City of Raleigh
North Carolina

Rehabilitation of Lower Longview Lake Dam

Public Meeting
September 22, 2014

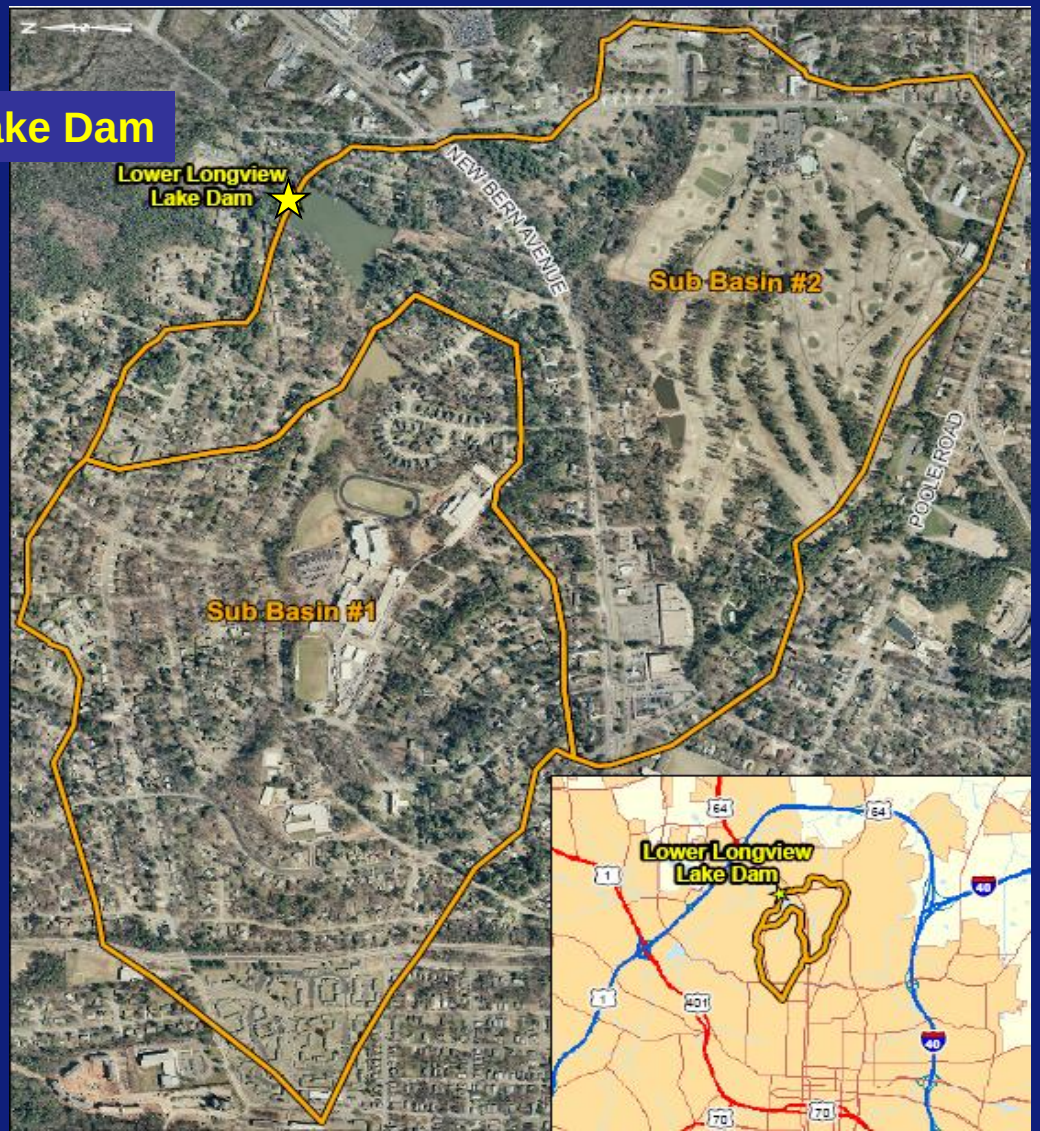
Project Team

- City of Raleigh
  - Gilles Bellot, PE –Project Manager
  - Scott Bryant, PE – Senior Project Engineer
- Schnabel Engineering
  - Gerald Robblee, PE – Project Manager
- CDM Smith
  - Michael Sloop, PE – Project Manager
  - Robert Hopper, PE – Project Engineer

Project Location & Dam Safety Classification

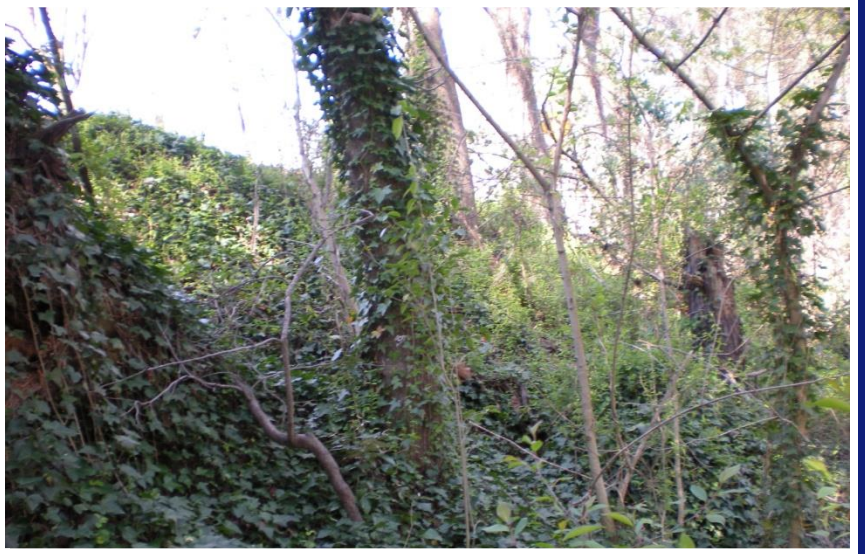
Lower Longview Lake Dam

Small High Hazard Dam



Dam Crest – Albemarle Avenue

Downstream Slope



Upstream Slope

Pertinent Dam Data – Existing Dam

- Earthfill
- Structural height of ~20 ft.
- Hydraulic height of ~14 feet
- Crest width varies (~20 to ~25 feet)
- Spillway – Box Culvert/Bridge ~8’x16’
- Crest elevation varies from El 207 ft. to El 210 at abutment contacts

