WORKING WITH NATURE TRAINING SERIES

JULY 27, 2022

Implementing nature-based solutions

LOUISIANA
WATERSHED
INITIATIVE

working together for sustainability and resilience

AGENDA

- Program overview
- Implementing nature-based solutions
- Nature-based solutions explorer tool
- Questions

NATURE-BASED SOLUTIONS PROGRAM OVERVIEW

MAXIMIZE NATURAL FUNCTIONS OF THE FLOODPLAIN

- Fund projects that harness natural features to reduce flood risk, improve water quality and provide additional co-benefits
- Provide training and technical resources to advance understanding and adoption of nature-based solutions
- Prioritize nature-based solutions throughout state programs and projects
- Use tools to quantify benefits and measure performance of nature-based projects

IMPLEMENTING NATURE-BASED SOLUTIONS

Mark Goodson

PRINCIPAL AND PLANNING AND RESILIENCE PRACTICE LEAD | CSRS

Mark Goodson oversees a multidisciplinary team of professionals advising clients on how to survive, adapt and thrive during changing conditions. He is particularly skilled at helping turn liabilities into assets and maximizing community benefits of capital expenditures. Goodson and his team assist commercial and governmental clients across the U.S. in identifying risks, developing strategic plans and implementing resilience programs.

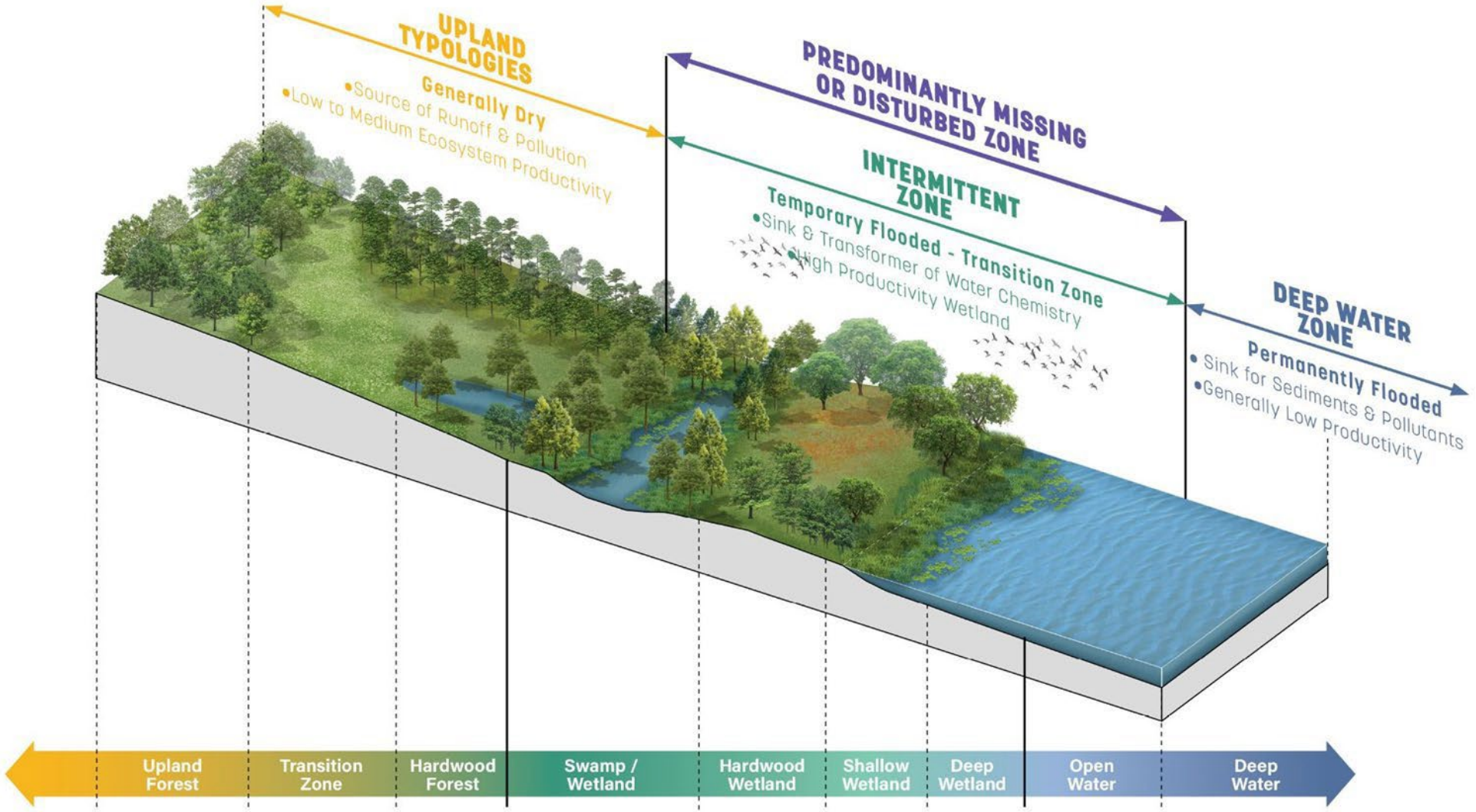
Case study: The University Lakes project

IMPLEMENTATION PHASES

- **Problem Definition**
- **Modeling**
- **Site Selection**
- **Cost-Benefit Analysis**
- **Design**
- **Funding**
- **Project Management**
- **Construction**
- **Operations & Maintenance**

University Lakes: Existing ecology and flood risks

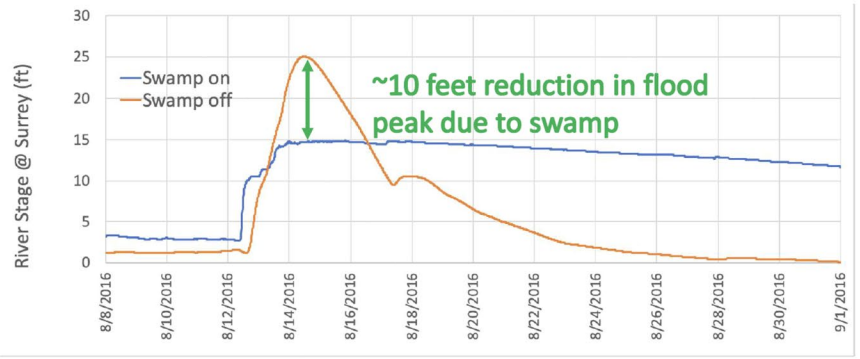
- Fully understanding the root cause of the flood risk
- Modeling flood risk
- Determining what interventions will reduce risk

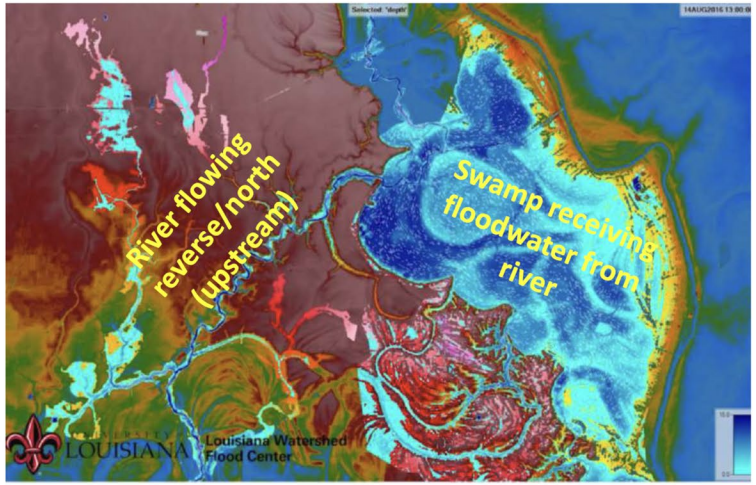


Module No. 1: Introduction to Working With Nature and Vermilion River case study

- Critical to understanding what drives flood risk
- Critical to determining project effectiveness

