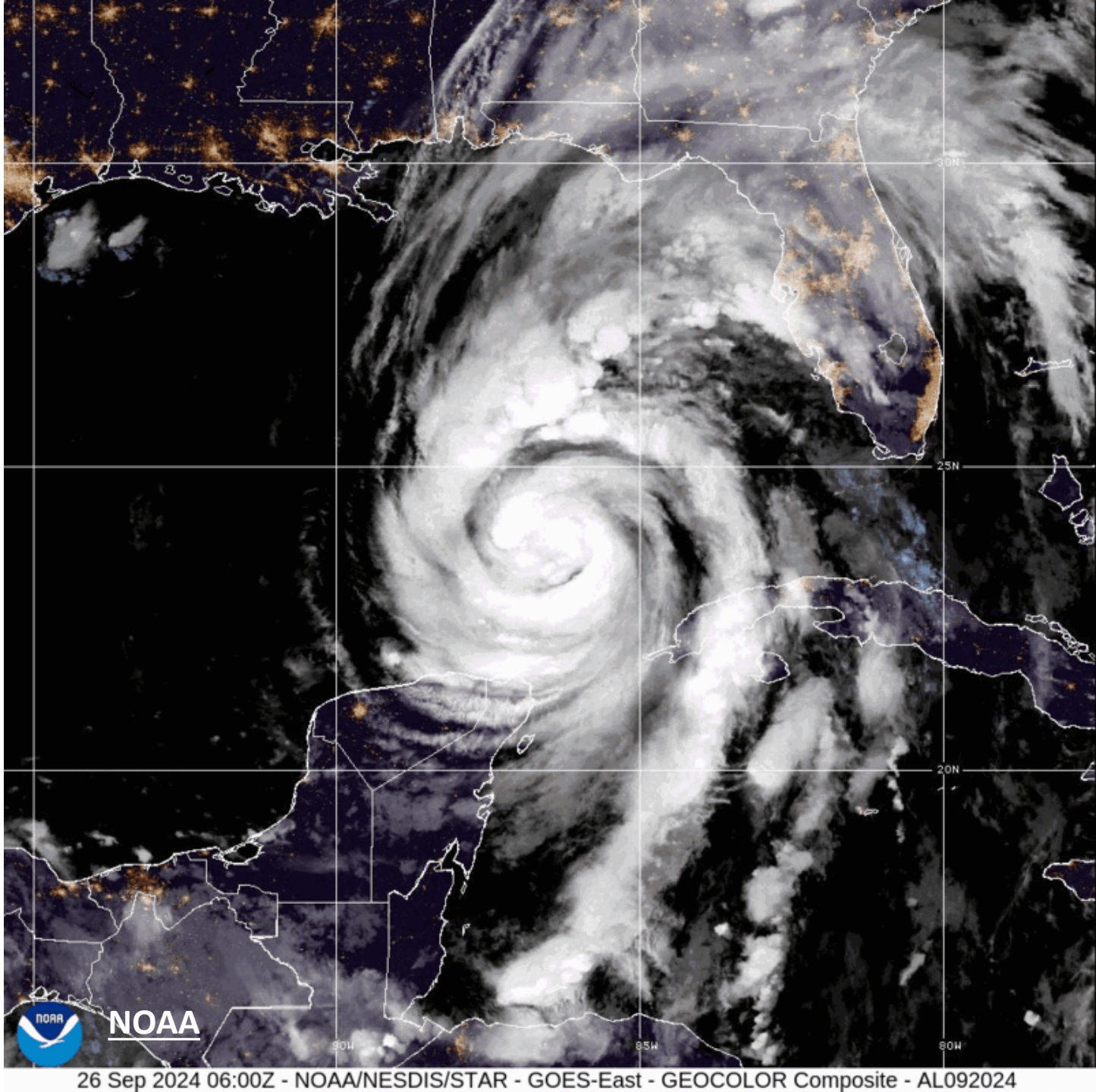
The Brownfields Challenges Created through Increasing Frequency and Intensity of Hurricanes

Insights from Hurricanes Helene and Milton in Florida

Dr. Christian Wells, University of South Florida

Richard Jenkins, Pasco County, Florida

Lem Dial, Terracon



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Richard Jenkins, JM

Program Manager, Planning Services

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Pasco County, Florida

Zack “Lem” Dial, PE

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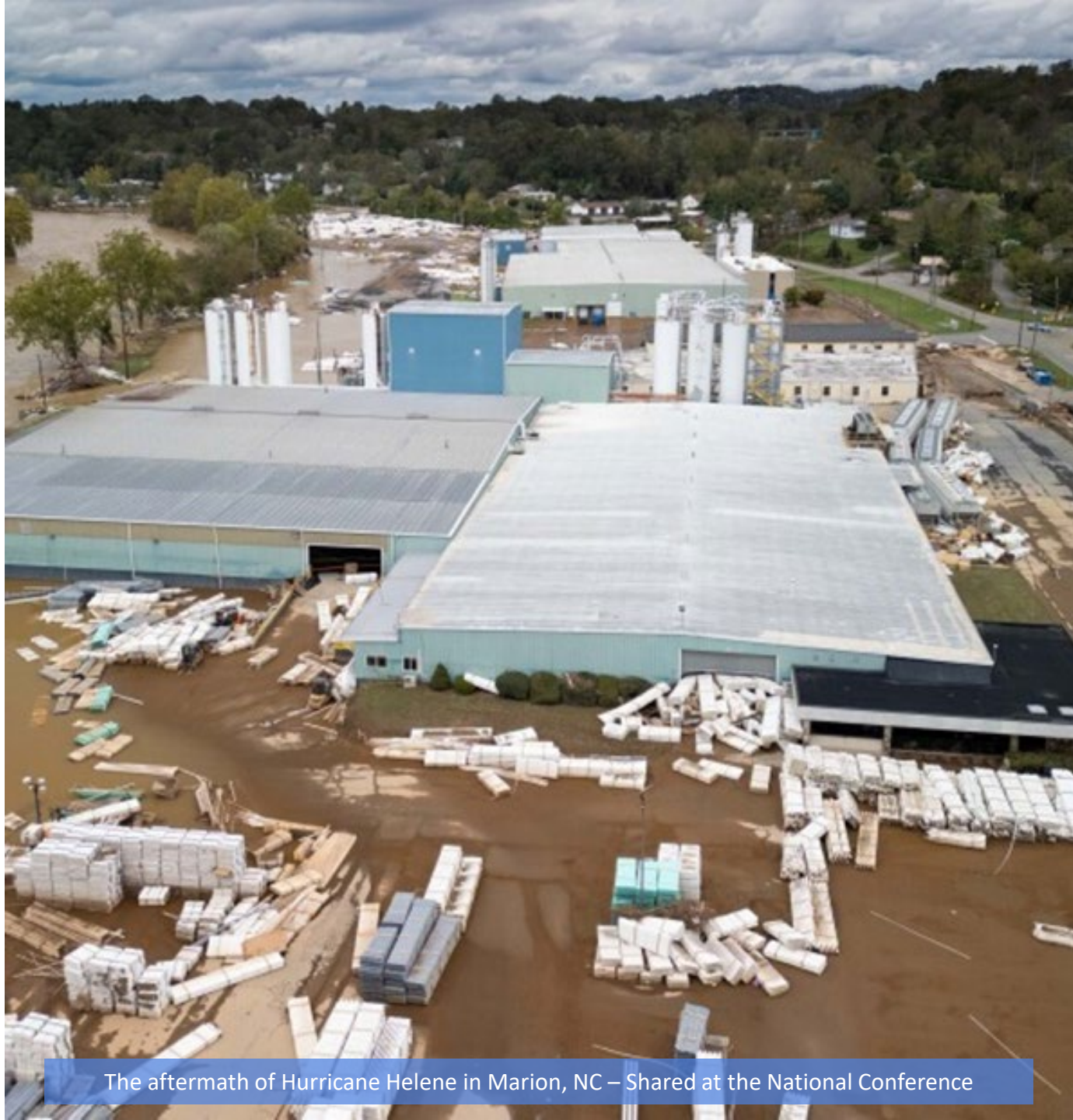
Terracon

EPA BROWNFIELDS AND LAND REVITALIZATION

What We Will Cover Today

- EPA Resources Available
  - Interim OLEM Report
  - EPA Disaster Debris Mitigation and Planning Resources
- Overview of Hurricane Milton and Helene
- Dr. Christian Wells: 3 Unresolved Issues
- Richard Jenkins: Pasco County's Lessons Learned and Next Steps
- Lem Dial: Case Studies

EPA BROWNFIELDS AND LAND REVITALIZATION



The aftermath of Hurricane Helene in Marion, NC – Shared at the National Conference

Interim Report: Impacts of inland and coastal flooding at EPA Office of Land and Emergency Management (OLEM) sites and facilities

Bottom Line Up Front: Flooding can cause damage and disrupt sites/facilities increasing the risk of contamination spread and community exposure.

Interventions include:

- Collaborate with State and Local governments to track costs, improve communication and information sharing across programs,
- Prioritize sites most vulnerable, lessening economic burden and increasing efficiencies,
- Implement improved routine monitoring and sampling (before and after disasters)

Available here: https://assessments.epa.gov/risk/document/&deid%3D365668

EPA Disaster Debris Mitigation and Planning Resources

- *Creating Disaster Resilient Buildings to Minimize Disaster Debris* Report (link)
- *Planning for Natural Disaster Debris* Report (link)
- *All-Hazards Waste Management Planning Tool* (link)
- *Disaster Debris Recovery Tool* (link)
- More resources on waste management for disasters are available here.