Project Goals

- Provide for Public Safety
  - Safe Dam and Spillway
  - Maintain Right-of-Way for Albemarle Ave
- Stormwater / Watershed Management Benefits
  - Protect Water Quality
  - City’s Lake Preservation Program

Dam Safety Deficiencies

- Inadequate spillway capacity
- Slopes too steep
- Trees and brush on slopes
- Seepage
- No operating low-level outlet
- Scour in existing spillway outlet channel

Other Issues

- City street (Albemarle Ave) over dam
- City sewer in spillway outlet channel
- Proximity of residences
- Millburnie Ave ~400 ft. downstream

Rehabilitation Design Constraints

- Must pass spillway design flood
- Roadway needs to meet City of Raleigh standards
- Only minor changes to dam crest elevation
- Maintain reservoir pool elevation
- Maintain hydraulic characteristics

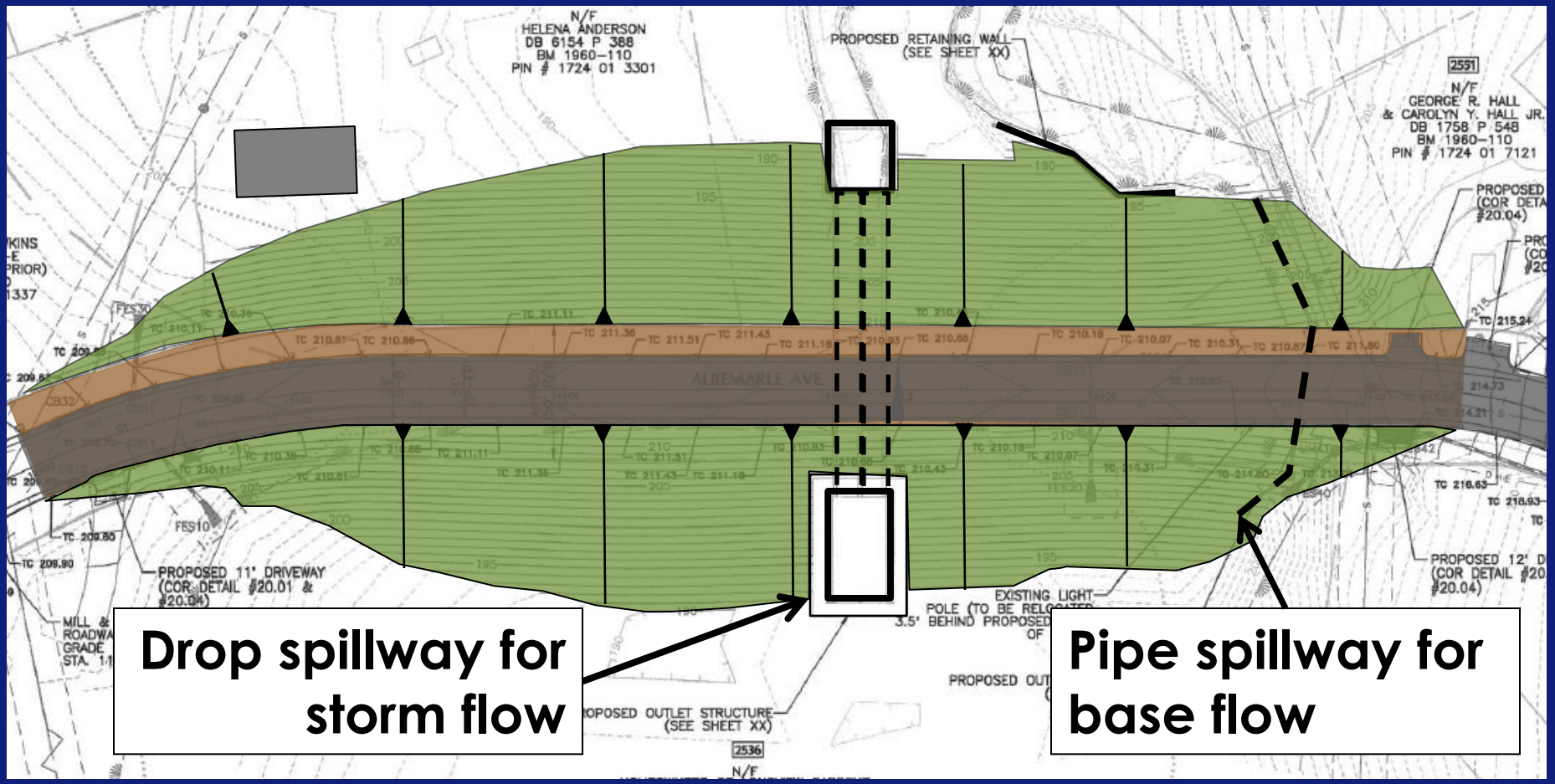
Other Rehabilitation Goals

- Protect sanitary sewer
- Find, then remove or abandon existing low-level outlet
- Construct a new low-level outlet

