Update on:
Princess Anne Plaza, Windsor Woods & The Lakes

City Council Presentation – September 5, 2017
City Engineers Office
Stormwater Engineering Center – Toni Alger, P.E.
INTRODUCTION

• Rainfall from Hurricane Matthew (October 2016) resulted in extreme flooding
• Records indicate approximately 675 residences were affected
• Many streets were impassable
• Council provided over $42M in the CIP for flood control improvements
• The City has selected the firm of Michael Baker International, teamed with CDM Smith, to develop and design the program of needed flood control measures
BACKGROUND

• Elevations in the area are low

• Sea Level Rise
  o Receiving waters are one foot +/- higher today
  o Expected to be 1.5 feet higher (or more) in 50 years

• Frequency and severity of the storms are increasing

• Infrastructure is 50 years old +/-
  o Princess Anne Plaza: 1961
  o The Lakes (East of Plaza Park): 1964
  o Windsor Woods: 1966
  o The Lakes (West of Plaza Park): 1976
1949 AERIAL

FEMA Flood Zones – Effective January 16, 2015

Legend
- ZONE AE
- ZONE A
- ZONE X
- 0.2 PCT ANNUAL CHANCE FLOOD HAZARD
SEA LEVEL RISE TRENDS

50-year Trend

<table>
<thead>
<tr>
<th>Location</th>
<th>Increase, inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sewells Point</td>
<td>9</td>
</tr>
<tr>
<td>Chesapeake Bay Bridge Tunnel</td>
<td>11.5</td>
</tr>
<tr>
<td>Duck, NC</td>
<td>8.9</td>
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</tbody>
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Local/Regional Trends

- Sewells Point: 9 inches
- Chesapeake Bay Bridge Tunnel: 11.5 inches
- Duck, NC: 8.9 inches
FUTURE RAINFALL
THEN CATASTROPHIC FLOODING OCCURRED....
HURRICANE MATTHEW

Thalia Creek
Peak Water Elev. 5.3-ft
Peak Rainfall 13.0 inches

London Bridge Creek
Peak Water Elev. 5.3-ft
Peak Rainfall 13.0 inches

West Neck Creek
Peak Water Elev. 7.0-ft
CITY COUNCIL RESPONDED

• $42M in the 6-yr CIP and another $86M to be funded beyond that
  o Princess Anne Plaza – $20M
  o Windsor Woods – $17M
  o The Lakes – $2M

• The projects are moving forward
  o May 9, 2017 – Budget Approved
  o May 10, 2017 – RFP for A/E Services Posted
  o June 22, 2017 – SOIQs received
  o July 1, 2017 – FY18 Budget in Effect
  o July 20, 2017 – Michael Baker International teamed with CDM Smith selected
MUCH HAS ALREADY BEEN DONE.....
Canal Number 2 Improvements

- Cost Participated with Army Corp of Engineers
- Improvements from London Bridge Creek to West Neck Creek
- Diverted Stormwater Runoff from London Bridge Creek
- Completed in 1990
- Total Project Cost - $55M
Rosemont Road – Windsor Woods Drainage

- Improvements were between Bow Creek Boulevard and King’s Point Road
- Constructed Stormwater Detention Basins
- Completed in 1996
- Total Project Cost - $1.2M
COMPLETED PROJECTS

Princess Anne Plaza Drainage Phase 2

- Improvements within Bow Creek Golf Course
- Culvert Replacement at Bow Creek Boulevard and Clubhouse Road
- Completed in 1998
- Total Project Cost – $5.9M
Stormwater Infrastructure Rehabilitation

- Princess Anne Plaza Neighborhood
- Provided Inspection, Design, Evaluation and Rehabilitation of Stormwater Infrastructure
- Slip-Lining Pipes
- Pipe Replacement
- Completed in 2008
- Total Project Cost – $5M
Bow Creek Rec Center
Storm Drainage Improvements

- Provided Storm Drain Improvements for Club House Road
- Completed in 2015
- Total Project Cost - $600K
MUCH IS BEING DONE.....
Northgate Ditch, CIP 7-028.001

- Dredge 6,000-ft canal to restore original drainage capacity
- Approximately 3,000 cubic yards of dredge material
- Notice to Proceed – May 2017
- Construction Complete – January 2018
- Total Project Cost - $2M

