

# SOUTH ELLERBE RESTORATION IN DOWNTOWN DURHAM, NC:

## *TRANSFORMING AN UNDERUTILIZED PROPERTY TO A COMMUNITY AMENITY*



20<sup>th</sup> Annual Regional  
Stormwater Seminar  
April 25, 2025

**Geosyntec** 

consultants

Geosyntec Consultants of NC, P.C.



**PUBLIC WORKS**  
CITY OF DURHAM



**WILDLANDS**  
ENGINEERING

# AGENDA

## Project Background

- History
- Motivation
- Community Involvement
- Priorities
- Project Funding
- Timeline

## Project Design

- Initial Concept Plan
- Site Investigation
- Modeling & Constraints
- NCDEQ Dam Incremental Analysis
- Final Design/Permitting
- Community Amenities & Benefits
- Feasibility Environmental Assessment
- Soil Beneficial Reuse Planning

## Project Construction

- Phase 1 2018 Building Demolition
- Phase 1 2018 UST Closure
- Phase 2 – 2022 Site Grading
- Phase 2 – 2022 Site Planting
- Phase 3 – 2025 & Beyond

# TODAY'S PRESENTERS



**Sandra Wilbur, PE**

**S Ellerbe Project Manager**

- Professional Engineer
- 25+ years of engineering experience in water resources engineering, watershed planning for water quality and quantity, stormwater management, SCM, stream and wetland restoration projects, infrastructure design and construction, ordinance and rule writing, and NPDES program management
- Head of the City of Durham Public Works Stormwater Services Division, Watershed Restoration Unit



**Angela Allen, PE**

**S Ellerbe Project Engineer**

- Senior Water Resources Engineer and Project Manager
- 20+ years of experience design and construction of stream and wetland restoration projects, SCMs, and dam removals
- Current president of the North Carolina Environmental Restoration Association



**Vicki Garlington, PG**

**S Ellerbe Project Environmental Professional**

- Senior Project Geologist
- 23+ years of experience in environmental due diligence, site investigation, and remediation
- Current career focus on brownfields urban infill and soil management on redevelopment projects in North Carolina
- Managed over a dozen redevelopment projects in the North Carolina Brownfields Program since 2015 and assisted multiple municipalities in implementing U.S. EPA Brownfields Assessment Grants
- Manages Geosyntec's environmental management group in the Raleigh, North Carolina