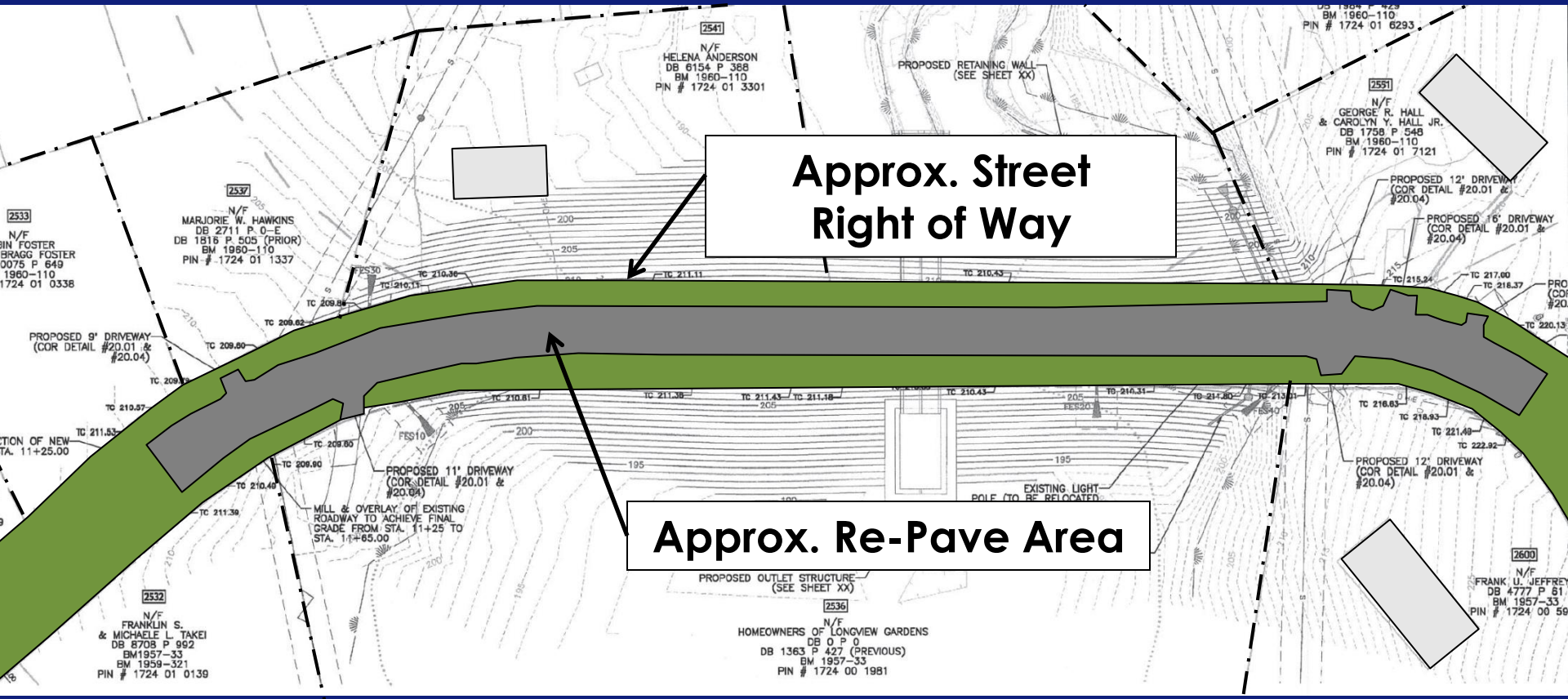
Rehabilitation Design Configuration

- Place 12-inch pipe in existing spillway to pass base flow
- New spillway in center of dam
  - Drop structure and double barrel conduit
  - 3-stage weir
  - Pass SDF (1/3 PMP)
- Widen dam crest (road & sidewalk) to 36 ft
- Flatten slopes (3H:1V)

