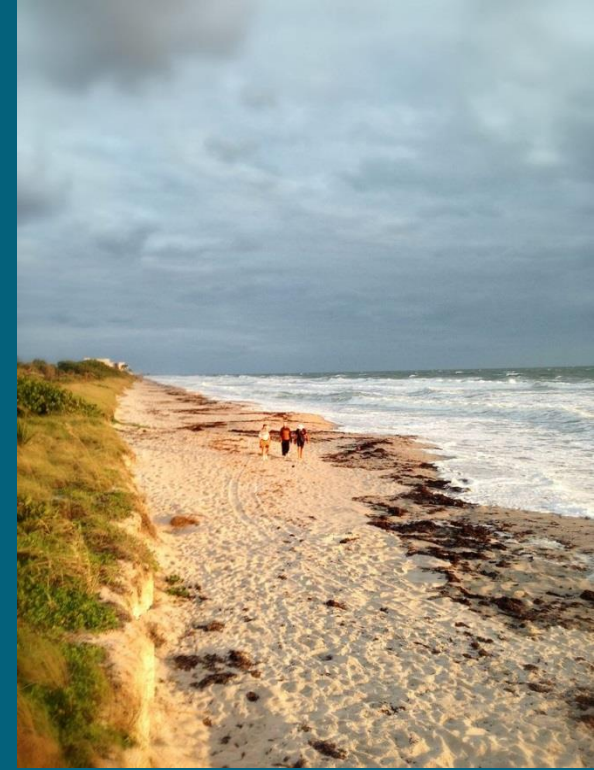


# City of Satellite Beach Community Resiliency

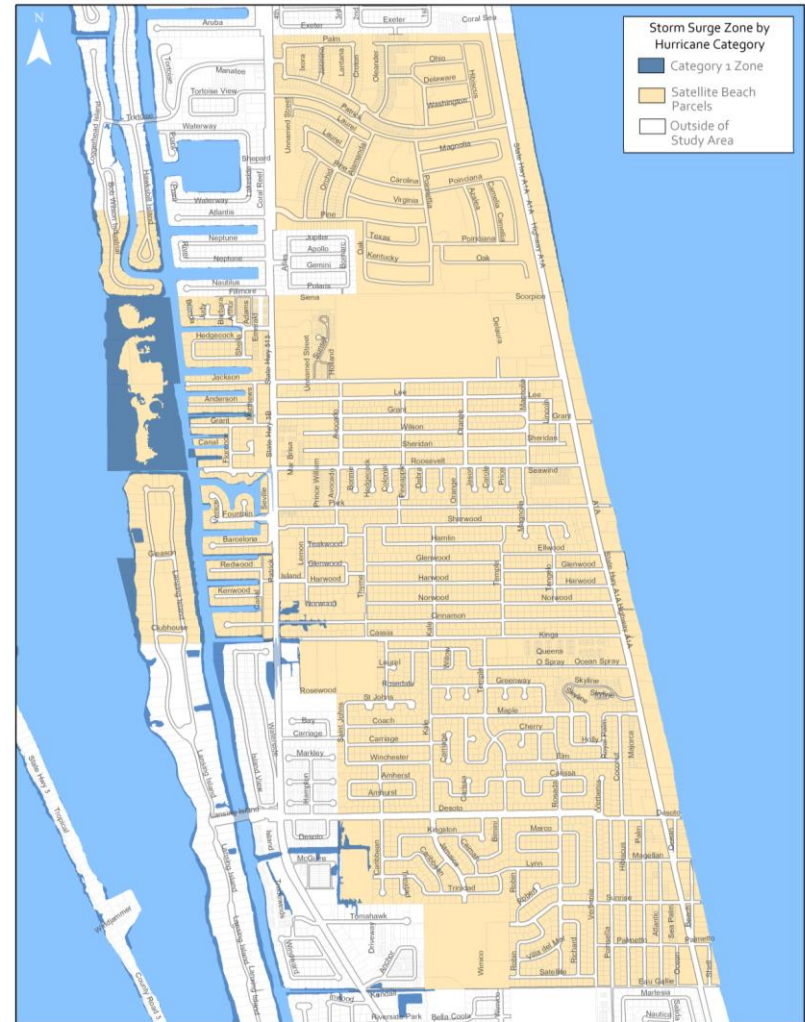


Climate Outreach  
November 17, 2016

Courtney H. Barker, AICP

# City of Satellite Beach Intro

- Situated on an barrier island between the Banana River and the Atlantic Ocean
- 15 miles south of Cape Canaveral Air Force Station and NASA
- Patrick Air Force Base is adjacent to our City
- Population is 10,300
- 3.8 square miles, with 617 acres of navigable canal system and Banana River