# PROJECT BACKGROUND

# HISTORY



City Purchased former YMCA and Duke Diet Fitness Center from Duke University



Property adjacent to former mill

# HISTORY

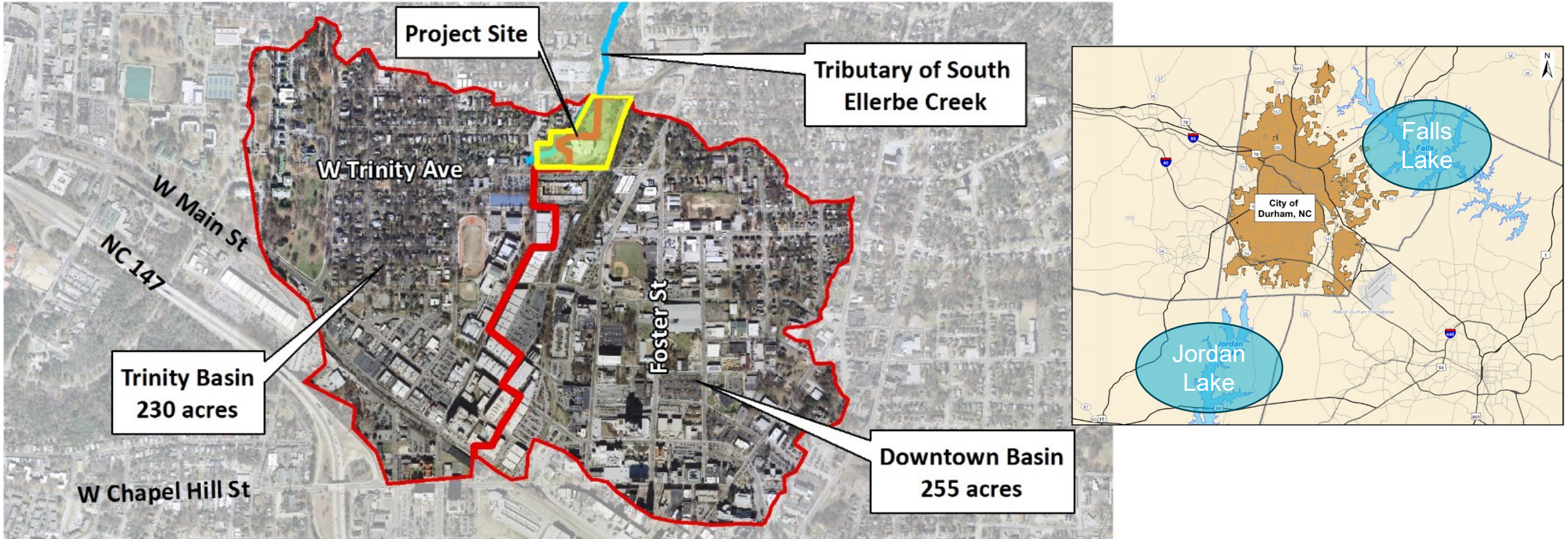


South Ellerbe Tributary



Existing Stormwater Infrastructure

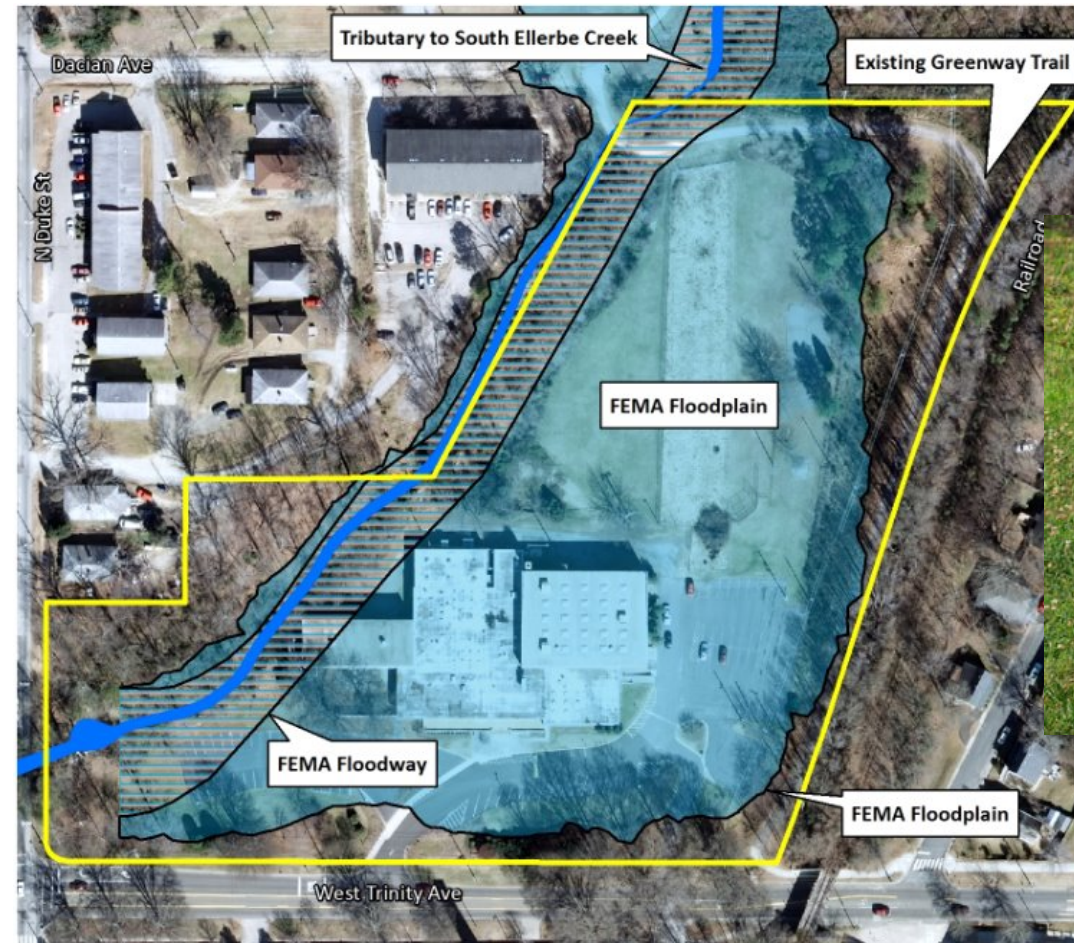
# MOTIVATION



Ideally located to provide flood control for 585 acres of runoff from urbanized watershed as part of the Falls Lake Nutrient Management Strategy

# MOTIVATION

- 9-acre site is unique due to its size and location in the watershed
- Site is a natural low point that collects water from two different branches of the Tributary to South Ellerbe Creek
- Few stormwater control measures currently in place within the basin
- Majority of the area is piped with very few open channels



# COMMUNITY INVOLVEMENT



## Proyecto para restaurar naturalmente las aguas pluviales de South Ellerbe

La Ciudad de Durham Departamento de Obras Públicas desea recibir los comentarios de los vecinos cercanos. Te invitamos a la siguiente exposición de proyectos para que nos cuentes tus pensamientos y aportes tus ideas. Sus comentarios son vitales y queremos asegurarnos de que usted es capaz de definir el este nuevo espacio verde.

La Ciudad está preparando la construcción de un proyecto ubicado en la dirección 805 W Trinity Ave. El proyecto está diseñado para transformar el área en un hábitat natural para restaurar y controlar las aguas pluviales.

La zona es naturalmente situado más bajo al centro de Durham y alrededores vecindades. La acumulación de agua de lluvia de estas áreas fluye en un arroyo que conduce a South Ellerbe Creek antes de drenar en el lago cercano de Falls Lake, un importante reserva de agua potable para la región.

El rápido crecimiento allí así hará más lento el agua, pensando que las plantas y el suelo especializado tratan un poco la contaminación y mejoran la vida acuática. Toda la comunidad se beneficiará con tener las nuevas áreas naturales cerca.

**Sesión de Información Pública**  
el 22 de Abril 2018  
5:30 - 7:30 de la tarde  
Durham County  
Human Services Building  
314 East Main Street  
Durham, NC 27701

¿Sabías que...  
Al vertido a tierra de agua del Neuse (Neotoma lewisi), una salamandra poco conocida puede ayudar a limpiar el río de la contaminación y mejorar la calidad del agua que fluye.  
Para obtener más información sobre el proyecto y estar al tanto del progreso, visita <http://durhamnc.gov/428>

**IMMACULATE CONCEPTION CATHOLIC CHURCH**  
A Roman Catholic Parish in the Diocese of Raleigh

October 27, 2018  
Thanksgiving in Ordinary Year

...the parish will be participating in the annual St. Francis, Missionary of the Sea...  
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## Public Works Department, Stormwater & GIS Services FUNCTIONS AND BENEFITS OF CONSTRUCTED WETLANDS

**WHAT IS A CONSTRUCTED STORMWATER WETLAND?**  
A constructed stormwater wetland (or constructed wetland) is one type of stormwater control measure (SCM) that is designed to mimic the functions of a natural wetland. Constructed wetlands consist of water-living plants, soils and pools of water that can filter stormwater before it's slowly released downstream. As stormwater flows through a constructed wetland, wetland microbes, plants, and soil help their pollutants and filter the water through natural ecological processes. Stormwater leaves constructed wetlands cleaner than when it entered.

**HOW DO CONSTRUCTED WETLANDS WORK?**

- 1. Inlet:** Stormwater flows through pipes and enters the wetland at the inlet.
- 2. Storage:** Reduces the speed of stormwater as it enters into the wetland and helps trap debris and sediment.
- 3. Soils:** Soils promote healthy plant growth.
- 4. Deep pools:** Hold water more permanently, help capture sediment, and provide habitat for mosquito predators and other aquatic life.
- 5. Shallow water areas:** Shallow areas with different types of plants that promote filtering and removal of sediment, nutrients, and other pollutants.
- 6. Outlet structure:** Controls the amount of water that is stored in the wetland and the amount that flows downstream.

**WHAT ARE THE BENEFITS OF A WETLAND?**

- Improved water quality
- Enhanced aquatic life
- Help protect stream banks
- Pollinator friendly habitat
- Home for birds, wildlife and native plants
- Increased green space
- Plants that absorb carbon dioxide



**South Ellerbe Restoration Project**

CITY OF DURHAM

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- 7 Public Information Sessions beginning 2012
- 20 Public Presentations
  - 2 PAC districts
  - 3 neighborhood Associations & Community Groups
  - 2 Advisory Boards
  - 2 Committees
  - 1 Non-profit
- 3 Focus Group Meetings
- 4 Community Surveys
- 5 Videos
- >15 handouts and press releases
- Bi-weekly posts on Facebook and X
- 5 City Council Meetings
- Other
  - Fence art collaboration with Lee Crawford & 3 local school
  - National Land Trust Alliance field trip
  - Collaboration with City's Cultural & Public Art Program to issue RFQ for public art installations in the park

# PRIORITIES

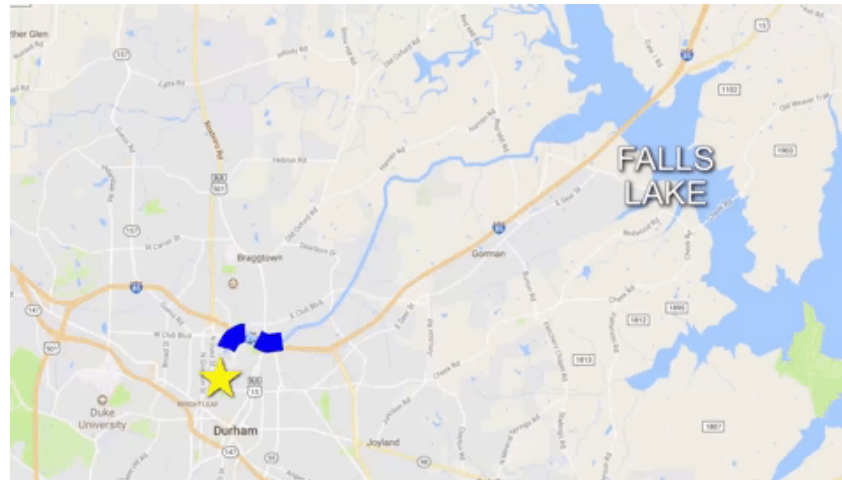
#1

Improve water quality in Ellerbe Creek



#2

Protect Falls Lake as a drinking water supply



#3

Create a natural area that improves wildlife habitat



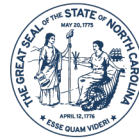
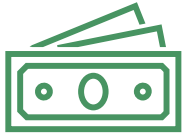
# PRIORITIES

## Highest rated community amenities:

- 1) Access to nearby trails
- 2) Educational signage
- 3) Boardwalk
- 4) Overlook
- 5) Seating areas



# PROJECT FUNDING



NORTH CAROLINA  
*Environmental Quality*

ARPA LASSI



CITY OF  
**DURHAM**

Stormwater Utility Fund



NORTH CAROLINA  
**LAND & WATER**  
• F U N D •

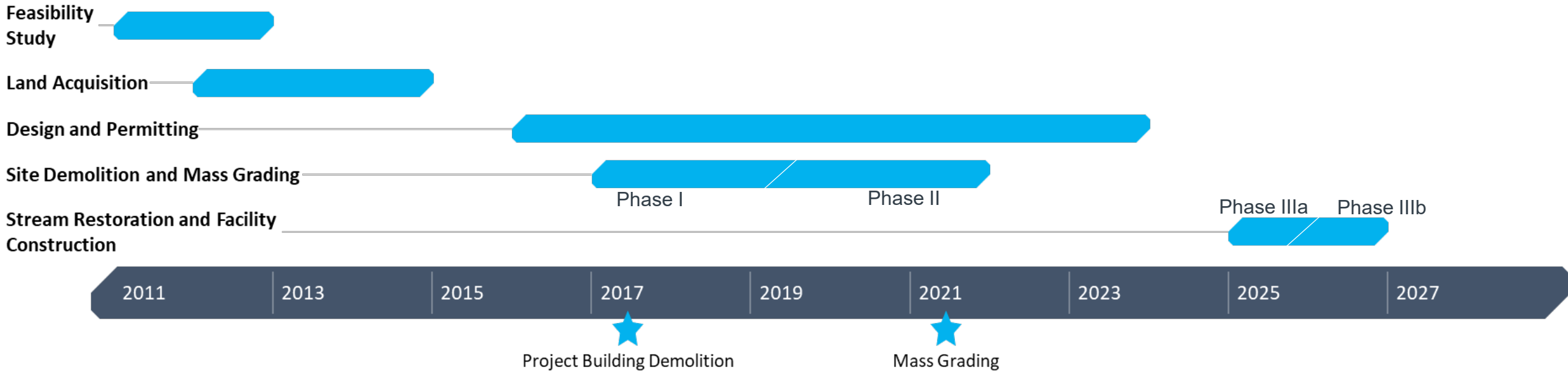
- ✓ Flood Reduction
- ✓ Restoration



**Raleigh**

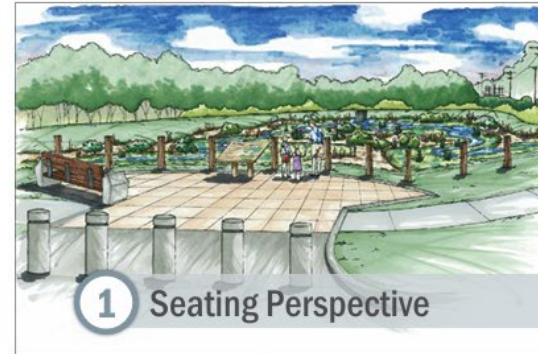
Watershed Protection  
Program

# PROJECT TIMELINE



# PROJECT DESIGN

# INITIAL CONCEPT PLAN



# DESIGN PHASE - SITE INVESTIGATIONS

- Topographic Survey
- Bedrock Survey
- Delineation of streams and wetlands
- Inspection of building: focus on materials reuse/recycle
- Asbestos, lead-based paint (LBP), poly chlorinated biphenyl (PCB) and Universal waste materials survey
- Soil testing