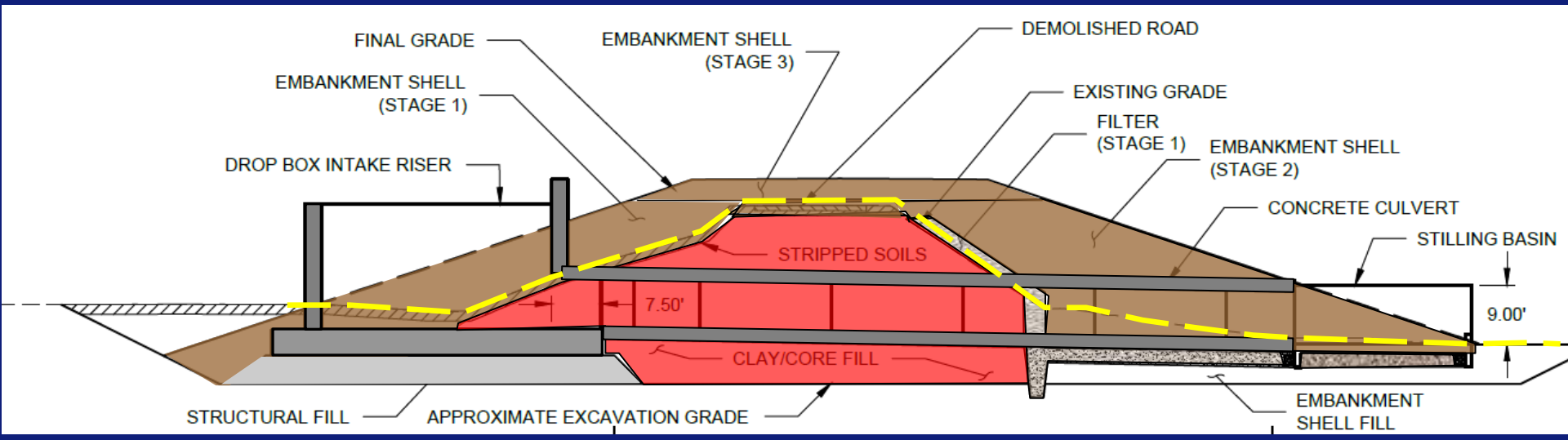
Proposed Embankment Grading



Re-Paving Limits



Section Through Dam & Drop Inlet Spillway



Hydraulic Characteristics New Spillways

Table 3: Summary of Proposed Dam Variables and Outputs

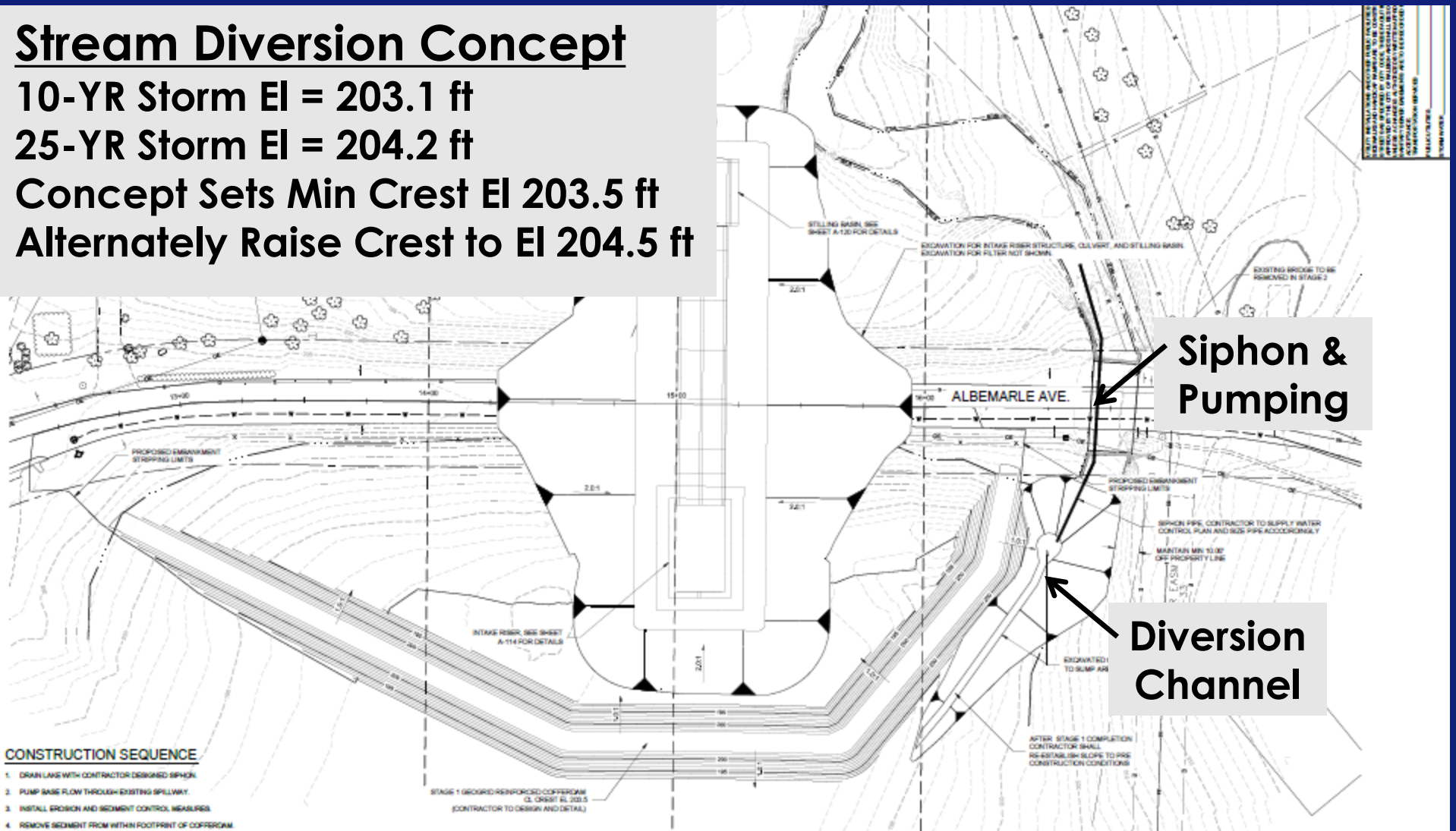
Normal Pool WSEL	201 feet
Top of Dam Elevation	209.5 feet
1-inch Rainfall Outflow	1.6 cfs
1-inch Rainfall Peak WSEL	201.6 feet
100 year Outflow	645 cfs
100 year Peak WSEL	206.3 feet
500 year Outflow	1146 cfs
500 year Peak WSEL	207.4 feet
⅓ PMP Outflow	2,243 cfs
⅓ PMP Peak WSEL	209 feet

WSEL = water surface elevation **cfs = cubic feet per second**

Stream Diversion – Stage 1

Stream Diversion Concept

10-YR Storm El = 203.1 ft
25-YR Storm El = 204.2 ft
Concept Sets Min Crest El 203.5 ft
Alternately Raise Crest to El 204.5 ft

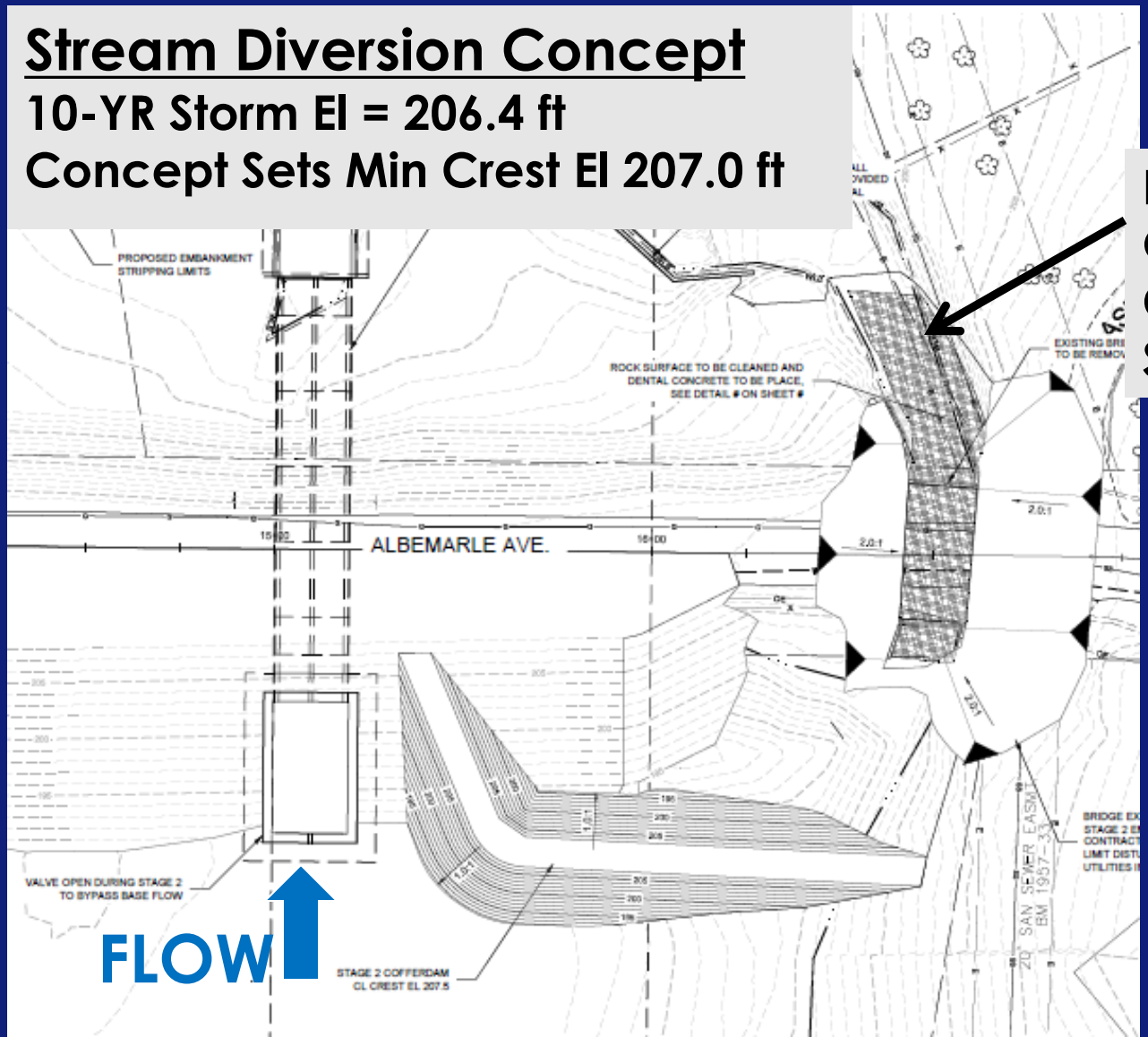


Stream Diversion – Stage 2

Stream Diversion Concept

10-YR Storm El = 206.4 ft

Concept Sets Min Crest El 207.0 ft



Leveling Concrete Over Rock & Concrete Encase Sewer in Abutment

Disposition of Utilities

- Water Line Replaced
  - Shut-offs on abutments
  - Encased steel pipe casing with vents/drains
- Gas line has been removed and stubbed
- Install replacement street lights

Lake Sediment Removal Study Goal

To determine the cost versus benefit relationship for the City of Raleigh to remove sediment from Lower Longview Lake while the lake is drained for dam rehabilitation.

