All In One!

A Watershed Plan Can Do More Than One Thing!

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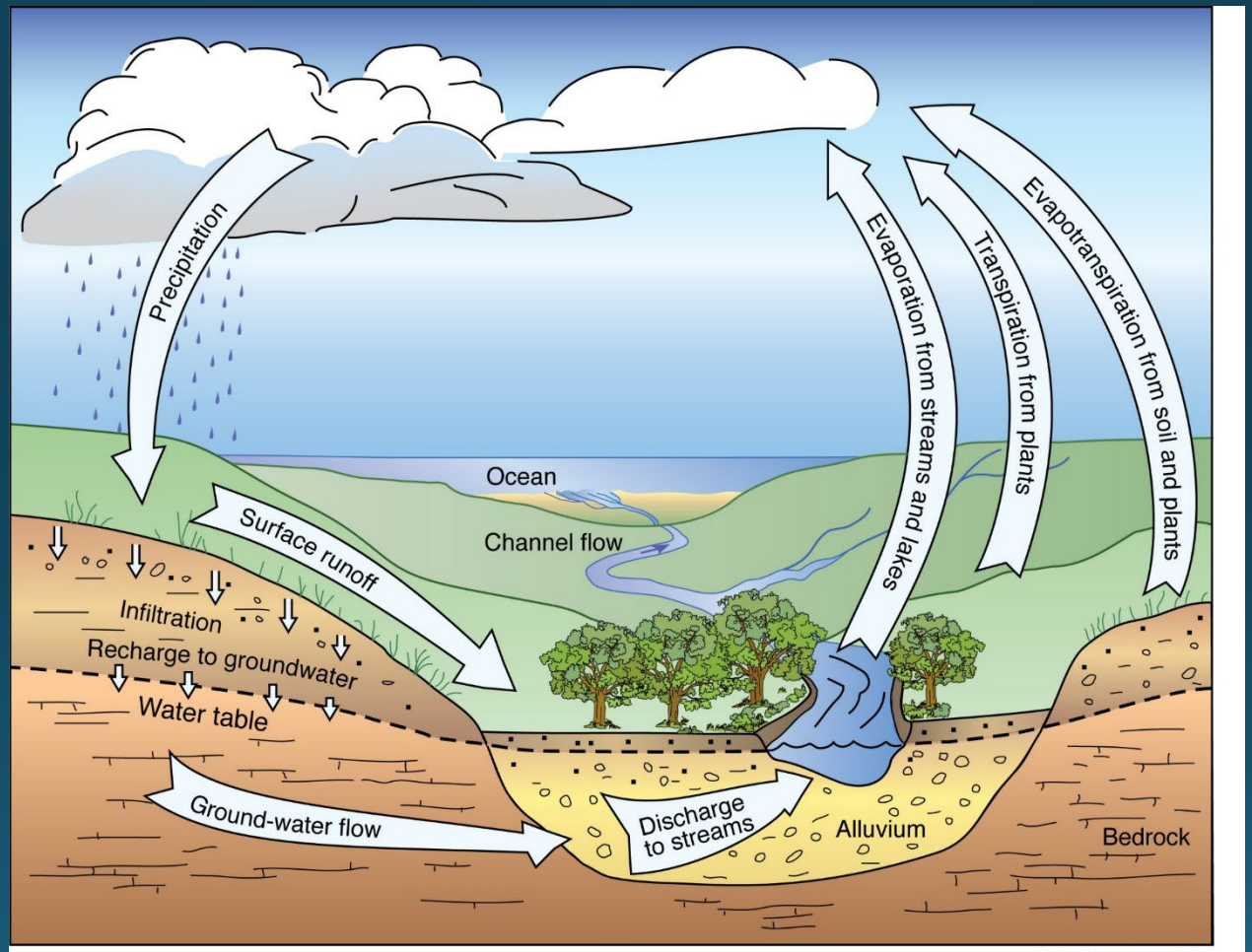
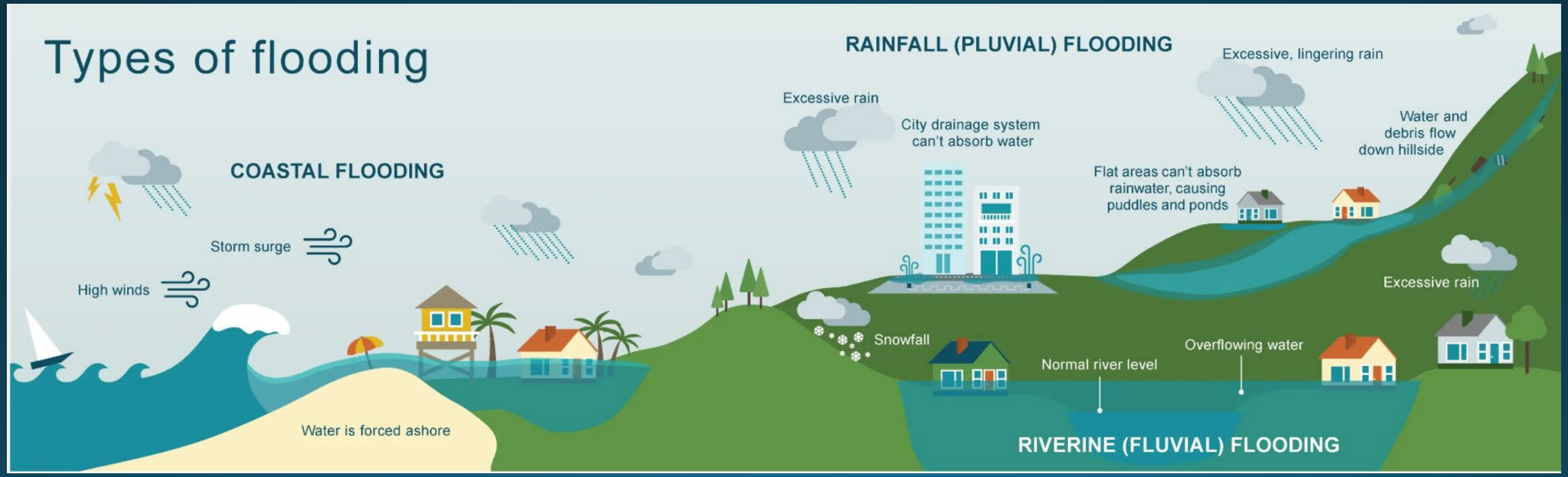
So, what can it do?

