RUNOFF RESILIENCE: IDENTIFYING PRIORITY AREAS FOR GREEN INFRASTRUCTURE IN JACKSONVILLE, FLORIDA

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INTRODUCTION

As Florida's population grows rapidly, its water resources are increasingly stressed. Jacksonville, Florida faces significant environmental challenges due to urban expansion. The St. Johns River and nearby water bodies are suffering from rising pollution and degradation, caused by factors like increased development and septic tank failures. These changes disrupt the conditions of aquatic ecosystems, impacting wetlands and overall water quality, landing these waterways on the Florida Department of Environmental Protection Statewide Comprehensive Verified List of Impaired Waters (FDEP, 2025).

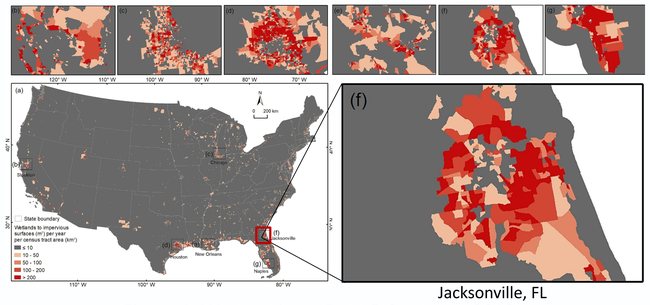


Figure 1: Wetland Loss (Dahl & Stedman, 2013).

Urban development is directly linked to the expansion of impervious surfaces, which increases stormwater runoff and pollutant loads in local water bodies. Converting natural wetlands into built environments reduces the land's ability to filter contaminants and manage water flow effectively (Pinto & Bielmyer-Fraser, et. al., 2024). By analyzing runoff risks, soil attributes, parcel details, and flood risk, this project aims to identify which areas of Jacksonville are the best candidates for green infrastructure interventions. The most effective sites will be those that could contribute significantly to runoff pollution, ones with room for redevelopment, and with public ownership. The main research question of this analysis is what sites are the most suitable and in need of redevelopment that integrates green infrastructure interventions?

Study Area

This region of Downtown has specifically been highlighted by local stakeholders and has been illustrated as Areas of Interest by local teams such as Resilient Jacksonville (Figure 2). These 18 census tracts have been identified as critical locations that could greatly benefit from policy improvements and community-driven redevelopment initiatives to bring environmental justice and equity.

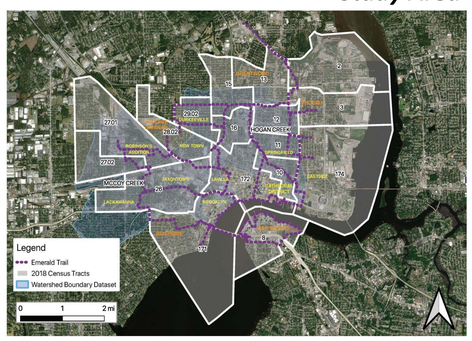


Figure 2: Tracts of Interest (Groundwork Jacksonville, 2021)

METHODS OVERVIEW

Runoff Risk and Pollution

Soil Analysis: Used ArcGIS Pro to assess soil runoff potential.
Land Use: Combined with soil data to find high runoff and pollution areas.

Site Selection

Parcel Data: Identified key attributes for green infrastructure.
DEM Analysis: Targeted McCoy Creek sub-watershed.
Flood Risk: Highlighted areas to avoid and adapt.
Watershed Proximity: Scored parcels as within (5) or near (1) the watershed.
Park Proximity: Measured distance to parks with Euclidean Distance

Site Suitability

Raster Calculator: Reclassified attributes to a 1-5 scale in raster layers.
Suitability Modeler: Combined selected raster layers to determine parcel suitability

METHODS

Runoff Risk Suitability Model Methodology

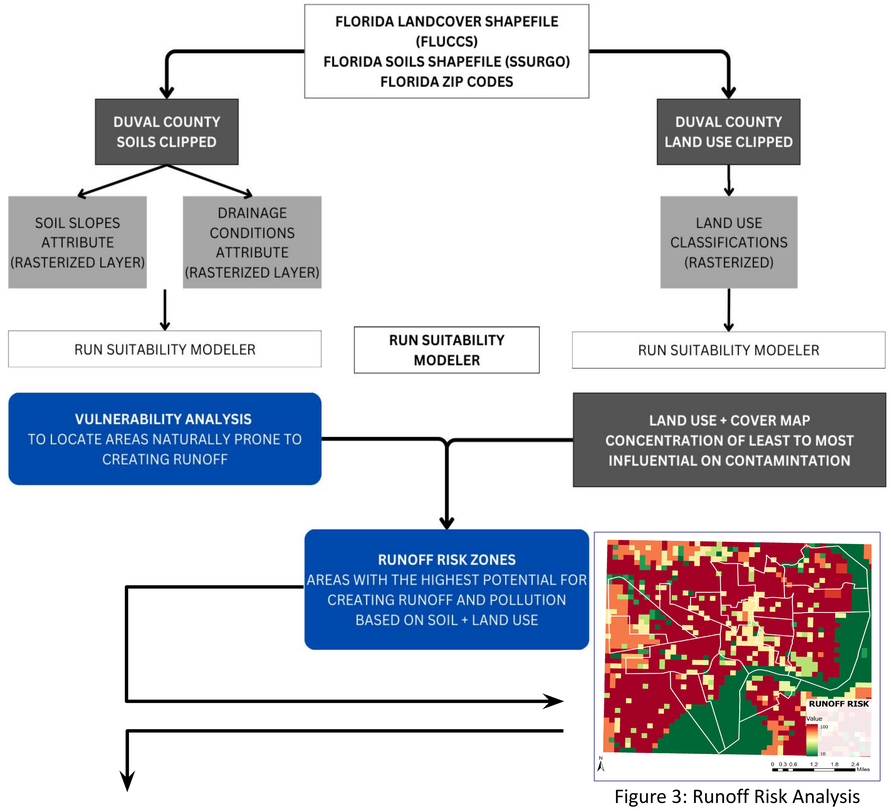
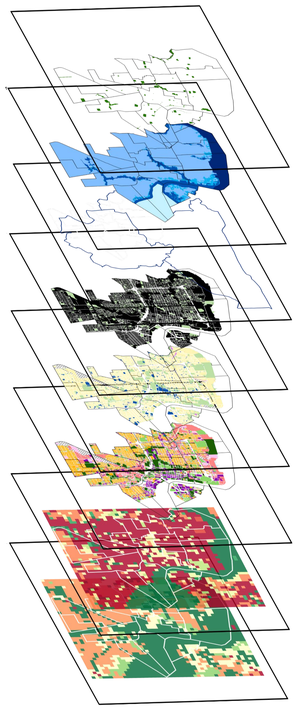