Maximizing benefits of natural features and processes



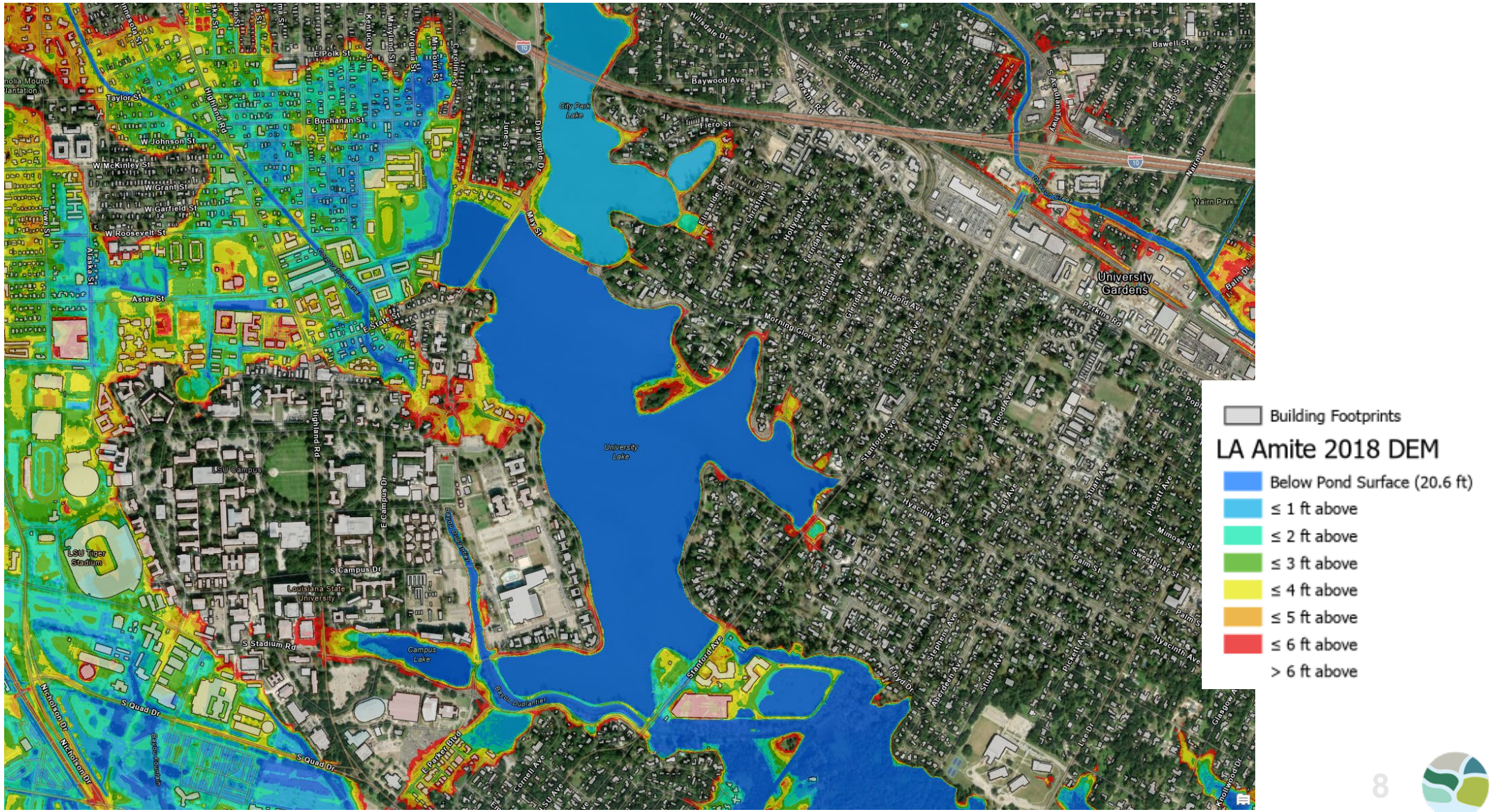


- Enhance flow exchanges between river and swamp
- Enhance storage capacity of swamp

UNIVERSITY of LOUISIANA LAFAYETTE | Louisiana Watershed Flood Center

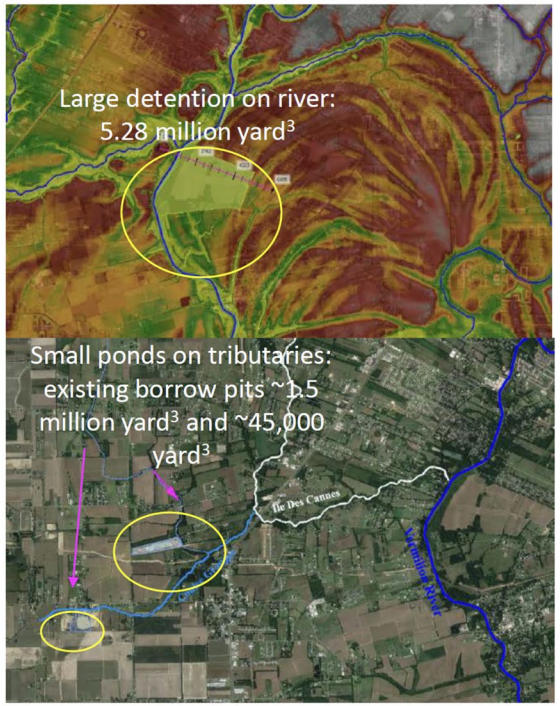
Emad Habib, Ph.D., University of Louisiana at Lafayette

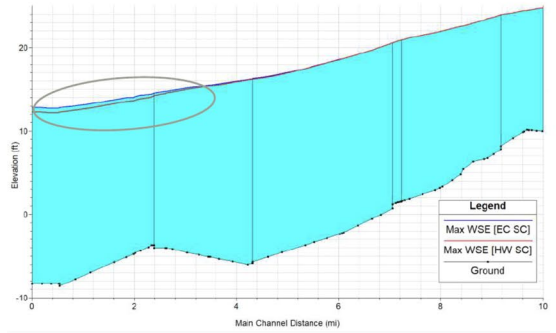
University Lakes: Existing topography



Module No. 1: Introduction to Working With Nature and Vermilion River case study

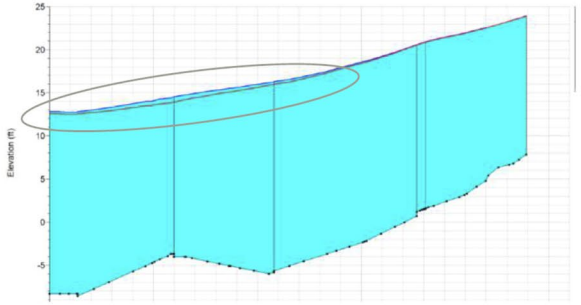
Strategic detention





Drop in tributaries: 0.52 feet

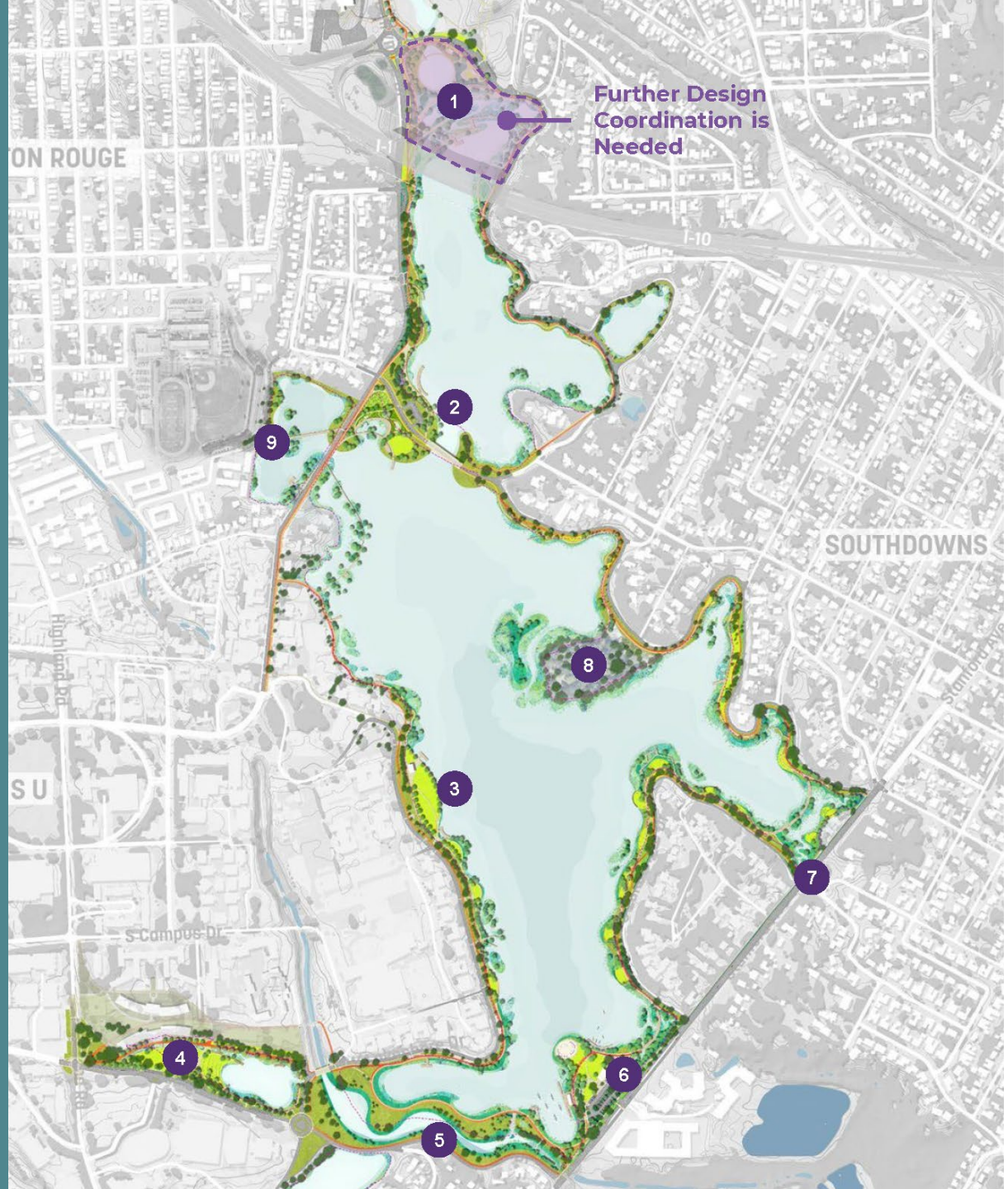
Smaller interventions can make large impacts if put in the right place.



