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

PAP Presentation - April 10, 2018 
City Engineers Office 
Stormwater Engineering Center – Mike Mundy, P.E.
INTRODUCTION

- Rainfall from Hurricane Matthew (October 2016) resulted in extreme flooding
- Records indicate approximately 800 residences were affected
- Many streets were impassable
- Council provided over $56M in the CIP (6-year) for flood control improvements ($129M 15-year)
- Michael Baker International, teamed with CDM Smith, retained by the City last September, is continuing 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
1949 AERIAL

FEMA Flood Zones – Effective January 16, 2015

Legend
- ZONE AE
- ZONE A
- ZONE X
- 0.2 PCT ANNUAL CHANCE FLOOD HAZARD
1949 AERIAL

FEMA Flood Zones – Effective January 16, 2015

Legend
- ZONE AE
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TIDAL IMPACTS
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Inundation Areas Between Elevations: 0 to 2 Feet NAVD 88
TIDAL IMPACTS

Inundation Areas Between Elevations: 0 to 4 Feet NAVD 88
TIDAL IMPACTS

Inundation Areas Between Elevations:
0 to 6 Feet NAVD 88
TIDAL IMPACTS

Inundation Areas Between Elevations:

0 to 8 Feet NAVD 88
TIDAL IMPACTS

Inundation Areas Between Elevations:

0 to 10 Feet NAVD 88
Protection Measures

- Two Primary Components:
  - Flood barriers to prevent high water levels from directly inundating the area
  - Pumps and storm drainage systems to convey rainwater and minor overtopping out
Typical Barrier & Pump Station
Typical Barrier & Pump Station
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Typical Barrier & Pump Station
Preliminary Concept Plan

- Potential South Pump Station Location
- Potential North Pump Station Location
- Potential Stormwater Retention Ponds
- Lake Windsor
- Windsor Woods Canal
- Trashmore
- Northgate Plaza
- Ball Fields
- London Bridge Creek
- Canal No. 2
Windsor Woods, Princess Anne Plaza & The Lakes
Fourth Quarter 2017 Activities

• October 10, 2017 – Princess Anne Plaza Civic League Project Update
• November 7, 2017 – Public Utilities kick-off coordination meeting
• November 14, 2017 – Princess Anne Plaza Civic League Project Update
• November 30, 2017 – Drains on Elmont Road cleaned
• December 12, 2017 – Princess Anne Plaza Civic League Project Update / Quarterly Council Update
• December 15, 2017 – Initial stormwater models submitted
Windsor Woods, Princess Anne Plaza & The Lakes
First Quarter 2018 Activities

• January 9, 2018 – Princess Anne Plaza Civic League Project Update
• January 22, 2018 – Michael Baker fact finding charrette with Public Works Operations
• January 31, 2018 – Michael Baker program solutions alternative charrette
• February 6, 2018 – Michael Baker workshop to develop Princess Anne Plaza and The Lakes early implementation projects
Windsor Woods, Princess Anne Plaza & The Lakes
First Quarter 2018 Activities

• February 6, 2018 – Presentation to council on FEMA Flood Mitigation Grant projects – FEMA reimbursement assigned to the three grant projects

• February 9, 2018 - Feasibility analysis for Club House Road Storm Drain and Outfall Improvement completed

• February 12, 2018 Bow Creek Golf Course ditch from hole #2 to Bow Creek snagged and dragged

• February 13, 2018 – Princess Anne Plaza Civic League Project Update
Windsor Woods, Princess Anne Plaza & The Lakes
First Quarter 2018 Activities

• February 19, 2018 – Follow-up of Program Solutions Charrette

• February 26, 2018 – London Bridge Creek Pump Station Location Alternatives Draft Assessment Brief

• March 7, 2018 – Public Utilities coordination for initial drainage projects

• March 13, 2018 – Princess Anne Plaza Civic League Project Update

• March 27, 2018 – Quarterly Council Update
Early Construction Projects – Clubhouse Road Drainage Improvements

- Design in Progress
- Survey and Geotech work underway
- Complete Design – October 2018
- Acquisition Complete – September 2019
- Construction Start – January 2019
Early Construction Projects – FEMA Reimbursement Projects

- Engineering Design Initiated
Early Construction Projects
FEMA Reimbursement Projects

• Project 1 – $4.2 M
  o 2,608 lf of pipe improvements
  o South Plaza Trail from Rosemont Road to Presidential Boulevard to Windsor Woods Canal