EPA BROWNFIELDS AND LAND REVITALIZATION

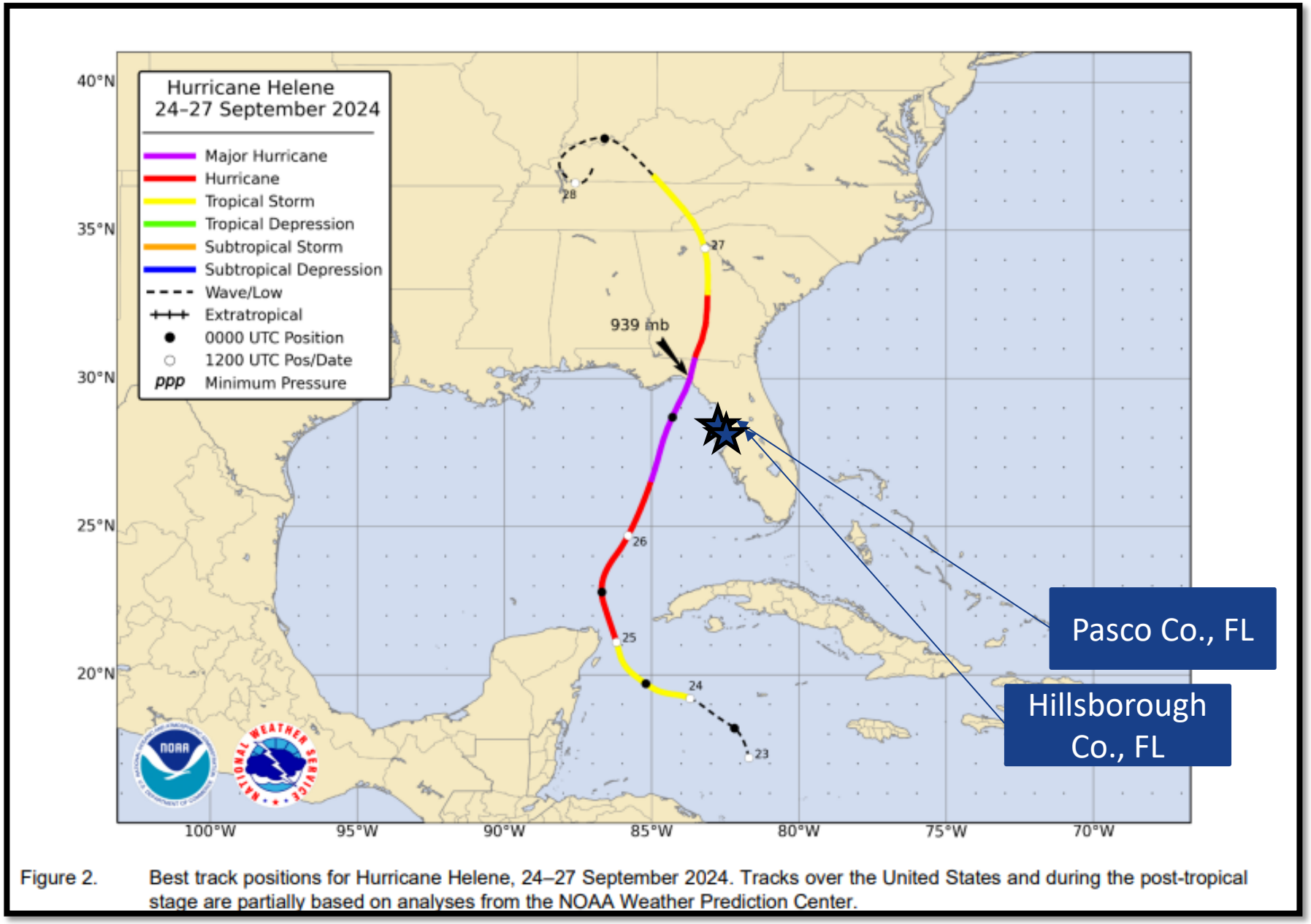


Figure 2. Best track positions for Hurricane Helene, 24–27 September 2024. Tracks over the United States and during the post-tropical stage are partially based on analyses from the NOAA Weather Prediction Center.

Hurricane Helene

September 2024

Source: https://www.nhc.noaa.gov/data/tcr/AL092024_Helene.pdf

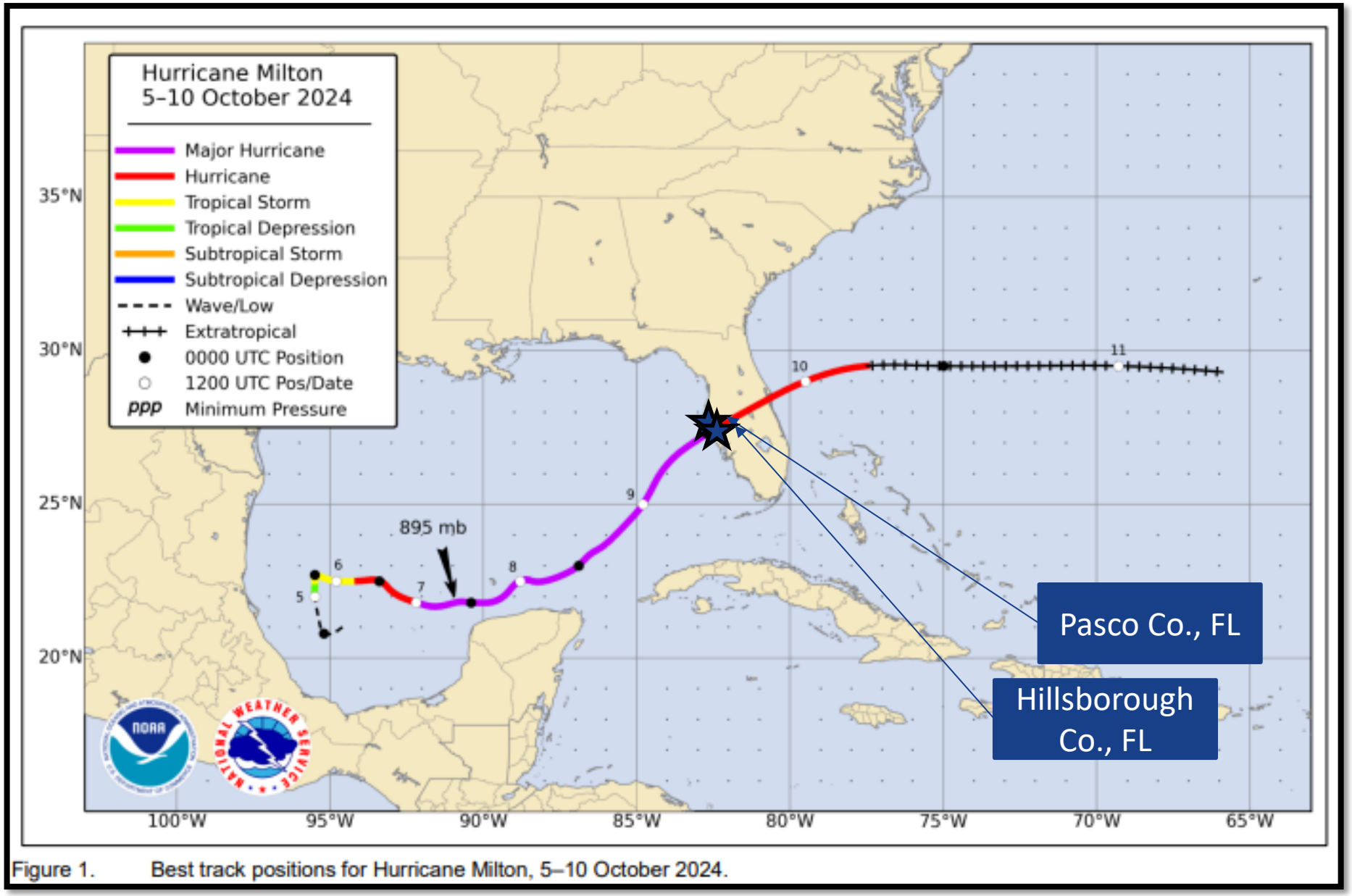


Figure 1. Best track positions for Hurricane Milton, 5–10 October 2024.

Hurricane Milton

October 2024

Source: https://www.nhc.noaa.gov/data/tcr/AL092024_Helene.pdf

UNIVERSITY of SOUTH FLORIDA

CENTER FOR BROWNFIELDS RESEARCH & REDEVELOPMENT

Our mission is to leverage interdisciplinary scientific expertise at the University of South Florida to inform and support community-driven research on brownfields challenges, environmental pollutants, land use legacies, and sustainable and equitable (re)development.

UNIVERSITY of SOUTH FLORIDA
CENTER FOR BROWNFIELDS RESEARCH & REDEVELOPMENT

RESEARCH

U.S. EPA CERCLA Section 128(a) & 104(k) funding through the Florida Department of Environmental Protection, 2017-2024; FDEP BIL and U.S. EPA TAB funding for student internships

REDEVELOPMENT

U.S. EPA Brownfields Area-Wide Planning Grant, 2017-2019; Community-wide Assessment Grants, 2019-2022, 2023-2025; Coalition Assessment Grant, 2024-2026; Community Change Grant, 2025-2028

EDUCATION

U.S. EPA Environmental Workforce Development and Job Training Grant, 2020-2022; Brownfields Job Training Grant, 2023-2025

UNIVERSITY AREA CDC
Let's grow together!

Redevelopment in the University Area Community

Investment: $200K
Return: $17.4M

cdc
CORPORATION TO DEVELOP COMMUNITIES OF TAMPA, INC.

Jobs Training in East Tampa

Investment: $10K
Return: $700K

Focus

Environmental Assessment & Cleanup in Tallevast

Investment: $20K
Return: $525K

UNIVERSITY of SOUTH FLORIDA 1956 TRUTH WISDOM

Internships & Curriculum Development at USF

Investment: $15K
Return: $1.7M

Top 3 Unresolved Issues in Florida

#1. Lack of EPR planning/policies at the intersection of flooding and brownfields.

#2. No statewide regulation of stormwater quality.

#3. Limited regulatory oversight of post-disaster debris sites.

