



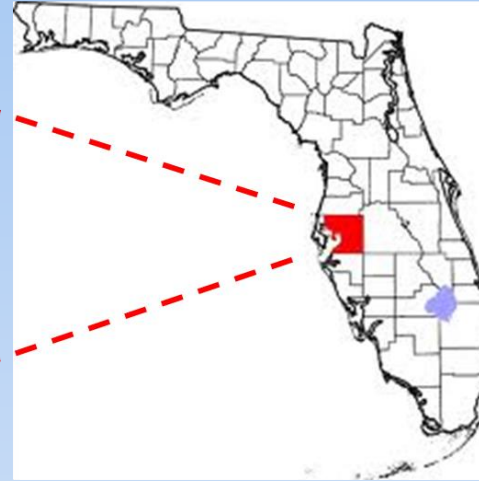
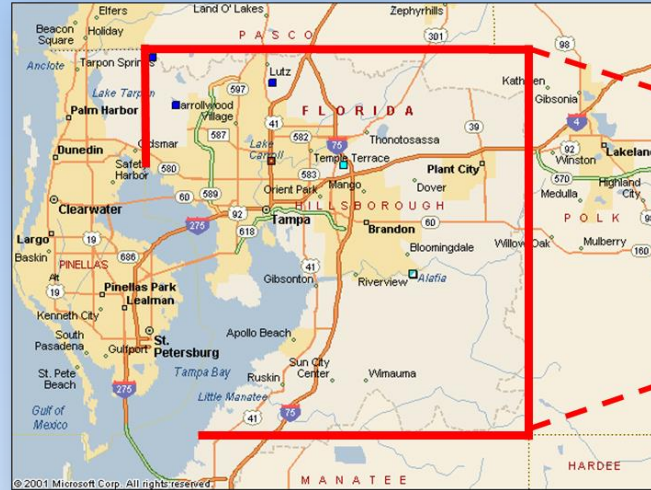
Hillsborough MPO
Metropolitan Planning
for Transportation

Surface Transportation Resiliency Planning in Hillsborough County, FL

Allison Yeh, AICP, LEED GA



Hillsborough County, Florida



- 158 miles of coastline
- 4th Largest Population in Florida (1.3 Million)
- 25% of the population inside the FEMA floodplain
- Economic Hub of Tampa Bay Metropolitan Region
- Largest seaport in Florida
- Major cruise homeport
- Home to US Central Command & Special Operations Command Center
- Tampa General Hospital – Regional Burn Center

Surface Transportation Assets

- 800 Freeways & Toll Road Lane Miles
- 3,300 Arterial & Collector Lane Miles
- 3 Major Bridges Across Tampa Bay /Evacuation Routes
- Tampa International Airport
- Container, Bulk Cargo & Cruise Ship Terminals
- 9 Transit Centers & 243 Vehicle Fleet
- Heritage Streetcar System
- Class I Rail Lines & Intermodal Yard





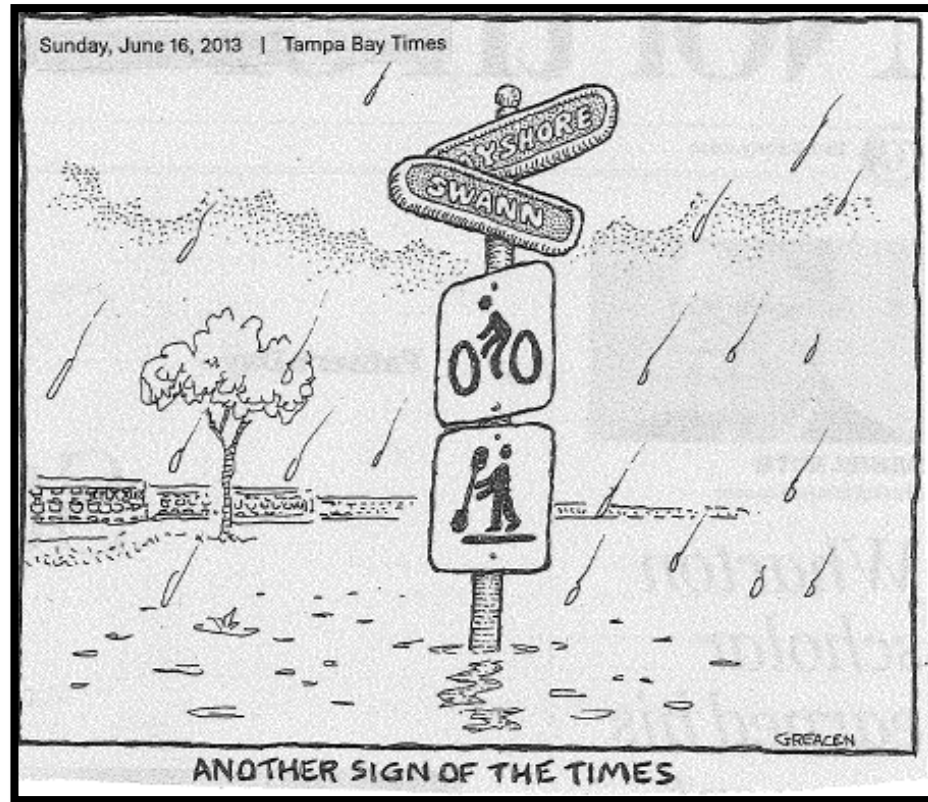
Hurricane Hermine 2016



TS Debbie 2012



Project Inspiration



- Tampa dubbed “ most vulnerable & overdue” city for a direct hurricane hit. –Weather Channel Meteorologist Survey
- No direct hit in over 90 Years
- Recent Flooding – 2012 Tropical Storm Debby (20”)
- Updating Long Range Transportation Plan to 2040



Vulnerability Assessment Framework

2010-2011 Pilots

San Francisco Bay-MTC
New Jersey DOT/TPA
Virginia DOT
Washington State DOT
Oahu MPO

2013-2015 Pilots

19 Pilots around the country including:
Hillsborough County MPO
Broward County MPO

http://www.fhwa.dot.gov/environment/climate_change/adaptation/adaptation_framework/

1. DEFINE SCOPE

IDENTIFY KEY

CLIMATE VARIABLES

- Climate impacts of concern
- Sensitive assets & thresholds for impacts

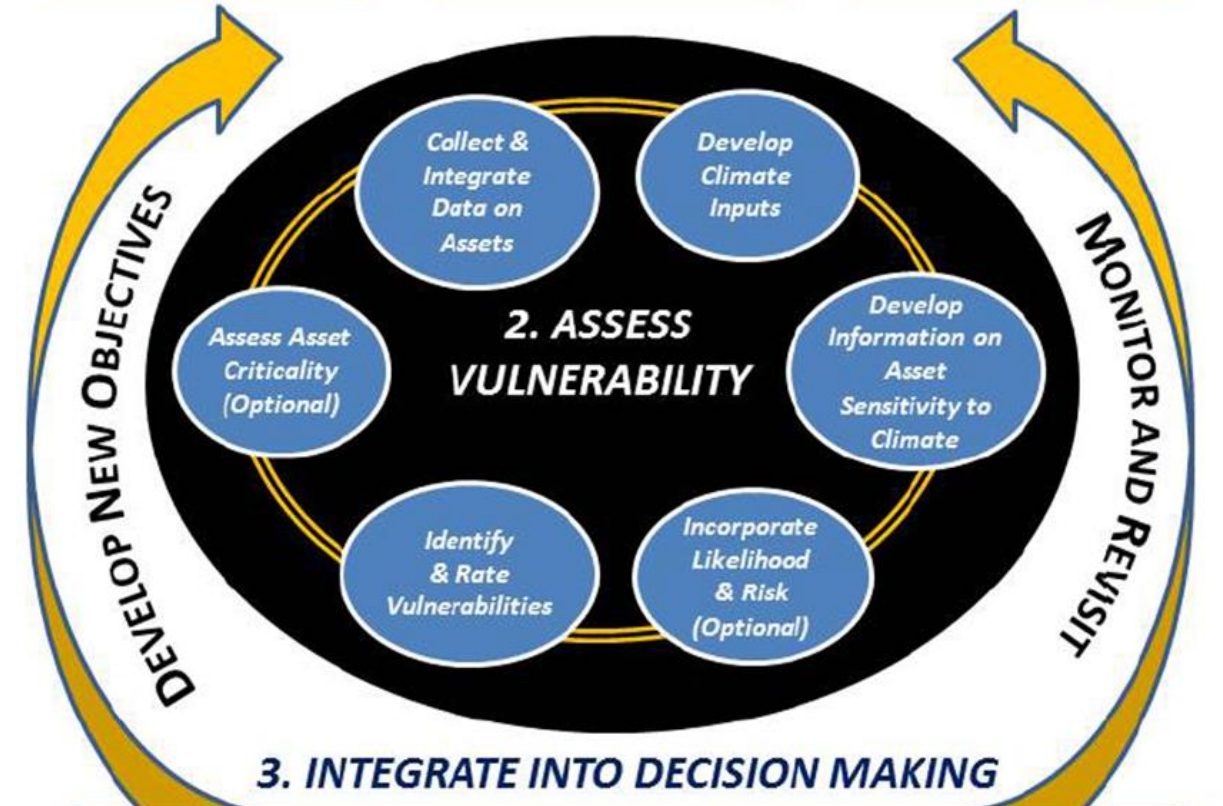
ARTICULATE OBJECTIVES

- Actions motivated by assessment
- Target audience
- Products needed
- Level of detail required

SELECT & CHARACTERIZE

RELEVANT ASSETS

- Asset type
- Existing vs. planned
- Data availability
- Further delineate

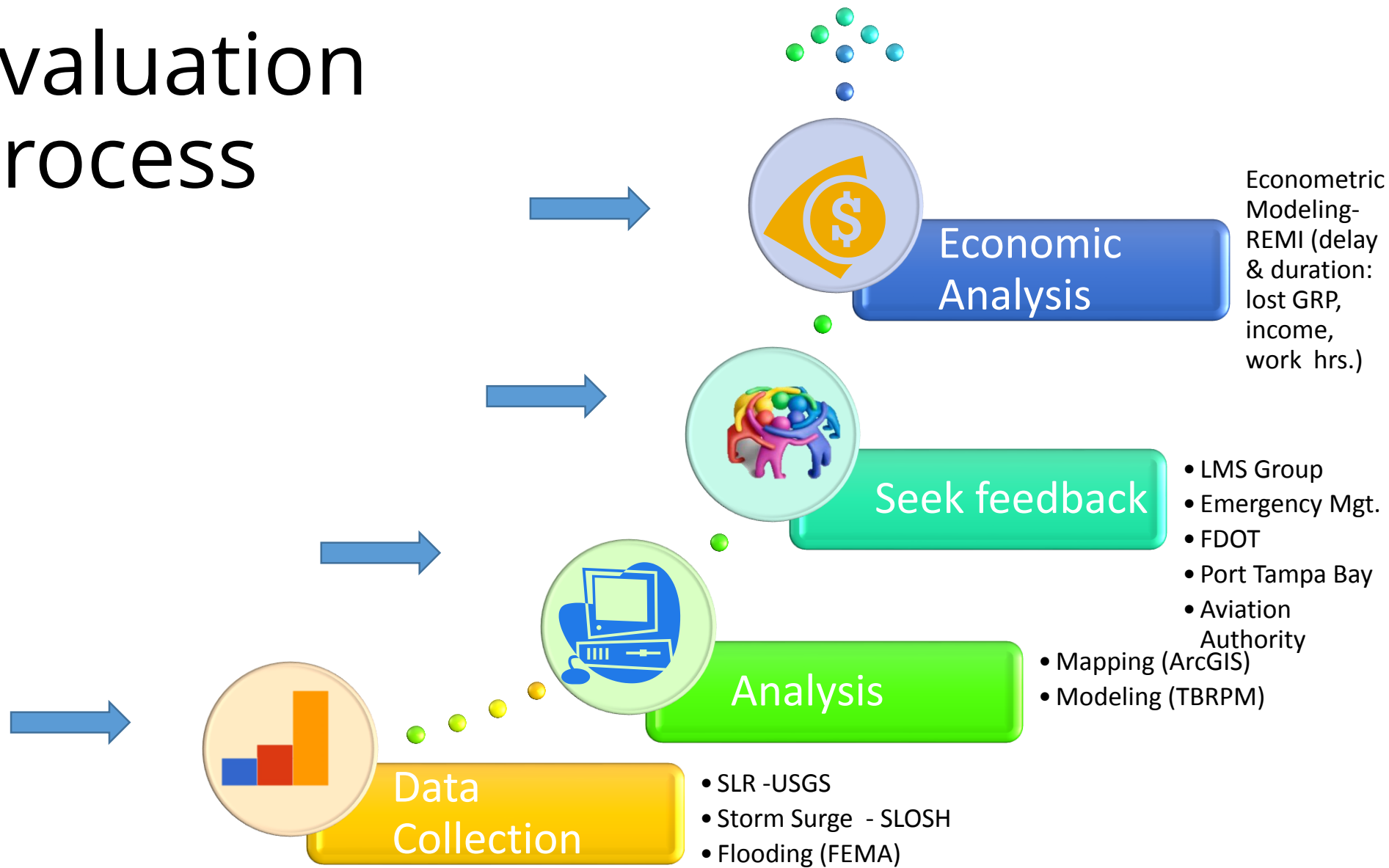


3. INTEGRATE INTO DECISION MAKING

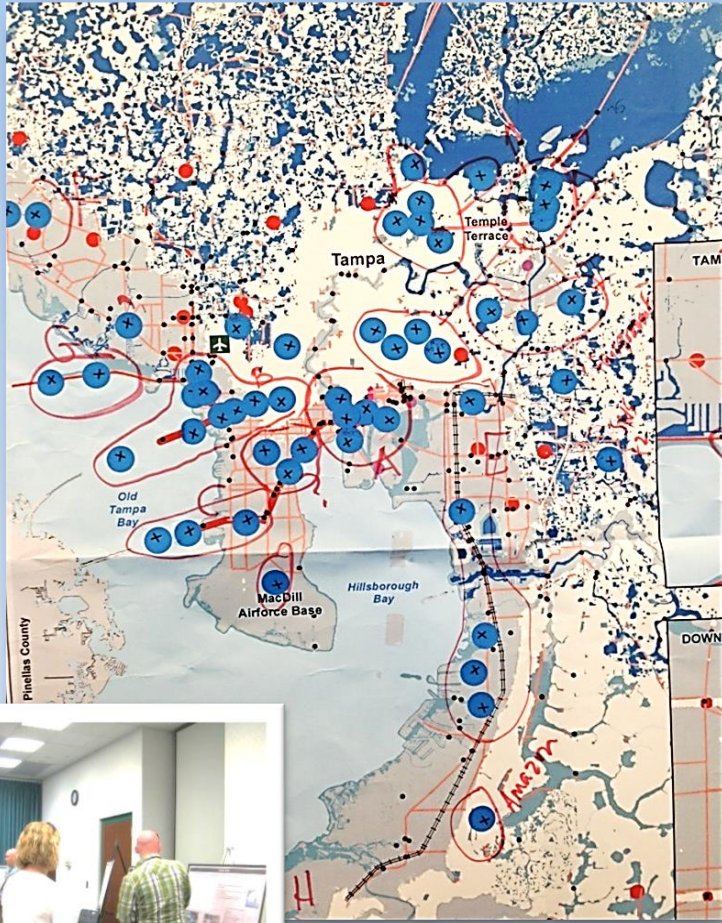
- INCORPORATE INTO ASSET MANAGEMENT
- INTEGRATE INTO EMERGENCY & RISK MANAGEMENT
- CONTRIBUTE TO LONG RANGE TRANSPORTATION PLAN
- ASSIST IN PROJECT PRIORITIZATION
- IDENTIFY OPPORTUNITIES FOR IMPROVING DATA COLLECTION, OPERATIONS OR DESIGNS
- BUILD PUBLIC SUPPORT FOR ADAPTATION INVESTMENT
- EDUCATE & ENGAGE STAFF & DECISION MAKERS