Source(s): ECFRPC, Brevard County GIS, NOAA (SLOSH)

# Sea Level Rise Study 2010

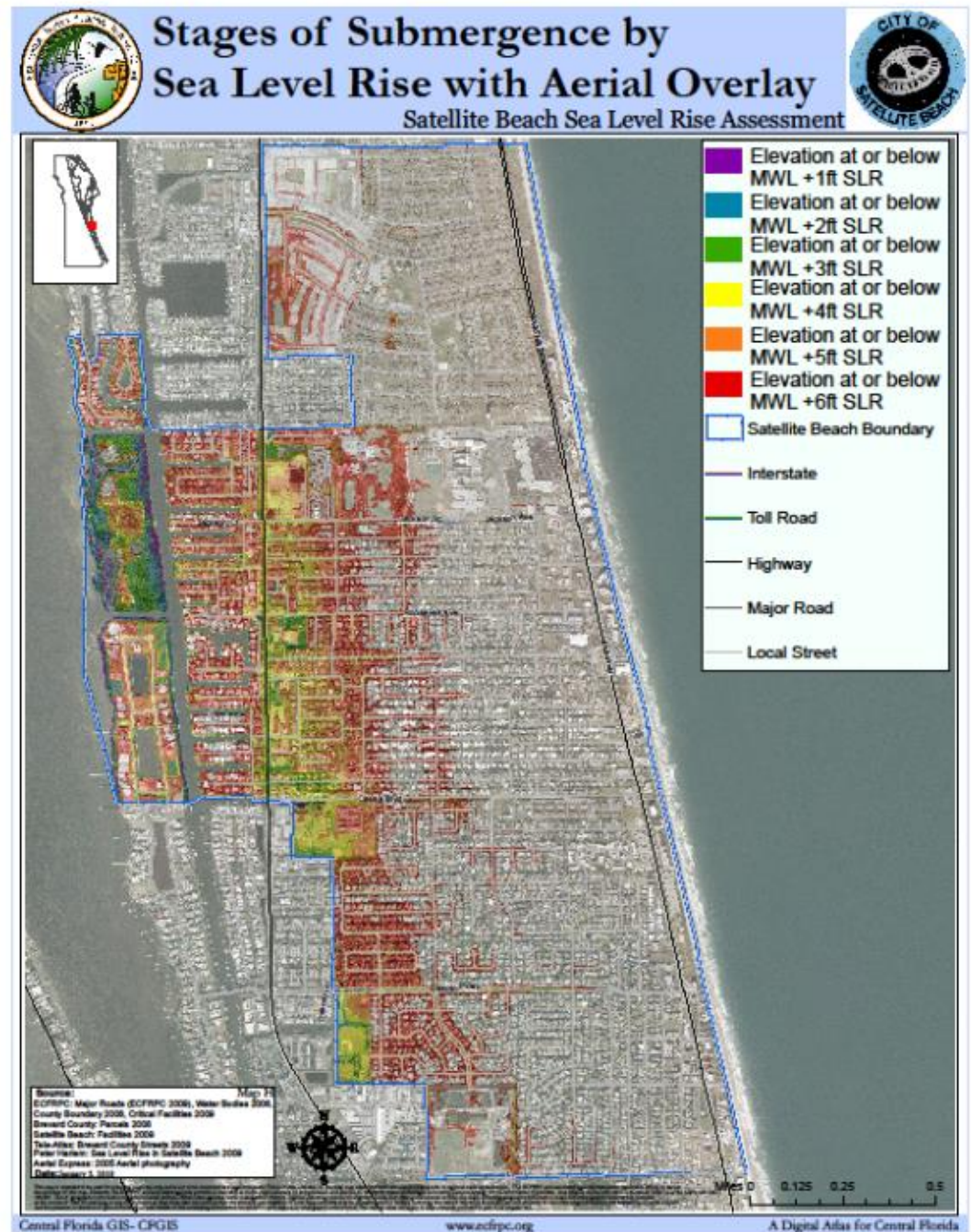
- City began looking at Sea Level Rise in 2010, with the Sea Level Rise Adaptation Report, conducted by RWParkinson, Inc.
- This report used a “bathtub” model to “assess municipal vulnerability and to initiate the planning process to mitigate impacts.”





# Sea Level Rise

- LiDAR
- Vertical datum NAVD88
- Local adjustment based on Banana River data and SLR
- Final Adjusted MWL(2010)  
0.189m
- 2010 Sea Level Rise
- Sub-Committee  
unanimously forwarded  
recommendations to CPAB.