Drop in tributaries: 0.71 feet

- Site control (who owns/controls it)
- Acquisition or right of access requirements
- Tested within a model
- Where intervention will be most effective

Emad Habib, Ph.D., University of Louisiana at Lafayette



University Lakes: Illustrative plan

Legend

1. City Park Lake forebay & improvements (further design coordination needed)
2. May Street bridge & site improvements
3. Active edge along LSU
4. Campus Lake improvements
5. Corporation Canal improvements
6. Baton Rouge Beach
7. Stanford Avenue improvements
8. Bird Sanctuary improvements
9. Connection to McKinley High School

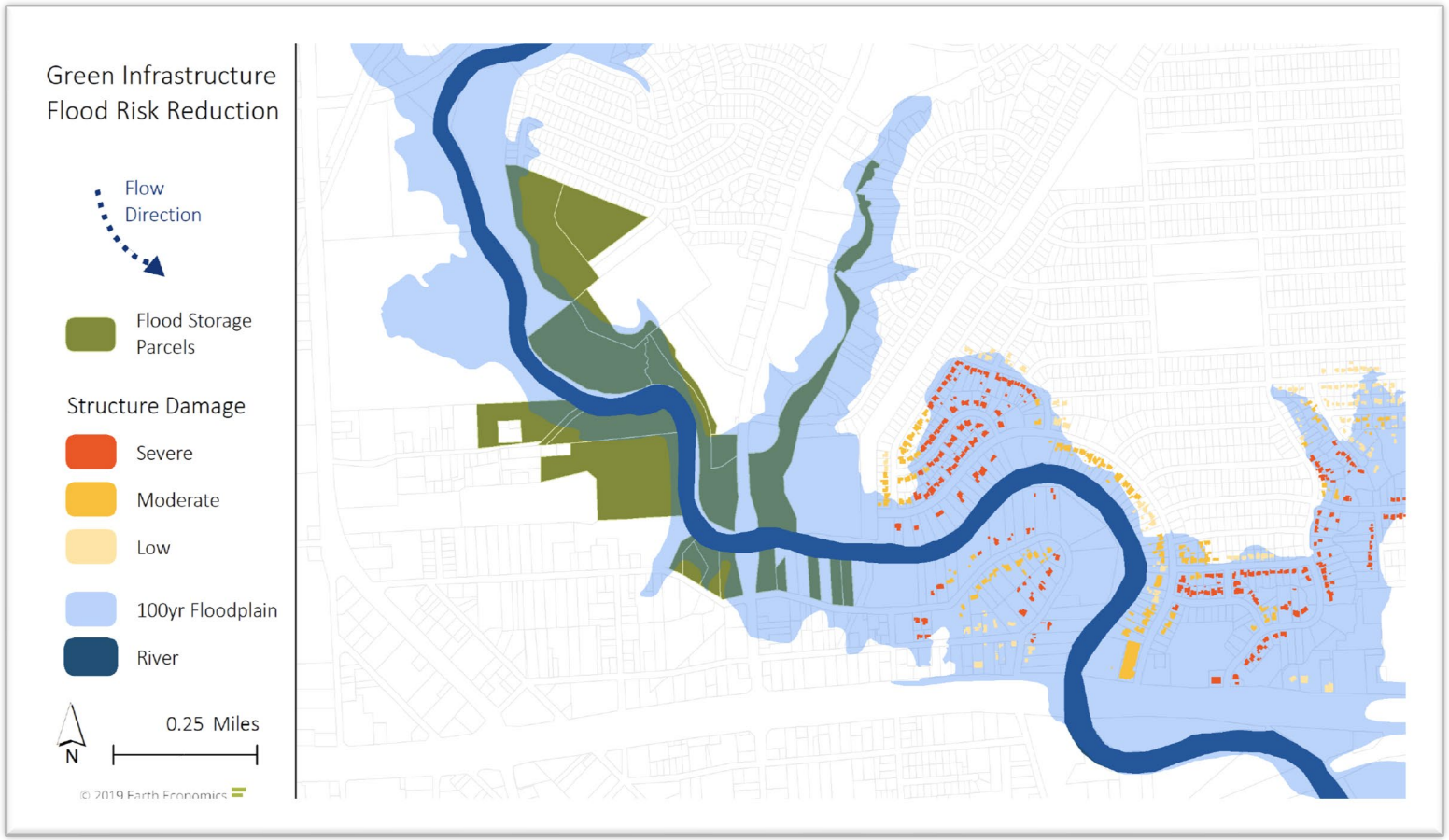
---- Existing shoreline

SASAKI

0 1000 ft

N

Module No. 6: Valuing nature-based solutions through cost-benefit analyses



- Cost-benefit analysis often required
- Design iterative with CBA

Trygve Madsen, Earth Economics

University Lakes: FEMA BCA Toolkit

FEMA BCA TOOLKIT 6.0

Standard Benefits - Ecosystem Services	
Total Project Area (acres or sq.ft):	124
Enter the percent land use of the project area below:	
Green Open Space (%)	4
Riparian (%)	15
Wetlands (%)	15
Forests (%)	6
Marine & Estuary (%)	60
Expected Annual Ecosystem Services Benefits ($)	1,026,498

FINAL BCA

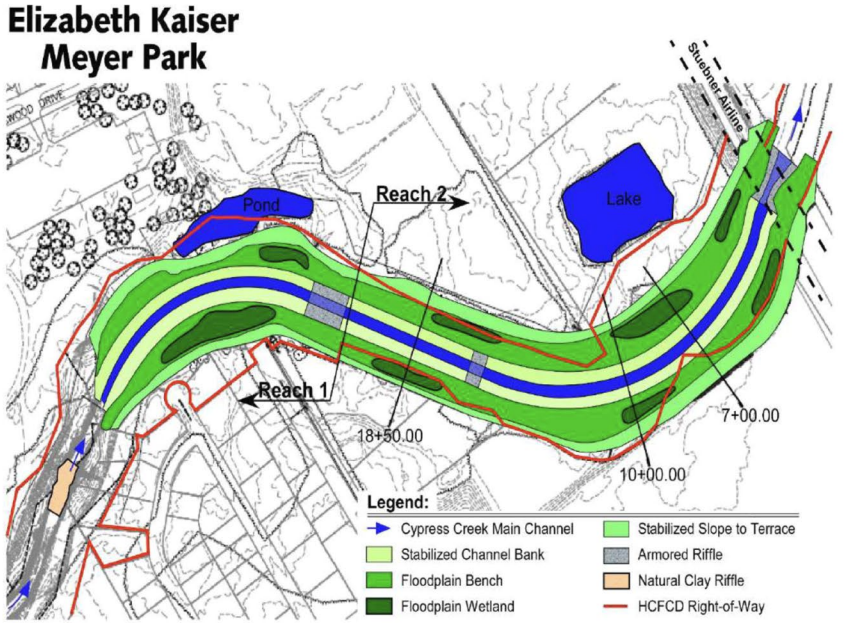
Benefit-Cost Summary	With Ecosystem Service benefits	Without Ecosystem Service benefits
Total Standard Mitigation Benefits ($):	$ 14,387,292	$ 220,853
Total Social Benefits ($):	$ 0	$ 0
Total Mitigation Project Benefits ($):	$ 14,387,292	$ 220,853
Total Mitigation Project Cost ($):	$ 7,988,812	$ 7,988,812
Benefit Cost Ratio - Standard:	1.80	0.03
Benefit Cost Ratio - Standard + Social:	1.80	0.03