Geospatial Vulnerability Framework for Identifying Water Infrastructure Inequalities

Mathews J. Wakhungu, Ph.D.[1]; Noha Abdel-Mottaleb, S.M.ASCE[2]; E. Christian Wells, Ph.D.[3]; and Qiong Zhang, Ph.D., M.ASCE[4]

Abstract: Recent infrastructure failures in the United States have brought attention to the ways and extent to which water security is unevenly distributed in urban areas. For many marginalized communities, infrastructure interdependencies (e.g., water, wastewater, stormwater, transportation) have created significant vulnerabilities in the face of aging or inadequate water treatment and delivery systems. In these communities, cascading failures precipitated by environmental hazards such as flooding often propagate across multiple infrastructure systems, sometimes resulting in poor water quality and/or lack of access to water for significant periods. However, little is known about how specific environmental and social factors combine with water infrastructure vulnerability and interdependencies to create enduring infrastructure inequalities. This paper presents a geospatial vulnerability framework for identifying water infrastructure inequalities, using the City of Tampa, Florida, to demonstrate the framework. For this framework, we integrate geographic information systems (GIS) analysis of environmental hazards, a factor analytic model of sociodemographic data, and a network topology-based performance indicator for the water distribution network. The resulting framework models the environmental and social vulnerabilities, quantifies hydraulic vulnerability and infrastructure interdependence, and maps their distributions across the urban environment. We find that the highest levels of social and environmental vulnerabilities in Tampa are present in low-income areas and communities of color that have high hydraulic vulnerability and infrastructure interdependency, which creates pockets of low resilience capacity. **DOI: 10.1061/(ASCE)EE.1943-7870.0001903.**

Author keywords: Environmental hazards; Social vulnerability; Infrastructure interdependency; Water insecurity; Geographic information systems (GIS); Marginalized communities.

Introduction

Access to a reliable and affordable supply of safe and clean water is essential for human well-being (UNESCO 2019). While continuous efforts through the United Nations Millennium Development Goals and, more recently, the Sustainable Development Goals, have succeeded in improving water quality and providing water access to millions of people globally (Dar and Khan 2011; UNICEF and WHO 2019), 2.1 billion people still lack access to potable water, mostly in developing countries (Mihelcic et al. 2017). At the same time, although high-income economies have made significant progress toward universal access to water through advances in treatment technologies and rapid expansion of water infrastructure networks (Sedlak 2014), recent infrastructure failures have exposed the growing problem of water insecurity for many marginalized communities in developed nations (Graham 2010). Recent studies in the United States and Canada, for example, reveal chronic and systemic failures of infrastructure systems and organizational management in communities of color, low-income communities in both urban (e.g., *colonias*) and rural (e.g., agricultural) settings as well as tribal communities (Allaire et al. 2018; Butler et al. 2016; Deitz and Meehan 2019; Jepson and Vandewalle 2016; Leker and Gibson 2018; Meehan et al. 2020).

In metropolitan areas, these failures are often attributed to aging infrastructure, dwindling resources, and lack of political will to address problems in minority and high-poverty communities (AWWA 2019; Butler et al. 2017; Steele and Legacy 2017). For example, from 2014 to 2015, lead leaching from municipal water pipes in Flint, Michigan, exposed approximately 99,000 residents of mostly low-income, minority communities to elevated levels of lead, *E. coli*, and *Legionella* bacteria (Clark 2018). In this case, dual failures of both infrastructure and its management were to blame (Pauli 2019). Moreover, as cities become smarter and more connected, water and other utilities have become increasingly interdependent, creating a varied array of infrastructural vulnerabilities (Mohebbi et al. 2020). Water treatment and distribution failure, for instance, can be precipitated by power outages (electricity infrastructure) and road maintenance (transportation infrastructure). Research has shown that infrastructures in densely built environments are often physically interdependent because of their high degree of physical colocation (e.g., water/wastewater pipes and roadways), which makes them vulnerable to cascading failures (Abdel-Mottaleb and Zhang 2020). The social, economic, and political relations between infrastructure institutions coupled with the connectivity of information systems also result in social and cyber interdependencies that influence the resilience of infrastructures (Wells et al. 2019).

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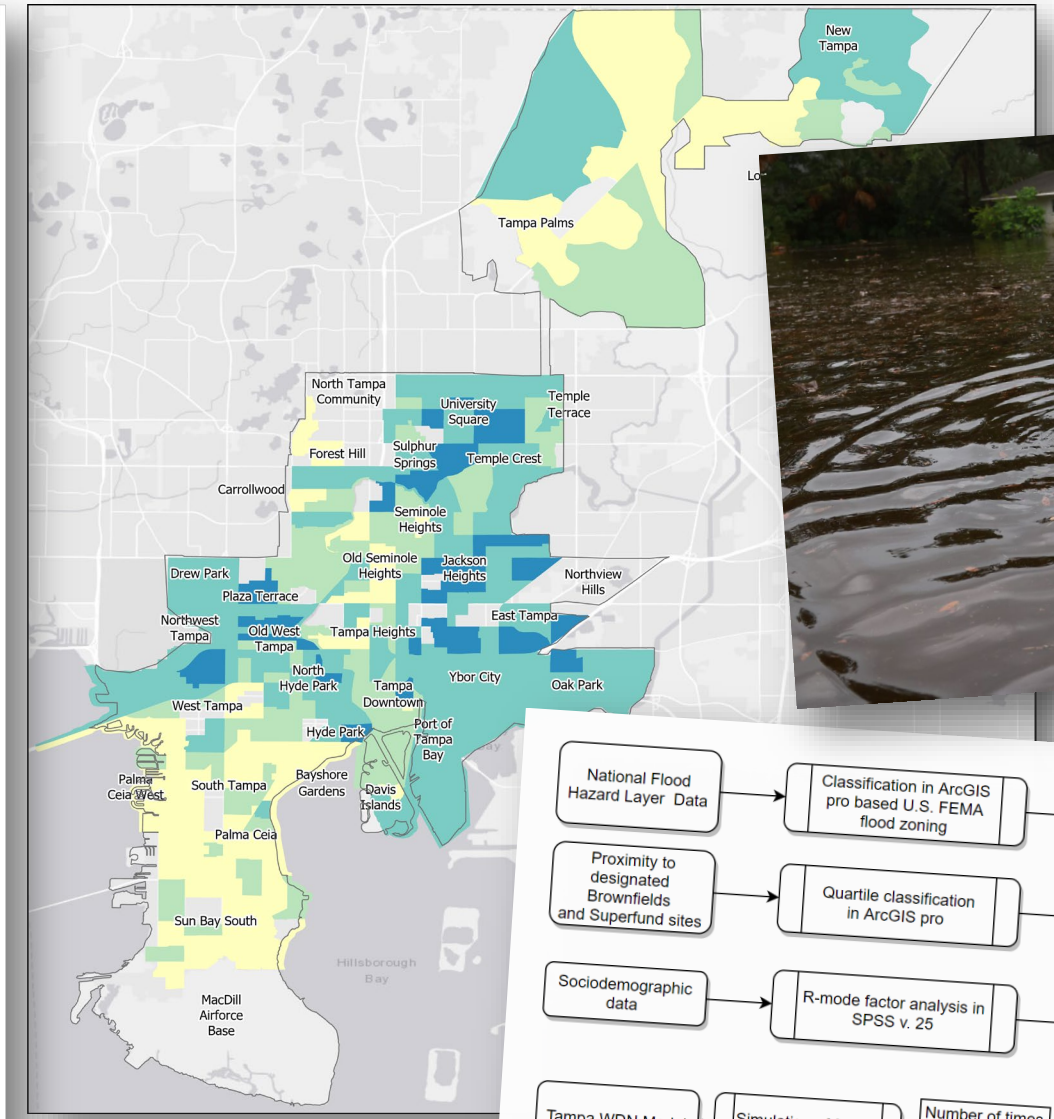
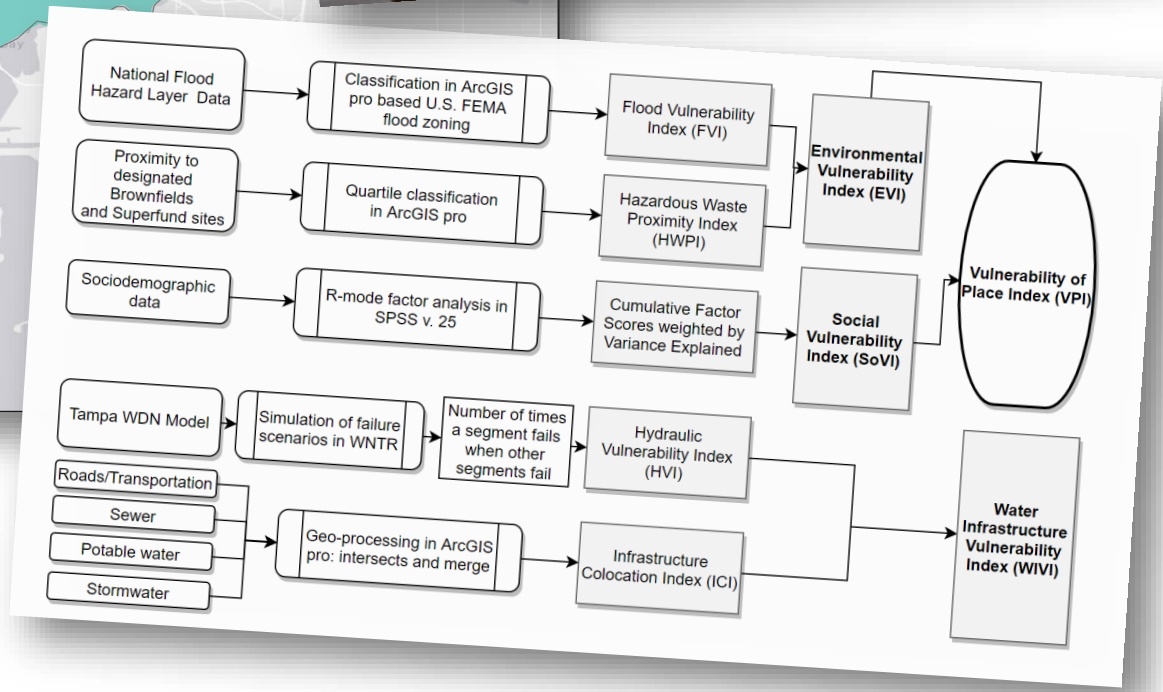
Note. This manuscript was submitted on February 25, 2021; approved on April 22, 2021; published online on July 15, 2021. Discussion period open until December 15, 2021; separate discussions must be submitted for individual papers. This paper is part of the ***Journal of Environmental Engineering***. © ASCE, ISSN 0733-9372.