# Where we have been...

Satellite Beach  
Climate Ready  
Estuaries Pilot  
Project  
2009-2010

Florida  
Department of  
Economic  
Opportunity –  
Community  
Resiliency  
Initiative Begins  
Jan. 2011

City of Satellite  
Beach adopts  
Adaptation  
Action Area and  
Sea Level Rise  
Policy  
2013

Satellite Beach  
Sea Level Rise  
Subcommittee  
to CPAB  
2010

State Adopts  
Community  
Planning Act with  
Adaptation Action  
Area Language  
May 2011

FDEP  
Coastal  
Partnership  
Community  
Resiliency  
Grant  
2014/2015



# Satellite Beach Comprehensive Plan

## Coastal Element

### Adaptation Action Area Policy

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#### Objective 1.4A

The City shall strive to reduce the exposure of human life and public and private property to natural hazards while reducing the cost of flood insurance.

**Policy 1.4A.1** - *The City shall initiate a public process to identify Adaptation Action Areas (AAAs) in accordance with Sections 163.3164(1) and 163.3177(6)(g)10 Florida Statutes. The purpose of the AAAs is to increase grant and other funding opportunities and identify creative solutions to achieve the following goals:*

- . *Protect the health, safety and welfare of residents,*
- . *Prevent damage to public and private property, and*
- . *Reduce National Flood Insurance Program premiums to property owners.*

#### Objective 1.12A

Development and redevelopment within the City shall be permitted only when consistent with sound planning practices that shall protect life and property from the effects of coastal erosion, flooding, sea level rise, or damage to environmental systems.

**Policy 1.12 A.2**

*The City of Satellite Beach designates the Adaptation Action Area (AAA) as that area which includes the CHHA and other areas of the City as may be identified by the City Council in the future as being subject to coastal erosion, flooding, sea level rise, or damage to environmental systems.*



# Creating a Resilient Community Project Overview

- Florida Department of Protection Grant Program – Coastal Partnership Initiative
- Community Resiliency
- 1 Year (July 2014- June 2015)



# Project Team

- **PROJECT LEAD TEAM**

- City of Satellite Beach
- East Central Florida Regional Planning Council
- Brevard County
- Florida Institute of Technology
- Florida Department of Economic Opportunity
- UF – Florida Sea Grant

- **TECHNICAL ADVISORY TEAM**

- City of Satellite Beach
- East Central Florida Regional Planning Council
- Brevard County
- Volusia County
- Florida Institute of Technology
- Florida Department of Economic Opportunity
- UF – Florida Sea Grant and GeoPlan
- Space Coast TPO
- River to Sea TPO
- FDOT
- NOAA – Melbourne Office
- Environmental Remediation
- USACE



# First Public Workshop

- Held on September 23, 2014
- Notice sent to each property address in the City
- Notice sent out on City Manager Facebook page, with NPR article of the City



# Day before Community Workshop



# Project Goals

- Identify “*other areas of the City*” and/or criteria for Adaptation Action Areas.
- Set the foundation to bring in Adaptation Action Areas to the community and the City Council as a tool for improving community resilience.
- Engage the public to help develop strategies and priorities for the City to implement and address.



# SEA LEVEL SCENARIO SKETCH PLANNING TOOL

## Atlantic Coast

Mean High High Water (NAVD88)