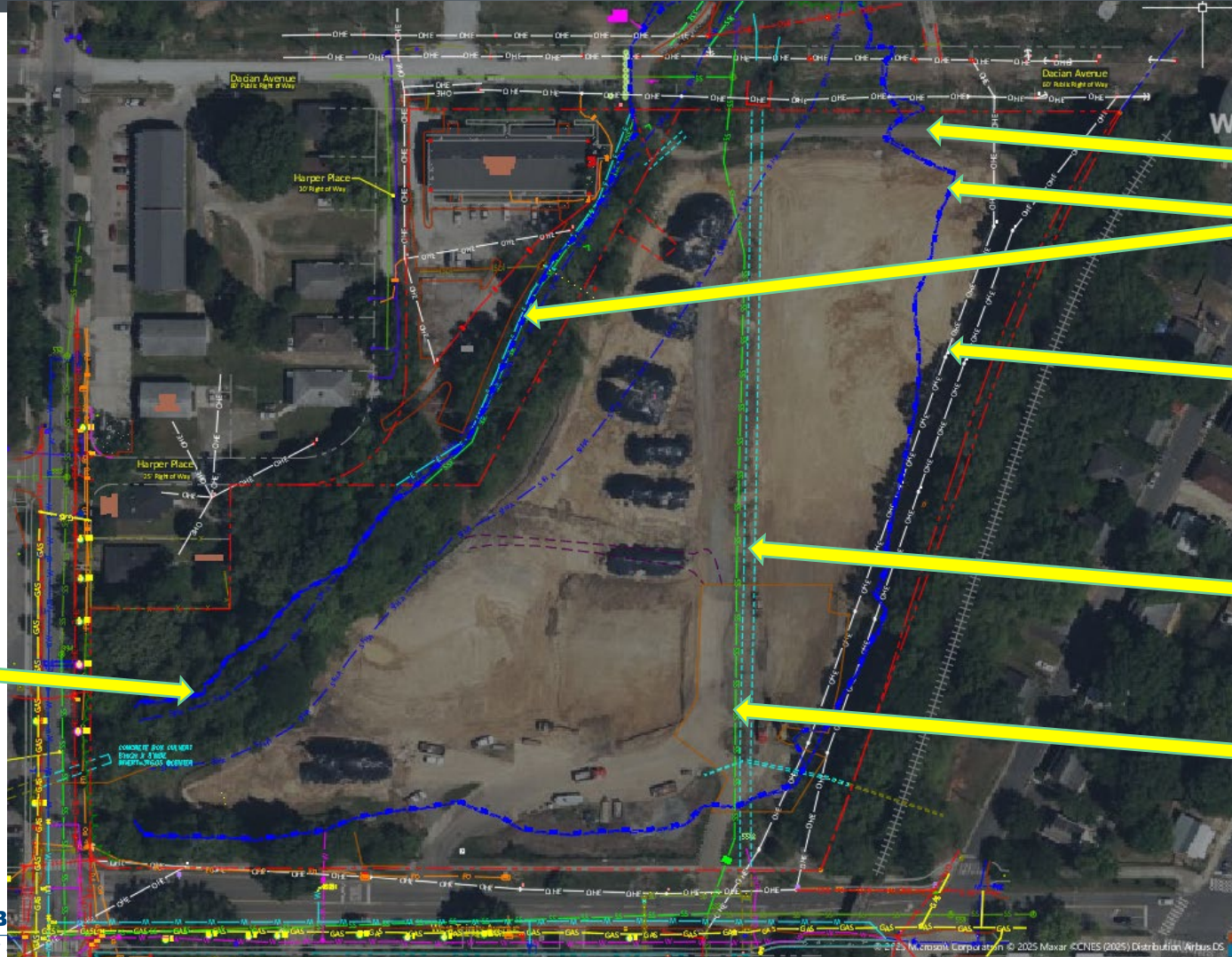


# DESIGN PHASE – MODELING AND CONSTRAINTS

TRASH!



Open Stream



Greenway Trail

FEMA Floodplain

Power to Downtown Durham

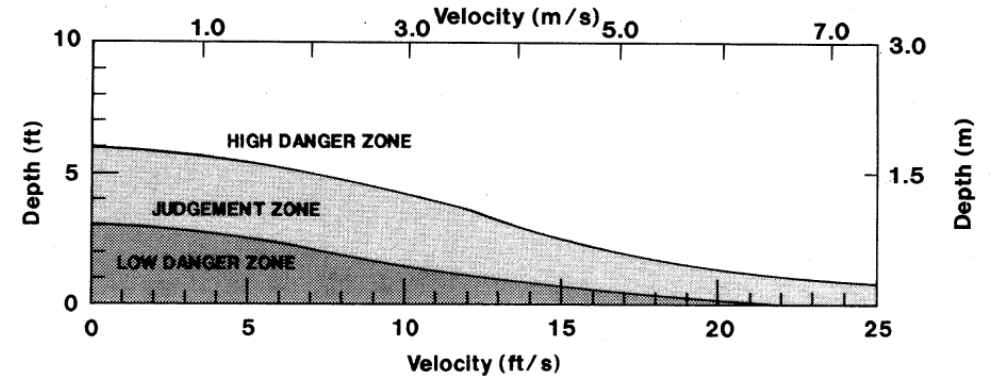
Piped Stream

Sanitary Sewer

# NCDEQ DAM INCREMENTAL ANALYSIS

- Performed Incremental Damage Analysis to establish hazard classification
- Evaluated dam breach scenarios (Sunny Day, Probable Maximum Flood [PMF], 1/3 PMF, 100-Year) and downstream inundation extent with and without the proposed Dam
- Incremental damage analysis identified the proposed Dam would not result in significant incremental increase in downstream damage during flood events [e.g., small number of additional structures impacted within low danger zone]
- **Requested and received exemption from the North Carolina State Dam Safety Law of 1967 due to the proposed dam height (less than 25 feet) and hazard classification (less than high)**

**HIGH DANGER ZONE** - Occupants of most houses are in danger from floodwater.  
**JUDGEMENT ZONE** - Danger level is based upon engineering judgement.  
**LOW DANGER ZONE** - Occupants of most houses are not seriously in danger from flood water.



Scenario	No. of Structures Impacted		No. of Roadway Crossings Impacted	
	Without Dam	With Dam	Without Dam	With Dam
Sunny Day	None	None	None	None
PMF	125	128*	6	6
1/3 PMF	23	27*	4	4
100-Year	15	15	3	3

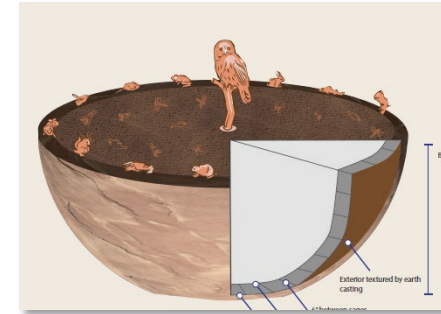
\*Maximum incremental increase in flood depth and velocity for additional structures impacted was less than 0.6 ft and 1 ft/s, respectively, falling within "low danger zone"