Top 3 Unresolved Issues in Florida

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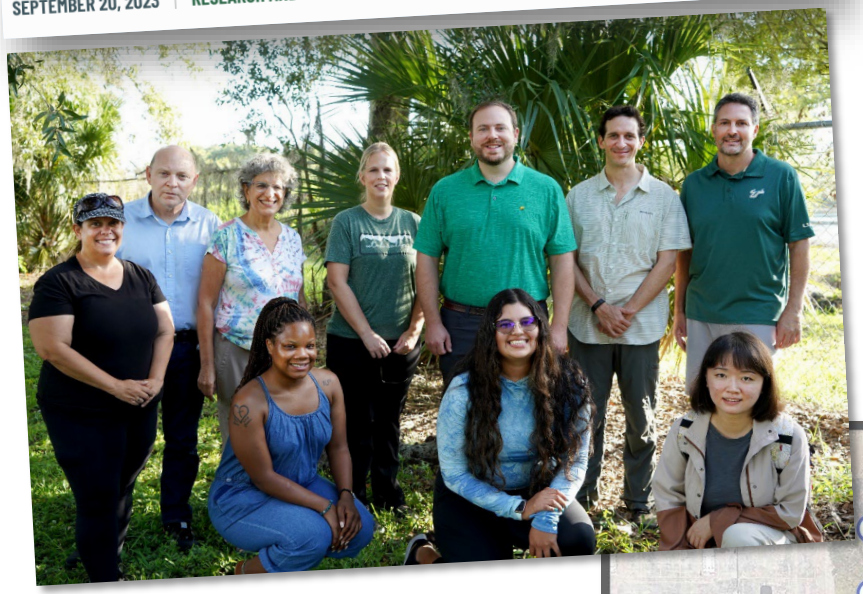
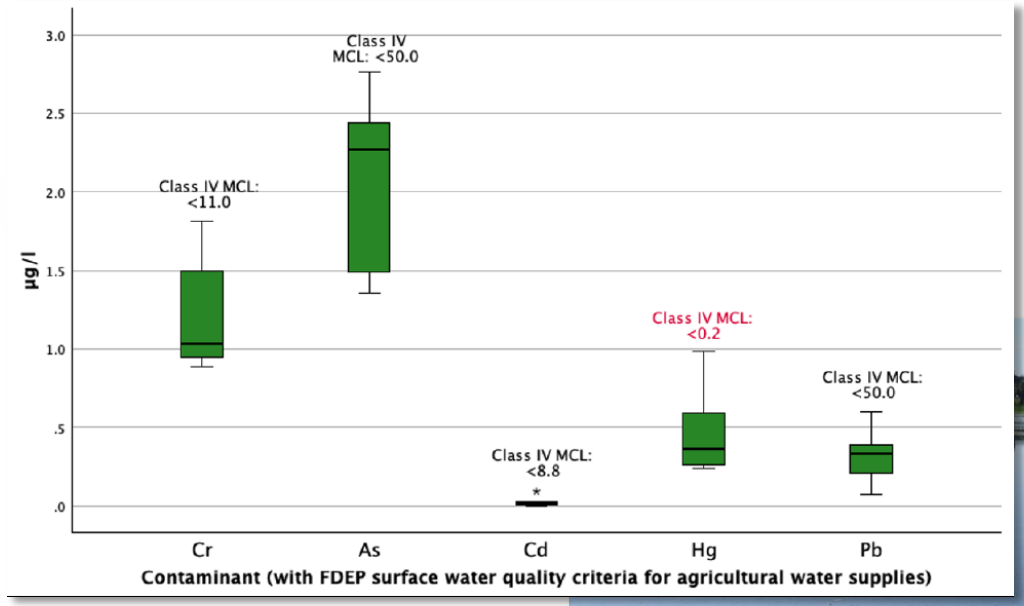
#2. No statewide regulation of stormwater quality.

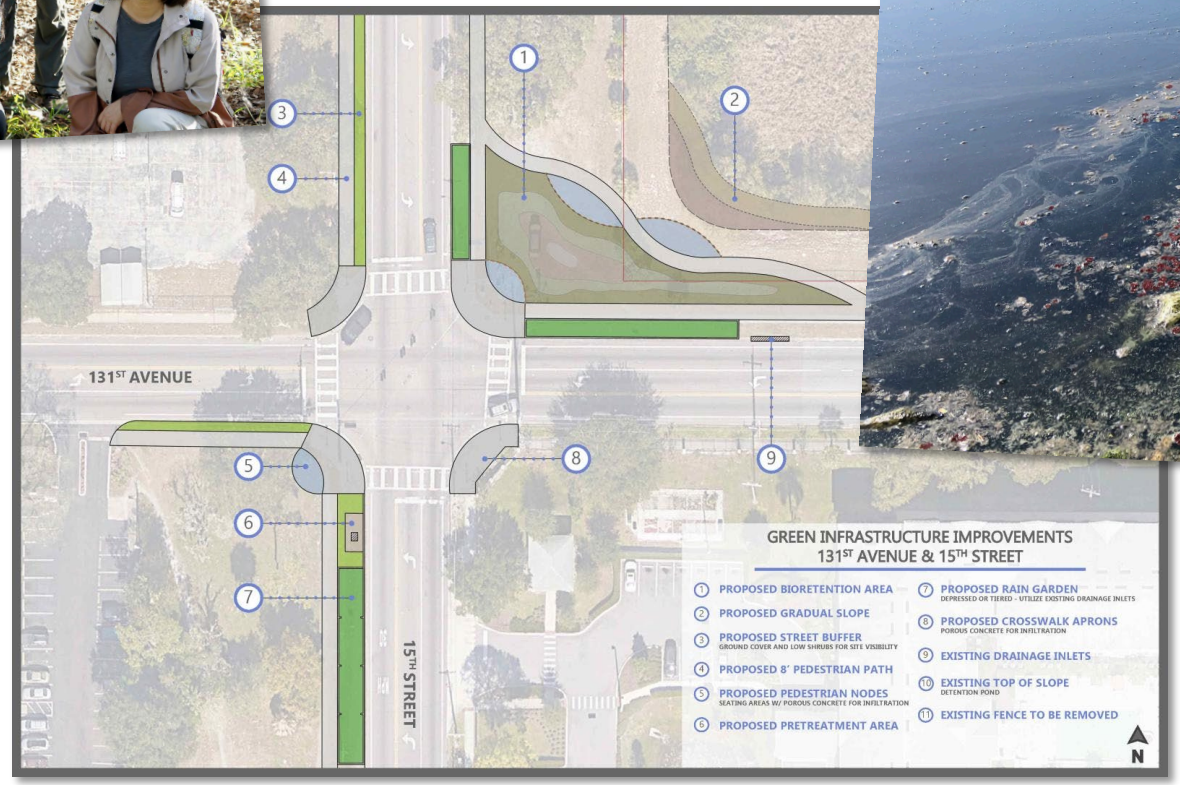
#3. Limited regulatory oversight of post-disaster debris sites.

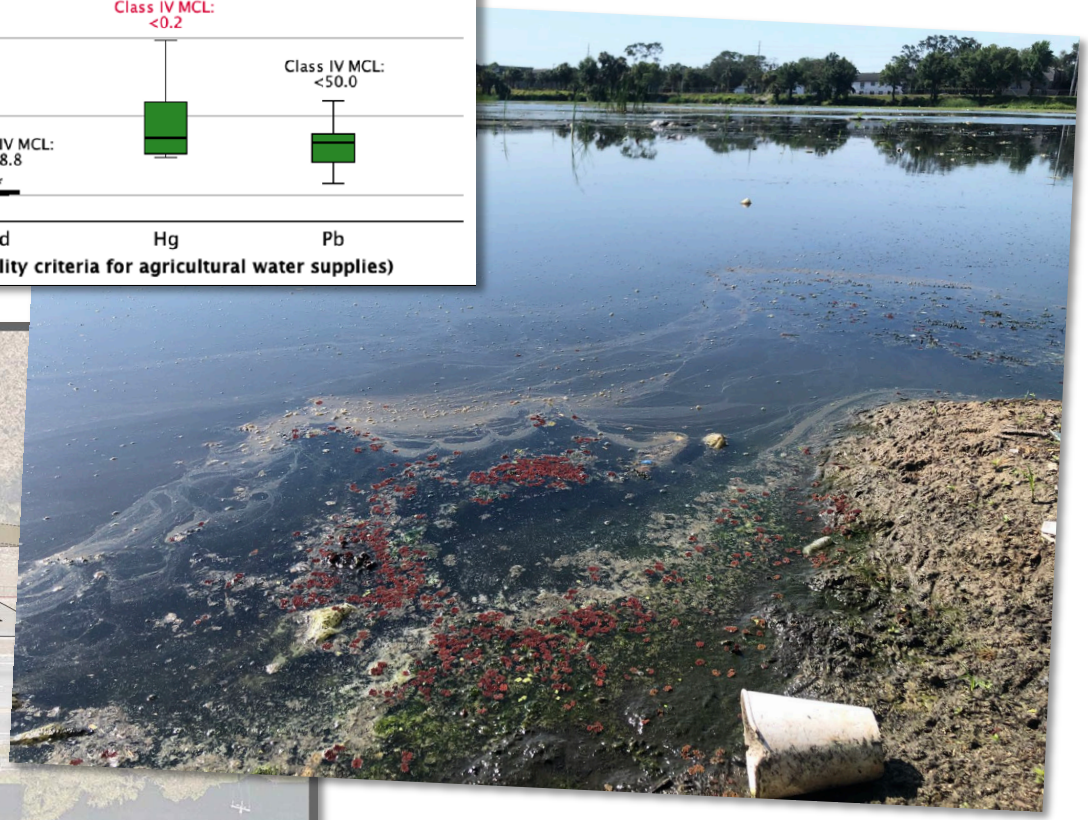
USF researchers secure $1.5 million federal grant to improve water quality and reduce runoff into Tampa Bay and the Gulf of Mexico