Module No. 2: Designing with nature-based solutions in rural areas and open space

Natural channel design and nature-based improvements

SWCA ENVIRONMENTAL CONSULTANTS

- New Priority 2 NCD channel
- Constructed boulder riffles
- Geomorphic floodplain bench
- Stabilized slopes
- Geomorphic floodplain wetlands
- Grass and tree plantings
- Armored storm sewer outfalls
- Greenway and park trail alignments



- Defining project goals and priorities
- Designing for co-benefits and to meet goals and priorities

Lee Forbes, SWCA Environnemental Consultants

Module No. 3: Designing with nature-based solutions in urban areas

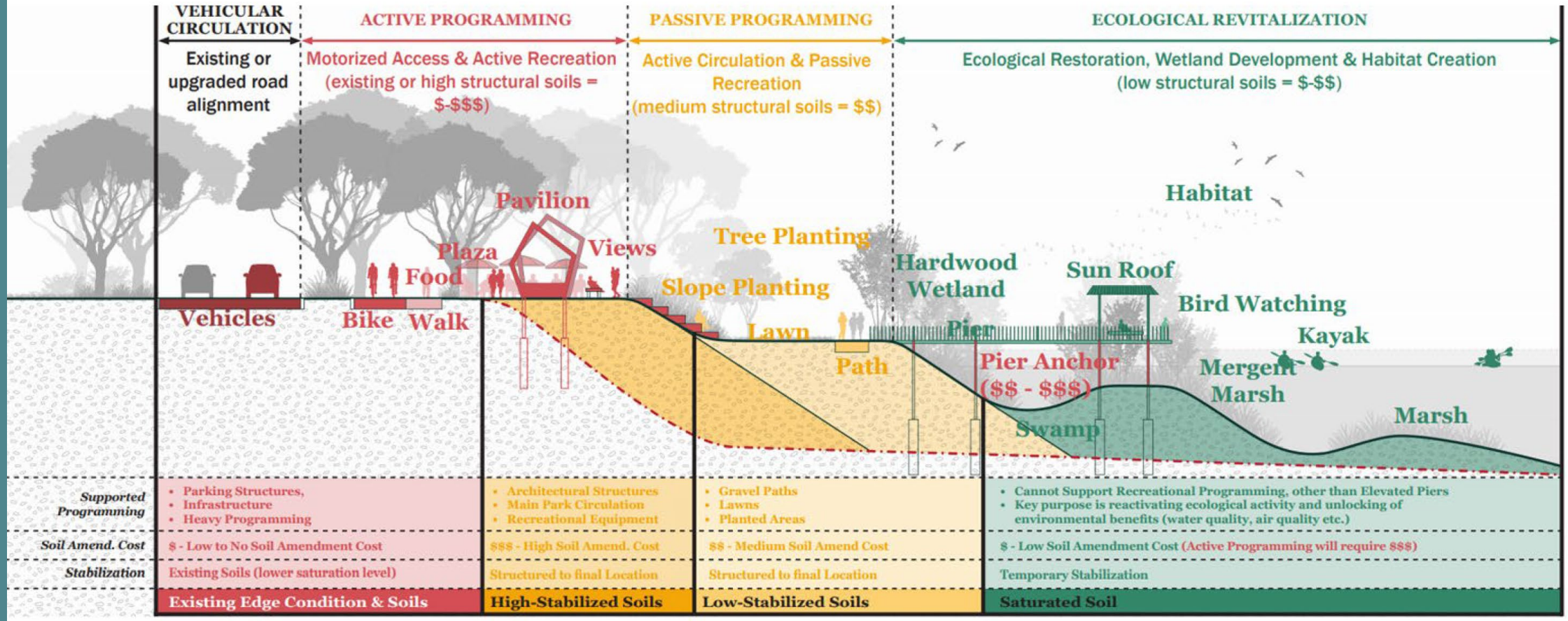
How do we retrofit neighborhoods?

DANA BROWN& Associates

- In the public realm
  - Renovate parking
  - Reconstruct play fields
  - Revise street standards
  - Green space at civic buildings
  - Remnant parcels
  - Interstitial spaces
  - Break sectoral silos
  - Educate the public
  - PPP
- In the private realm
  - Renovate parking
  - Convert green spaces
  - Interstitial spaces
  - PPP

Dana Brown, Dana Brown & Associates

University Lakes: Concept typologies



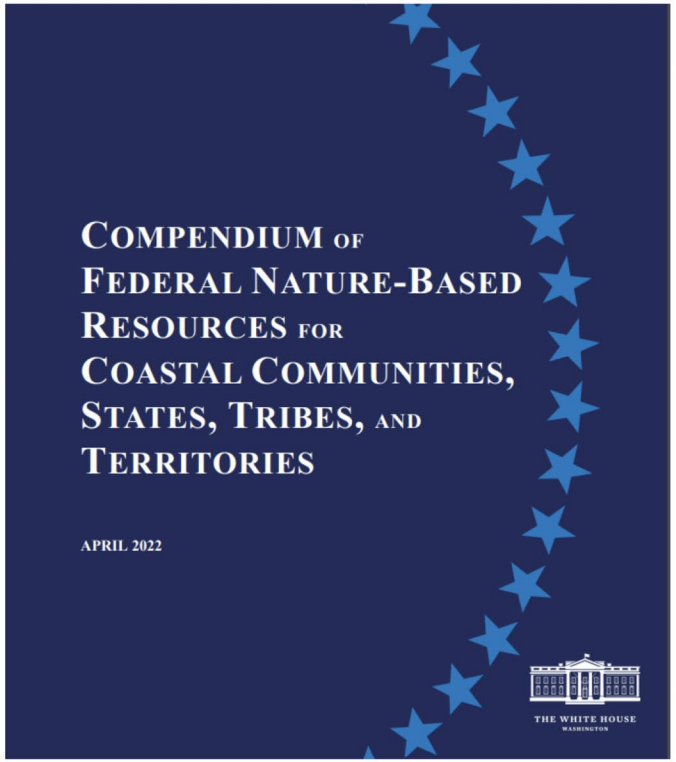
Module No. 7: Federal programs and nature-based solutions

- Defining project goals and priorities
- Identifying funding sources that match project goals
- Layering funding sources
- Phasing the projects

Resources

FEDERAL PROGRAM SUPPORT

The White House Coastal Resilience Interagency Working Group released a summary of federal nature-based resources in April. The document is available at watershed.la.gov/nature-based-solutions.



FEMA & EPA

University Lakes: Funding sources

(as of February 2022)

SOURCE	AMOUNT	RESTRICTIONS?	STATUS
BREC	$5 million	Yes	Funded
East Baton Rouge City-Parish	$5 million	Yes	Funded
LSU	$260,000	No	Funded
State (OCD)	$10 million CDBG-MIT	Yes	Funded
State (Capital Outlay)	$10 million	Yes	Approved, CEA executed
State (DOTD)	$5 million	Yes	Committed

SASAKI

Total short-term funding available: **$35,260,000**

Additional funding not included above:

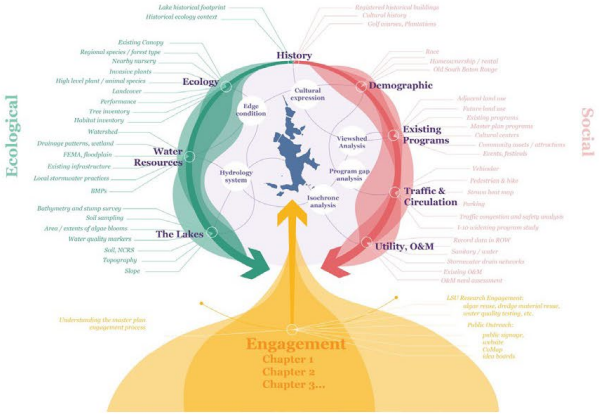
- $10 million in State Capital Outlay ($6 million approved in Priority 5 for FY 2022)
- $5 million from LSU Athletic Department

University Lakes: Schematic design phase (30% design)

(as of February 2022)

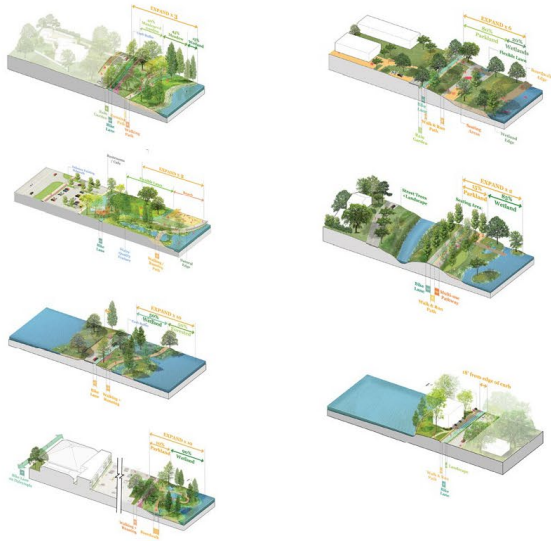
- When project management is helpful/essential

SASAKI



Due-diligence

Comprehensive understanding of the site



Concept Typologies

Interactive tool to explore lake edge possibilities

Focus Area Study

Use Baton Rogue Beach and Stanford Avenue as focus area to study ecology, hydrology, program and circulation

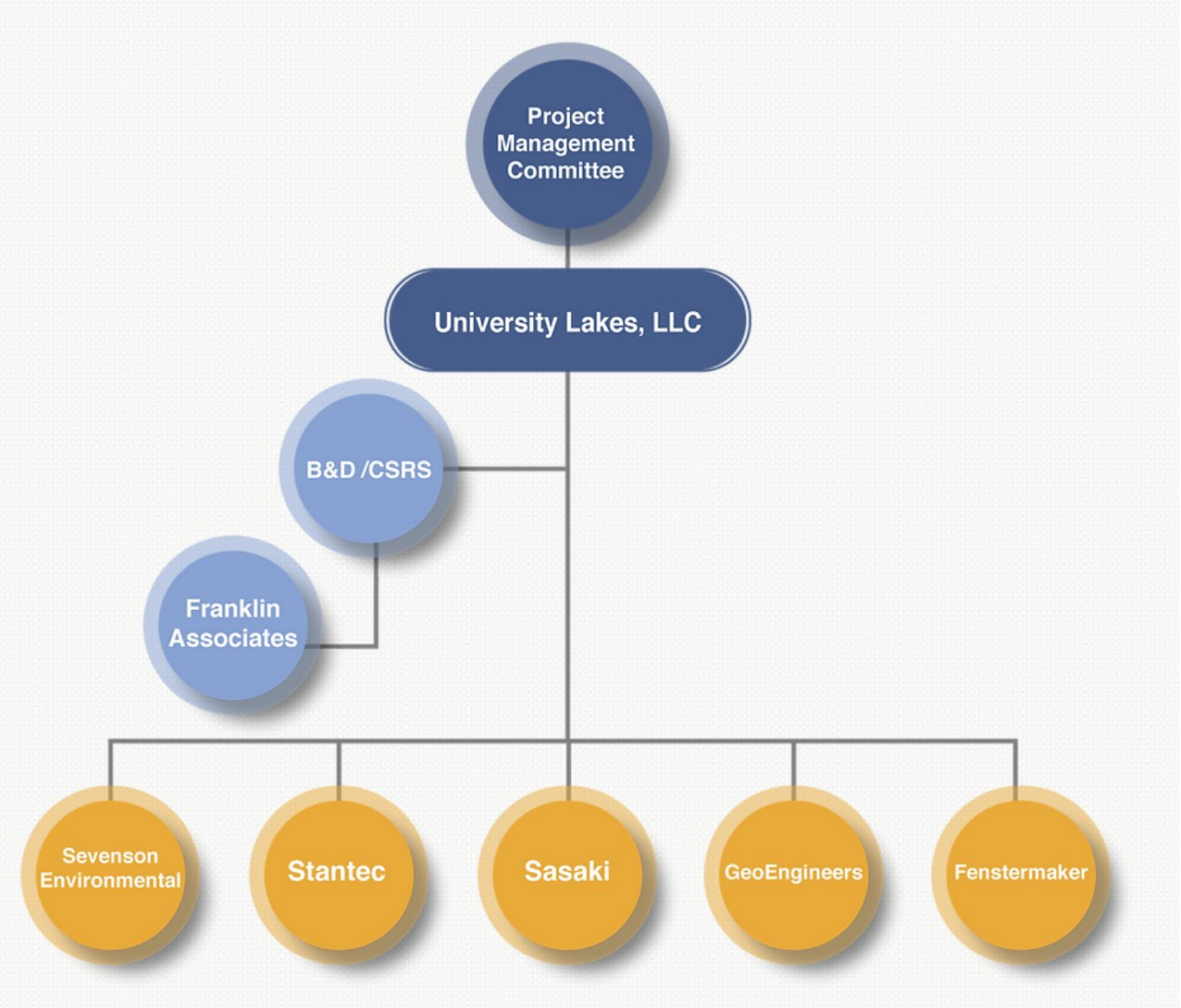
PROJECT SCOPE AND TIMELINE

2021

- Conceptual design
- Schematic design (30% Design)
- Bathymetry, stump identification, sediment sampling
- Hydrologic/earthwork/dredging model development
- Dredging implementation

2022

- Construction begins summer 2022



Sevenson Environmental
Construction Manager at Risk

Stantec
Flood risk reduction design services

Sasaki
Master design services

GeoEngineers
Geotechnical data collection and sediment sampling

Fenstermaker
Bathymetric and stump identification survey

B&D/CSRS Joint Venture
Lead project advisor in partnership with Brailesford & Dunlavey

Franklin Associates
Public engagement support

- Federal regulations if using federal funding
- Procurement for modeling, design, construction and project management

University Lakes: Advanced work study area

- Phasing, costing

Module No. 8: Operating and maintaining nature-based solutions

- Defining project goals and priorities
- Identifying funding sources that match project goals
- Layering funding sources
- Phasing the projects

Wes Michaels, Spackman Mossop Michaels Landscape Architects

NATURE-BASED SOLUTIONS EXPLORER TOOL

Bryan P. Piazza

FRESHWATER AND MARINE SCIENCE DIRECTOR | THE NATURE CONSERVANCY

Bryan Piazza provides scientific support and strategic guidance for freshwater and coastal conservation and restoration projects throughout Louisiana, the Gulf Coast and the Mississippi River basin. His areas of expertise include environmental decision-making, resource management and freshwater and marine science. He is author of “The Atchafalaya River Basin: History and Ecology of an American Wetland.”

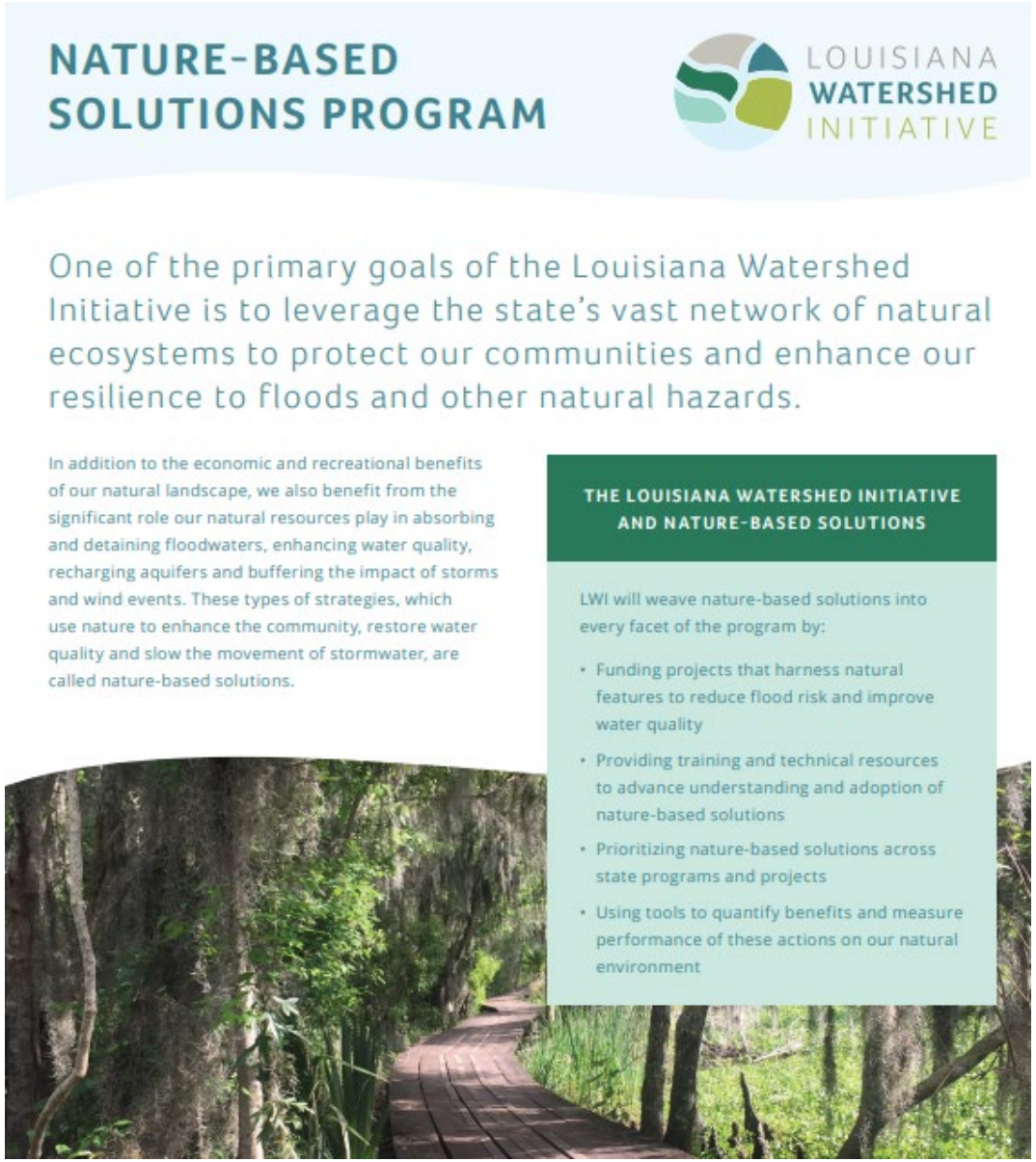
The Nature-Based Solutions Explorer: A model-based tool to evaluate how Louisiana's natural ecosystems can help protect and benefit Louisiana's communities