Figure 3: Runoff Risk Analysis

Suitability Model Methodology Applied



Screening Focus:	
Existing Parks	5%
Flood Risks	15%
Hydrology	10%
Parcel Development	5%
Parcel Ownership	20%
Parcel Land Use	15%
Runoff Risk	20%
Soil Attributes	10%

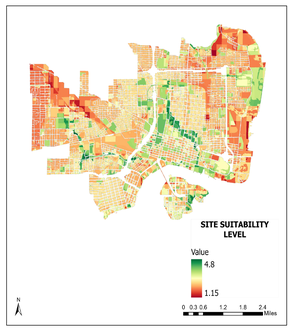


Figure 4: Site Suitability Analysis

RESULTS

The maps show calculated site suitability within the study area.

- Green areas indicate higher potential for green infrastructure projects, Figure 7 has the highest suitability scores extracted
- red indicates areas with a lower chance of adopting these public green infrastructure efforts

These sites have fully public, or mixed with institutional, ownership, a high 'runoff risk', suitable land use types (mainly public/semi-public, recreation, or institutional), moderate to high chance of future flooding, near existing parks, and variations in levels of site development, as well as have high flow accumulation.

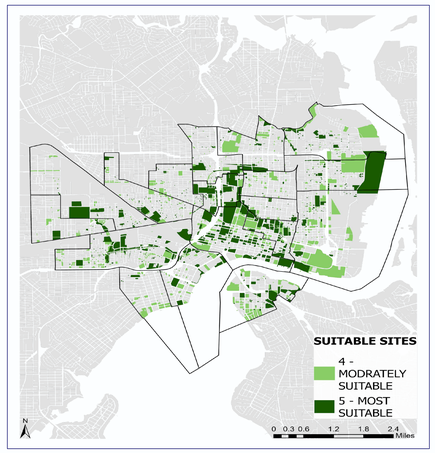


Figure 5: Most Suitable Sights

DISCUSSION

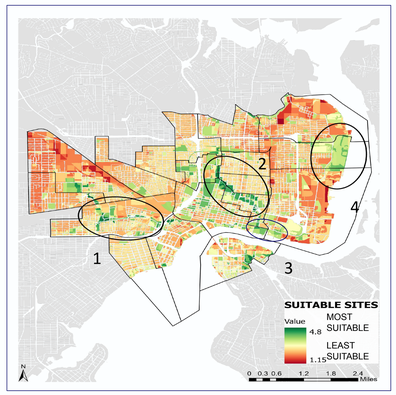


Figure 6: Site Selections

From highest scoring areas, 4 sites were selected to display unique intervention opportunities: riverside vs. inland locations, and large- scale projects vs. neighborhood level opportunities. Each location has partial or full public land ownership. Selection of the sites is displayed to the left to provide suitability context.

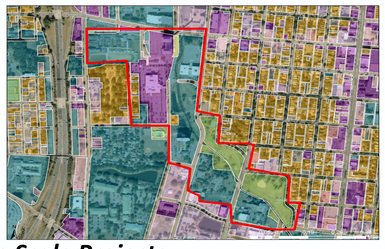
PARCELS OF INTEREST LAND USE

- INDUSTRIAL
- INSTITUTIONAL
- OTHER
- PARCELS WITH NO VALUES
- PUBLIC/SEMI-PUBLIC
- RECREATION
- RESIDENTIAL
- RETAIL/OFFICE
- ROW
- VACANT NONRESIDENTIAL
- VACANT RESIDENTIAL
- WATER

Inland Local Neighborhood Interventions

Site 1: McCoy Creek

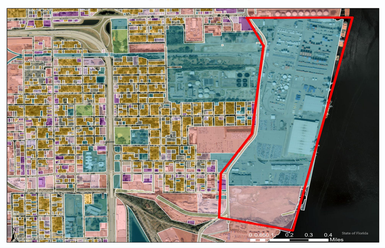
Site 2: Hogan's Creek



Riverside Large Scale Projects

Site 3: Riverfront Plaza

Site 4: Port



REFERENCES: