Integrated Water Resource Management Planning in Pinellas County FL

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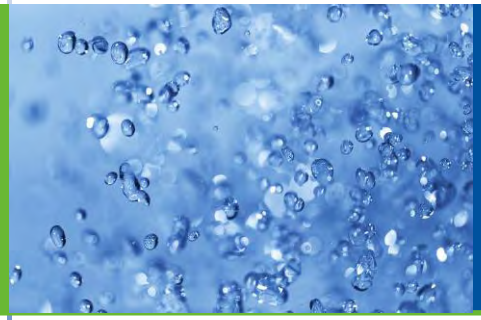


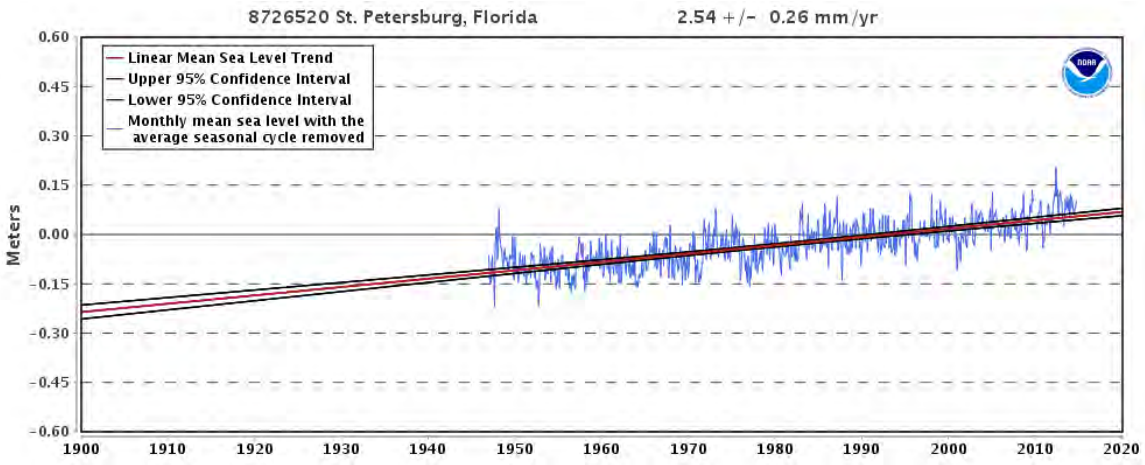
CDM Smith

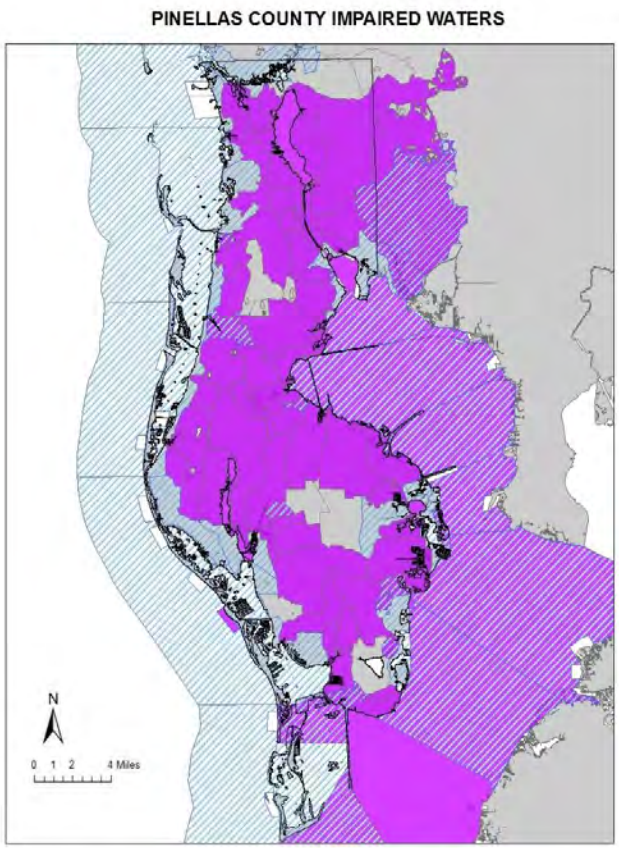
13th Annual Regional Stormwater Conference

SeSwA Southeast Stormwater Association

A Case for Integrated Water Resource Management

- Pinellas County is facing several water resource related challenges
  - Built-out conditions
  - Aging infrastructure
  - Ecosystem pressures
  - Impaired water bodies
  - Climate change





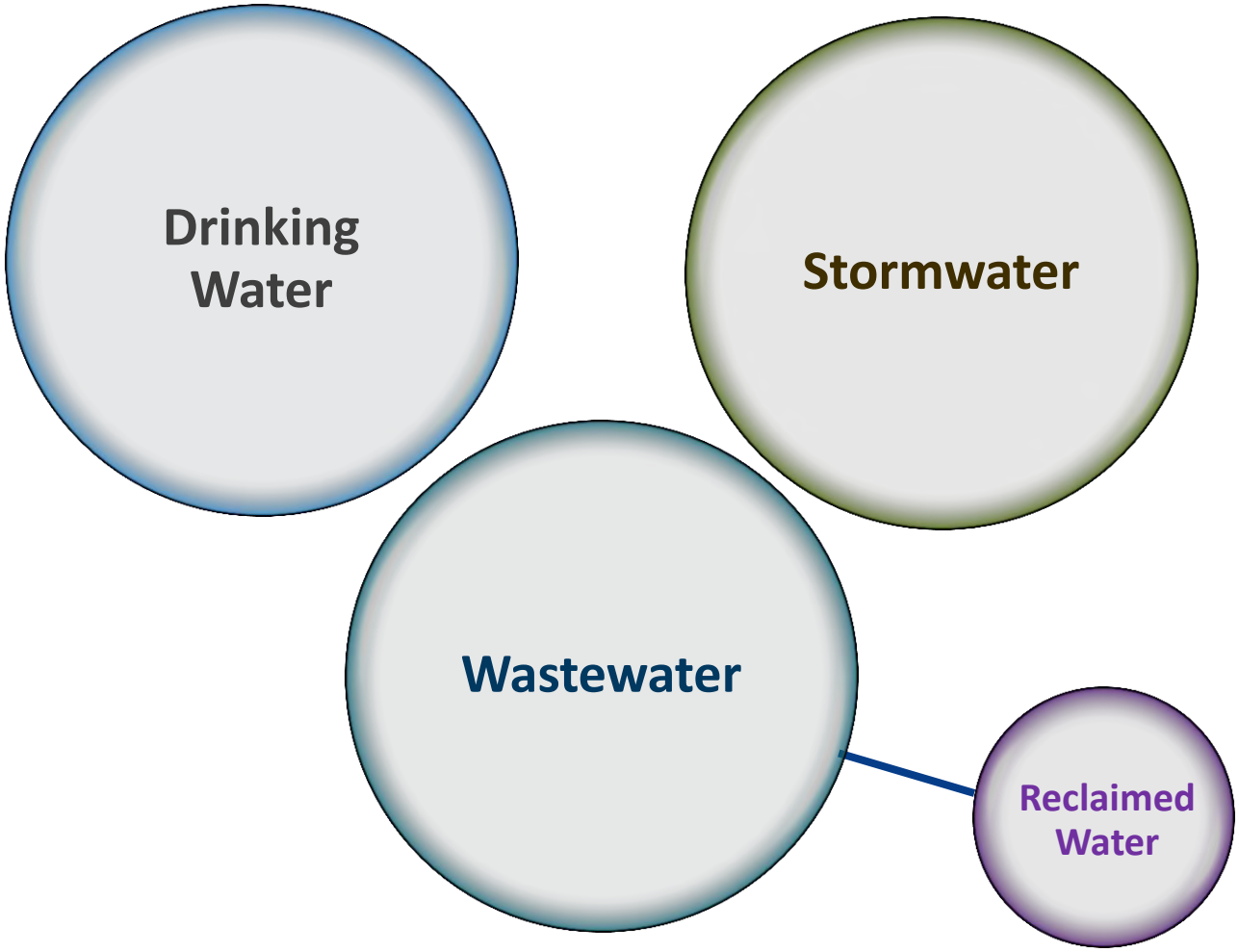
A Case for Integrated Water Resource Management

- From 2011 to 2013, Pinellas County defined a Comprehensive Surface Water Management Initiative
  - Move from reactive to proactive
  - Called for:
    - Integrated asset management
    - Source controls
    - Maintenance improvements
    - Watershed planning
    - Floodplain management
    - Community engagement
    - Regulatory compliance
    - Dedicated revenue source

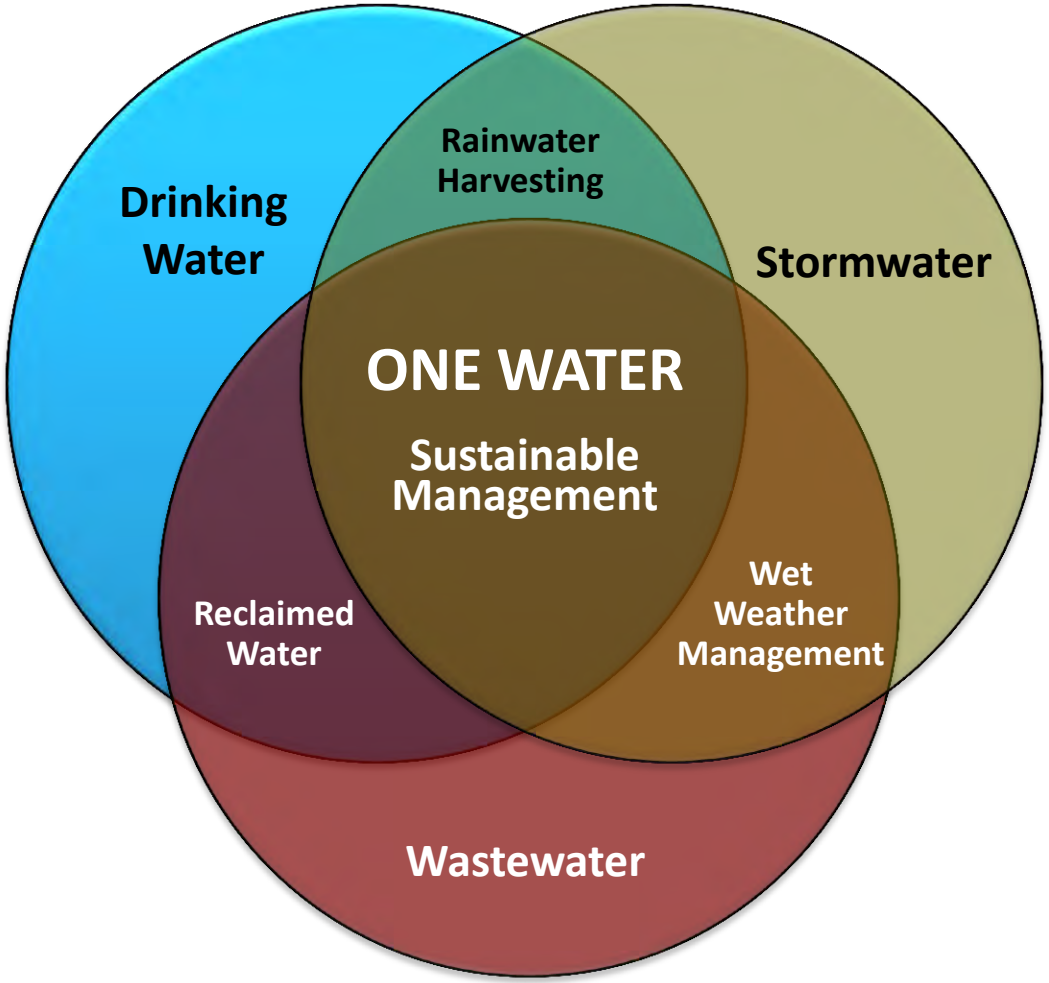
As part of the Comprehensive Program, Pinellas County has embraced Envision™

- Envision™ is a sustainability rating system for civil infrastructure
- Comprehensive tool to rate the community, environmental, and economic benefits of projects
  - Quality of Life (e.g., Protect, Preserve, Enhance Local Resources)
  - Leadership (e.g., Stakeholder Involvement)
  - Resource Allocation (e.g., Life Cycle Costs Considered)
  - Natural World (e.g., Preserve Local Habitat and Biodiversity)
  - Climate and Risk (e.g., Prepare for Long-term Adaptability)
- The County will use Envision™ to evaluate IWRMP alternatives

Past Practice (Silo Approach)



New Integrated Approach



Climate Change

IWRMP Terms

Objectives

- Represents major goals of plan, defined in broad, understandable terms (e.g., ensure water reliability)

Metrics

- Indicates how well an objective is being achieved (e.g., frequency and magnitude of water shortages; or total lifecycle cost)

Options

- Represents individual projects or management measures/activities

Alternatives

- Represents combinations of options designed to best meet the stated objectives, and will be evaluated against metrics

IWRMP Principles

- Recognize that water resources are finite
- Manage all water resources (drinking, wastewater, stormwater, and even solid waste-produced water) as if they were “one water”
- View urban communities as a complete, interconnected system
- Seek sustainable practices

IWRMP Principles (Cont.)

- Develop multi-use/multi-benefit projects and infrastructure
- Allocate resources efficiently and equitably
- Account for risk and uncertainty
- Involve and engage stakeholders

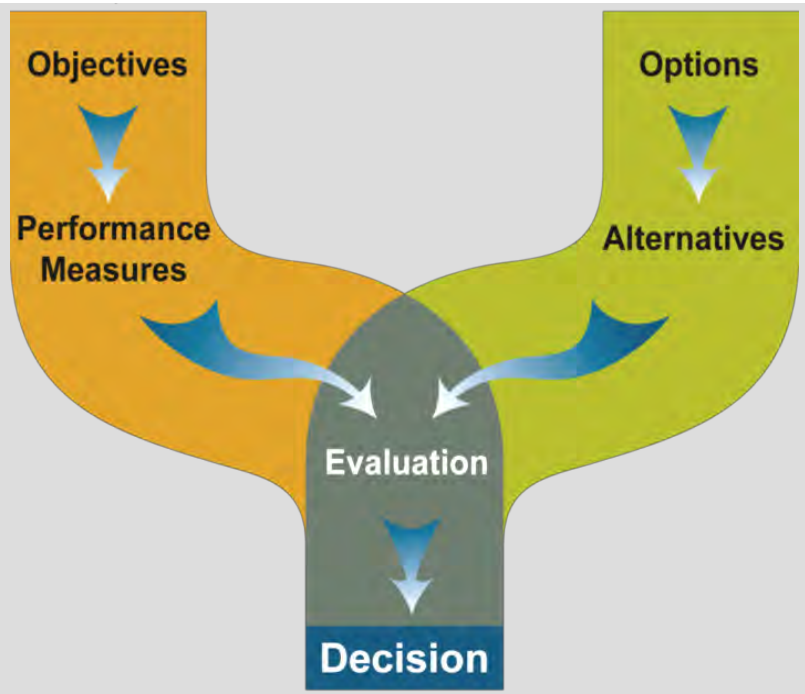
IWRMP Benefits

- System reliability
- Water quality
- Efficiency and sustainability
- Natural/urban environment
- Quality of life for residents
- Funding opportunities
- Resiliency to climate change
- Increased public awareness, trust, and advocacy

Blending the Purpose and Options of IWRMP Collaborative Approach to Planning

INCORPORATION OF:

- Institutional goals
- Stakeholder needs



IDENTIFICATION OF:

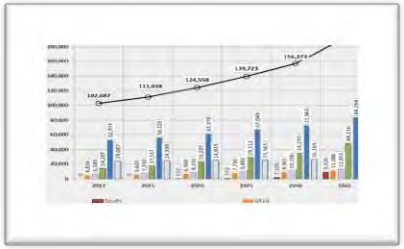
- Technologies
- Projects and processes

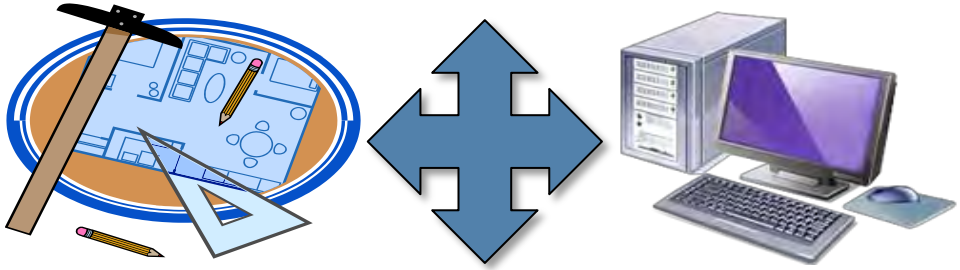
RESULTING IN:

- Tradeoffs
- Sensitivity
- Adaptivity
- Management

Overall Approach to Pinellas IWRMP

- Analysis of Options
  - Stakeholder Involvement
  - Systems Modeling
  - Analysis of Programs and Options
  - Preliminary Plan Reporting





Stakeholder Involvement

- Internal Stakeholders:
  - Programs:
    - Water Supply
    - Wastewater/Reclaimed Water
    - Stormwater
    - Surface Water
    - Solid Waste
  - Management
  - Southwest Florida Water Management District
- External Stakeholders (Not Involved Yet):
  - “Connected” Governments
  - Regulatory Agencies
  - General Public

Internal Stakeholder Early Decisions

Definition of Goals/ Objectives: Define the Purpose of the IWRP in 8 to 10 Goals

Performance Measures: How Goals/ Objectives Measured

Constraints: Limitations

Pinellas County's List of Objectives

Meet Utility Needs Reliably	Potable water	**Example Metrics**
	Wastewater	Percent of County generated reclaimed water beneficially reused
	Reclaimed water	Percent of time that reclaimed supply meets demands on an annual basis
		Amount of stormwater beneficially used
		Increase in potable water conservation

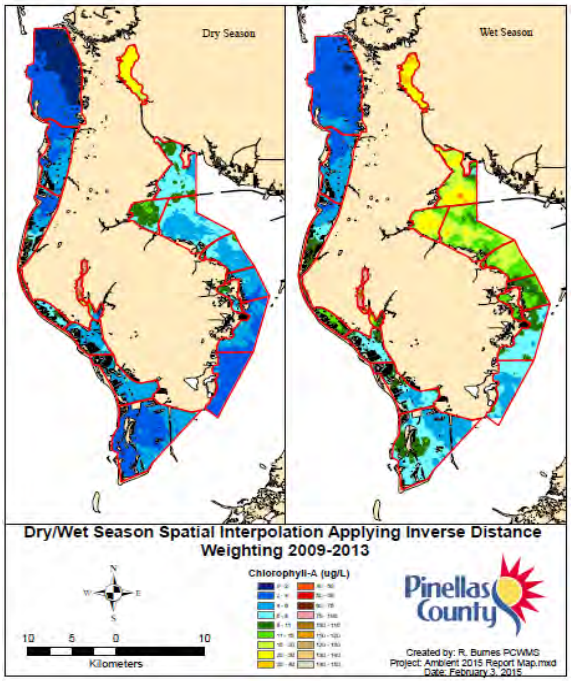
Pinellas County's List of Objectives (cont.)

Provide Cost Effective Solutions	Multi-purpose/multi-benefit
	Innovative
	Cost-effective

Example Metrics	Dollar per reduced flood event inundation
	Dollar per gallon of potable water delivered
	Dollar per pound of pollutant removed from receiving waters
	Dollar per reduced volume wastewater surface discharge
	Dollar per increased reclaimed water use

Pinellas County's List of Objectives (cont.)

Improve Ambient Water Quality	Receiving waters
	Groundwater



Example Metrics	Pounds of pollutant of concern removed
	Percent of potential wastewater customers on septic tank
	Qualitative ambient water quality improvement (stream restoration, sediment removal)

Pinellas County's List of Objectives (cont.)

Provide Resiliency Against Climate Change	Adaptive solutions	**Example Metrics**
	Protection against future changes in temperature, rainfall patterns, and sea-level rise	Percent of County facilities/infrastructure in vulnerable areas
		Acres of recreational areas and open spaces located in vulnerable areas

Pinellas County's List of Objectives (cont.)

Protect Watersheds and Natural Systems	Protect and enhance watersheds and the natural environment	**Example Metrics**
	Aquatic and terrestrial	

Miles of stream protection

Acres of habitat protection

Pinellas County's List of Objectives (cont.)

Ensure Quality of Life	Maintain and improve the quality of life of residents	**Example Metrics**	Acres of recreation/open space protected or created
	Natural and built environment		Impact to underserved communities
	Recreation		Qualitative score for public education/participation
	Open space		Qualitative score for benefiting economy
	Quality and diverse economy		Qualitative score for protecting public health
	Healthy community		
	Public outreach and education		

Project/Activity Options

- Categories (Number of Options):
  - Reclaimed Water (8)
  - Solid Waste (2)
  - Surface Water (16)
  - Wastewater (8)
  - Water Supply (9)

- Planning Horizons:
  - Early Out (1 to 2 years)
  - Short-term (5 to 10 years)
  - Medium-term (25 years)
  - Long-term (50 years) – Climate Change

Example Project Options

- South-North Regional Reclaimed Water Transmission *(Short-term)*
- Green Infrastructure/LID *(Short- to Medium-term)*
  - Linear Detention
  - Green Streets
  - Reduced Imperviousness
  - Bio-swales
- Stormwater Harvesting *(Short- to Medium-term)*
- Facility Vulnerability to Climate Change *(Long-term)*

Other Internal Stakeholder Decisions

Groupings to Form Single Alternatives

- Centered on Theme (e.g., Most Reliable)
- May Change as Alternatives are Processed

Scoring and Weighting of Criteria/Performance Measures

Preferred Alternatives for Further Development

Final Alternative or Set of Alternatives

Overall Approach Modeling

Systems Modeling

- Interconnections of Programs and Activities
- Effects of Programs/Activities on Environment, Economy, etc.

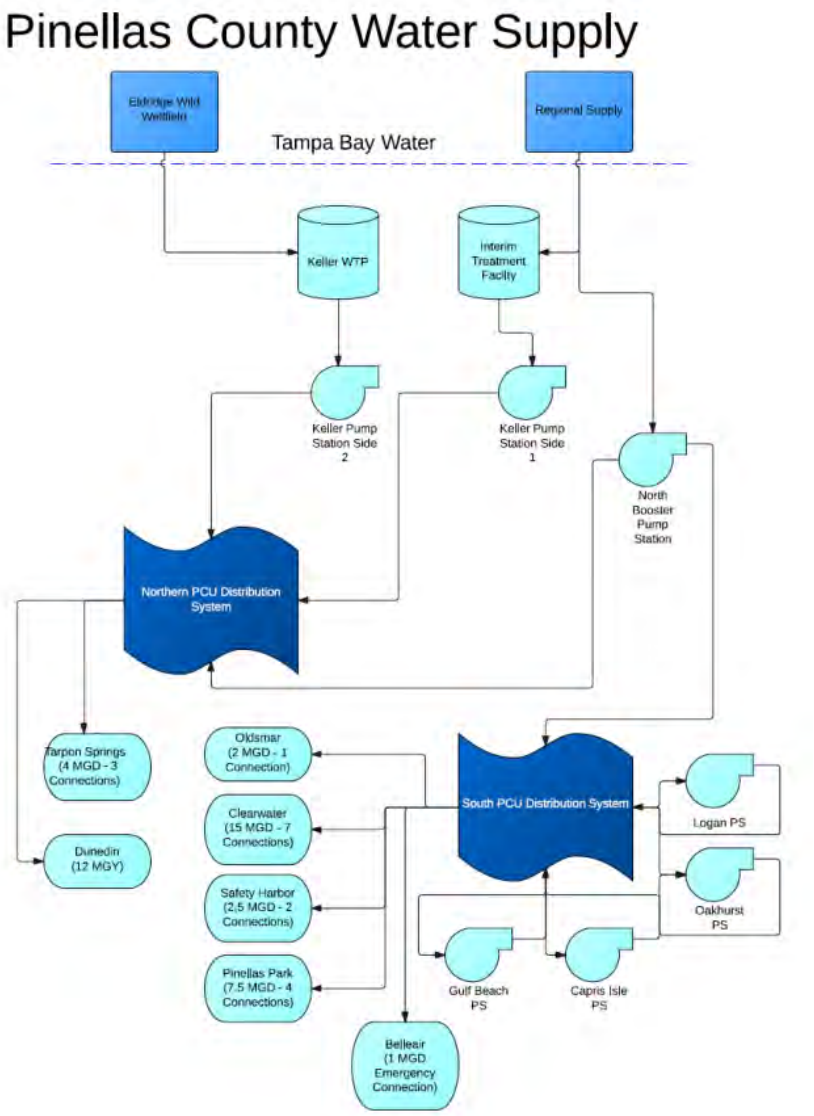
Decision Making Support

- Comparison of Goals and Objectives
- Comparison of Options

Tactical Level Modeling

Strategic Level Modeling

Discipline Schematics – Existing System



Discipline Schematics – Existing System (cont.)

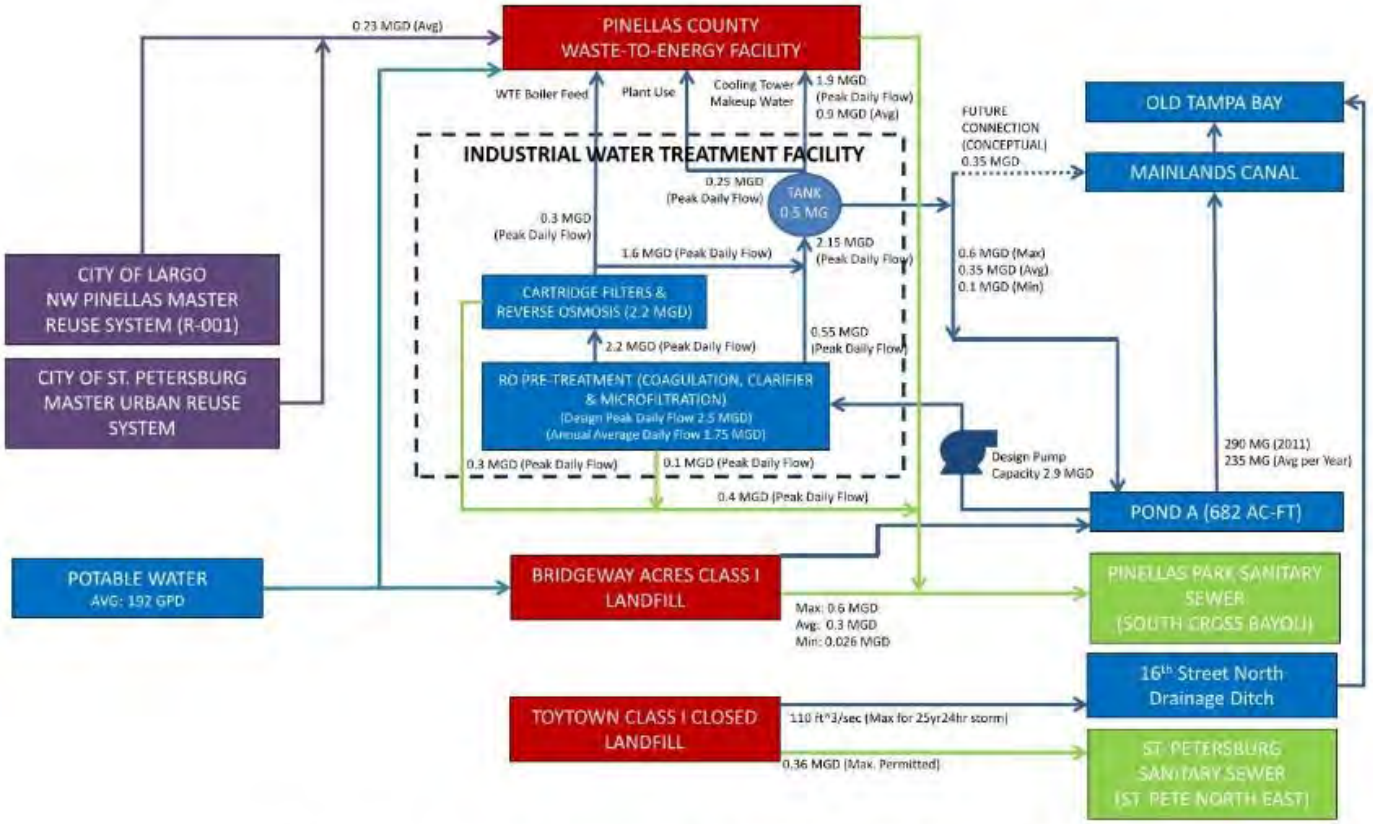
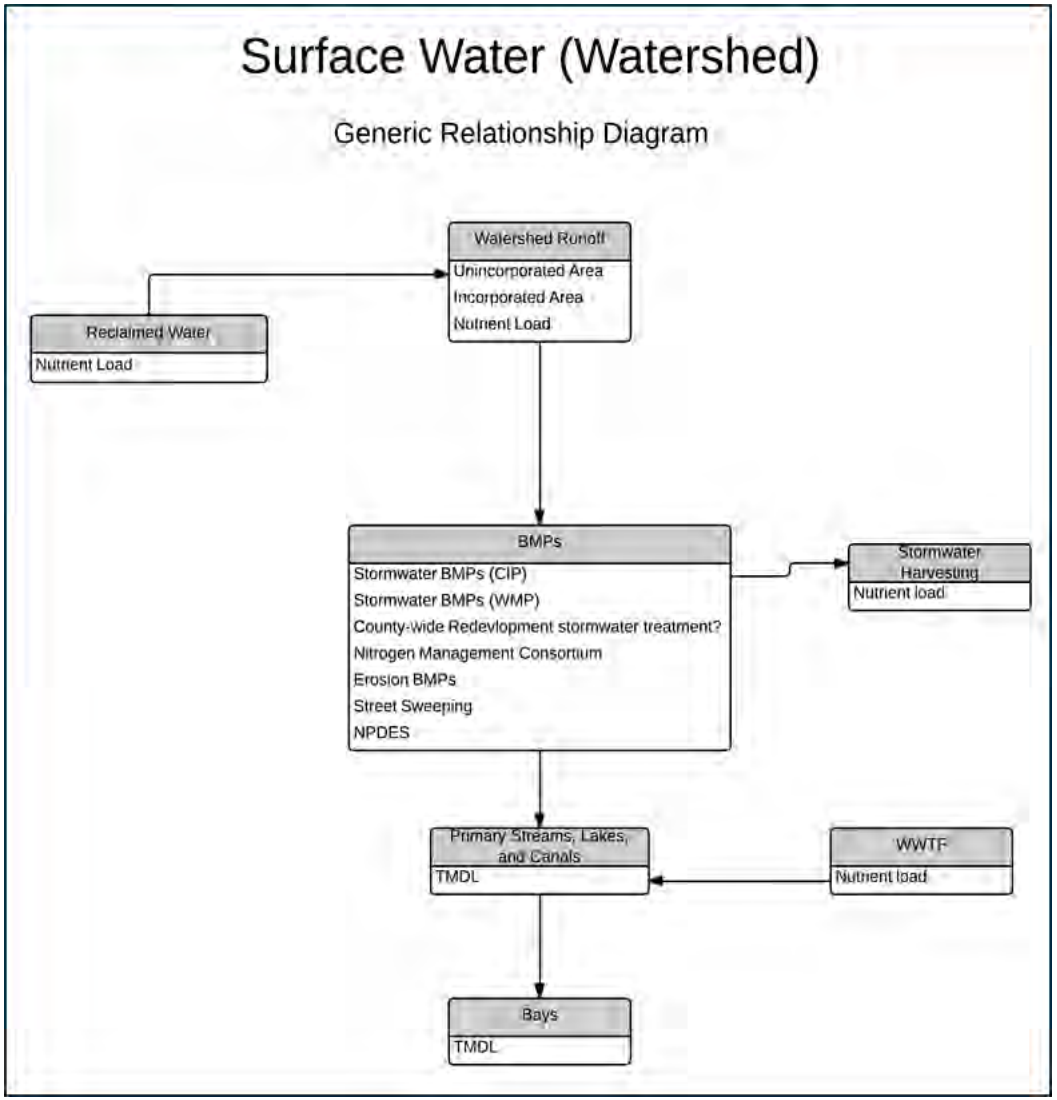
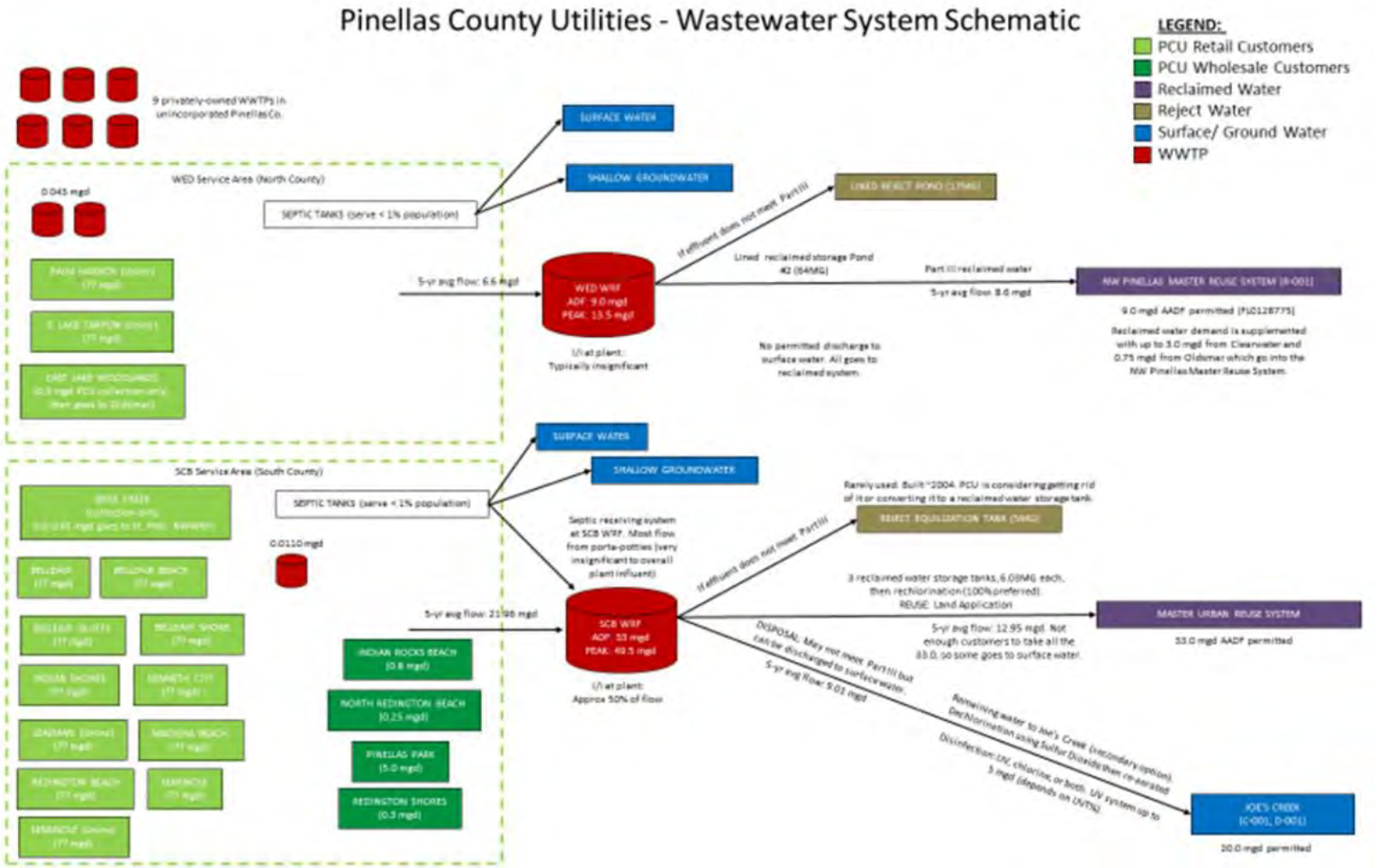


Figure 1 – Water Resources System at Pinellas County Solid Waste Facilities Schematic

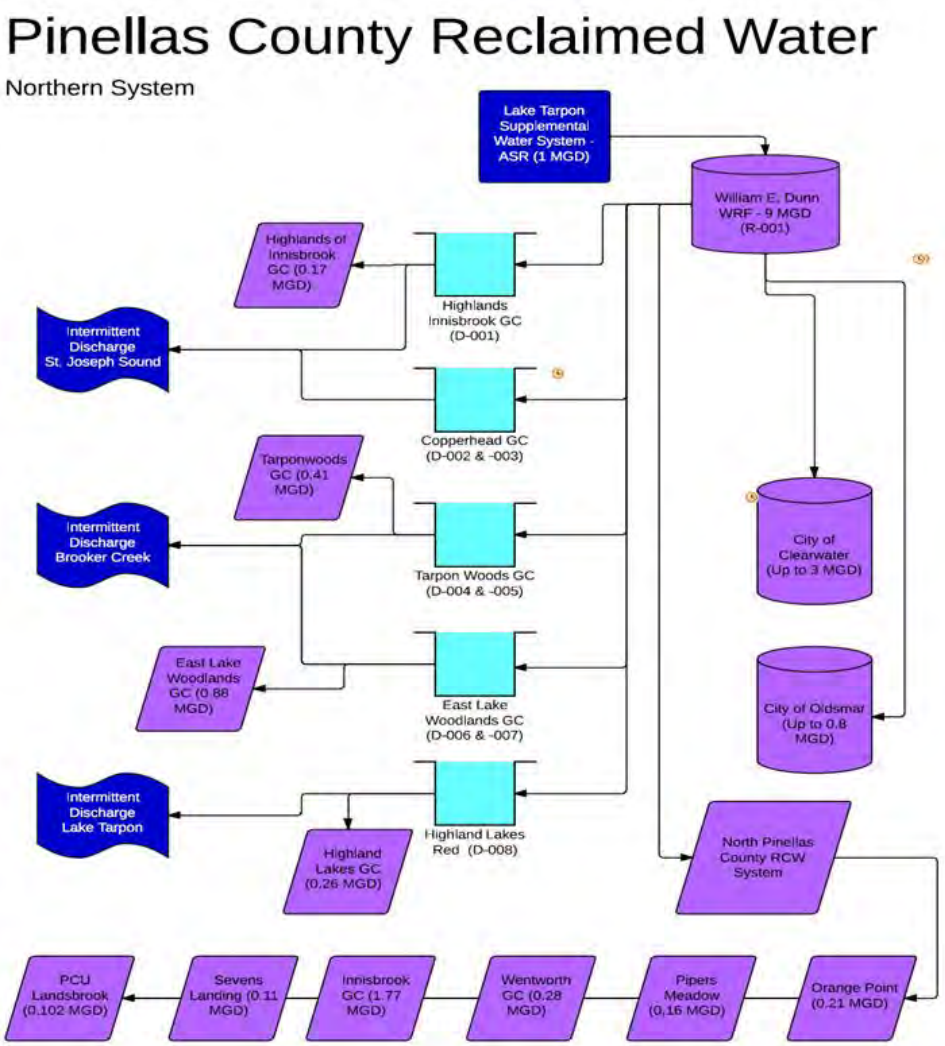
Discipline Schematics – Existing System (cont.)



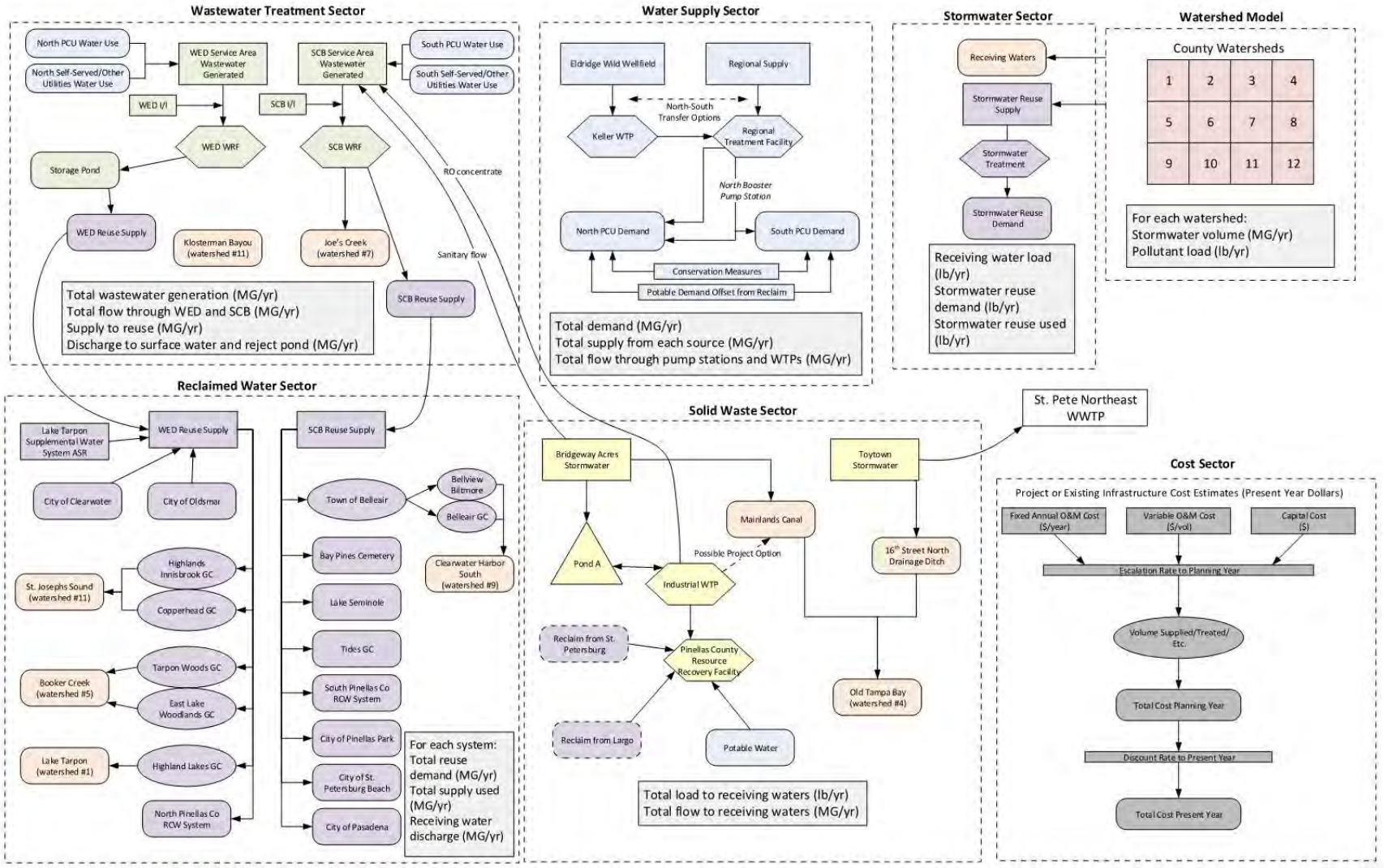
Discipline Schematics – Existing System (cont.)



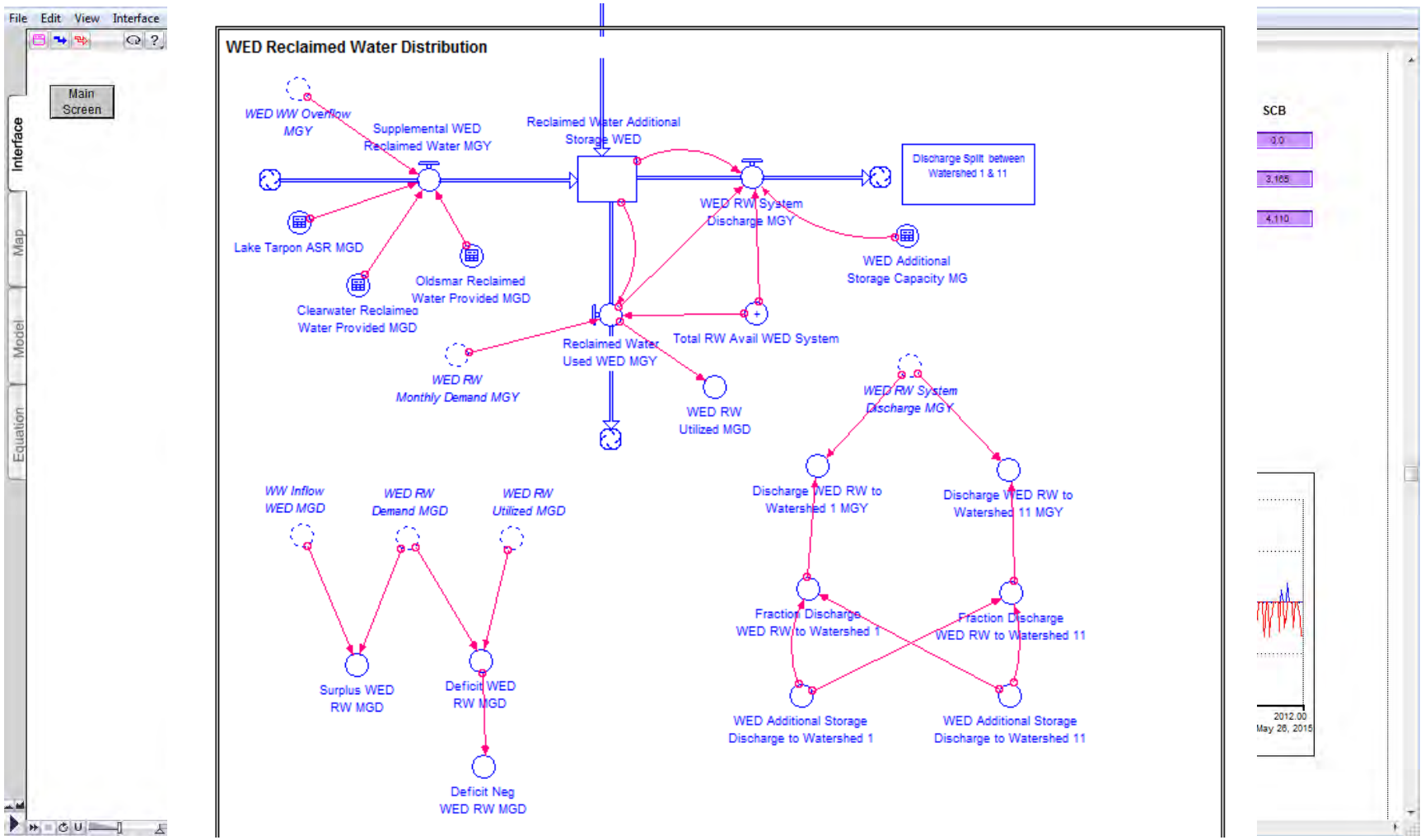
Discipline Schematics – Existing System (cont.)