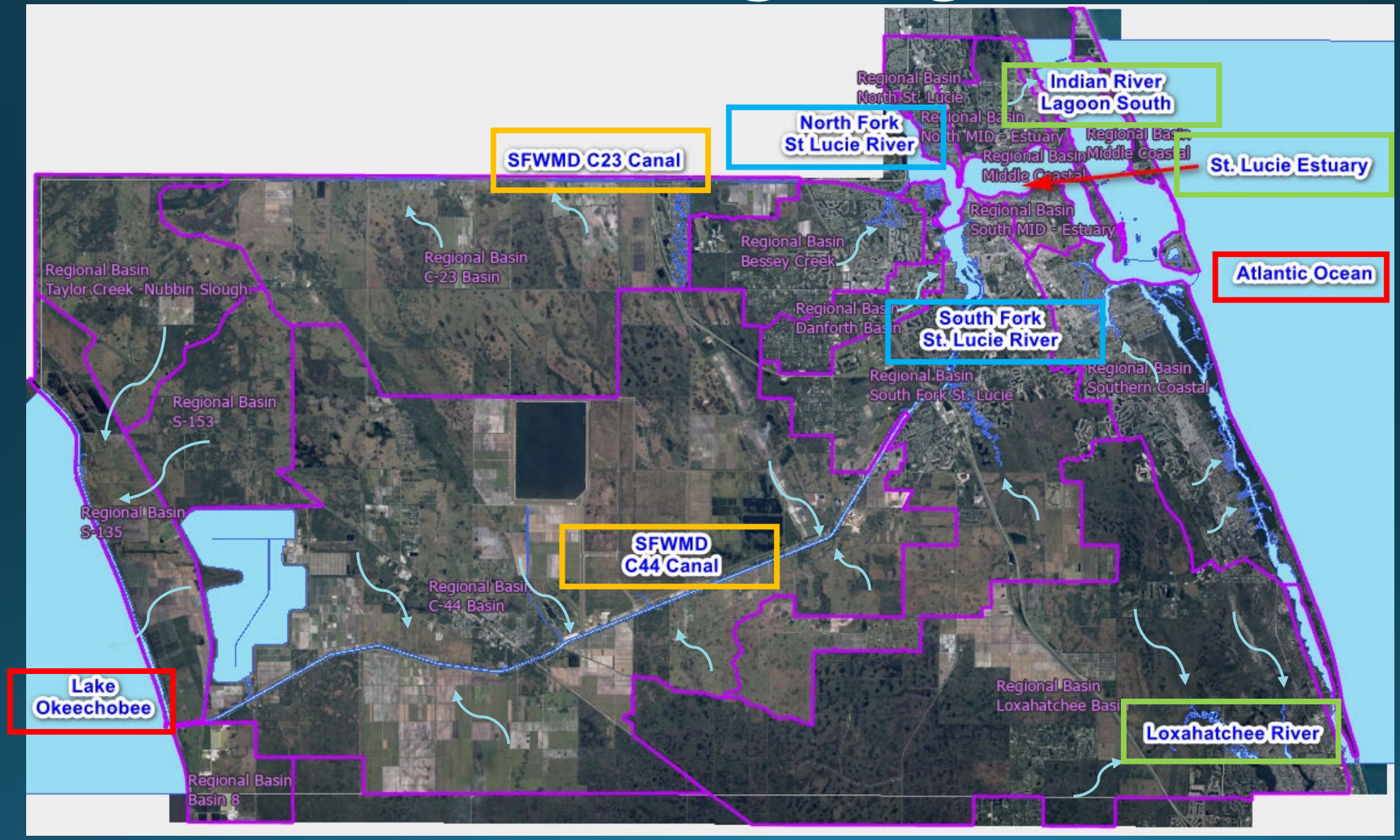
Why should I approach it this way?



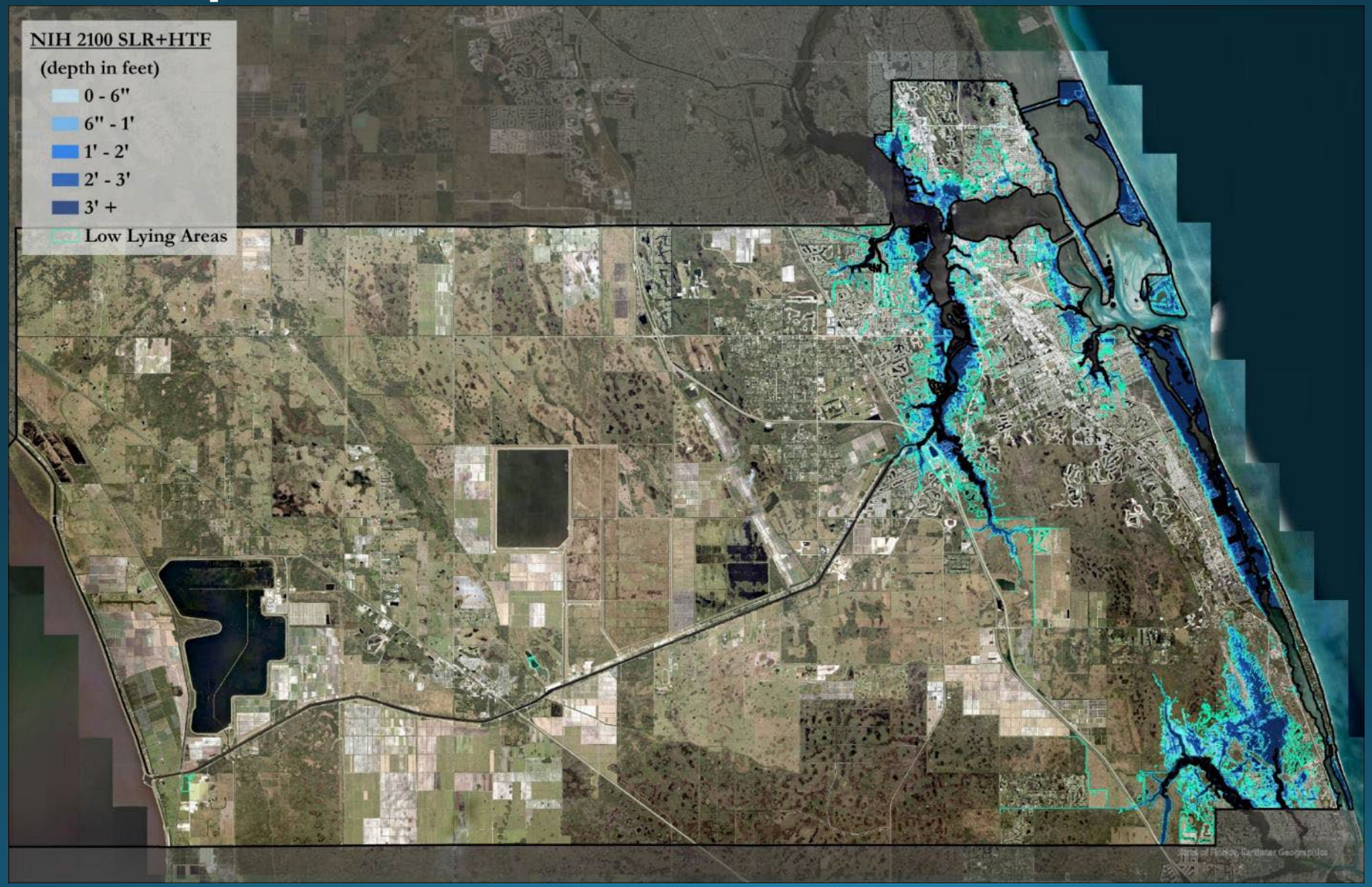
Types of Flooding



Where is the water going?



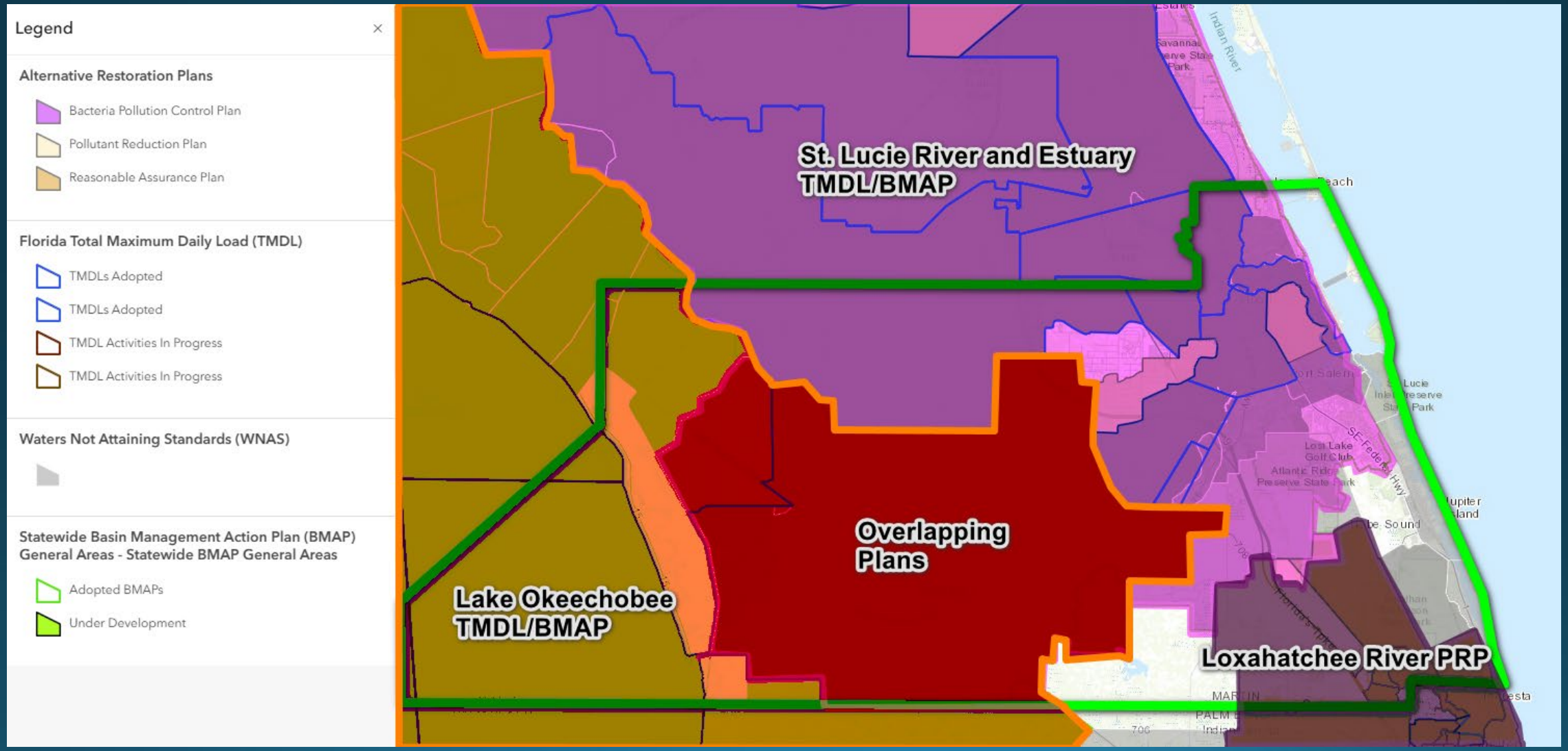
Tidal Exposure



Water Impairments

- St. Lucie River and Estuary and Loxahatchee River are major tributaries to the Indian River Lagoon (IRL)
- Both waterbodies are impaired by excessive nutrient inputs that are causing algal blooms and low dissolved oxygen conditions
- Although existing rules, regulations, and projects have helped improve water quality, additional projects are needed

Pollutant Plans



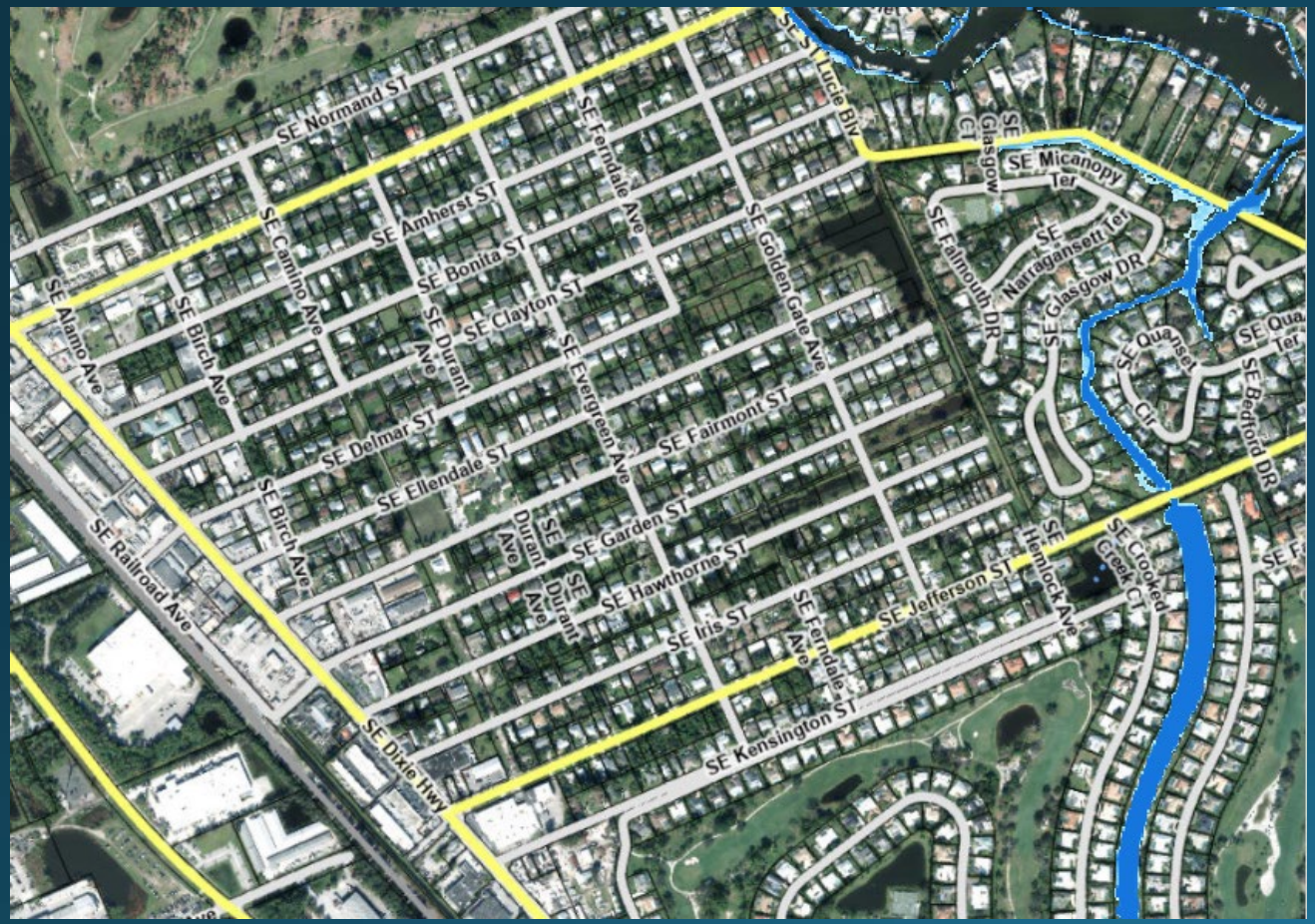
Participation Programs

- Community Rating System (CRS) – a voluntary incentive program of the National Flood Insurance Program (NFIP) that rewards communities for going beyond minimum federal floodplain management requirements. (Class 5 – Receive 25% Discount)
  - Reduce Flood Losses
  - Strengthen the NFIP
  - Promote Awareness
- Local Mitigation Strategy (LMS) – Emergency Management
- Post-Disaster Redevelopment Plan – Addressing Adaptation During Long-Term Recovery
- Resilient Florida Program - Statewide Assessment – Resiliency
- National Pollutant Discharge Elimination System (NPDES) – Phase 2 Municipal Separate Storm Sewer System