Evaluation Process



Local Mitigation Strategy Working Group- Selection of Assets

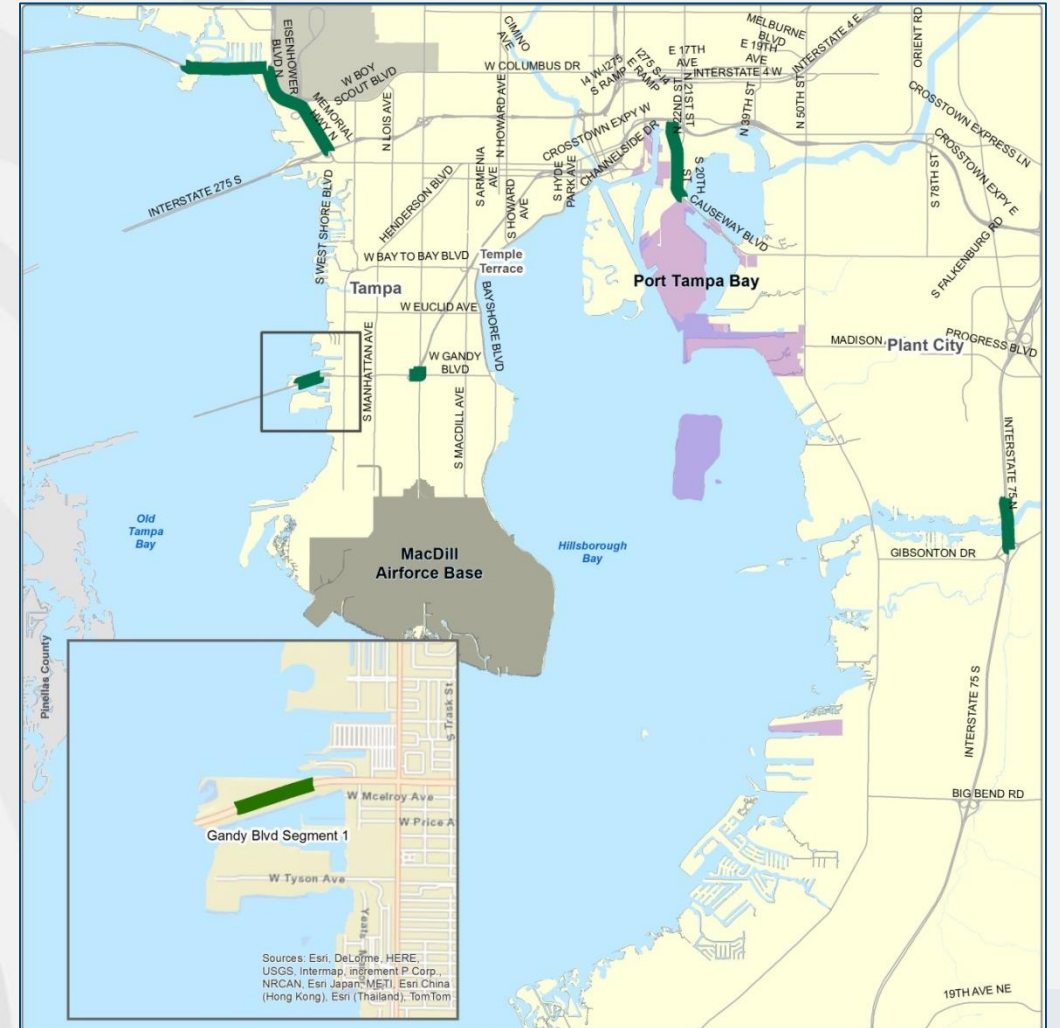


Pre & Post Disaster Planning

- Post-Disaster Redevelopment Plan
 - » Required of coastal counties & municipalities
 - » Addresses long-term redevelopment & recovery
- Local Mitigation Strategy (LMS)
 - » Addresses all potential hazards
 - » Assesses areas vulnerable to various hazards
 - » Identifies actions to mitigate potential damage in the future

Assets Studied

- Memorial Highway (Segment)
- South 20th/22nd (Segment)
- Selmon Expressway (Ramps)
- Gandy Boulevard (Segment)
- Courtney Campbell Causeway (Segment)
- I-75 over Alafia River (Bridge)



Memorial Highway Project

- Cost Feasibility based on FDOT Strategic Intermodal System (SIS) 2040 Plan:
 - Part of SR 60/I-275 interchange reconstruction
 - \$193 M cost (in YOE)
- Vulnerable area: 0.6 – 1.1 mi. based on Cat 1-Cat 3 storm surge
- Replacement cost: \$100 M +
- Protection cost: \$ 4.2 M
- ***Potential to incorporate into SIS project***

Inundation with Cat 3 Surge



Memorial Highway – 158,000 ADT

The Cost-Feasible 2040 Plan

"Status Quo" Funding Scenario



Level 1

Preserve the System

Roads repaved every 50 years on average

Level 2 ½

Aging bridges replaced on time, buses every 16 years



Level 1

Reduce Crashes & Vulnerability

Continue today's programs: crashes drop 10%

Level 1

Low-lying major roads usable 8 weeks after a Cat. 3 storm



Level 1

Minimize Traffic for Drivers & Shippers

Intersections work 10% better

Level 1

Continue today's truck "quick fix" program



Level 2

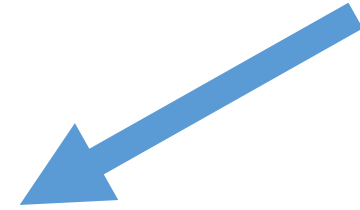
Real Choices when Not Driving

Add 140 miles of trails & sidepaths by 2040

Level 1

- Frequent bus service for 16% of people & jobs, frequent service (every ½-hour) for 45%

somewhat





What can we get if we invest in Reduced Vulnerability

Based on illustrative Cat 3 storm occurring in next 20 years

Investment Level 1 – \$988 M (current spending trend x 20 years, in YOE \$)

- Routine drainage improvements
- Up to 8 weeks of road network disruption with sample Cat 3 storm
- Economic loss to Hillsborough County: \$266 M

Investment Level 2 - \$1,025 M (in YOE \$)

- Interstates only: drainage improvements, shoreline armoring & wave attenuation
- Up to 6 weeks of road network disruption with sample Cat 3 storm
- Economic loss to Hillsborough County: \$153 M or 42% less
- \$31 M investment results in \$113 M benefit

Investment Level 3 – \$1,159 M (in YOE \$)

- Interstates & arterials: drainage improvements, shoreline armoring & wave attenuation
- 3 weeks of road network disruption with sample Cat 3 storm
- Economic loss to Hillsborough County: \$119 M or 55% less
- \$112 M investment results in \$147 M benefit

