ditches/swales/canals).
- Models are being prepared for 1-, 2-, 10-, 25-, 50-, 100- and 500-year storm events under **the current standards** using recurrent tailwater elevations. Models are also being prepared for 1.5- and 3-feet of sea level rise.
- When new standards are adopted, the models will be updated to reflect the new standards.

Hydraulics (View in PCSWMM)



LEGEND



2018 Model Schematic:
3,184 nodes
13,762 conduits

Comparison of Previous to Current

Validation/Calibration Photographs



Calibration/Validation Results

Table 3-4 September 19, 2016 Flood Elevations at 10:00 AM (Revised Model)

ID	Location	Flood Elevations (feet NAVD)		Delta (feet)
		Observed	Model	
1	N Rosemont Road between Old Forge Road and Club House Road	5.7	5.7	0.0
2	S Rosemont Road between Old Forge Road and Club House Road	5.7	5.7	0.0
3	Rosemont Road near St. Francis Church	5.7	5.7	0.0
5	South Plaza Trail and Palace Green Boulevard	5.9	5.8	-0.1
6	Silina Drive and Palace Green Boulevard	5.7	5.8	0.1
7	Starlighter Drive east of Palace Green Boulevard	5.8	5.8	0.0
8	Silina Drive north of Windsor Woods Boulevard	6.0	5.8	-0.2
9	Silina Drive north of Colonial Parkway	5.7	6.0	0.3
10	Brentwood Crescent south of Cortland Lane	6.5	6.4	-0.1
11	South Boulevard west of Brentwood Crescent	6.6	6.4	-0.2
12	Lake Windsor near South Boulevard	5.2	5.1	-0.1
13	South Boulevard near Lake Windsor	5.1	5.1	0.0
14	South Plaza Trail south of the Presidential Canal	6.1	5.8	-0.3

Average delta (feet) = -0.05

ArcGIS Online Results Map

- [Online Map Link](#)

