City of Raleigh
Engineering Services Department

Stormwater Management

White Oak Lake Reconstruction Project

October 18, 2017

Public Meeting
At Thomas Woodland Center
Phasing and Project Orientation

Phase 1
- Lail, Kaplan, and Swift Culverts

Phase 2
- Pineview Drive Culvert
- Swift Drive Culvert
- Driveway Bridge
- Bank Stabilization

Phase 3
- White Oak Lake

You Are Here

DA = 1.2 sq. mi.
1. Improve public safety
2. Reconstruct failing or missing lake controls (embankment, riser, emergency spillway)
3. Move embankment out of future NCDOT I-440 widening project
4. Address future maintenance challenges
5. Reduce downstream flooding
   - Eliminate roadway flooding for a 10-year flood
   - Minimize flooding of homes and yards
I-440 Right-of-Way Line

Proposed Lake

Proposed Spillway

New NCDOT Right-of-Way Line

Proposed Dam Embankment

Proposed Riser/Barrel

Existing Dam Embankment
Flood Reduction

- Lower normal pool from 401.8’ to 397.0’
- Raise emergency spillway from 402’ to 404.25’
- Install new riser with 96” dia. Barrel
- Take temporary storage from 0 cf. to more than 1,500,000 cf.
- Peak flow is delayed by almost one hour
Flood Reduction

Simmons Branch Watershed Map

SB 8
SB 7
SB 6
SB 5
SB 4
SB 3
SB 2
SB 1
Current Lake
Failed Primary Spillway
Failed Primary Spillway
Failed Emergency Spillway
Failed Emergency Spillway
Tree Lined Dam Embankment
Lake Filling in With Sediment
Design Objectives

- Maintain lake footprint (if possible)
- Target a normal pool depth of 3.0’
- Reduce downstream flows
- Convey 500-yr flood with 1.0’ of freeboard on top of dam
- No flooding of FFE in 500-yr flood
- No garage flooding in the 100-yr flood
Stormwater Modeling

NRCS 24-Hour Type II synthetic rainfall event

Soils

Land

Slope of the land

Drainage area
Summary of Proposed WSELs

5227 Melbourne Road - Garage @ 409.2’

5207 Hawksbury Ln Road FFE @ 408.5’

<table>
<thead>
<tr>
<th>Event</th>
<th>WSEL</th>
<th>Top of Dam</th>
<th>Emergency Spillway</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-yr</td>
<td>403.3</td>
<td>406.5</td>
<td>406.5</td>
</tr>
<tr>
<td>100-yr</td>
<td>404.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>500-yr</td>
<td>405.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Presented design elevations are subject to final design changes to best achieve project goals.
### Summary of Flows Changes

<table>
<thead>
<tr>
<th>Existing Conditions</th>
<th>Proposed Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-Yr = 553 cfs</td>
<td>10-Yr = 305 cfs</td>
</tr>
<tr>
<td>100-Yr = 1112 cfs</td>
<td>100-Yr = 749 cfs</td>
</tr>
<tr>
<td>500-Yr = 1317 cfs</td>
<td>500-Yr = 882 cfs</td>
</tr>
</tbody>
</table>

*Presented design flows are subject to final design changes to best achieve project goals.*
Proposed Riser/Barrel

- 10’x10’ concrete riser (vault)
- 96” dia. barrel (110 LF)
- Steel trash rack
- Anti-vortex plate
Proposed Riser/Barrel

Trash Rack

Barrel

Concrete Riser

Concrete Foundation
Proposed Emergency Spillway

Ravenwood Drive

Emergency Spillway

I-440
Proposed Emergency Spillway

- 35’ wide concrete lined spillway
- Crest elevation = 404.25’ NAVD ‘88
- Top of dam elevation is 406.5’ NAVD ‘88

*Presented design elevations are subject to final design changes to best achieve project goals*
Existing Conditions Mapping

[Map showing existing conditions and water areas with markings and labels like "Existing Dam Top Elev = 403 to 404 ft" and "Existing Dam Emergency Spillway Elevation = 400 ft"]

Legend:
- Existing Water Area
- Limits of Wetland
- Proposed NCDOT Drainage Easement
- Proposed NCDOT Right-of-way
- Existing NCDOT Right-of-way
- Existing Sanitary Sewer Easement
- Existing Topography
- Parcels

Scale: 1 inch = 50 feet

White Oak Lake Reconstruction Project

Existing Conditions
Proposed Conditions Mapping

Proposed Normal Pool Elev = 357 ft
Proposed Water Area = 0.88 acres (21% of existing)

Proposed Emergency Spillway Elev = 404.25 ft
35-ft wide
Dam Classification

Size = Small (total storage of 68 acre feet and height = 17 feet)

Hazard Classification = High

Regulated by NC Dam Safety

Emergency Operation Plan

Submittal for Dam Safety Permit
Permitting

- NC Dam Safety

- US Army Corps:
  - < ½ wetland impacts (PCN submittal – Nationwide Permit)
  - Lowering lake level (working through)

- NCDENR Erosion Control Permit
Project Schedule – White Oak Lake

October 2017: 25% design complete

October 2017: Public meeting

October - January 2018: Private utility relocation, obtain permits, easement acquisition; finalized construction plan

February - April 2018: Project bid

May – June 2018: Project award

July – August: Project construction begins

May 2019: Project completed
Questions?
City of Raleigh
Stormwater Management Division
Raleighnc.gov (Search “White Oak Lake”)
RaleighStormwater@raleighnc.gov
919-996-4074