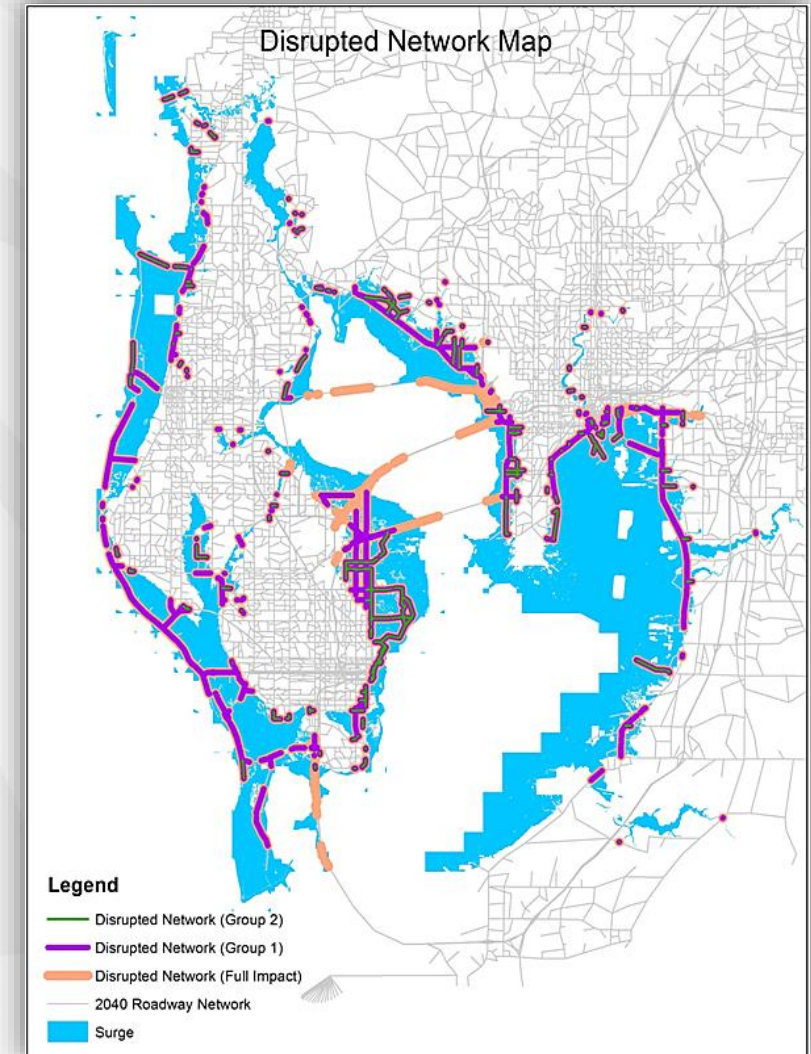
Estimated avoided losses are based on making highway segments less vulnerable to storm & flood damage



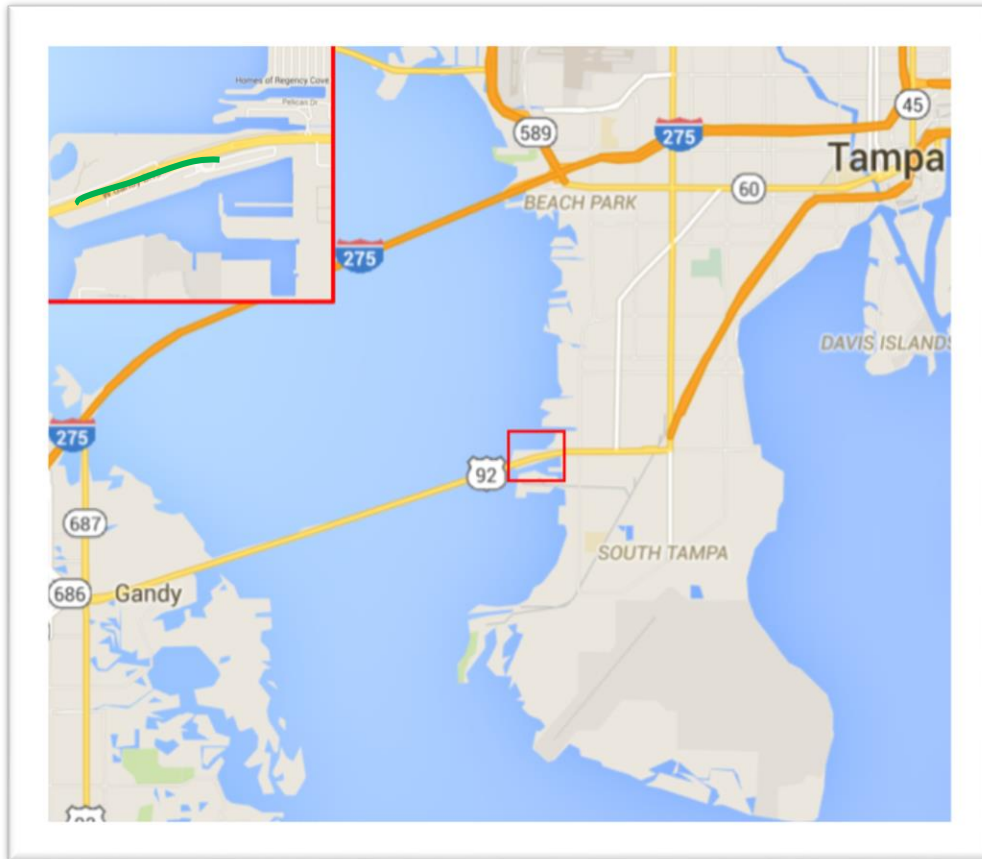
Vulnerability Reduction Investment Assumed in 2040 Plan

Investment Level	Benefits and Costs
Scenario 1 Level 1	\$31 Million per year Continue today's stormwater drainage improvement programs Category 3 storm impacts: - 8 weeks major roads may be unusable - \$266 million economic loss
Scenario 8b Level 3	\$39 Million per year Continue today's stormwater drainage, plus: raise road profiles, enhance base, protect shorelines from wave damage Category 3 storm impacts: - 3 weeks major roads may be unusable - \$119 million economic loss (cut in half!)