SEPTEMBER 20, 2023 | RESEARCH AND INNOVATION









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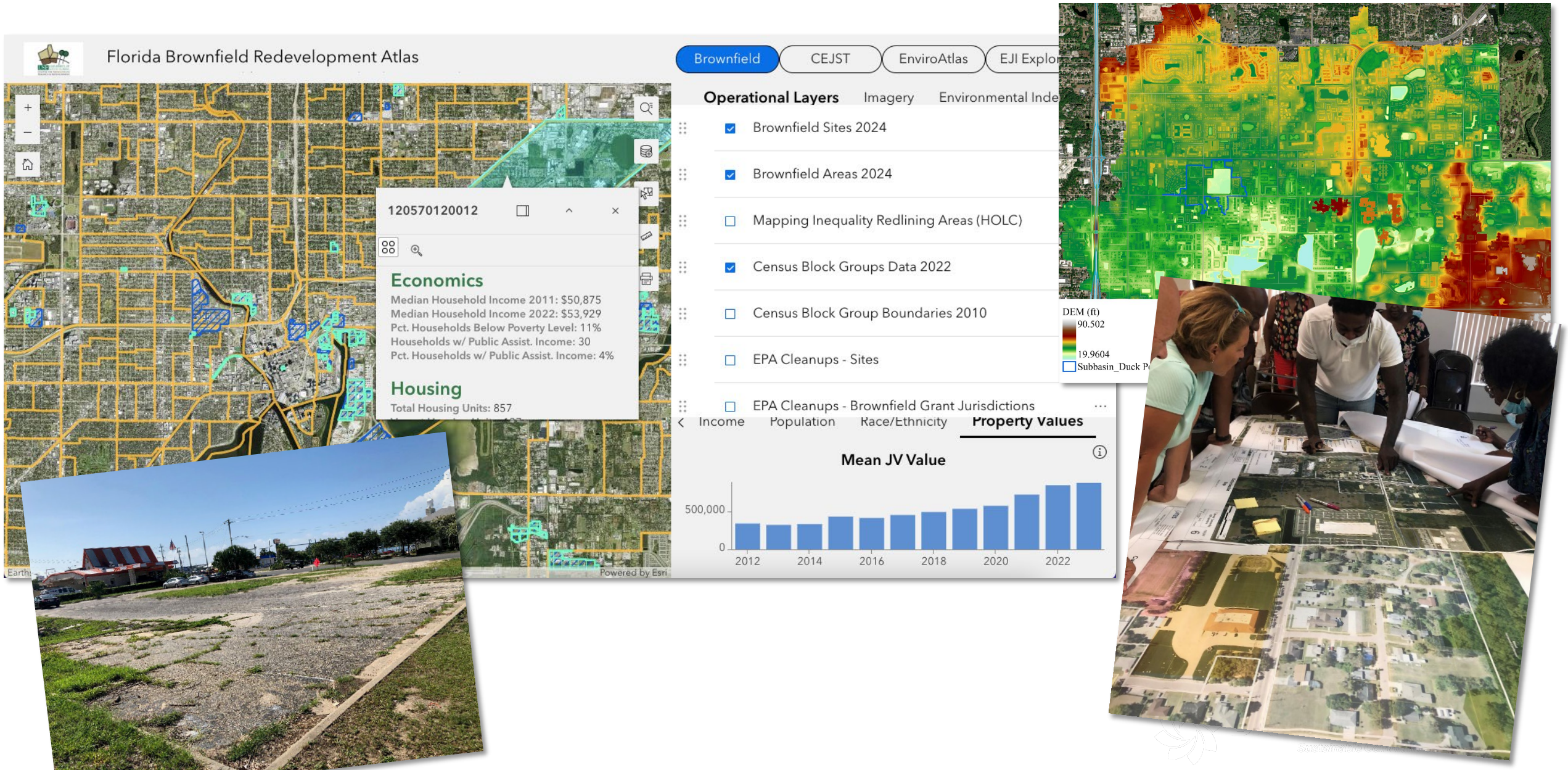
Florida Brownfield Redevelopment Atlas
Brownfield
CEJST
EnviroAtlas
EJI Explor
Operational Layers
Imagery
Environmental Inde
Brownfield Sites 2024
Brownfield Areas 2024
Mapping Inequality Redlining Areas (HOLC)
Census Block Groups Data 2022
Census Block Group Boundaries 2010
EPA Cleanups - Sites
EPA Cleanups - Brownfield Grant Jurisdictions
120570120012
Economics
Median Household Income 2011: $50,875
Median Household Income 2022: $53,929
Pct. Households Below Poverty Level: 11%
Households w/ Public Assist. Income: 30
Pct. Households w/ Public Assist. Income: 4%
Housing
Total Housing Units: 857
Income
Population
Race/Ethnicity
Property Values
Mean JV Value
500,000
0
2012
2014
2016
2018
2020
2022
Powered by Esri
DEM (ft)
90.502
19.9604
Subbasin_Duck P

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THANK YOU!

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Support us! giving.usf.edu/online, fund #420128