The Nature Conservancy

RTI INTERNATIONAL

Leveraging Louisiana's natural ecosystems to protect communities and enhance resilience to floods and natural hazards

1. Funding projects
2. Providing training and technical resources
3. Prioritizing nature-based solutions in state programs and projects
4. Measuring impact



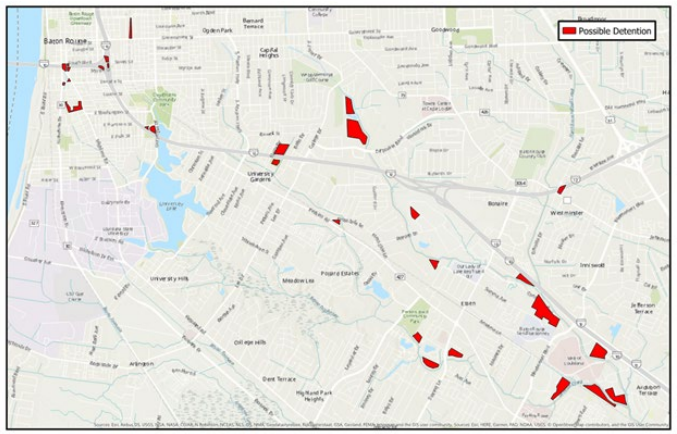
Nature-Based Solutions Explorer Tool

1. **Build local capacity to develop NBS projects**
   - Inform where projects are most relevant and appropriate
   - Model key project performance metrics including co-benefits (ecological, water quality, habitat, health, economic)
2. **Build statewide capacity to develop NBS projects and programs**
   - Inform state agencies on NBS suitability throughout state via priority mapping
   - Provide a review and evaluation platform for consistently defined and quantifiable performance metrics

Permeable pavement

Detention pond

Floodplain conservation and restoration



Collaborative decision-making

1. Scoping outreach
2. Modeling and co-benefits analyses
3. NBS tool design and testing
4. Outreach training

Component Decision Matrix

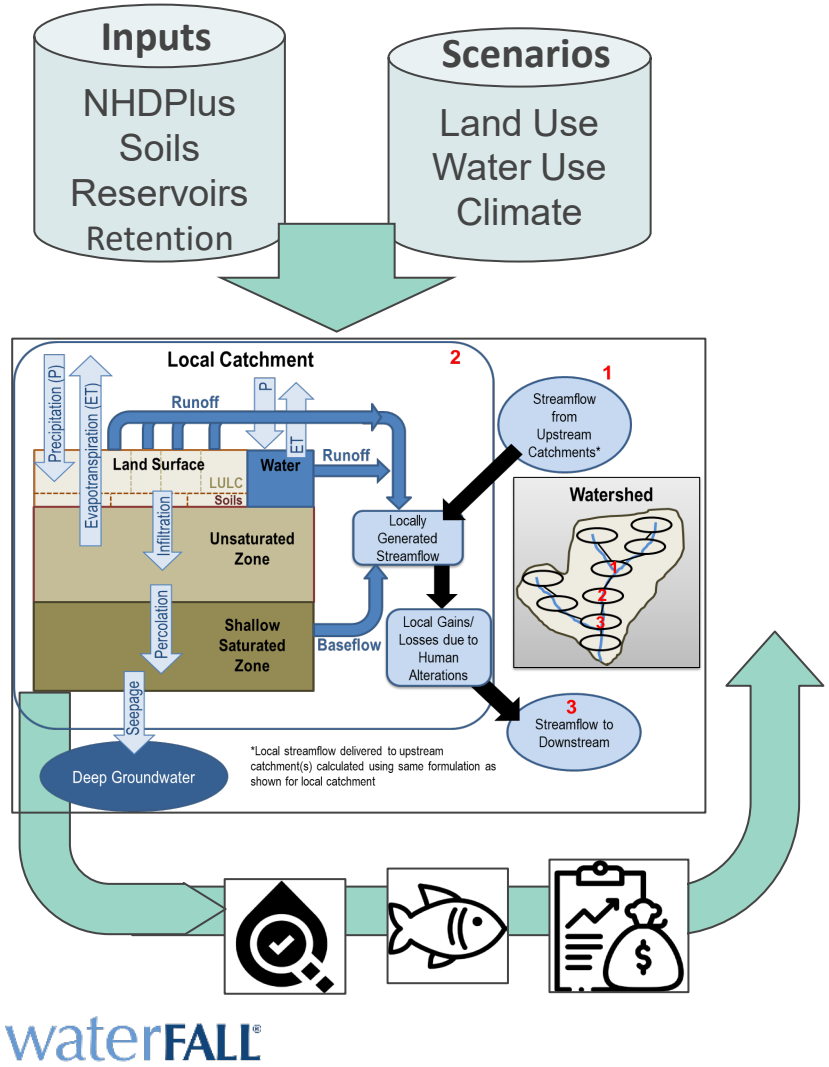
Statewide Screening: Yes, but with set filters (not limiting; prioritization only)
Also prioritization at basin scale
Ability to drive between scales

User Interaction	NBS Projects and Options	Analysis Methods	Output Types	Output Reports	Outreach and Training
Simplified to controlled options (i.e., dropdown lists, slider bars for values)	Predefined list of selected NBS projects. User only selects size and location	Calculation of change metrics based on previously conducted long-term model runs	❑ Long-term peak flow changes (i.e., flood-related benefits from watershed model)	❑ Tabular data with export to csv	❑ Static User Guide accessed in tool
A mix of controlled options to limit what can be assessed (e.g., each NBS is pre-defined) but more freedom to select their location	Predefined list of selected NBS projects, but user is able to modify characteristics of NBS including size and hydrologic properties	Calculation based on previously conducted model runs with supplemental co-benefit and downstream analysis based on empirical methods	❑ Curated set of hydrologic change metrics related to co-benefit analyses	❑ Map of selected area/watershed	❑ Scheduled series of webinars leading up to deployment to introduce tool
Advanced manipulation of map areas, free entry of parameters, customized set up of analyses (i.e., what output types and reports, which calculations)	List of NBS but user defines via map interface, which then populates some properties with others left to the user to specify	Incorporate from or provide input to H&H models. Complete "on the fly" computation of all required calculations and model runs. Execute available H&H models using tool inputs	❑ Water quality ❑ Impacts to fish and wildlife – change in biological response due to change in river flows and channel straightening ❑ Economic impacts ❑ Carbon benefits ❑ Other ecosystem services? ❑ Advanced H&H	❑ Map display of values using color gradation for one or more of the selected Output Types ❑ Report-ready chart(s) ❑ Formatted report tailored to project application	❑ "Train a trainer" set up for training (in-person) ❑ Recorded training modules available at will