**Economic losses cut
in half**



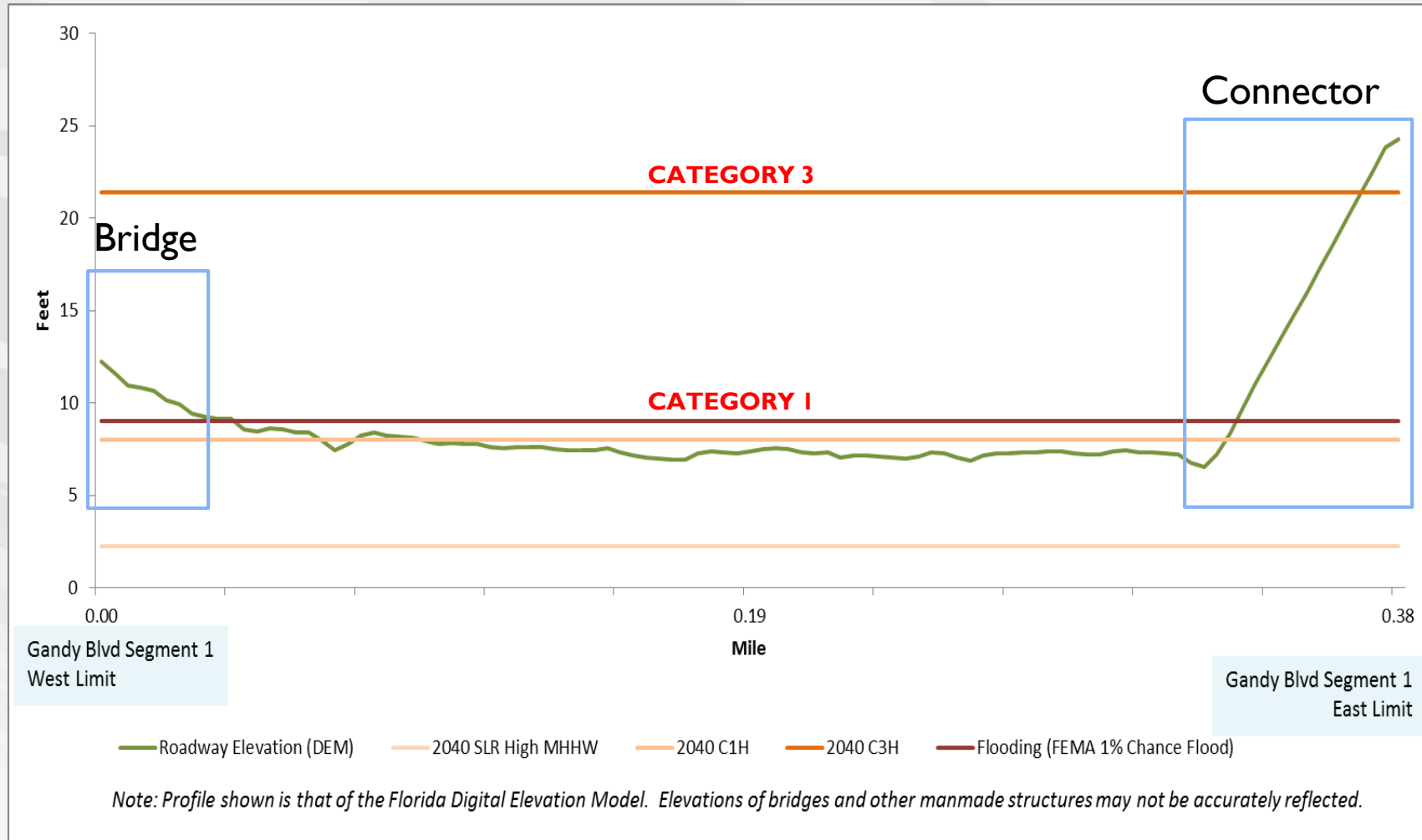
Pilot Project Follow-Up Study (2016)



- Gandy Boulevard critical segment in 2014 Vulnerability Assessment
- 1/3-mile segment connecting bridge to planned expressway
- \$1.9M estimated for strategies



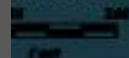
Inundation Profile – Gandy Blvd (segment)



Gandy Blvd – West End Segment



AERIAL MAPPING OBTAINED FROM FDOT



<ul style="list-style-type: none">PROPOSED ROADWAYWETLANDS/SURFACE WATERSEXISTING ROWBRIDGE STRUCTURE/RETAINING WALL	<p>Hillsborough MPO Metropolitan Planning for Transportation</p>	<p>FLORIDA TRANSPORTATION ENGINEERING, INC 6790 NW 36TH ST, SUITE 600 DORAL, FLORIDA 33178 PHONE: (305) 269-8411 FAX: (305) 493-8744 CA NO: 2605726</p>	<p>GANDY BLVD. ADAPTATION</p>
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Gandy Blvd – East End Segment



ALL AERIAL MAPPING OBTAINED FROM FDOT

	<p>PROPOSED ROADWAY WETLAND/SURFACE WATERS EXISTING W/F BRIDGE STRUCTURE/RETAINING WALL</p>	 <p>Hillsborough MPD Metropolitan Planning for Transportation</p>	<p>FLORIDA TRANSPORTATION ENGINEERING, INC 6708 NW 56TH ST, SUITE 678 DORAL, FLORIDA 33178 PHONE: (305) 480-8411 FAX: (305) 489-8744 CA. NO.: 00007984</p>	<p>GANDY BLVD. ADAPTATION</p>
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Strategy Refinement for Implementation