Study Objectives

- Calculate the quantity of accumulated sediment to be removed
- Evaluate the water quality benefits associated with removal of the sediment
- Determine the methods and requirements for disposal of the sediment based on constituents
- Evaluate additional considerations associated with the removal of sediment

Data Collection and Evaluation

- Jurisdictional Wetlands
- Sediment Testing
- Lake Bathymetry
- Contributing Watershed
- Pollutant Loadings
- Estimated Costs for Sediment Removal and Disposal

Jurisdictional Wetlands

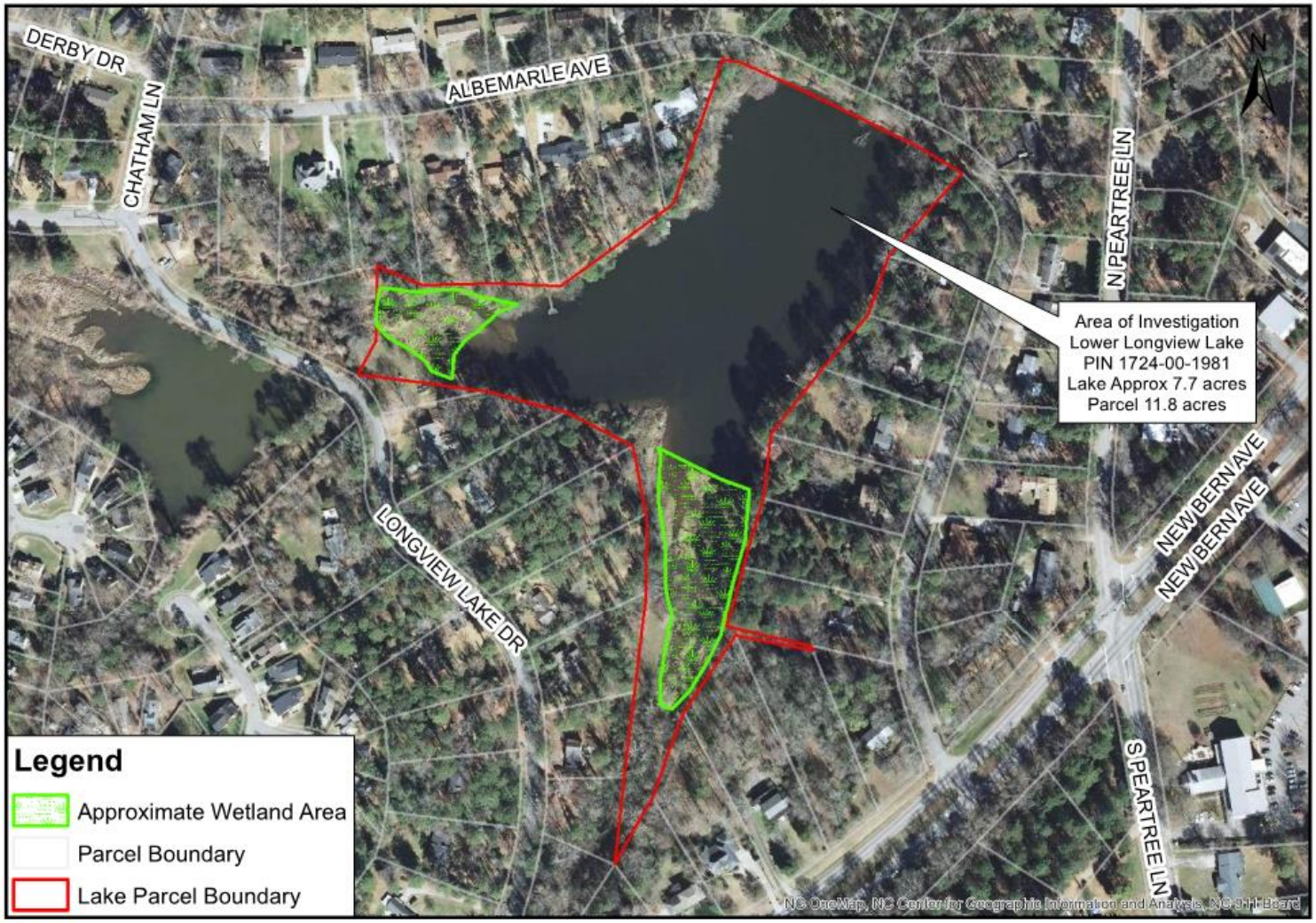


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Figure 1. Lower Longview Lake Dredging Evaluation Study Area

Sediment Constituent Testing

www.encolabs.com

SAMPLE SUMMARY/LABORATORY CHRONICLE

Client ID: #1 **Lab ID: C405065-01** **Sampled: 04/24/14 09:00** **Received: 04/24/14 11:20**

Parameter	Hold Date/Time(s)		Prep Date/Time(s)		Analysis Date/Time(s)
EPA 6010C	10/21/14		05/01/14	10:54	05/02/14 13:56
EPA 7471B	05/22/14		04/29/14	10:11	04/30/14 16:56
EPA 8081B	05/08/14	06/10/14	05/01/14	09:16	05/02/14 12:33
EPA 8082A	04/24/15	06/10/14	05/01/14	09:24	05/02/14 12:33
EPA 8260B	05/08/14		05/01/14	15:55	05/02/14 01:40
EPA 8270D	05/08/14	06/10/14	05/01/14	12:30	05/08/14 18:44