• Project 2 – $948 K
  o 1,415 lf of pipe improvements
  o Old Forge Road to Red Lion Road to Windsor Woods Canal

• Project 3 – $201 K
  o 445 lf of pipe improvements
  o Kings Point Court to Windsor Woods Canal
Current Dredging Projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Total Value</th>
<th>Construction Status</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windsor Woods Canal</td>
<td>$2,000,000</td>
<td>Began in January 2018. Complete in June 2018.</td>
<td>6 Months</td>
</tr>
<tr>
<td>Windsor Oaks West 1 (2 Phases)</td>
<td>$800,000</td>
<td>Began in June 2017. Completed in December 2017.</td>
<td>6 Months</td>
</tr>
<tr>
<td>Windsor Oaks West 2 (2 Phases)</td>
<td>$600,000</td>
<td>Began in July 2017. Completed in January 2018.</td>
<td>6 Months</td>
</tr>
<tr>
<td>Windsor Oaks West 3 (3 Phases)</td>
<td>$600,000</td>
<td>Begin in June 2018. Complete in March 2019.</td>
<td>9 Months</td>
</tr>
<tr>
<td>Northgate Ditch</td>
<td>$2,000,000</td>
<td>Began in May 2017. Complete in June 2018.</td>
<td>12 Months</td>
</tr>
</tbody>
</table>
Completed Projects

Windsor Oaks West I, CIP 7-415.039

- Dredge 1,510-ft canal to restore original drainage capacity
- 4,218 cubic yards of dredge material removed
- Notice to Proceed – June 2017
- Construction Complete
- Total Project Cost – $700K

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
- 7,053 cubic yards of dredge material removed
- Notice to Proceed – July 2017
- Construction Complete
- Total Project Cost – $675K

Avg. Pre-depth: 0.65’
Avg. Post-depth: 4.55’
**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’
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 – June 2018
- Total Project Cost – $2M

Avg. Pre-depth: 1.5’
Avg. Post-depth: 4.4’
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 – June 2018
- Construction Complete – March 2019
- Estimated Total Project Cost – $650K

Active Projects

Avg. Pre-depth: 1.8’
Avg. Post-depth: 4.95’
Windsor Woods, Princess Anne Plaza, and The Lakes are neighborhoods located in headwaters of the Lynnhaven River. History and characteristics of the area are:
- Residential neighborhood and infrastructure in place for over 50 years
- Low elevations coupled with sea level rise and increasing frequency of storms results in severe flooding
- Drainage projects are currently underway or starting soon
- City has developed a 30-15 year $120 million program for flood mitigation

Significant issues are:
- Low elevations
- Minimal capacity of stormwater conveyance systems
- High tides resulting in significant reduction of storage in Lake Trademore and Lake Windsor
- Intense storm events have resulted in more frequent flooding and increased property damage.

Potential solutions:
- Increasing the capacity of the combined stormwater system
- Construction of gates to minimize flooding
- Construction of pump stations for additional capacity
- Additional retention

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STORMWATER MAINTENANCE ACTIVITIES
(9/1/2017 – 3/31/2018)

• 1048 completed work orders
  o Pipe Cleaning: 51,438 Feet
  o Cave-ins: 28

• 47 open work orders
  o Pipe or Inlet Cleaning: 13
  o Cave-ins: 34
OTHER ON-GOING STORMWATER MAINTENANCE ACTIVITIES

• Street Sweeping - All City roads are swept 6 times per year (once every other month)

• MS4 Inspections
  o Asset Inspections: 15% of known assets (pipes, structures, ditches) shall be inspected annually
  o SWMF Inspections: All City maintained SWMF inspected annually, and 20% of the privately maintained SWMF inspected annually.
Princess Anne Plaza,
Windsor Woods and The Lakes
Combined Drainage Improvements
Fredrick Muncy, P.E.
Clarence Warnstaff
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, Permissible, Approvable Projects
  - Cost Effective Solutions
SERVICE REQUESTS
Call Public Works Clerks: 385-1470
Email Public Works Clerks: pwclrks@vbgov.com
City website:
https://www.vbgov.com/government/departments/public-works/Pages/service-requests.aspx
VBWorks:
https://www.vbgov.com/mobile-apps/Pages/default.aspx

PROJECT INQUIRIES
Call Public Works Engineering: 385-4131
Public Works Engineering Project Web Page:
Email Public Works Engineering: papww@vbgov.com
QUESTIONS