Brownfields 2025
Sustainable Communities Start Here

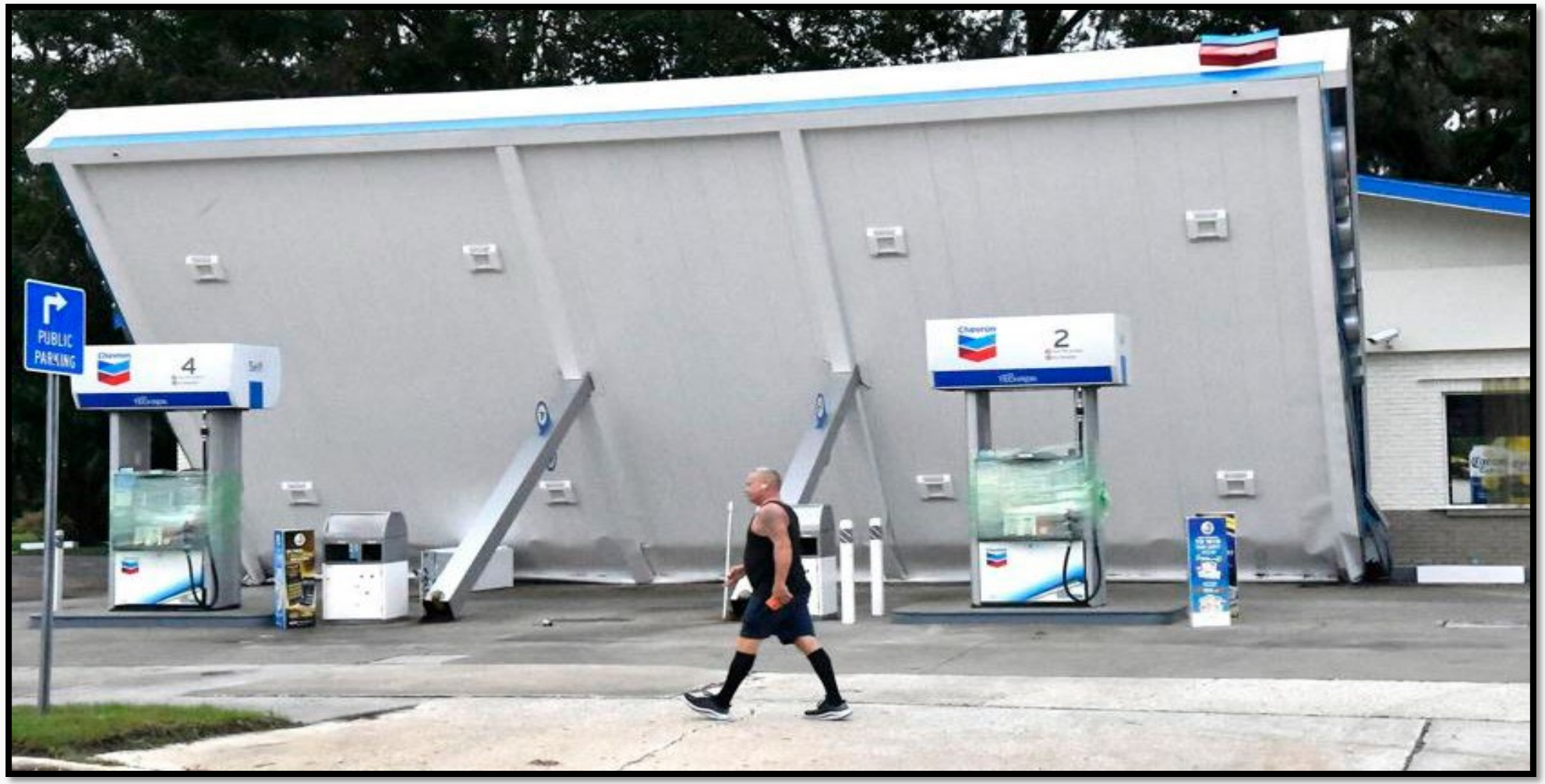
BROWNFIELD CHALLENGES IN PASCO COUNTY, FL DUE TO IMPACTS OF 2024 HURRICANES

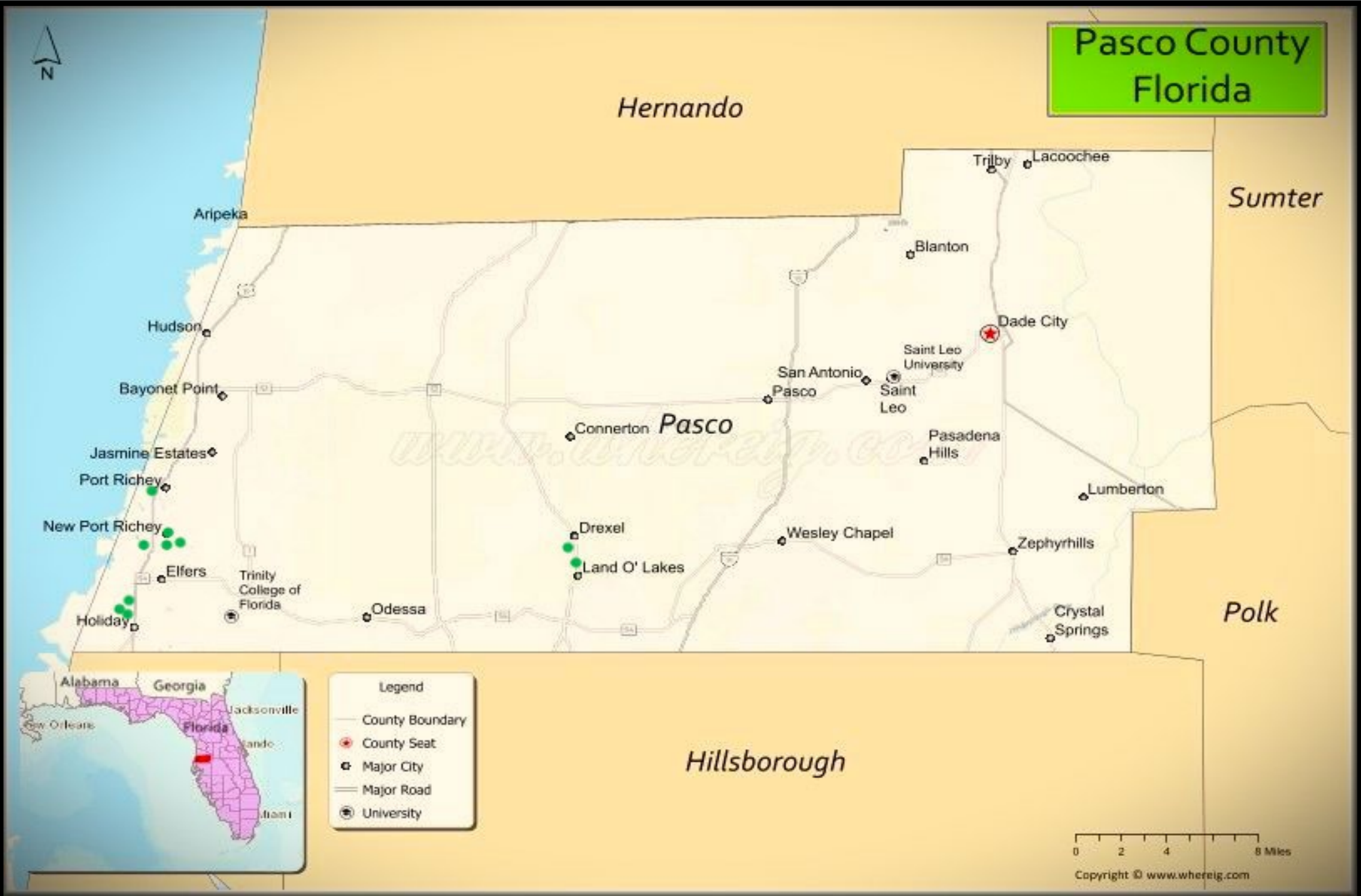
September 9, 2025

TOP WORK PLACES 2021 USA

PASCO COUNTY FLORIDA
OPEN SPACES. VIBRANT PLACES.

Hurricane Impacts on Brownfield Properties



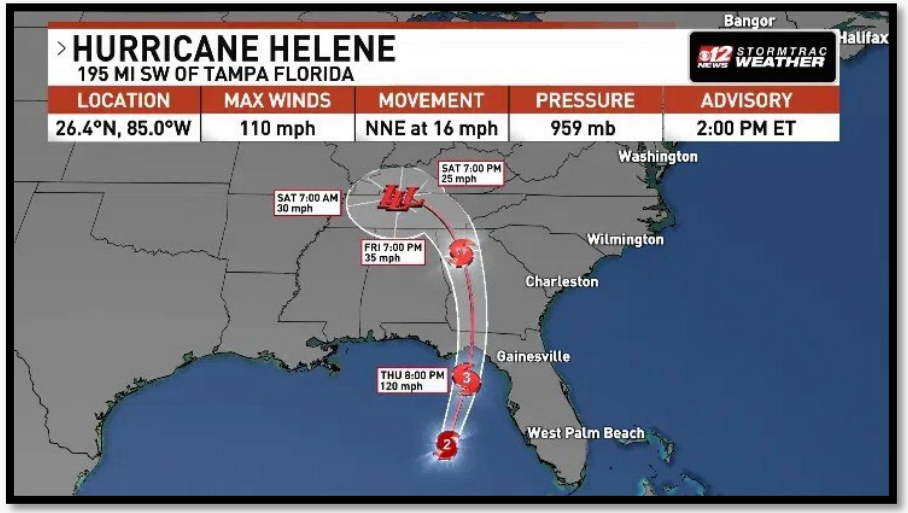


Pasco County Map

Storm Impacts Pasco County, FL

Hurricane Helene
September 26, 2024

- Category 4 storm
- Landfall in Perry, Florida,
- 174 miles north of Pasco County
- Torrential rain
- Severe flooding



Hurricane Milton
October 9, 2024

- Category 3 storm
- Landfall in Siesta Key, Florida
- 76 miles south of Pasco County
- Strong winds
- Additional flooding

Cleaning up - 1.3 million cubic yards of debris collected across Pasco County!

Damage Assessments

- Conducted by Pasco County Office of Economic Growth in partnership with SCS Engineers.
- Included all active Phase I and Phase II Environmental Site Assessment (ESA) locations, especially along U.S. 19.
- Two sites required follow-up due to storm debris being improperly dumped on vacant lots.
- No major environmental hazards identified.

Specific Concerns

- Structures built or painted prior to 1978- Possibility of lead base paint.
- Common chemicals pesticides, household chemicals, oil, fertilizers.
- Above ground or below ground storage tanks.
- Dry cleaning plants.
- Laydown yards, treatment yards.

PASCO COUNTY FLORIDA
OPEN SPACES. VIBRANT PLACES.

- **POST-STORM PROPERTY CONDITION & BROWNFIELDS ASSESSMENT FORM**

1. Client & Property Information

- Client Name_____
- Phone Number_____
- Email Address_____
- Company (if applicable): _____
- Property Address:
  _____
- Parcel ID: _____
- Inspection Date: ____ / ____ / _____
- Staff Member Name: _____
- Weather Conditions at Time of Inspection:
  _____
  _____

2. Storm Event Information

- Storm Name / ID: _____
- Date of Impact: ____ / ____ / _____
- Type of Event: ☐ Hurricane ☐ Tropical Storm ☐ Severe Thunderstorm ☐ Flooding ☐ Tornado ☐ Other: _____
- Wind Speed / Flood Height (if known): _____

3. Photo Documentation

- (Check boxes for what was taken, attach file names or links)
- Before Photos: ☐ Yes ☐ No — File refs: _____
- After Photos: ☐ Yes ☐ No — File refs: _____

Looking Forward

After Storm Actions

- Comprehensive Damage Assessment
- Photos of Site
- Communication- Property Owner
- Communication- Consultant
- Notification of Public Works

Planning Ahead

- Remain nimble and proactive
- Photos before and after events
- No dumping signs
- Robust communication with EPA
- Advocate for best practices

Presented by:

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Community Resilience Enhancements & Brownfields

Presenter:

Zack “Lem” Dial

Terracon Brownfields Manager

Terracon
Explore with us

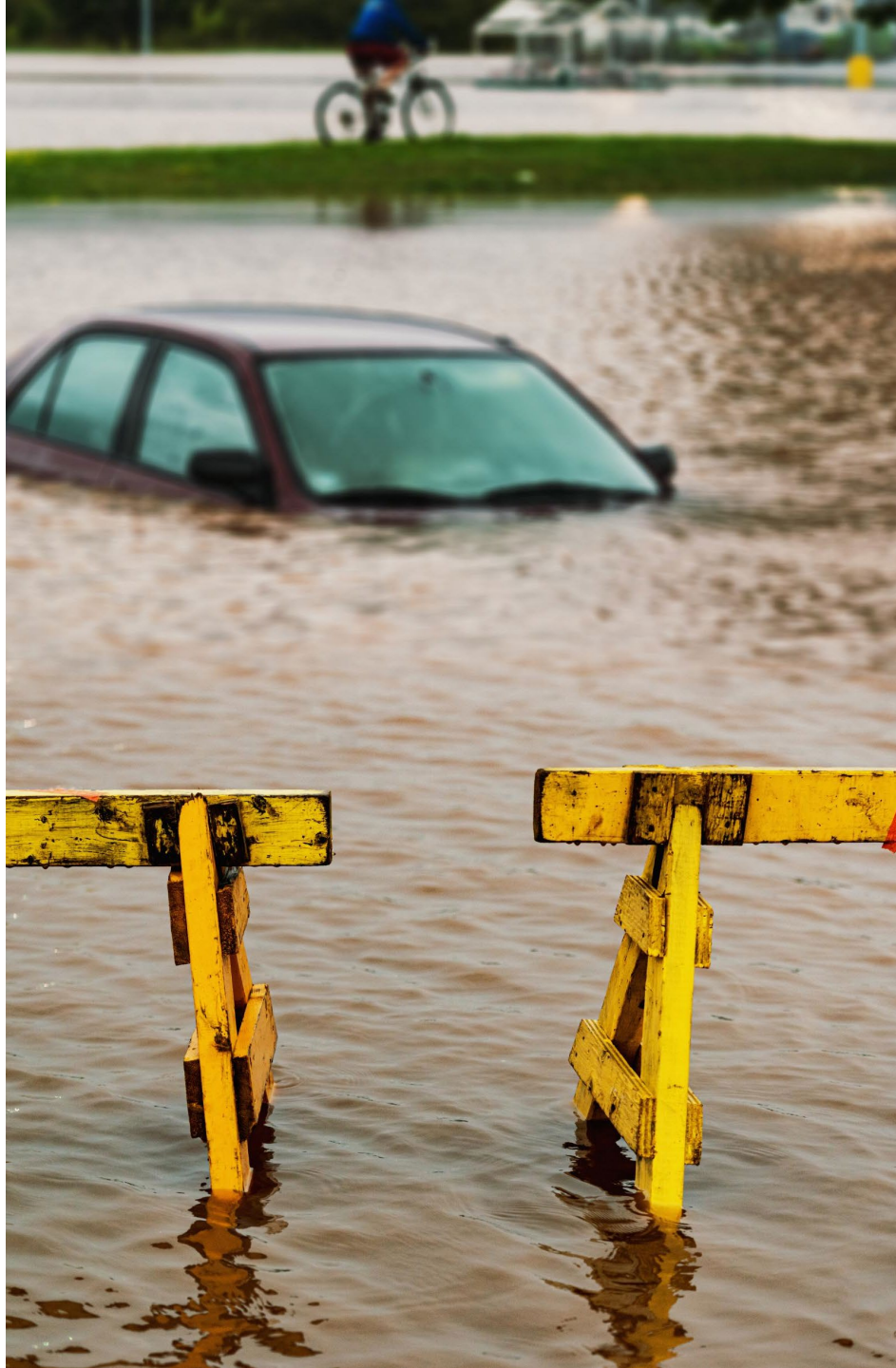
Where it Started Hurricane Katrina

Initial Impacts

- Extensive flooding and displacement
- Claimed over 1,800 lives
- Economic damages exceeding $100 billion
- Shortcomings in disaster preparedness and slow response led to widespread criticism and prompted policy reforms

Long-term Impacts

- Initial estimate of 26,000 blighted properties grew to ~60,000 by June 2009 in New Orleans alone.
- Increased Restoration/Redevelopment Costs resulted in 1,000’s of new Brownfield properties.



Environmental Shortcomings

- Lack of resiliency construction resulted in massive amounts of environmental contaminants released to the environment.
- Debris mismanagement led to improper handling and disposal of environmentally regulated materials.
- Delays in damage mitigation due to lack of hazardous building materials information.
- Lack of planning resulted in a shortage of properly trained/licensed companies and individuals to assess and mitigate hazardous building materials and contaminants.

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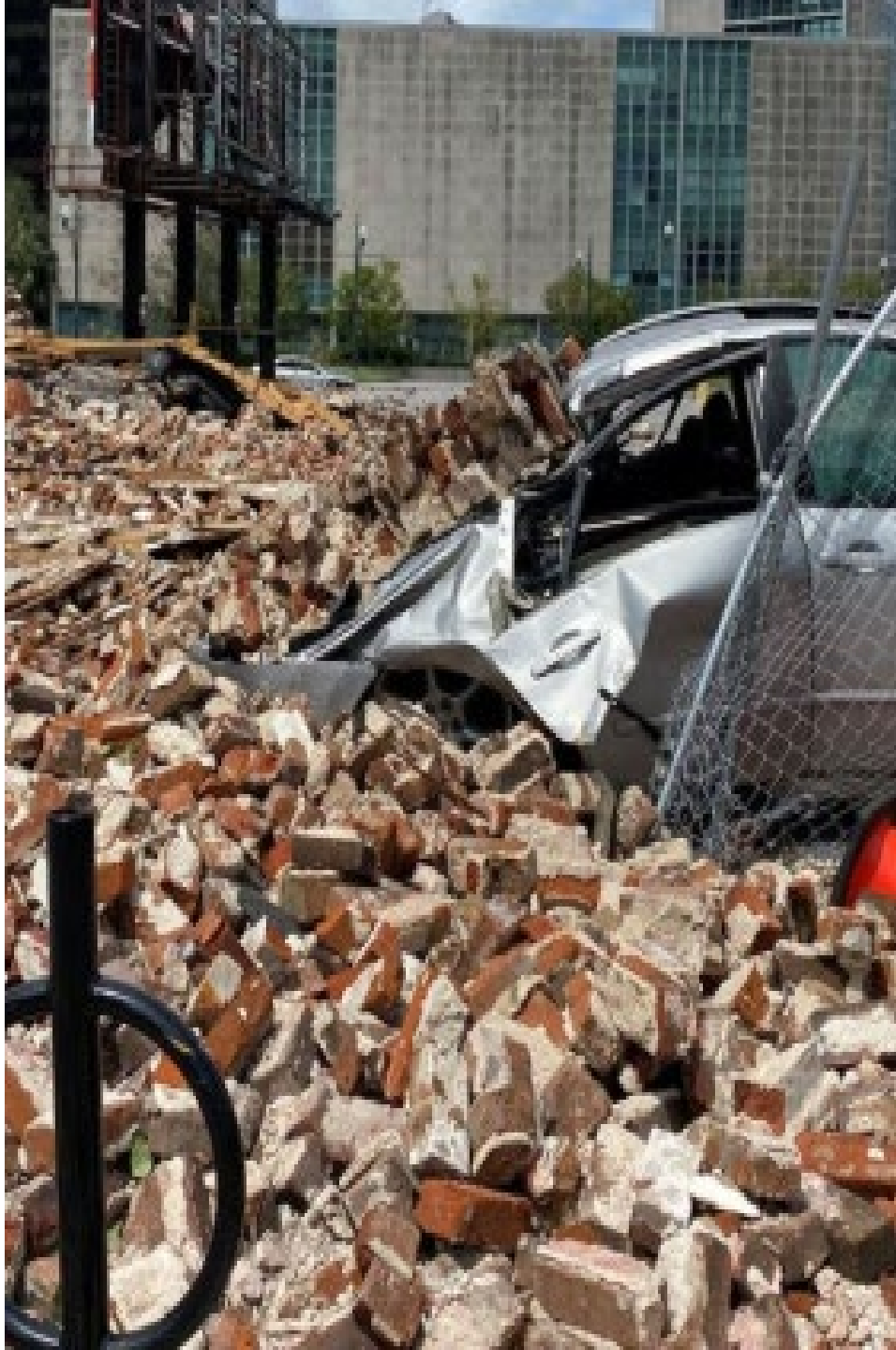
16 Years Later- Hurricane Ida

Initial Impacts

- Extensive flooding and wind damage
- Claimed 112 lives
- Economic damages exceeding $95 billion
- Once again, vulnerabilities in infrastructure and disaster preparedness were highlighted

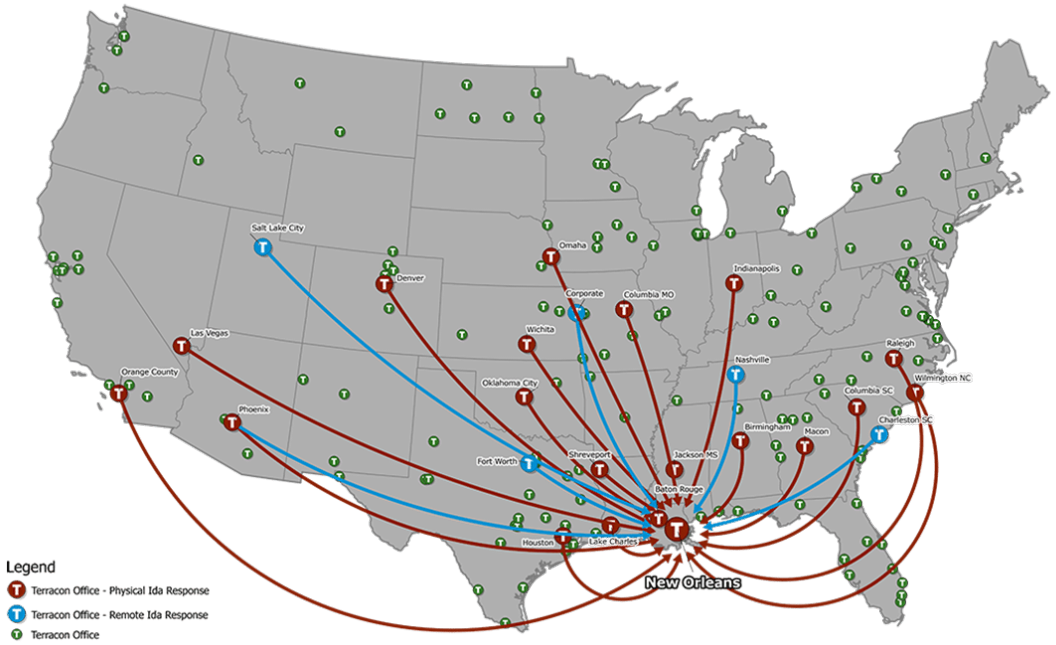
Long-term Impacts

- Increased Restoration/Redevelopment Costs resulted in an overall increase in Brownfield properties.
- Further damage to pre-existing Brownfield properties.



What Was Different?

- Improvements in debris management substantially reduced improper handling and disposal of environmentally regulated materials.
- More resilient construction and infrastructure lessened extent of impact.
- Emergence of more disaster response companies led to properly trained/licensed companies to quickly assess and mitigate hazardous building materials and contaminants.