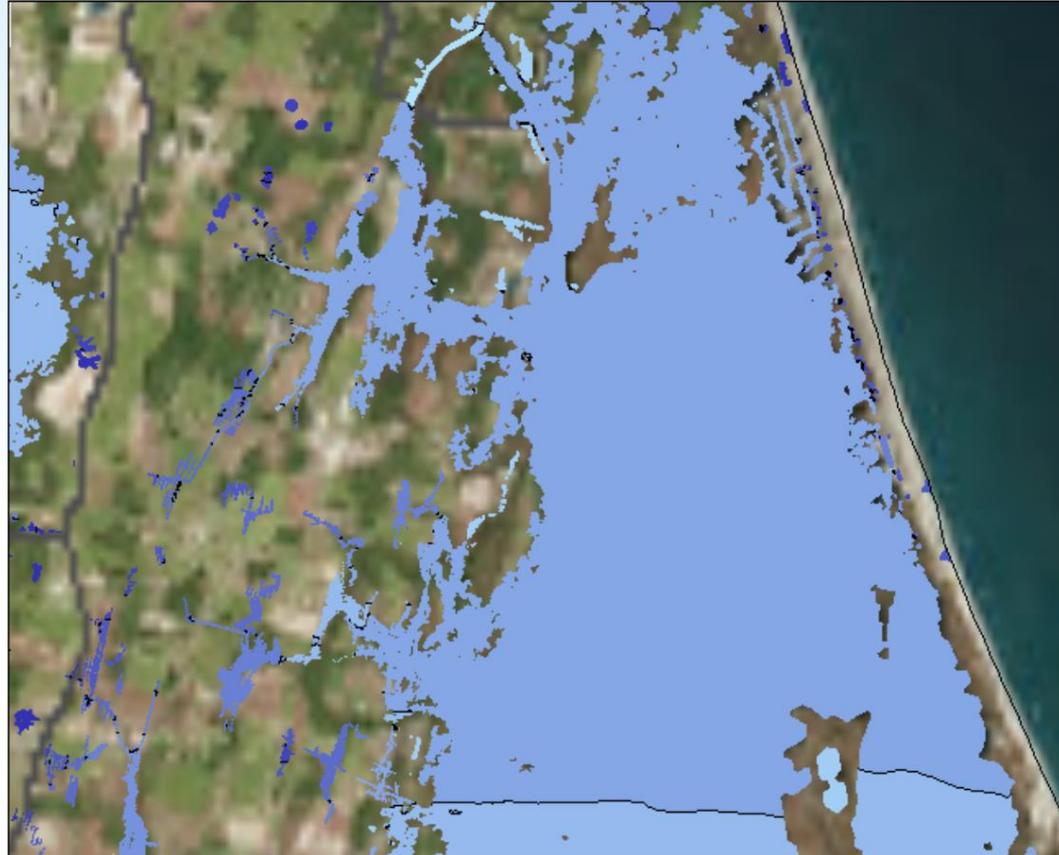
2D Model Animation

- PCSWMM – Windsor Woods



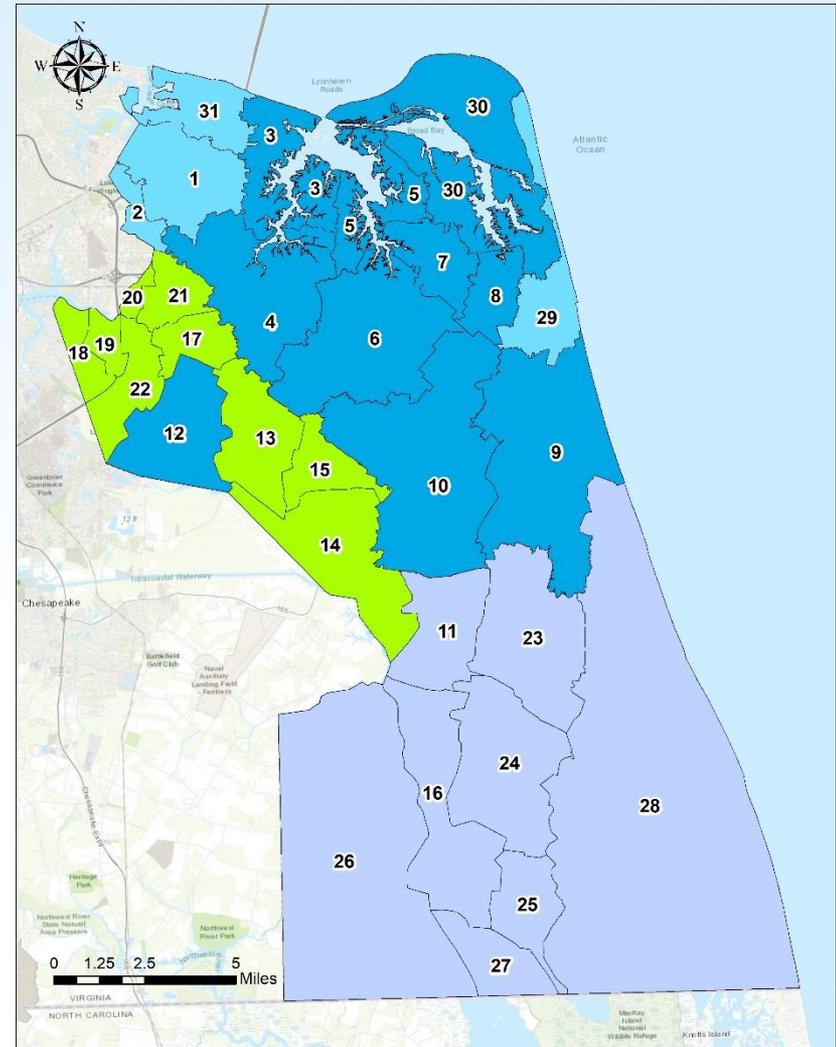
2D Model Animation (continued)

- MIKE – Lower Southern Rivers



Comprehensive Master Plan Integration of multiple stormwater issues

- Modeling effort began in May 2015.
- As of December 31, 2018, 22 of 31 drainage basins have completed models. 10 of the 22 have been validated and calibrated.
- By September 2019, all drainage basin models will be complete.



Next Steps

- Briefing on SLR (January 15, 2019).
- Complete modeling of all basins.
- Kimley-Horn has been hired to prepare the master plans based on the models (both with and without the SLR results). This effort will begin in early 2019 and anticipated completion is scheduled by January 2022. The master plans will be used to inform the CIP program which projects are the highest priority.
- Upon completion of the master plans, PW-SWEC will coordinate establishing a Comprehensive Stormwater Management Plan with DEQ to govern storm drainage in Virginia Beach.

DISCUSSION



email: stormpics@vbgov.com