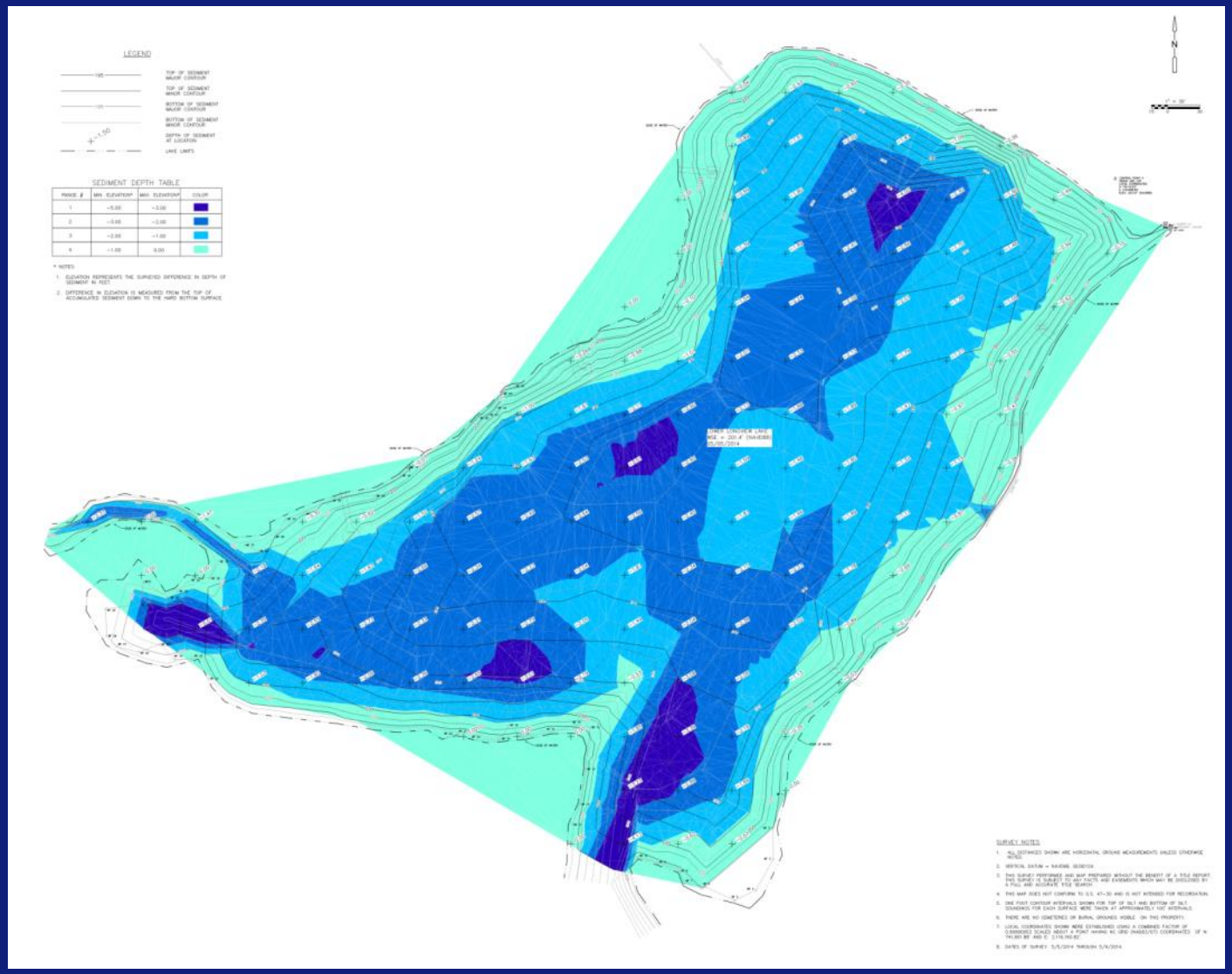
Client ID: #2 **Lab ID: C405065-02** **Sampled: 04/24/14 09:15** **Received: 04/24/14 11:20**

Parameter	Hold Date/Time(s)		Prep Date/Time(s)		Analysis Date/Time(s)
EPA 6010C	10/21/14		05/01/14	10:54	05/02/14 14:08
EPA 7471B	05/22/14		04/29/14	10:11	04/30/14 16:58
EPA 8081B	05/08/14	06/10/14	05/01/14	09:16	05/02/14 12:59
EPA 8082A	04/24/15	06/10/14	05/01/14	09:24	05/02/14 12:59
EPA 8260B	05/08/14		05/01/14	15:55	05/02/14 02:13
EPA 8270D	05/08/14	06/10/14	05/01/14	12:30	05/08/14 19:13

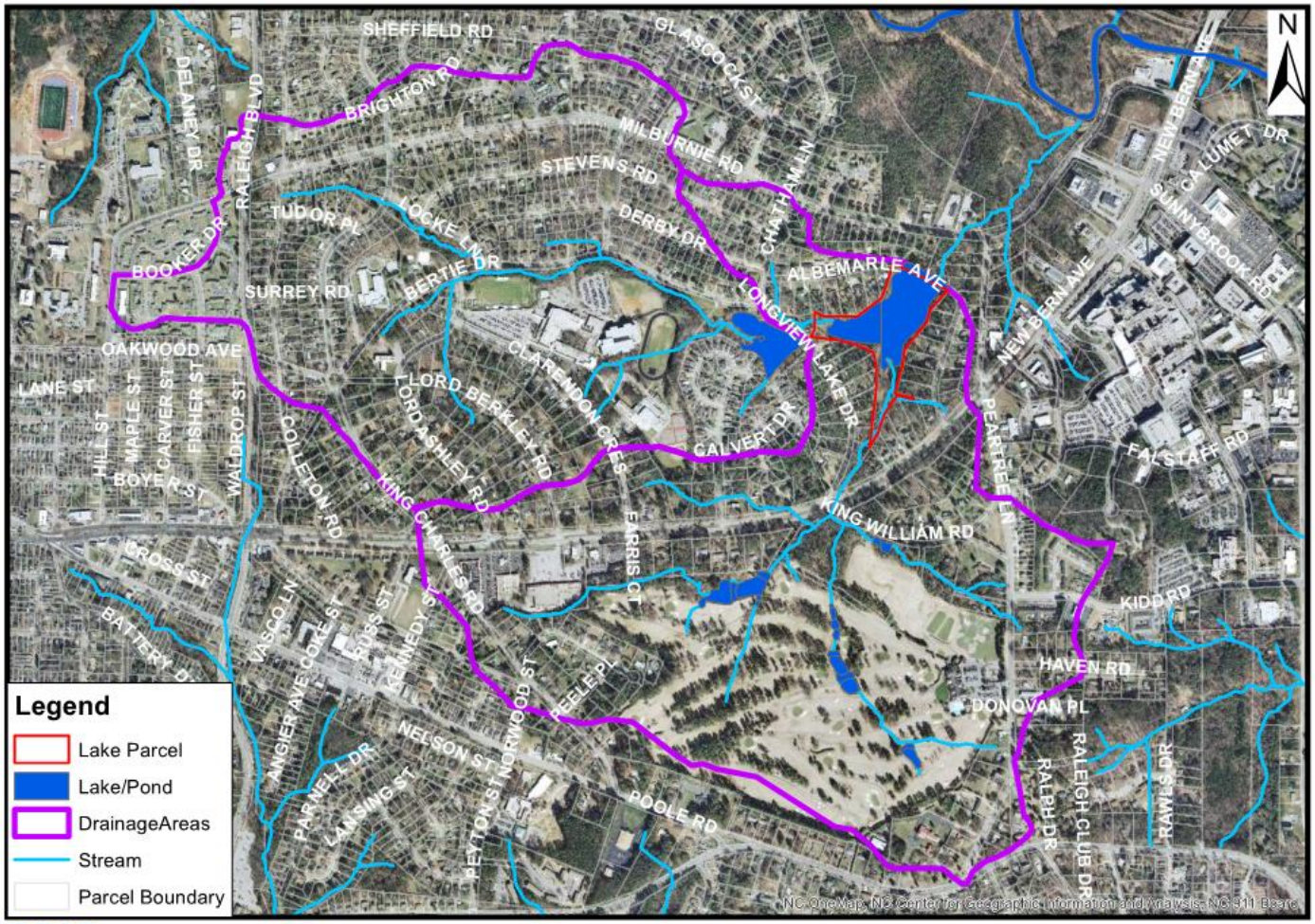
Client ID: #3 **Lab ID: C405065-03** **Sampled: 04/24/14 09:30** **Received: 04/24/14 11:20**