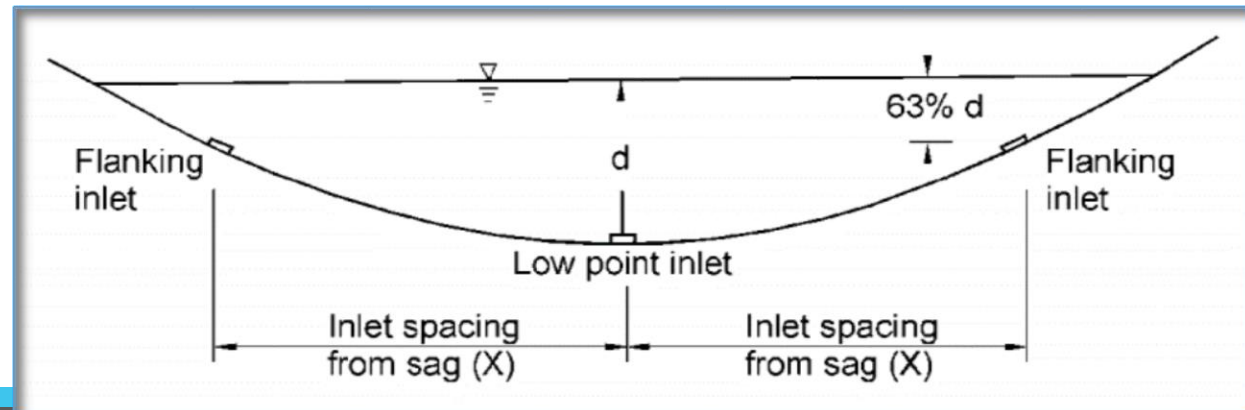


- Refined strategies appropriate Selmon Elevated extension at Gandy Blvd.
- Developed conceptual designs & specific pre-engineering cost estimates
 - Within limit of \$1.9M budget
 - Assume strategy mainstreaming as part of a project
- Offer low-risk, high benefit solutions to incorporate into elevated expressway extension PD&E proposal.



Adaptation Strategies - Drainage

- Permeable Pavement
 - Applicable for low speed and low volume roads
- Enhanced Drainage
 - Gandy Blvd existing constraints
 - Areawide watershed study



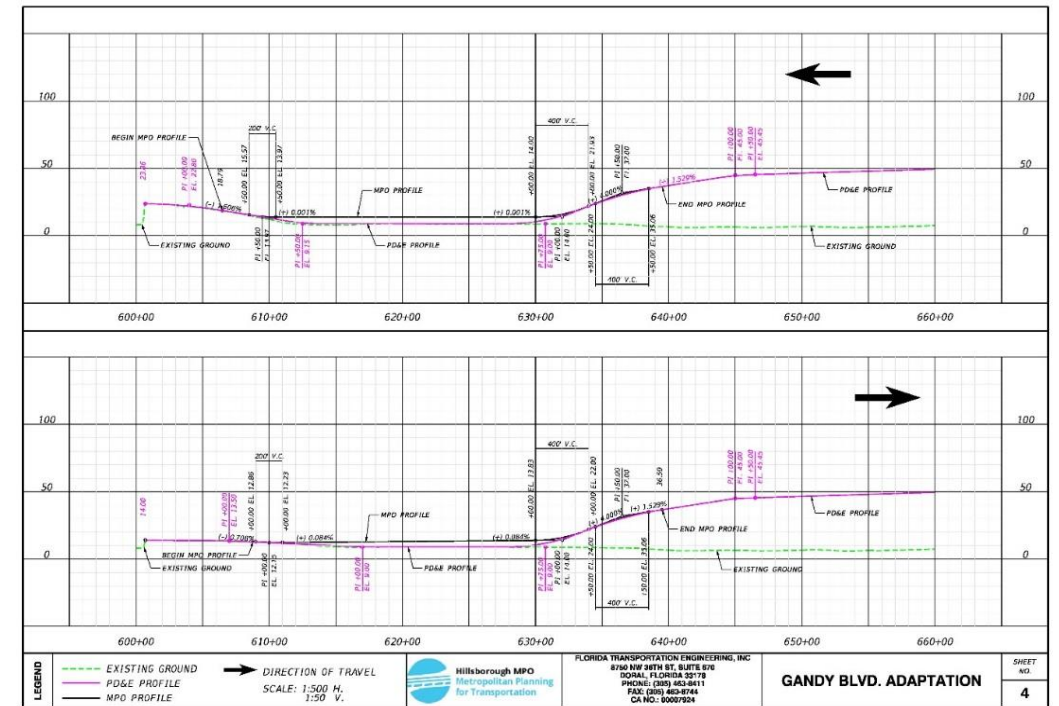
Adaptation Strategies – Harden Road

- Harden surface or base layers
 - Avoid potential washouts
- Full depth concrete
- New materials and concepts
 - Research underway



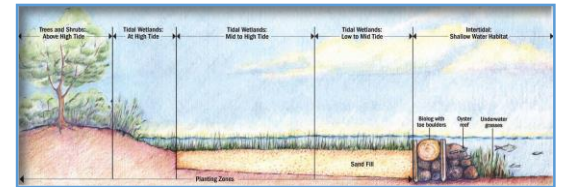
Adaptation Strategies – Raise Profile

- Gandy Blvd bridge has low elevation
 - Bridge has longer life than road
 - Eastbound/westbound different elevations
- Several options:
 - Raise Gandy Blvd to match lowest elevation
 - Consider raising one side only
 - Consider raising as companion (or after) bridge project



Adaptation Strategies – Erosion Control

- Wave Attenuation Device
 - Consider in longer term; Protection from Tampa Bay
- Living Shoreline
 - Consider in longer term; Environmental coordination
- Rivetments – Riprap or Vegetation
 - Recommend vegetation (specialty grasses or shrubs)
- Pier / Column Protection
 - Recommend vegetation (specialty grasses or shrubs)
 - Hardened solutions (e.g., concrete, double-wall construction)



Adaptation Options



Treatment	Cost Differential	Level of Risk
Do nothing	None initially. Reconstruction cost is \$3,312,000	Highest Risk. Required if roadway is destroyed.
Upgrade to full-depth concrete pavement	\$676,000	Medium Risk. Road damage possible if inundation occurs.
Raise Profile	\$1,119,000	Low Risk. Inundation from storm surge, rain or tide related flooding.
Erosion control via vegetation	\$104,544	Low Risk. Embankment damage or washout if inundation occurs.
Pier protection via vegetation	\$30 per pier (total depends on design)	Low Risk. Pier scour or damage possible if surge occurs.