➤ **\$100,000 cost savings due to exemption**

# DESIGN PHASE – FINAL DESIGN/PERMITTING



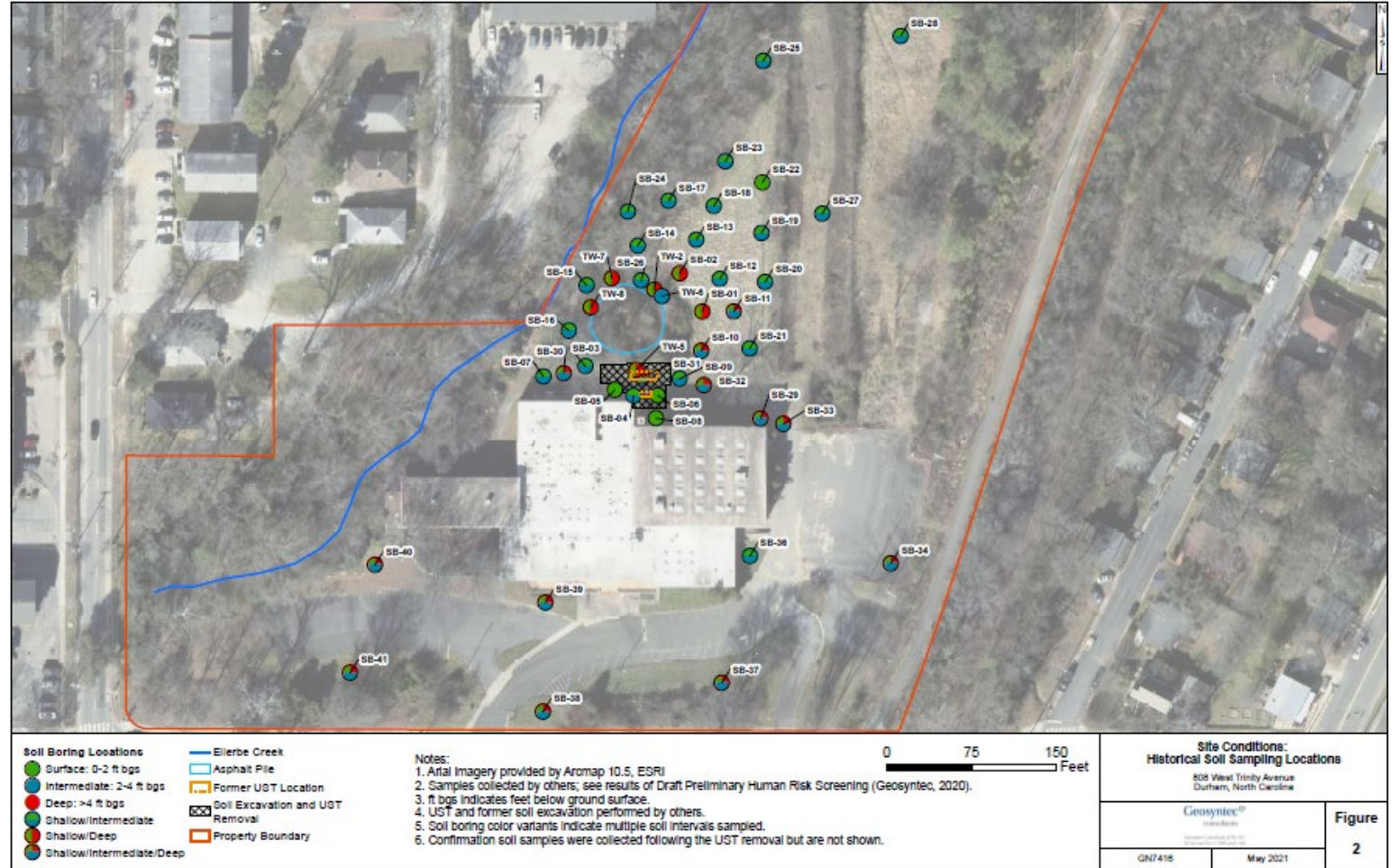
# DESIGN PHASE – COMMUNITY AMENITIES AND BENEFITS