USACE Low, Intermediate and High Projection Rate Curves

Planning Horizon: 2040, 2070, 2100

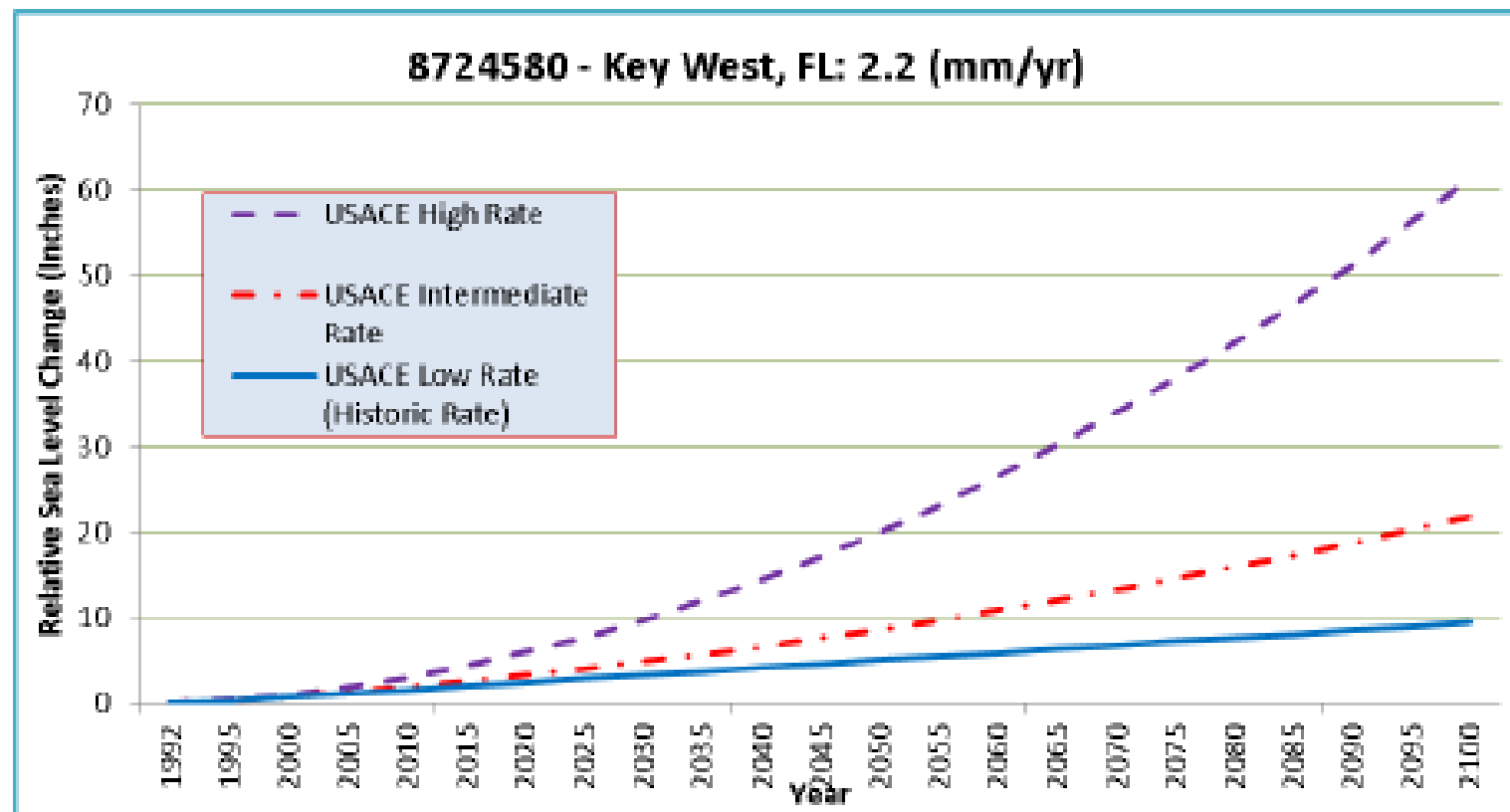
## Lagoon Side

Mean Annual High Water (NAVD88)