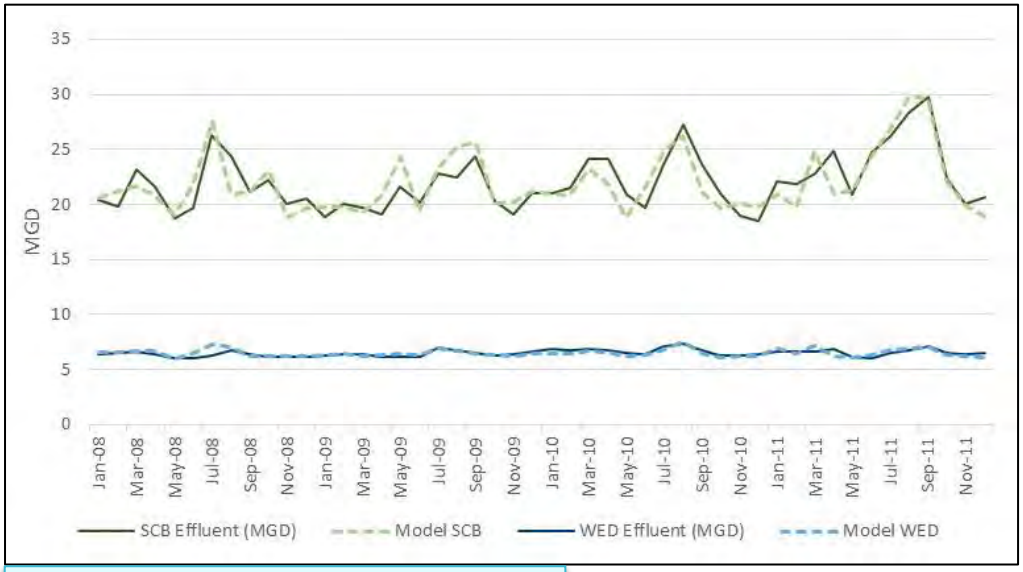
Model Schematic



Systems Thinking Experimental Learning Laboratory with Animation (STELLA) Model

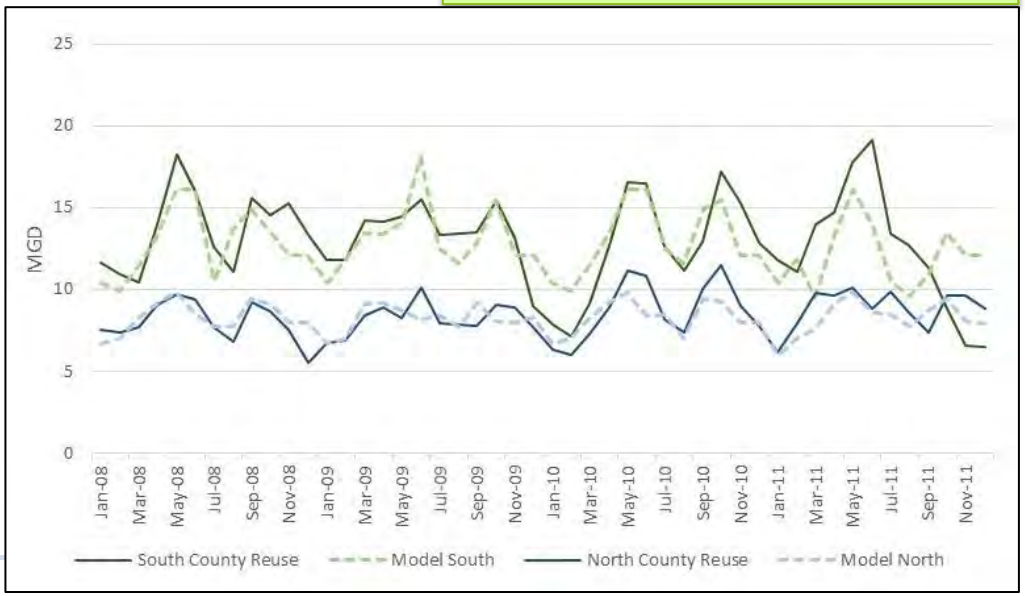


Model Calibration

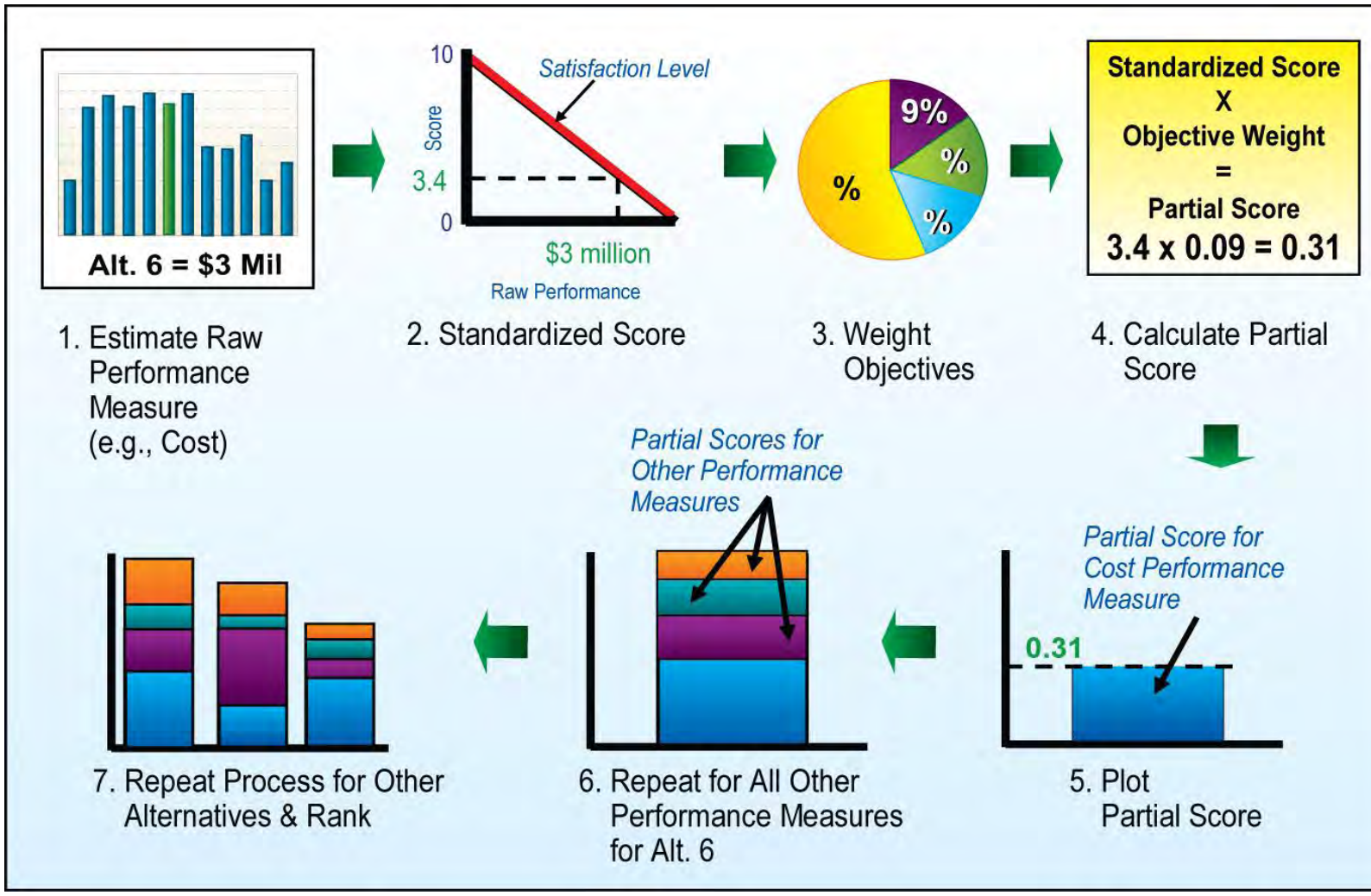


Modeled versus Historical Wastewater Flows

Modeled versus Historical Reclaimed Water Flows



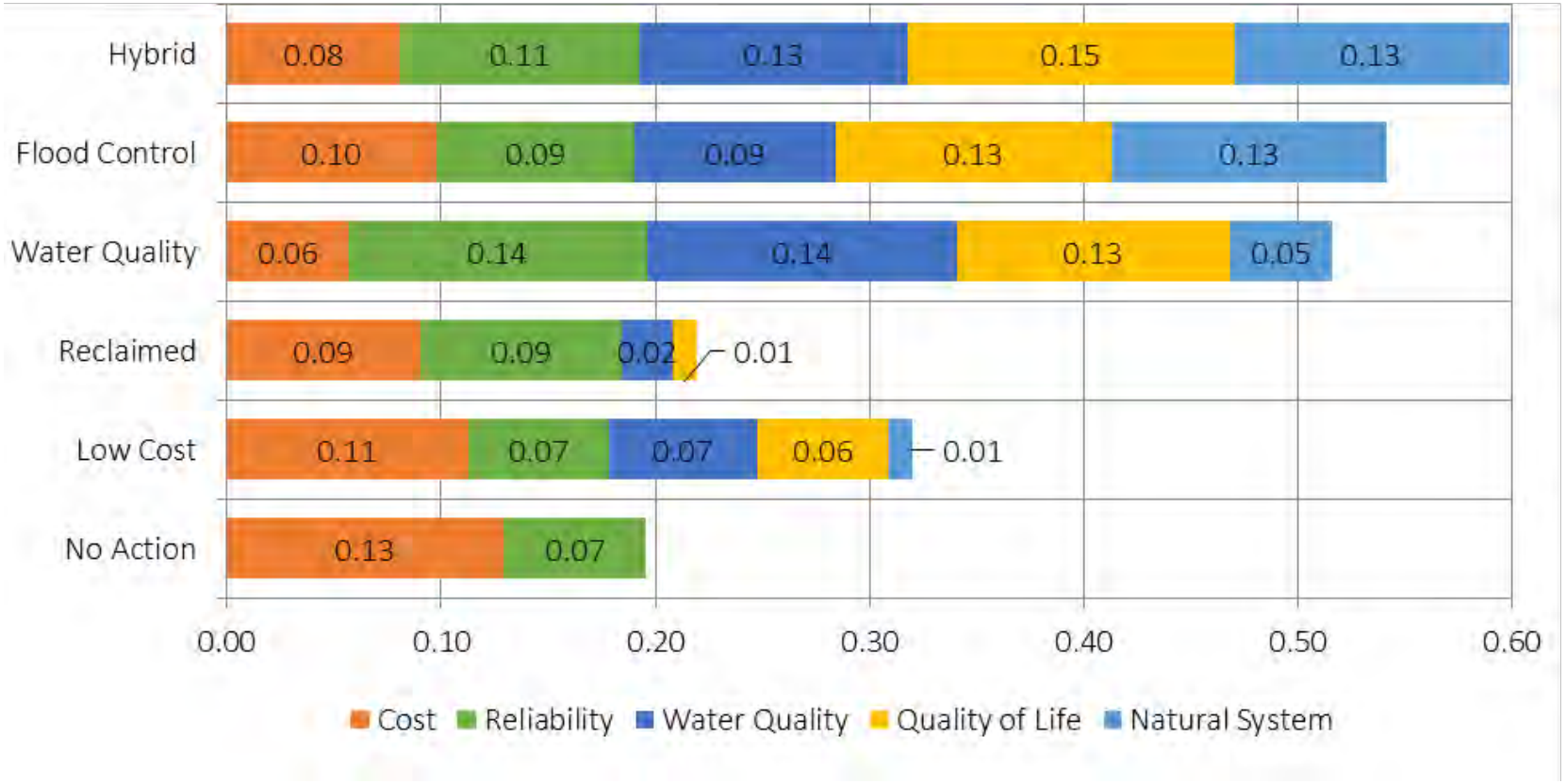
Strategic Modeling



Alternatives

Sector	Option	No Action	Low Cost	Reclaimed	Water Quality	Flood Control	Hybrid
Reclaimed Water	South-North Interconnect			X	X		
	Offset irrigation water use permits in County			X	X		
	Expand mixed use reclaimed water			X	X		
Solid Waste	Pond A reduced discharge				X		
	Toytown leachate diversion to Pond A		X				
Surface Water	McKay Creek Hickory Lane water quality improvements		X		X	X	X
	Central Lealman drainage improvement				X	X	X
	Dredging sediment in Cross Bayou					X	X
	Walsingham Reservoir drawdown		X			X	X