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Times editorials

Rising sea levels require unified effort

For a state surrounded by water, Florida should be leading the nation in preparing to adapt to climate change. Yet with Gov. Rick Scott a self-proclaimed skeptic to local communities despite the impact already being felt from man-made warming, the state is offering virtually no direction to increase their efforts before rising sea levels pose even greater dangers to public safety, property and the drinking water supply.

Standard of accuracy

Our standard at the Tampa Bay Times is simple: to get things right the first time. This being a human endeavor, we sometimes fall short.

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Our standard of accuracy applies equally to our business operations.

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An Associated Press review of thousands of documents and emails shows the state has yet to offer a clear plan or coordination on addressing rising sea levels, despite chronic flooding along Florida's coastline from storm surges and higher tides. It has yet to address the increasing problem of saltwater intrusion into drinking water wells, which has cities and counties scrambling to find new sources of fresh drinking water. And the AP review blamed this not merely on indifference but on the mindset and culture change that took root after Scott took office. The governor downsized and cut the budgets of the regional water management agencies, and he put sea level rise and planning on the back burner.

This is in keeping with a governor who has shown no appreciation for Florida's fragile ecosystem. It comes years after a state inter-agency report found that sea levels are rising and "likely to rise faster as each decade passes," requiring much of the infrastructure of coastal Florida to be replaced. In Miami, high tides push floodwaters onto Biscayne Boulevard and Ocean Drive. In St. Augustine, as the AP reports, the city's old town floods nearly once a month on average, putting historic landmarks and the tourism industry at risk.

"If I were governor, I'd be out there talking about it (sea rise) every day," Erle Buernemann, a former general counsel to the state Republican Party who also chaired the South Florida

Water Management District, told the AP. "He's really got to grab a hold of this, set a vision (and) rally the people behind it."

Miami and other communities are doing what they can. For the time, Hillsborough County's planning commission is looking to consider climate change in its review of long-term growth. In a nod to the politically charged dispute over climate change, the commission is referring instead to "climate adaptation." This is a silly word game, rather than indige citate-skeptics, commissioners should start thinking seriously about how to better protect a county where 40,000 properties already are covered by flood insurance.

Local governments have a role. But they should not be forced to act in a vacuum. These efforts need to be coordinated through a statewide strategy. That's why it's imperative that the governor quit denying reality and widely accepts a science. He needs to give the state effort greater urgency. Local communities cannot afford to storm-proof projects by themselves, and the state and local governments need to agree on a more responsible and unified approach for managing growth. As most Floridians live within 60 miles of the Atlantic Ocean or the Gulf of Mexico, sea level rise is hardly a hypothetical problem, and not one this governor should slough off to his successor.

TBO THE TAMPA TRIBUNE Wednesday, Aug 05, 2015 89°

LOCAL NEWS US & WORLD THINGS TO DO WEATHER SPORTS HEALTH & FITNESS DEALS & SHOPPING

POLITICS

Hillsborough governments building sea-level rise into development plans

BY CHRISTOPHER O'DONNELL
 Tribune staff
 Published: March 26, 2015

'Climate adaptation' on planners' radar

By Steve Contorno
 scontorno@tampabay.com

For the first time, the Hillsborough County Planning Commission might ask local governments to consider the effects of climate change when strategizing for future growth and development.

The shift in approach would not be seismic. It's just one proposed line in the massive comprehensive land-use plans for Hillsborough, Tampa, Temple Terrace and Plant City that are up for review this year.

And it wouldn't reference "climate change," but rather the less politically charged phrase "climate adaptation."

Here's what the Planning Commission's draft language for the section on coastal management in local comprehensive plans says: "Develop strategies to identify and address issues related to climate adaptation in cooperation with the (Environmental Protection Commission), the Planning Commission and other agencies."

However vague and open-ended, it still would be a notable step for the county, which faces rising sea levels. Scientists attribute that rise to increasing global temperatures from greenhouse gases. By comparison, Pinellas County has included several direct instructions for addressing climate change and its effects in the county's comprehensive plan since 2008.

The decision whether to acknowledge "climate adaptation" is part of review of the comprehensive plans, which guide development county-wide. The Planning Commission is an independent body created by the Legislature to oversee growth in Hillsborough all four local jurisdictions. Its recommendations are weighed but are not binding.

The commission on Monday listened to a presentation from Charles Paxton of the National Weather Service on the potential affects of climate change on the region. While sea levels rise and fall constantly, the peaks are higher and levels are more frequently above where they were even 50 years ago.

As a result, "systems engineered in the '70s may not accommodate events in the 2000s," Paxton told commissioners.

TBT 05-13-2015

Addressing Climate Issues Regionally

Tampa Bay Climate Science Advisory Panel (CSAP)

Unified Projection of Sea-Level Rise in Tampa Bay Region



TBRPC ONE BAY Resilient Communities

Pinellas County
Climate Team

Hillsborough County
EPC Workgroup

Manatee County
Green Team

Pasco County

Climate Adaptation Stakeholder Meeting



January 29, 2015

Local Comprehensive Plans



TA CM Policy 1.3.7: Develop strategies to identify and address issues related to climate adaptation in cooperation with the EPC, the Planning Commission, and other agencies.



TT LU Policy 1.4.3: The City shall develop strategies to identify and address issues related to climate adaptation in cooperation with the EPC, the Planning Commission and other agencies.



PC LU Policy 6.1.4: Develop strategies to identify and address issues related to climate adaptation in cooperation with EPC, the Planning Commission and other agencies.



- Continue work in 2045 LRTP update
- Coordinate with local jurisdictions on mainstreaming adaption options for projects.
- More work to be done...



Sunday, June 16, 2013 | Tampa Bay Times

2013



ANOTHER SIGN OF THE TIMES

2016



RIGHT NOW



CURRENT CONDITIONS ON THE ROADS
SOME NEIGHBORHOOD STREETS IMPASSABLE IN FLOODING



5:08 76°





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