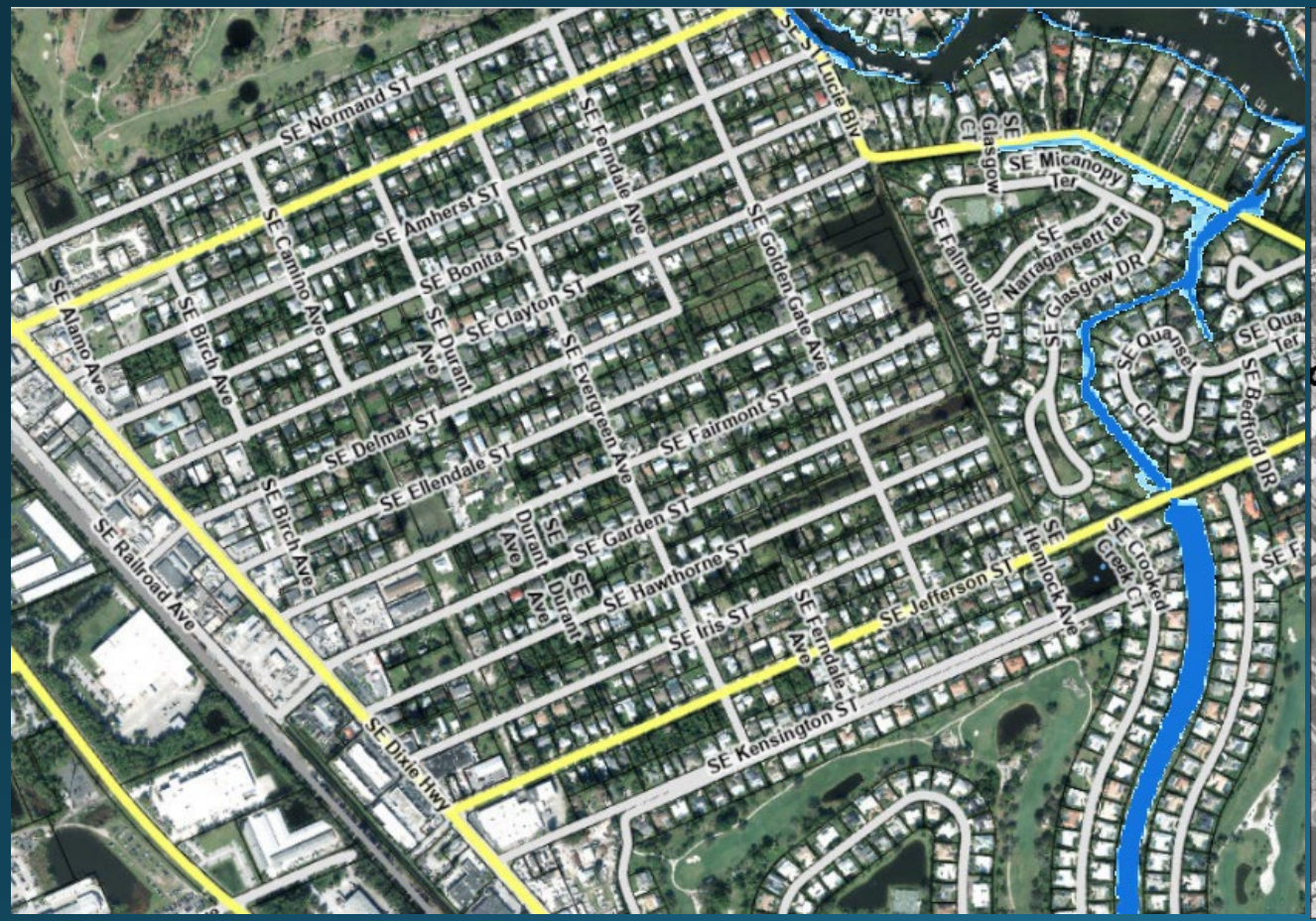
What is an Integrated Watershed Management Plan?

- A comprehensive strategy for managing land and water resources within a specific watershed, considering the interconnectedness of social, economic, and environmental factors.
- Holistic Approach
- Stakeholder Involvement
- Long-Term Perspective
- Tailored to water quality, water quantity, flood control, and resiliency
- Measurable Outcomes
- Adaptable

Project Based Versus Integrated Present Day – 10-year, 24-hour Storm

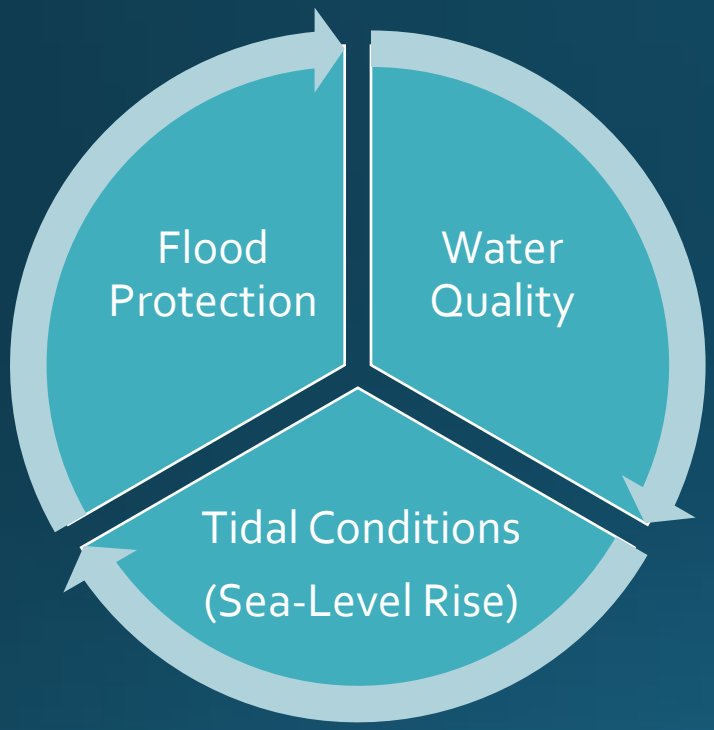


Project Based Versus Integrated 2040 – 10-year, 24-hour Storm



Project Based Versus Integrated 2070 – 10-year, 24-hour Storm

Components of Analysis



- Level of Service
- Alternatives Analysis
- 10-year Capital Improvement Plan
- Economic Analysis – Cost Benefit
- Operation and Maintenance
- Monitoring
- Policy Adjustments

What does "level of service" mean?

"Level of service" means at what level was a facility designed for and what level of maintenance can the public expect.

For example, the community could reasonably expect:

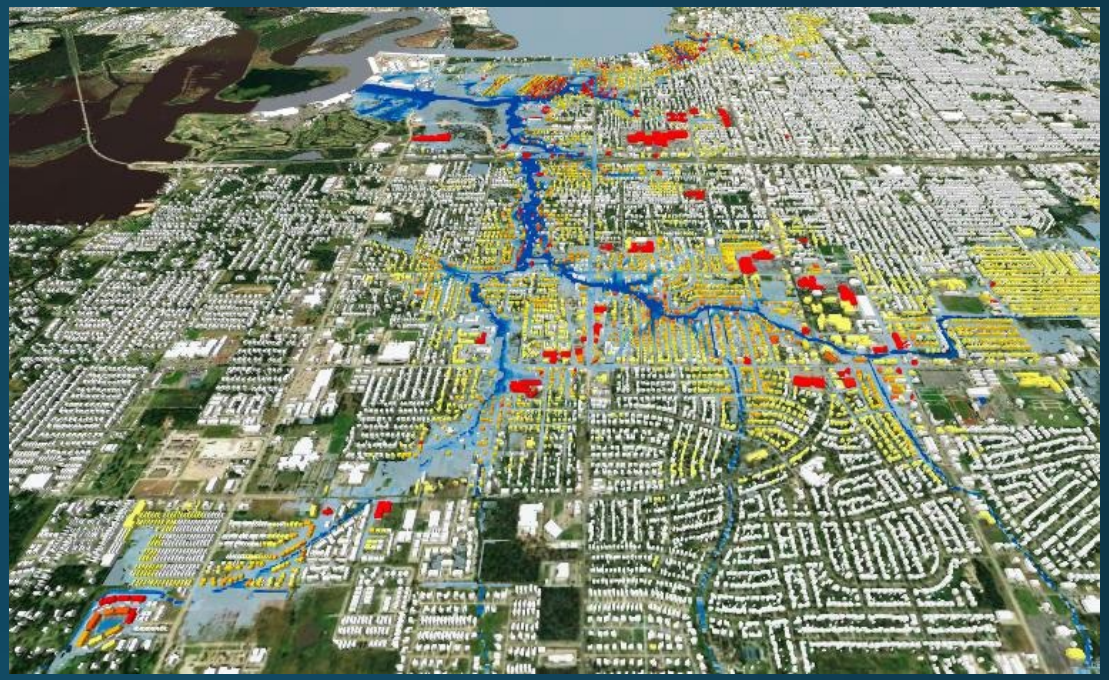
- No flooding of edge of pavement for a local road for a 10-year, 1-day storm event (7.5 inches)
- Stormwater system designed for a 25-year, 3-day storm event (11.0 inches)
- No flooding of buildings for a 100-year, 3-day storm event (14.5 inches)
- Culvert maintenance X times a year
- Street sweeping X times a week
- Pollutant reductions to meet BMAP
- Asset Life Span

Existing and Future Conditions

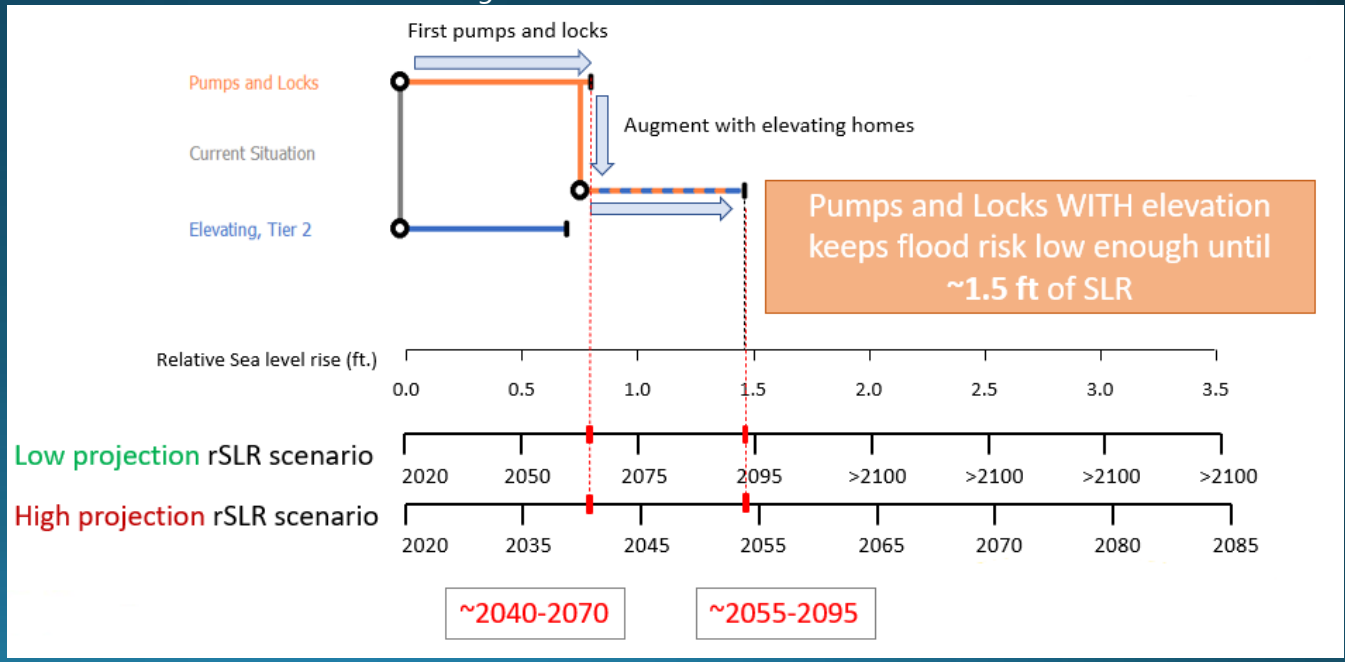
- Existing Conditions
  - Calibrate
  - Check Level of Service
  - Determine existing pollutant loads
- Future Conditions
  - Use future land use and stage-storage
  - Use future sea level rise and rainfall
  - Check Level of Service
  - Determine future pollutant loads

Alternatives Analysis

- Propose projects to meet level of service
- Verify projects by using a Hydrologic and Hydraulic model
- Determine Adaptation Pathways and Tipping Points