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Explore with us

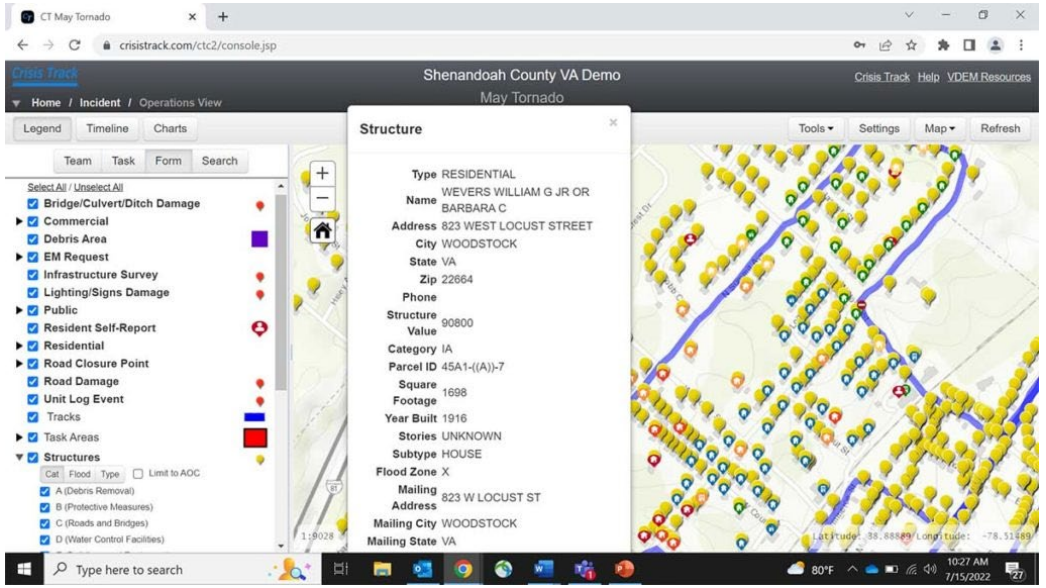
Case Study: Jefferson Parish, Louisiana

Community Resilience Enhancements

- Elevated flood prone structures
- Installing green infrastructure
- Expanding backup power to critical pumps
- Partnering with Entergy to install a resilient electric grid

Emergency Operations & Planning

- Emergency response contracts established
- Environmental Hazard Catalogue
- Safe Houses for essential workers to shelter in-place
- Post-Event Damage Assessments
- Emergency Management Technology – *Crisis Track*
- Training Exercises



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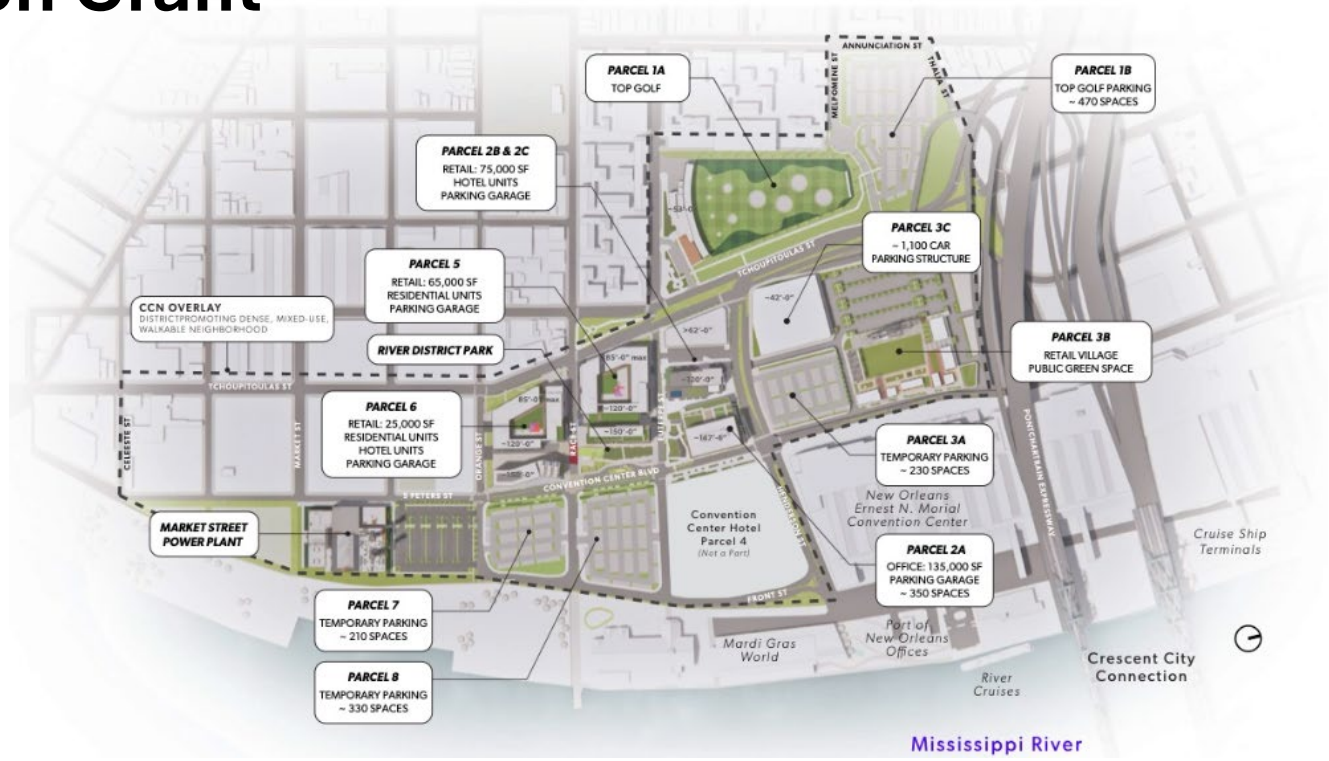
Case Study: Jefferson Parish, Louisiana

2021-2025 Brownfield Coalition Grant

- Considerations for extreme weather risks included in Analysis of Brownfield Cleanup Alternatives (ABCAs)
- Adopt adaptive reuse of existing structures
- Address stormwater management and flooding concerns in early site reuse visioning
- Prevent contaminant migration through voluntary remediation and abatement planning



Case Study: City of New Orleans

2022-2026 Brownfield Cleanup Grant

- Naval Support Activity Complex: 1.5M SF former military installation vacant and blighted since 2012
- Considerations for extreme weather risks included in Analysis of Brownfield Cleanup Alternatives (ABCAs)
- Removal of hazardous building materials determined necessary by ABCA to ensure public safety in light of future extreme weather events
- Adopted adaptive mixed-use redevelopment of existing structures

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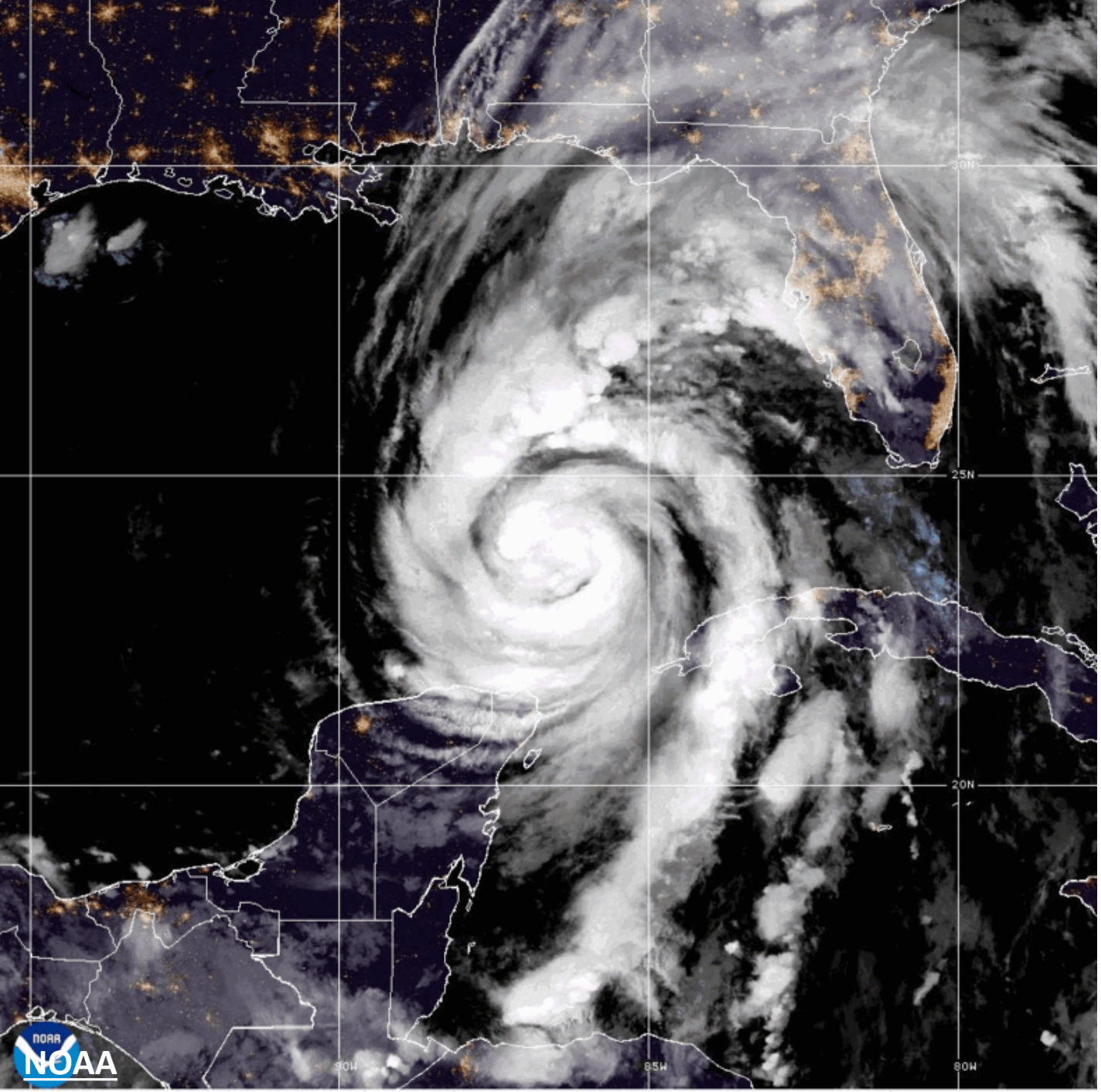
Explore with us



Questions?

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