	Targeted brownfield site				X	X	X
	Increase street sweeping				X		
	Stormwater harvesting opportunities at County facilities				X	X	X
	LID Improvements		X		X	X	X
	Granger flooding and septic removal		X		X	X	X
	Permitted facility improvements		X		X	X	X
Wastewater	Septic Tank Reduction Program				X		X
	I&I Reduction in SCB collection system				X		X
	Connect private WWTP to WED System		X				
	Connect private WWTP to SCB System		X				

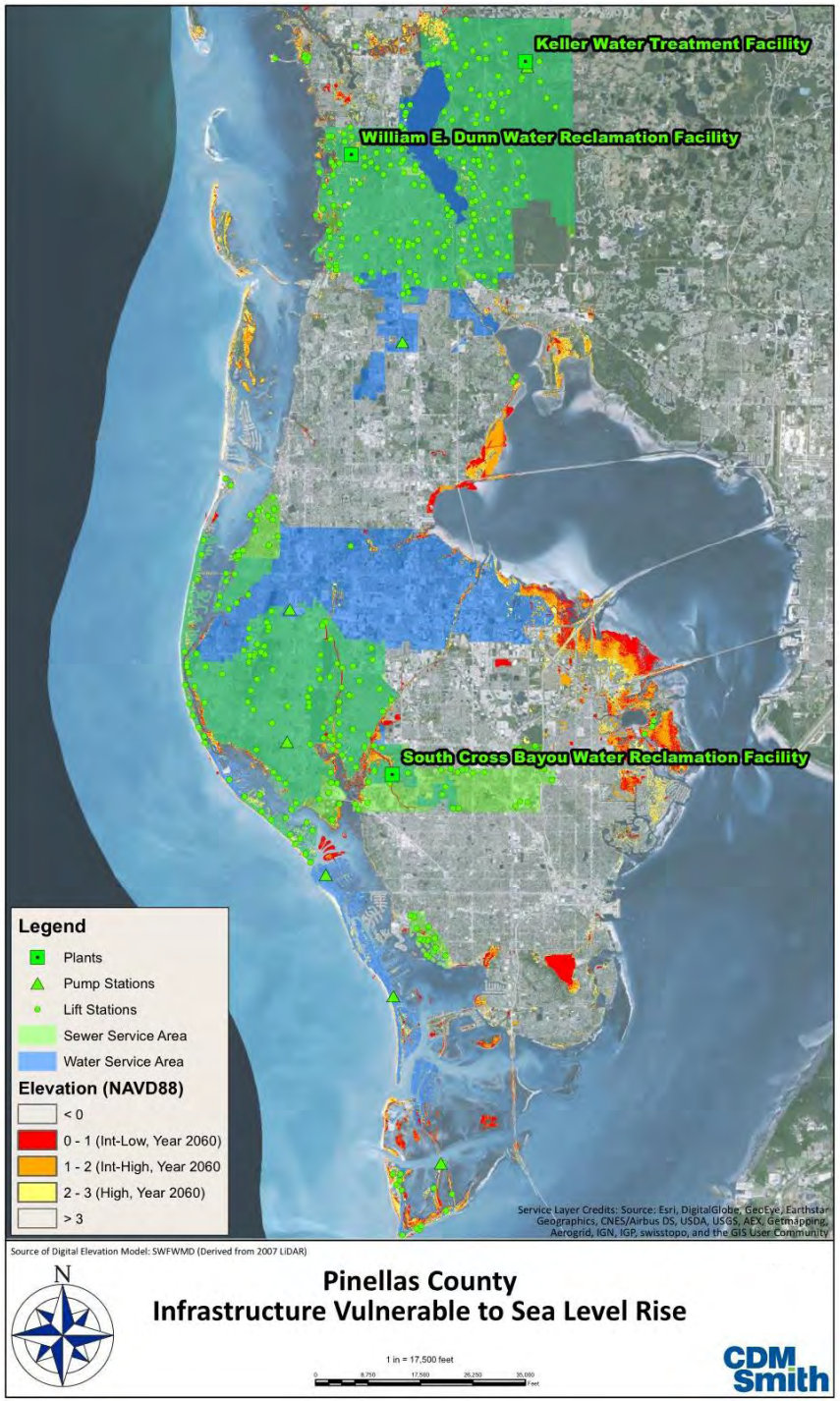
Ranking of Alternatives



Hybrid Alternative includes Surface Water Sector options, plus septic system reduction and I&I reduction from Wastewater Sector

Sea Level Rise - Vulnerability

- Map Infrastructure
- Overlay Map of Service Areas
- Add Map of Sea Level Elevations for 2060 (Need DEM)
- Color Elevation Depending on Severity
- Use Map to Help Support IWRMP Priorities



Time for a
new paradigm!

Questions?

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