Avg. Pre-depth: 1.5’
Avg. Post-depth: 4.4’
Windsor Woods Canal, CIP 7-028.002

- Dredge 4,100-ft canal to restore original drainage capacity
- Approximately 10,900 cubic yards of dredge material
- Notice to Proceed – June 2017
- Construction Complete – June 2018
- Total Project Cost - $2M

Avg. Pre-depth: 3.1’
Avg. Post-depth: 5.2’
Windsor Oaks West I,
CIP 7-415.039

- Dredge 1,510-ft canal to restore original drainage capacity
- Approximately 4,200 cubic yards of dredge material
- Notice to Proceed – June 2017
- Construction Complete – October 2017
- Total Project Cost - $750K

Avg. Pre-depth: 0.8’
Avg. Post-depth: 4.05’
Windsor Oaks West II, CIP 7-415.039

- Dredge 2,760-ft canal to restore original drainage capacity
- Approximately 7,000 cubic yards of dredge material
- Notice to Proceed – July 2017
- Construction Complete – January 2018
- Estimated Total Project Cost - $800K

Avg. Pre-depth: 0.65’
Avg. Post-depth: 4.55’
Windsor Oaks West III, CIP 7-415.039

- Dredge 2,150-ft canal to restore original drainage capacity
- Approximately 5,000 cubic yards of dredge material
- Begin Construction – October 2017
- Construction Complete – June 2018
- Estimated Total Project Cost - $600K
MOVING FORWARD

• Complete the 5 Current Active Projects
  o Northgate Ditch: January 2018
  o Windsor Woods Canal: June 2018
  o Windsor Oaks West I Canal: October 2017
  o Windsor Oaks West II Canal: January 2018
  o Windsor Oaks West III Canal: June 2018

• Keep the System Maintained - Ongoing

• Identify & Implement Upfront Improvements
  o Major Portable Pumps to Draw Down Lake Windsor
  o Selected Detention System Upgrades
  o Selected Collection System Upgrades
MOVING FORWARD

• Detailed Engineering Analyses to Develop the Specific Program of Flood Control Measures
  o Project Areas Combined for Initial Analysis
  o Identify Needed Improvements
  o Identify Costs of the Improvements
  o Identify the Implementation Plan of the Improvements Including a Phasing Plan
  o Identify the Environmental Permitting Required

• Design, Permit and Construct the Identified Improvements
Princess Anne Plaza, Windsor Woods and The Lakes Combined Drainage Improvements

Fredrick Muncy, P.E.
Clarence Warnstaff
Together Our Team Will Meet the Challenges Ahead

- Low Elevations and Sea Level Rise
- Minimal Capacity of Stormwater Conveyance Systems
- High Tides Reducing Lakes Storage
- Intense Storm Events Resulting In More Frequent Flooding & Property Damage
We Understand the Complexities Associated with Flood Resiliency

- Mega Size Stormwater Pump Stations
- Coastal Barriers and Tide Gates
- Regulatory Permitting
- Neighborhood Infrastructure
- Stakeholder Awareness and Advocacy
- Public Outreach
Key Program Objectives

• Early Implementation Projects - Sense of Urgency
  - O&M Type Projects
  - Infrastructure
  - “Outside of Box” Idea Reviews

• Keep City Council Informed

• Public Education/Awareness

• Long Term Solutions
  - Prioritized CIP, Design & Construction
  - Practical, Functional, Permittable, Approvable Projects
  - Cost Effective Solutions
Our Team Knows How to Successfully Deliver High Profile Programs For the City

- Lake Gaston Water Supply
- Comprehensive Stormwater Model
- Citywide Emergency Operations Planning, Response and Recovery
- Comprehensive Sanitary Sewer Evaluation and Rehabilitation
- GIS Conversion and Integration for Water and Sewer Assets
We are Committed to Providing All Necessary Resources

- Uniquely Qualified Team
- Program Liaison with City Leadership
- 85 Local Staff
- Design Team Depth
  - Pump Stations – 2 Teams
  - Barriers – 2 Teams
  - Infrastructure – 6 Teams
- Strong SWaM Support
DISCUSSION