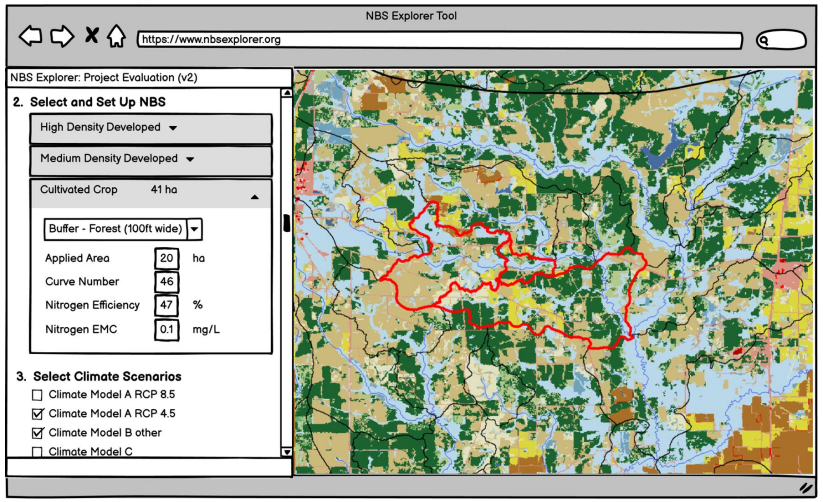
Compare grey infrastructure choices; need surface elevation

Technical analyses

1. Hydrologic and Co-Benefit Modeling



2. Tool and Reporting Products Design and Build




ROUND 1 FUNDING
Full Application – Not for submittal

ENVIRONMENTAL IMPACTS

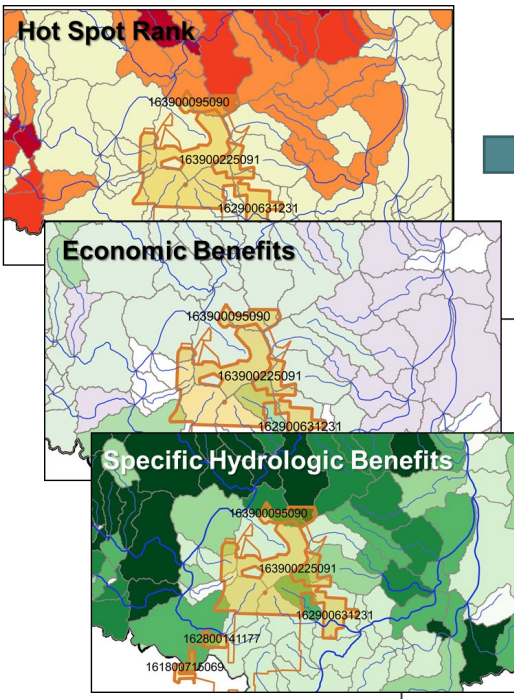
For each question, add your answer in the blank space provided. Where able, please quantify benefits with appropriate metrics or calculations.

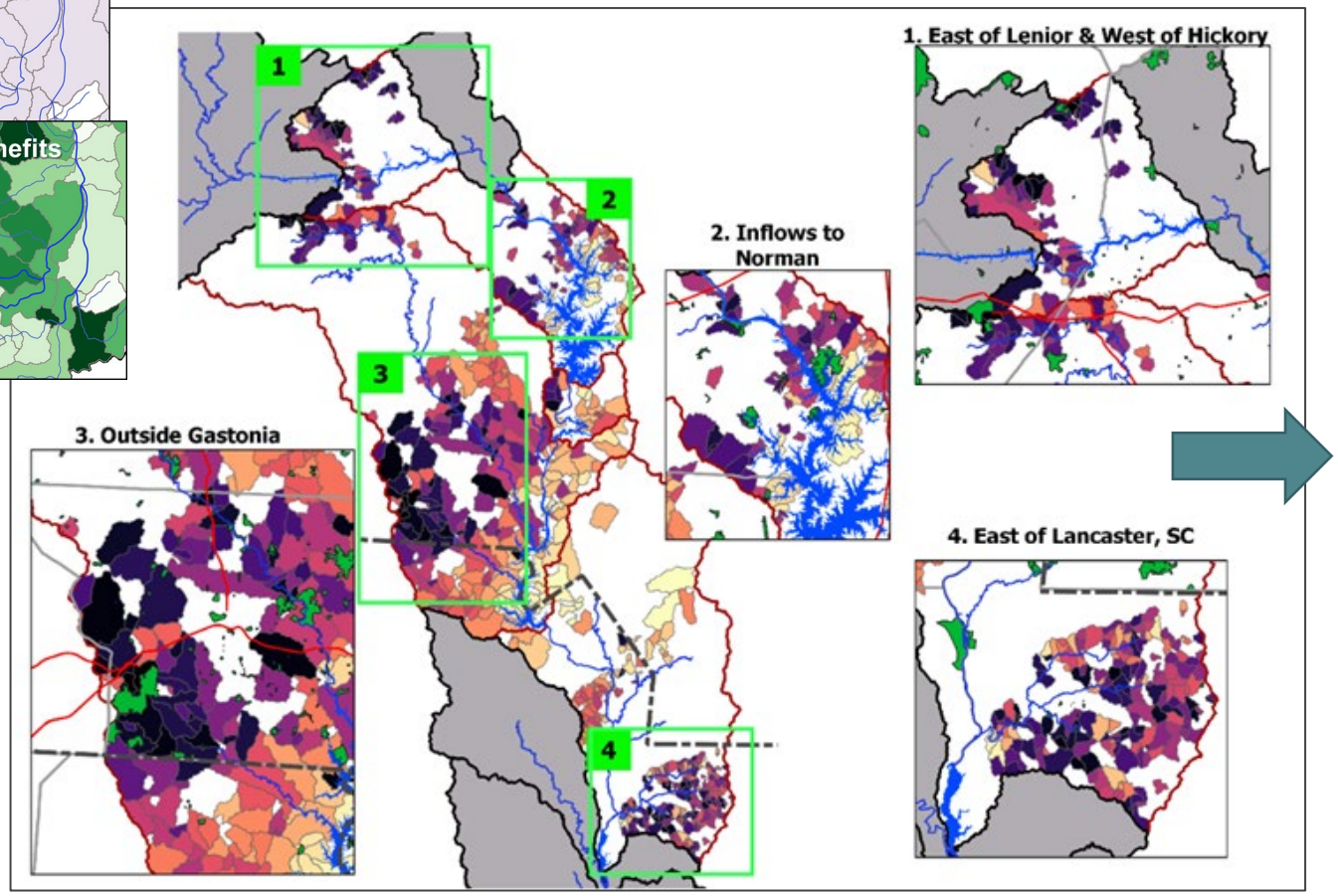
What is the existing condition of the hydrology of the benefitting watershed area? Is it natural or urban?

What is the expected impact of the proposed project on the natural hydrology (improve, no change, detract)? For example, a project may show benefits by providing flood storage and conveyance, reducing flood velocities, reducing peak flows, promoting infiltration and aquifer recharge, or reducing frequency and duration of low surface flows.

What is the existing condition of the water quality of the benefitting watershed area? What is the current LDEQ-designated use? Possible resources that may be used to obtain this information include EPA water quality assessments, 303(d) listings, and/or Total Maximum Daily Loads (TMDLs), available online at: cfpub.epa.gov/waters10/attains_index.home

Example 1: Smart development to improve water quantity in the Catawba-Wateree River Basin, North and South Carolina

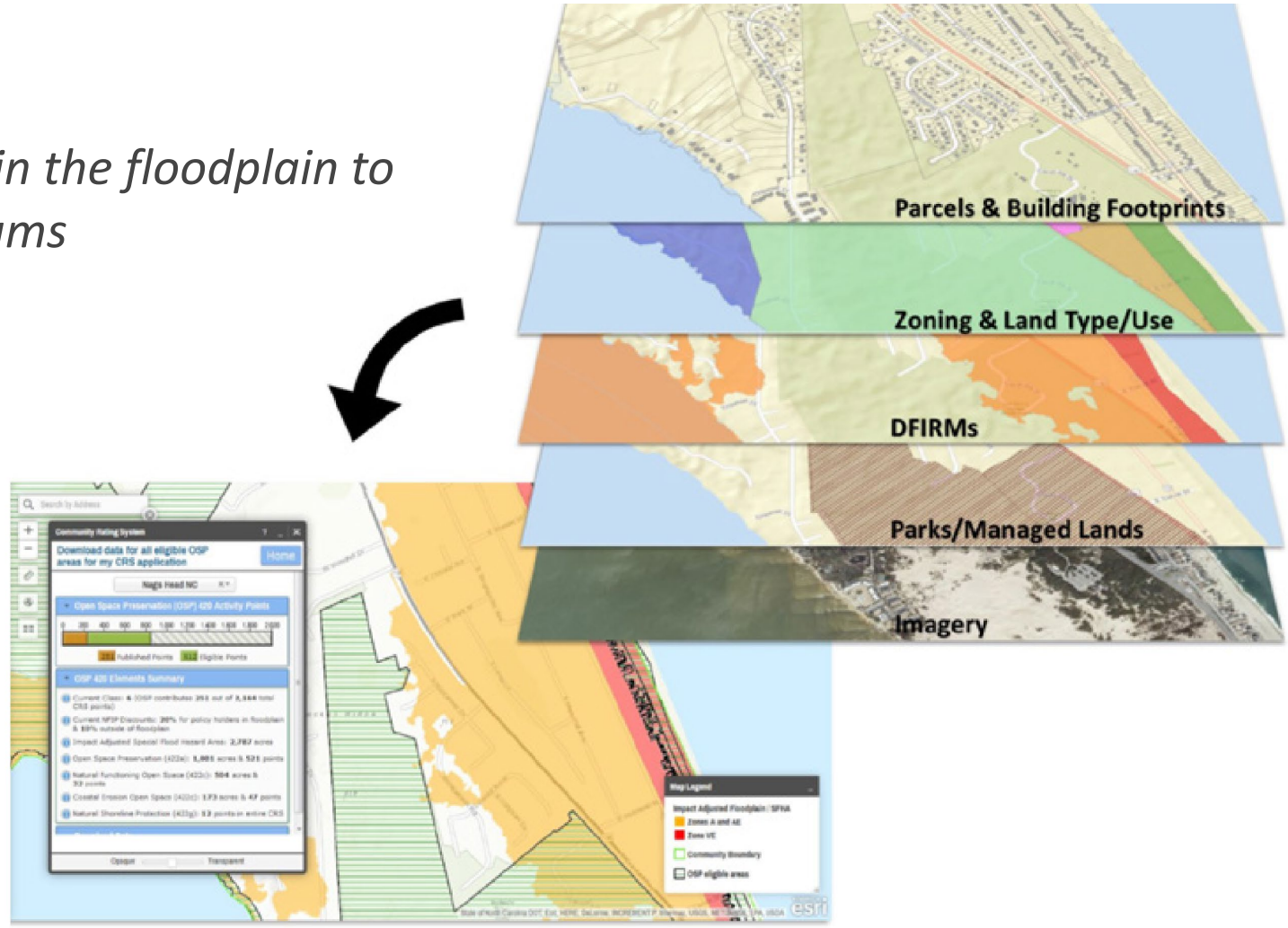




#	Specific area	# of catchments	Conserved acres	Total cost
1	Northern Hickory	15	1,815 (3,719)	$4,402,072
1	Inflows to Hickory	14	1,694 (3,864)	$5,033,790
1	Wylie/ Hickory Border	10	1,959 (5,270)	$5,085,882
2	West of Lake Norman Shoreline	11	1,714 (4,775)	$8,450,982
2	Inflow to Lake Sherman	5	508 (1,228)	$2,585,112
3	Outside Gastonia	26	7,928 (24,610)	$15,877,968
4	East of Lancaster, SC	0		

Example 2: Community Rating System Explorer

Identifying conservation opportunities in the floodplain to reduce risk and lower insurance premiums



Timeline

Phase 1. Initial scoping outreach (complete)

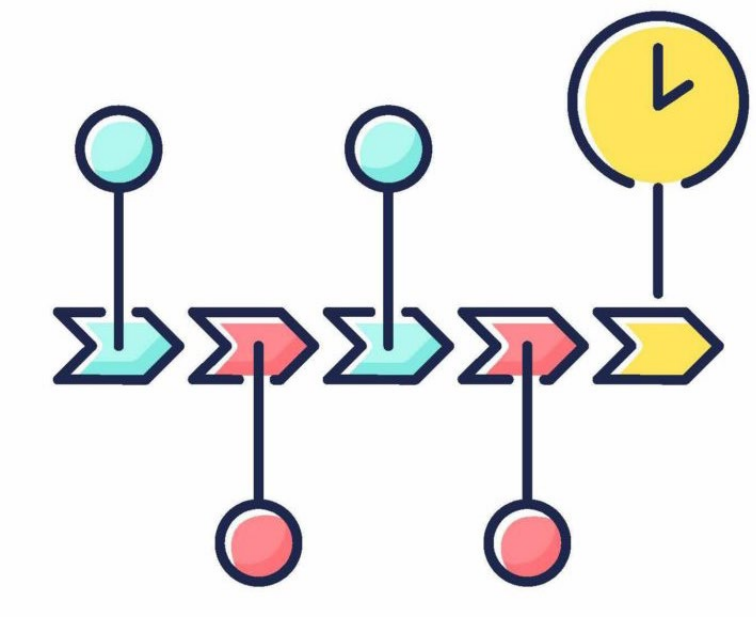
- NBS Explorer workshop

Phase 2. Modeling and analysis

- Scoping workshops (H&H modeling, NBS, co-benefits, IT/data storage, outreach/training)
- Modeling and analyses (hydrology, NBS, water quality, climate change, water use, fish and wildlife, economic, other co-benefits)
- Open space and CRS analyses
- Preliminary tool design for Phase 3 collaborative design and testing

Phase 3. Building and deploying the NBS Explorer

- Collaborative tool design with stakeholders
- Tool build, deployment and testing (with stakeholder review)
- Evaluation and reporting products
- Statewide, regional and local hotspot mapping
- Outreach and training



QUESTIONS?

CONTACT INFORMATION

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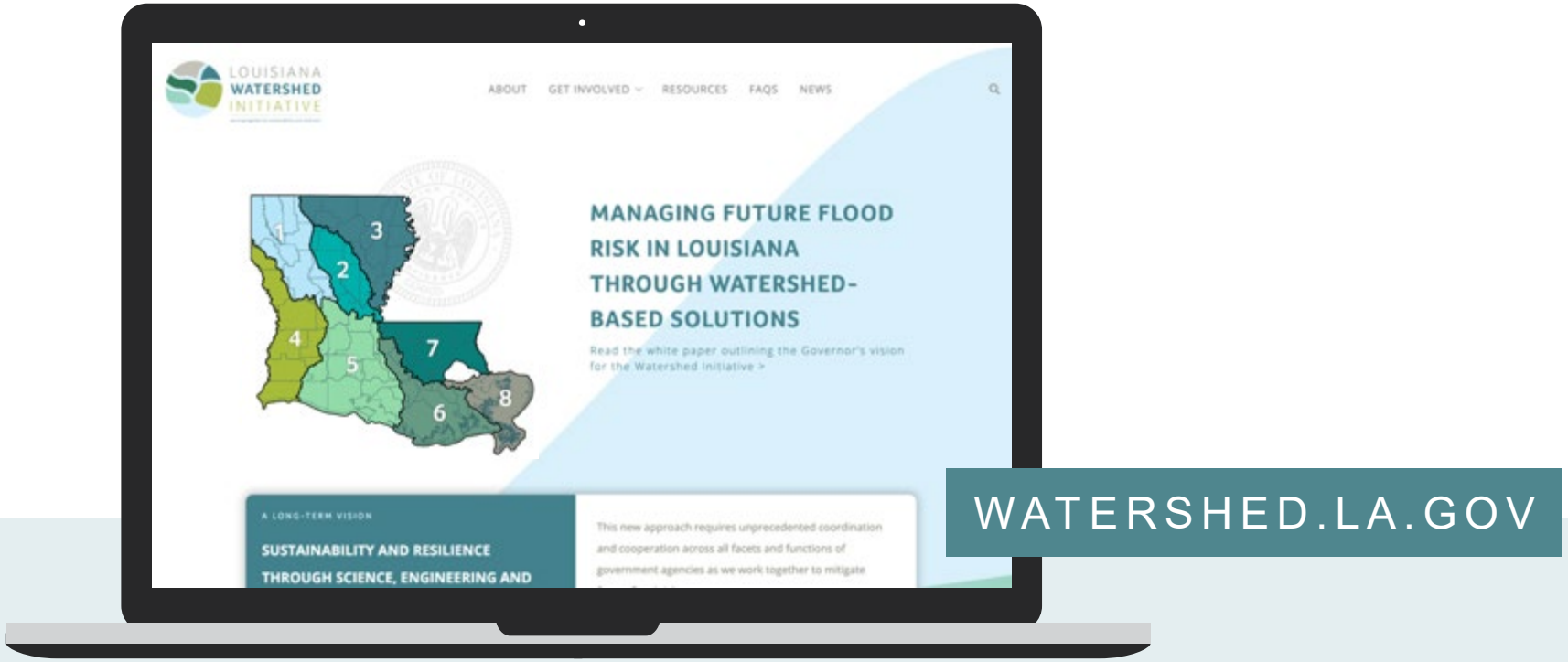
THANK YOU



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