Parameter	Hold Date/Time(s)		Prep Date/Time(s)		Analysis Date/Time(s)
EPA 6010C	10/21/14		05/01/14	10:54	05/02/14 14:11
EPA 7471B	05/22/14		04/29/14	10:11	04/30/14 17:00
EPA 8081B	05/08/14	06/10/14	05/01/14	09:16	05/02/14 13:13
EPA 8082A	04/24/15	06/10/14	05/01/14	09:24	05/02/14 13:13
EPA 8260B	05/08/14		05/01/14	15:55	05/02/14 02:46
EPA 8270D	05/08/14	06/10/14	05/01/14	12:30	05/08/14 21:38

Lake Bathymetry



Contributing Watershed



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550 0 550 1,100 1,650 2,200 Feet

Figure 4. Lower Longview Lake Dredging Evaluation Watershed

Engineer's Opinion of Probable Construction Cost for Sediment Removal

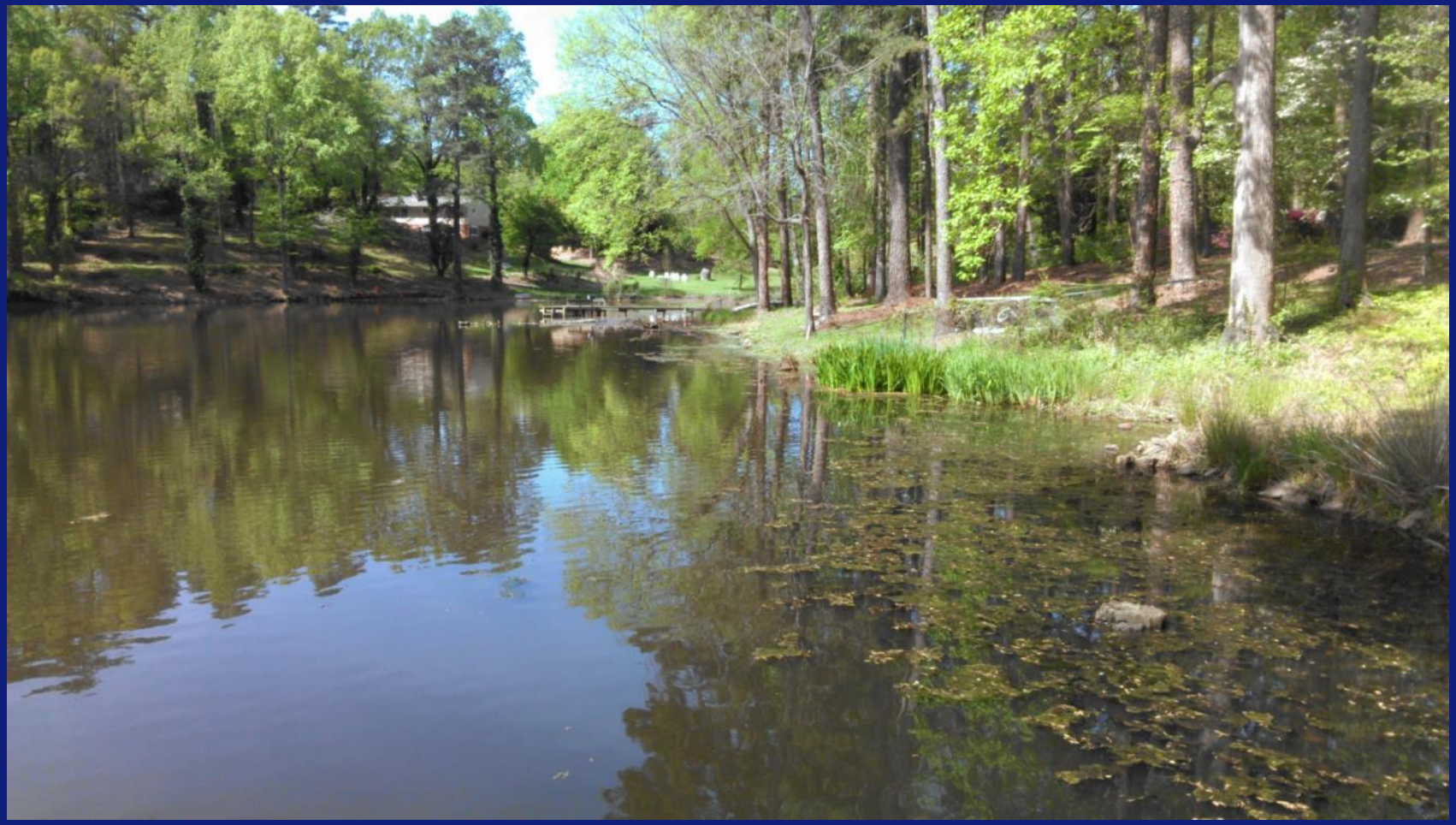
Item	Description	Quantity	Unit	Unit Price	Cost
1	Mud Mats	10	ea.	$500	$5,000
2	Dewatering Pump	1	ls	$10,000	$10,000
3	Excavation and Loading (Excavator)	20,000	cy	$15	$300,000
4	Transport to Disposal Site (Dump Trucks)	20,000	cy	$14	$280,000
5	Disposal at Landfill (Tipping Fee)	30,000	ton	$32	$960,000
6	Surveying	1	ls	$10,000	$10,000
				Subtotal, Items 1-5:	$1,565,000
				Mobilization (@ 5%):	$78,000
				Contingencies (@ 10%):	$157,000
				Engineering, Legal, Administration, Permitting (@ 15%):	$235,000
				Total Project Costs:	$2,035,000