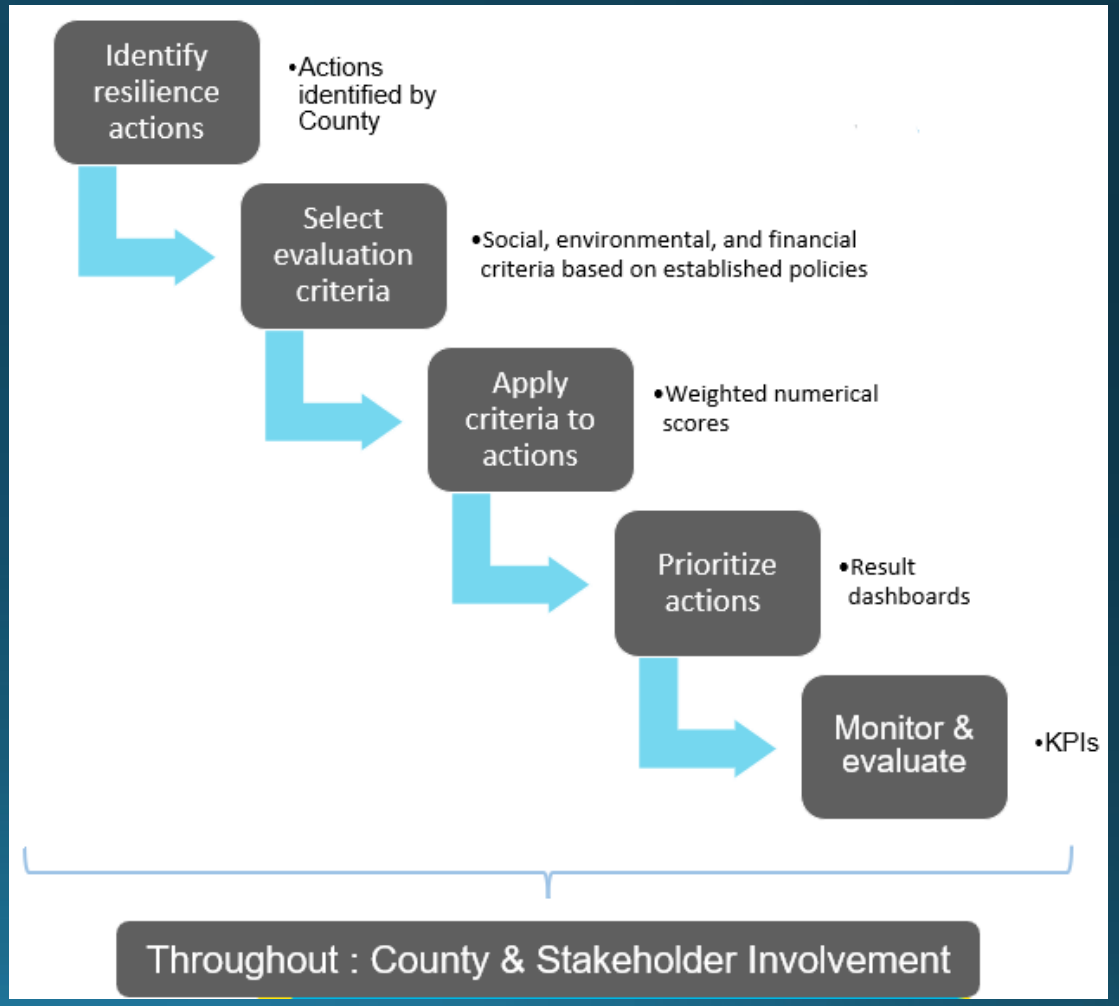


Images: Deltares



Capital Improvement Plan (CIP)

- Based off the tipping points and adaptation pathways, projects will be proposed to build the CIP
- Utilize Triple Bottom Line process to produce a CIP that is financeable, buildable, and permittable, and is reflective of the County and community's broader priorities

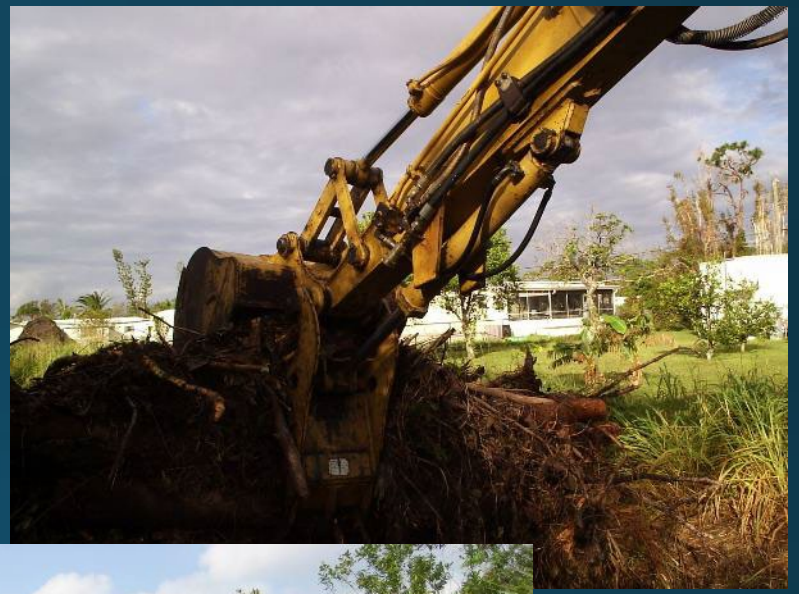


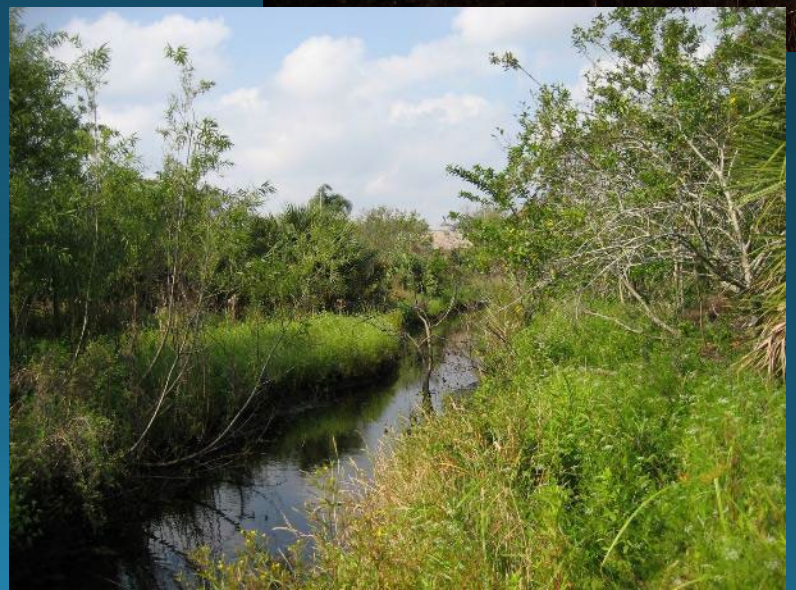
Economic Analysis

- Capital Improvement Cost Estimates
- Social Cost – Do nothing
- Business Cost – Do nothing
- Environmental Cost
- Benefit Cost Analysis per FEMA guidelines