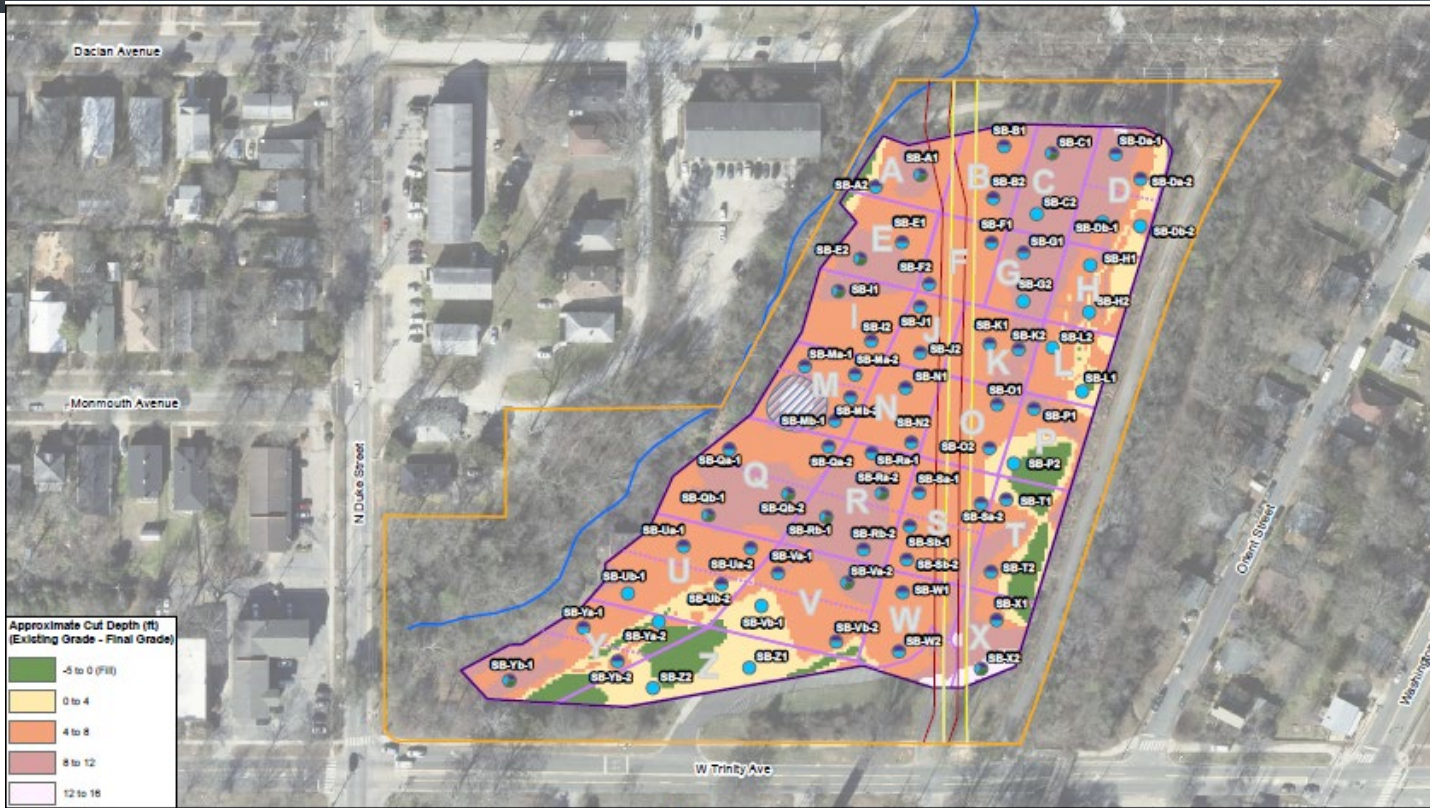
# FEASIBILITY ENVIRONMENTAL ASSESSMENT

**Problem: How to manage ~55,000 cubic yards of soil**

- Site-wide Polycyclic aromatic hydrocarbons (PAHS) in soil
- Diesel and gasoline fuel impacts
- Potential UST



# SOIL BENEFICIAL REUSE PLANNING



**Approximate Cut Depth (ft) (Existing Grade - Final Grade)**

- 5 to 0 (Fill)
- 0 to 4
- 4 to 8
- 8 to 12
- 12 to 18

**Legend**

- 2018 Groundwater Assessment Monitoring Well
- 2019 Phase I Monitoring Well
- Storm Drainage Element
- Sanitary Sewer Element
- Ellebe Creek
- Proposed Grading Footprint
- Composite Soil Sampling Zone Divisions
- Composite Soil Sampling Zone Sub-Divisions
- Property Line
- Asphalt Pile

**Vertical Characterization Sampling Intervals**

- 0 - 4 ft bgs
- 4 - 8 ft bgs
- 8 - 12 ft bgs

**Notes:**

1. Approximate cut depth represents difference between existing grade and final grade. Negative values indicate fill.
2. 'ft bgs' indicates feet below ground surface.
3. Soil boring color variants indicate multiple soil intervals sampled.
4. Base map from Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.

**Scale:** 0 100 200

**Risk for Individual Pathways** Output Form 1A  
 Version Date: June 2021  
 Basis: May 2021 EPA RSL Table  
 Site ID:  
 Exposure Unit ID:

**DIRECT CONTACT SOIL AND WATER CALCULATORS**

Receptor	Pathway	Carcinogenic Risk	Hazard Index	Risk exceeded?
Resident	Soil	NC	NC	NC
	Groundwater Use*	NC	NC	NC
Non-Residential Worker	Soil	9.9E-05	4.3E-02	NO
	Groundwater Use*	NC	NC	NC
Construction Worker	Soil	1.3E-05	4.4E-01	NO
Recreator/Trespasser	Soil	1.7E-04	4.8E-02	YES
	Surface Water*	NC	NC	NC

**VAPOR INTRUSION CALCULATORS**

Receptor	Pathway	Carcinogenic Risk	Hazard Index	Risk exceeded?
Resident	Groundwater to Indoor Air	NC	NC	NC
	Soil Gas to Indoor Air	NC	NC	NC
Non-Residential Worker	Indoor Air	NC	NC	NC
	Groundwater to Indoor Air	NC	NC	NC
	Soil Gas to Indoor Air	NC	NC	NC
	Indoor Air	NC	NC	NC

**CONTAMINANT MIGRATION CALCULATORS**

Pathway	Source	Target Receptor Concentrations Exceeded?	
Groundwater	Source Soil	Exceedence of 2L at Receptor?	NC
	Source Groundwater	Exceedence of 2L at Receptor?	NC
Surface Water	Source Soil	Exceedence of 2B at Receptor?	NC
	Source Groundwater	Exceedence of 2B at Receptor?	NC

**Notes:**

1. If lead concentrations were entered in the exposure point concentration tables, see the individual calculator sheets for lead concentrations in comparison to screening levels. Note that lead is not included in cumulative risk calculations.
2. \* = If concentrations in groundwater exceed the NC 2L Standards or IMAC, or concentrations in surface water exceed the NC 2B Standards, appropriate remediation and/or institutional control measures will be necessary to be eligible for a risk-based closure.
3. NM = Not Modeled
4. NC = Pathway not calculated

**Assessment – 1 sample for every 1,000 cubic yards**

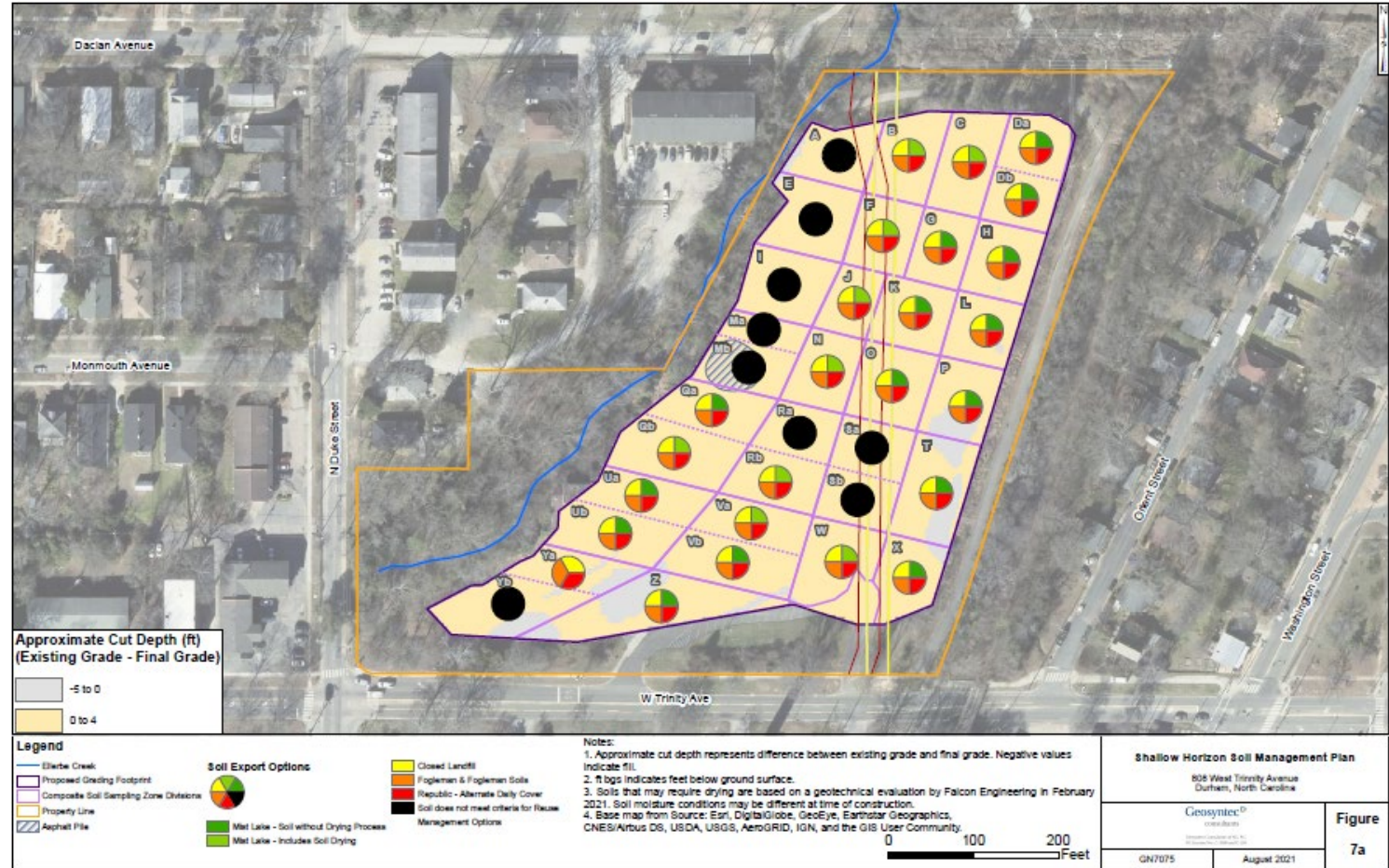
**Risk Calculator Evaluation**

# SOIL BENEFICIAL REUSE PLANNING

- 46,000 cubic yards proposed for use as cover at City's Closed Landfill
- 9,000 cubic yards managed at a permitted facility

**COST FOR ADDITIONAL ASSESSMENT: ~\$130,000**  
**COST AVOIDANCE EVALUTION:**

**\$2.5M** (Original estimated cost for 55,000 CYs soil)  
 - **\$2.0M** (Cost avoided because of 46,000 CY reuse)  
**\$500,000** (Total estimated cost for soil management)



# PROJECT CONSTRUCTION

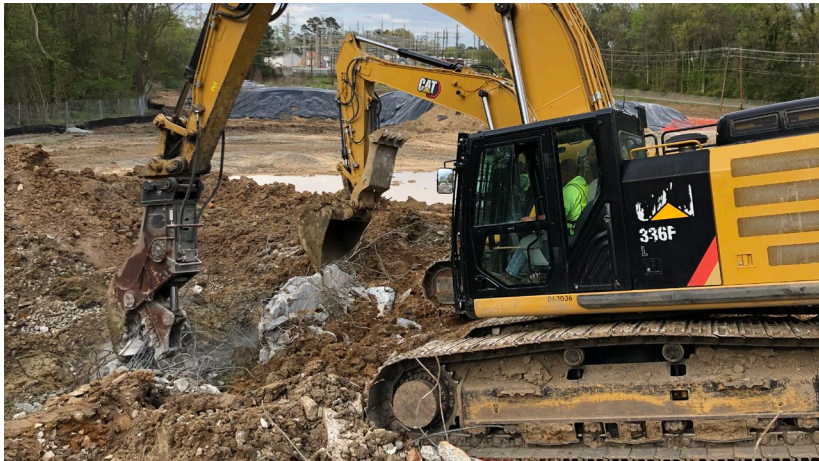
# PHASE 1 - 2018 BUILDING DEMOLITION



# PHASE 1 - 2018 UST CLOSURE



# PHASE 2 - 2022 SITE GRADING



# PHASE 2 - 2022 SITE PLANTING



# PHASE 3 - 2025 AND BEYOND



## Phase 3A

- All utilities in streets
- Culverts
- Trash Collection
- Daylight piped stream

## Phase 3B

- All internal features

# QUESTIONS

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