Further Evaluation Criteria

- *Recreation* – How will removing sediment improve recreation?
- *Algae* – How will removing sediment decrease algae growth?
- *Habitat* – How will removing sediment improve aquatic habitat?
- *Aesthetics* – How will removing sediment improve aesthetics?
- *Life Expectancy* – What is the life expectancy (i.e. time before the lake needs to be dredged)?
- *Wetland Growth* – How will removing sediment affect wetland growth and expansion into the lake?
- *Sediment Disposal* – How can the sediment removed be used as a benefit?
- *Cost Savings* – What are the cost savings of removing the sediment now compared to in the future?

Recreation – How will removing sediment improve recreation?

Algae – How will removing sediment decrease algae growth?



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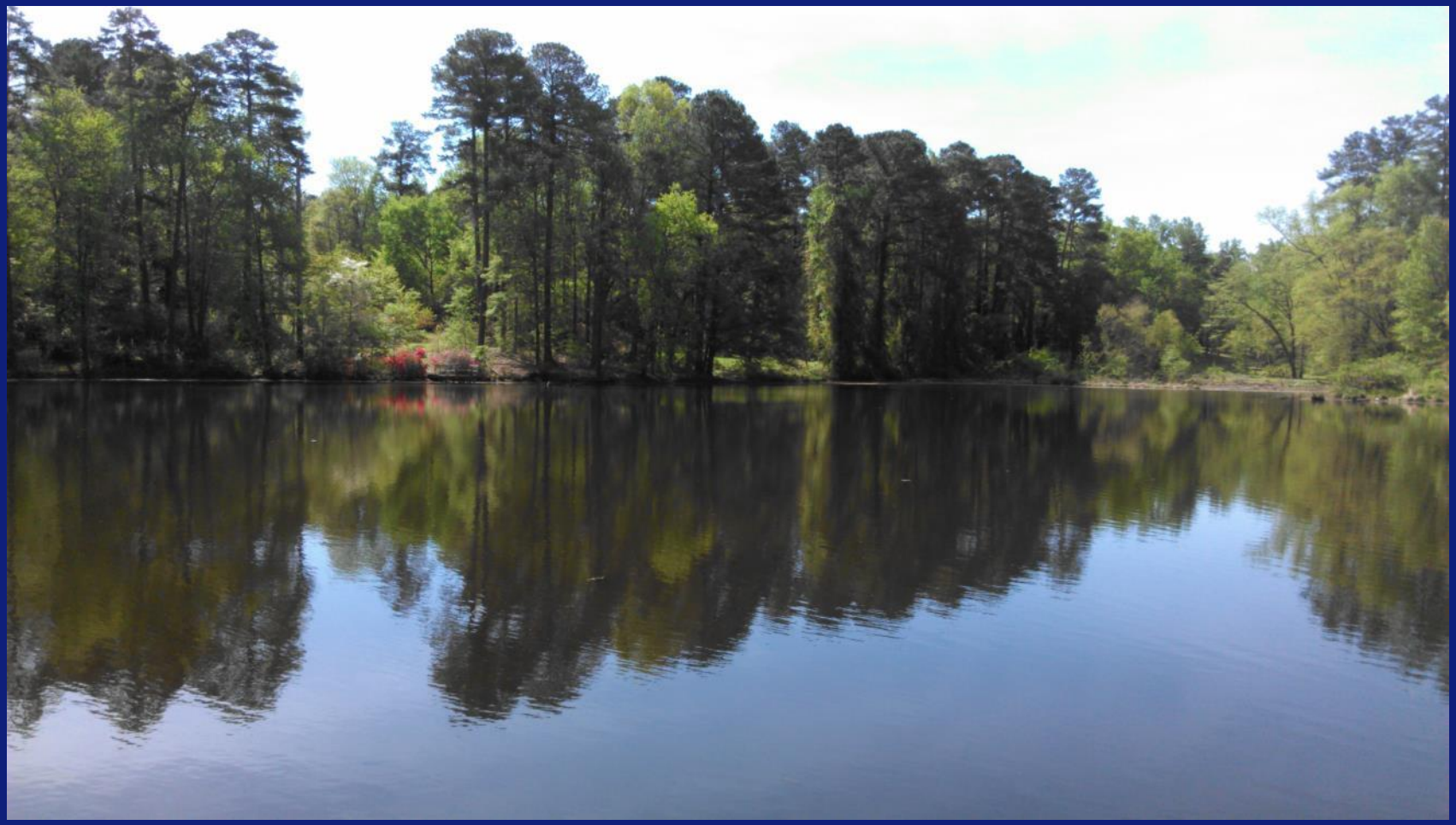

Recommendation

- Water Quality benefit of sediment removal would be minimal.
- Need to retain shallow littoral shelf around lake reduces the benefits on recreation and aesthetics.
- Public benefit for recreation and aesthetics is minimal since no public access to lake.
- Cost is high for sediment disposal without beneficial use site available nearby.
- Use of limited City Stormwater Utility funds would be better utilized on other projects with greater stormwater needs.

Schedule / Milestones

- Final design plans and specifications for construction – *September through Nov 2014.*
- Final required easements – *by end of November*
- Begin advertising to pre-qualify construction contractors – *November – December 2014*
- Begin construction – *by May 2015*
- Complete construction – *by May 2016*

Schnabel ENGINEERING

Questions & Comments

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- CDM Smith:
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ADDITIONAL STORMWATER PROJECT AND CIP INFORMATION:

http://www.raleighnc.gov/projects/content/PWksStormwater/Articles/StormwaterUtilityCIP.html

Stormwater Management Division
Your Fees Working For You

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