Operation and Maintenance

- Inventory of Existing Assets
- Establish Frequency and Reporting
- Determine future needs as projects are implemented
- Estimate costs and time needs (personnel and equipment)
- Confirm information with the MS4 NPDES Permit





Monitoring

- Effectiveness of the plan
- Tipping Points
  - Water Levels and Flows
  - Rainfall
  - Water Quality
    - Total Phosphorus
    - Total Nitrogen
    - BOD
    - Dissolved Oxygen
    - Algae

Policy Adjustments

- Acquisition Plan
  - Open Space
  - Natural and Environmental Conservation
  - Flood Risk
- Adjust development
  - Future Land use
  - Require stormwater management
  - Shoreline Protection
- Private Systems
  - Maintenance
  - Water quality
- Change level of service
  - Lesser or more stringent

Connections

COMMUNITY RATING SYSTEM

LOCAL MITIGATION STRATEGY

POST-DISASTER REDEVELOPMENT PLAN

POLLUTANT REDUCTION PLANS

RESILIENCY PLAN

IWMP Format – CRS Credit

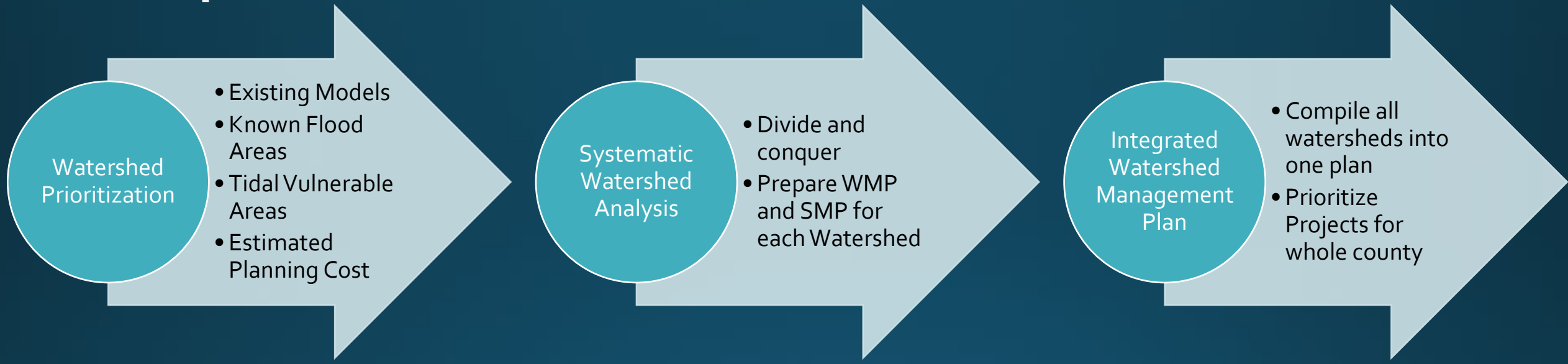
Watershed Management Plan

- Watershed Characterization
- Existing Conditions Model
- Existing Conditions Mapping
- Future Conditions Model
- Future Conditions Mapping
- Water Quality Modeling
  - Pre-1986
  - 2018 Conditions
  - Future Conditions

Stormwater Master Plan

- Alternatives analysis
- Public Engagement
- Develop Capital Improvements and Adaptation Projects
- Prioritize Improvements
- Cost Estimates and schedule
- Cost-Benefit Analysis
- Maintenance Plan
- Policy Adjustments

Implementation



- 10 to 20 year Capital Improvement Plan
- Operation and Maintenance Plan - NPDES

- Grant Opportunities
  - Resilient Florida
  - Hazard Mitigation Protection Grants
  - Water Quality Grants
  - NOAA Grants
  - PROTECT Grants
  - ETC.

What goes into the design of stormwater infrastructure?

- Rainfall Amount and Intensity
- Rainfall Duration
- Tidal Conditions
- Storm Surge
- Sea Level Rise
- Water Quality Treatment
- Maintenance

What types of projects are there?

- Water Storage
- Conveyance
- Treatment
- Nature-Based Solutions
- Land Acquisition
- Policy and Regulation Changes

Typical SW Infrastructure

Catch basins

Culverts and inlets

Culverts

Swales

Canals

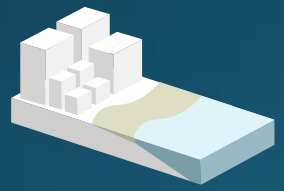
Curb and Inlets

Wet detention

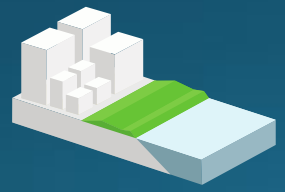
Stormwater Infrastructure

Types of Adaptation

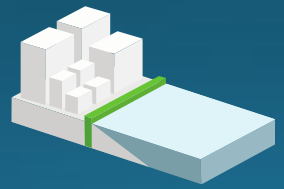
- Raise Roads
- Raise seawalls
- Construct Living Shorelines
- Pump Stations
- Berms
- Flood Proofing



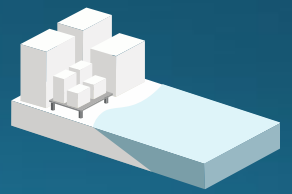
Beach Nourishment & Dune Restoration



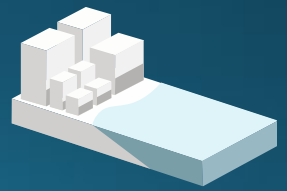
Berm Construction



Seawall Construction



Elevating Structures



Floodproofing

Questions or Comments