USACE Low, Intermediate and High Projection Rate Curves

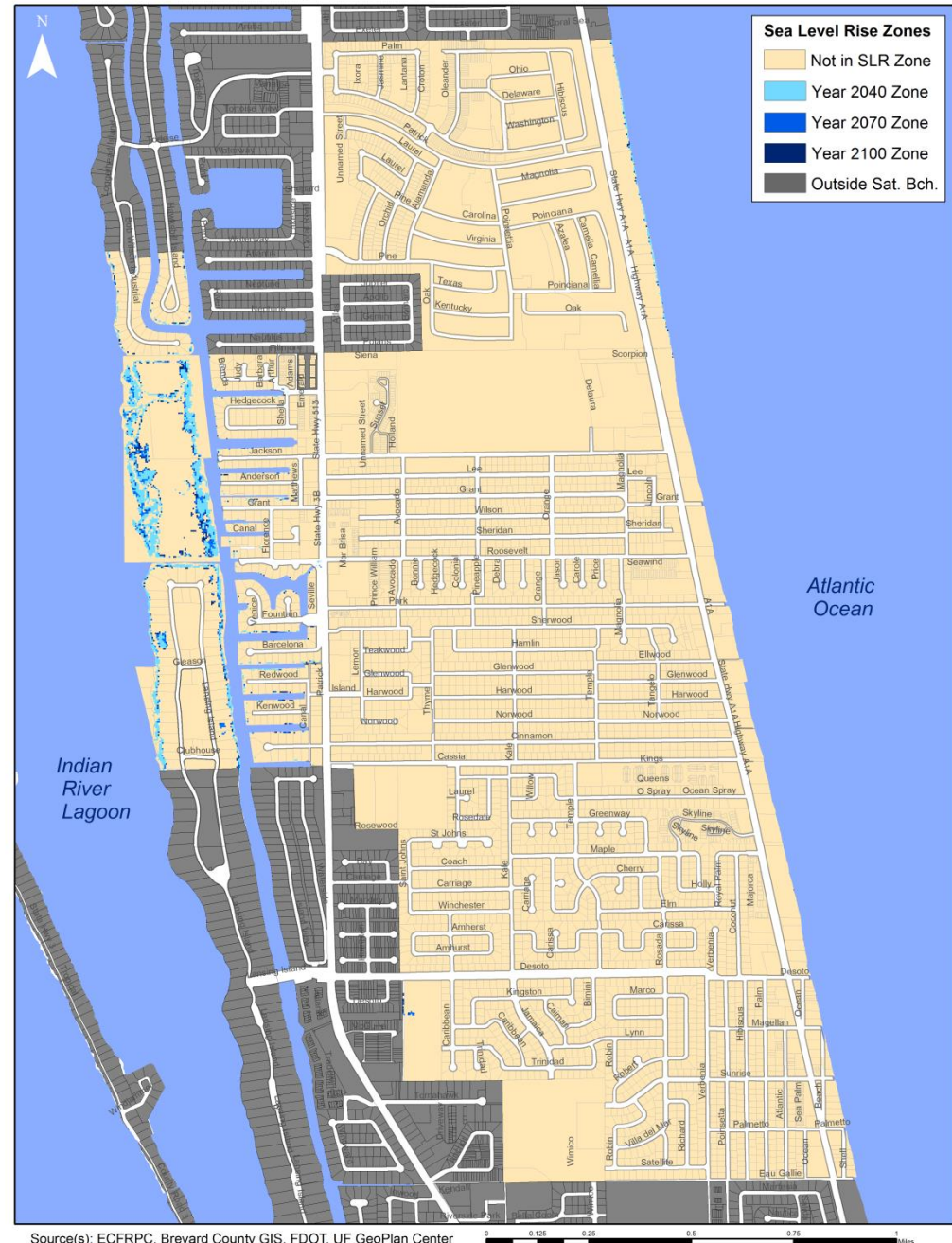
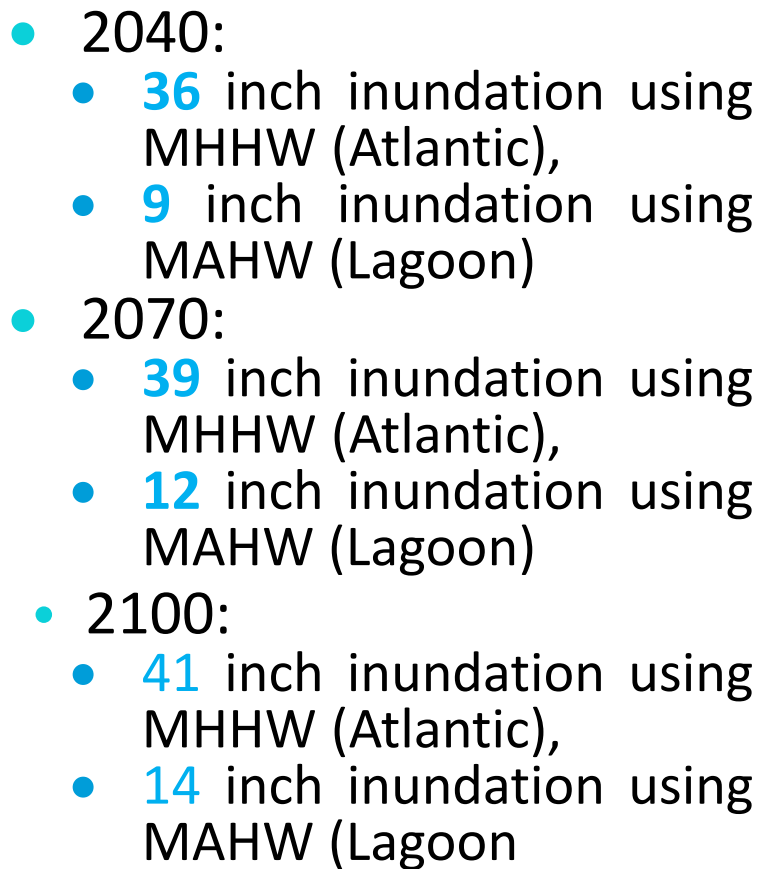
Planning Horizon: 2040, 2070, 2100





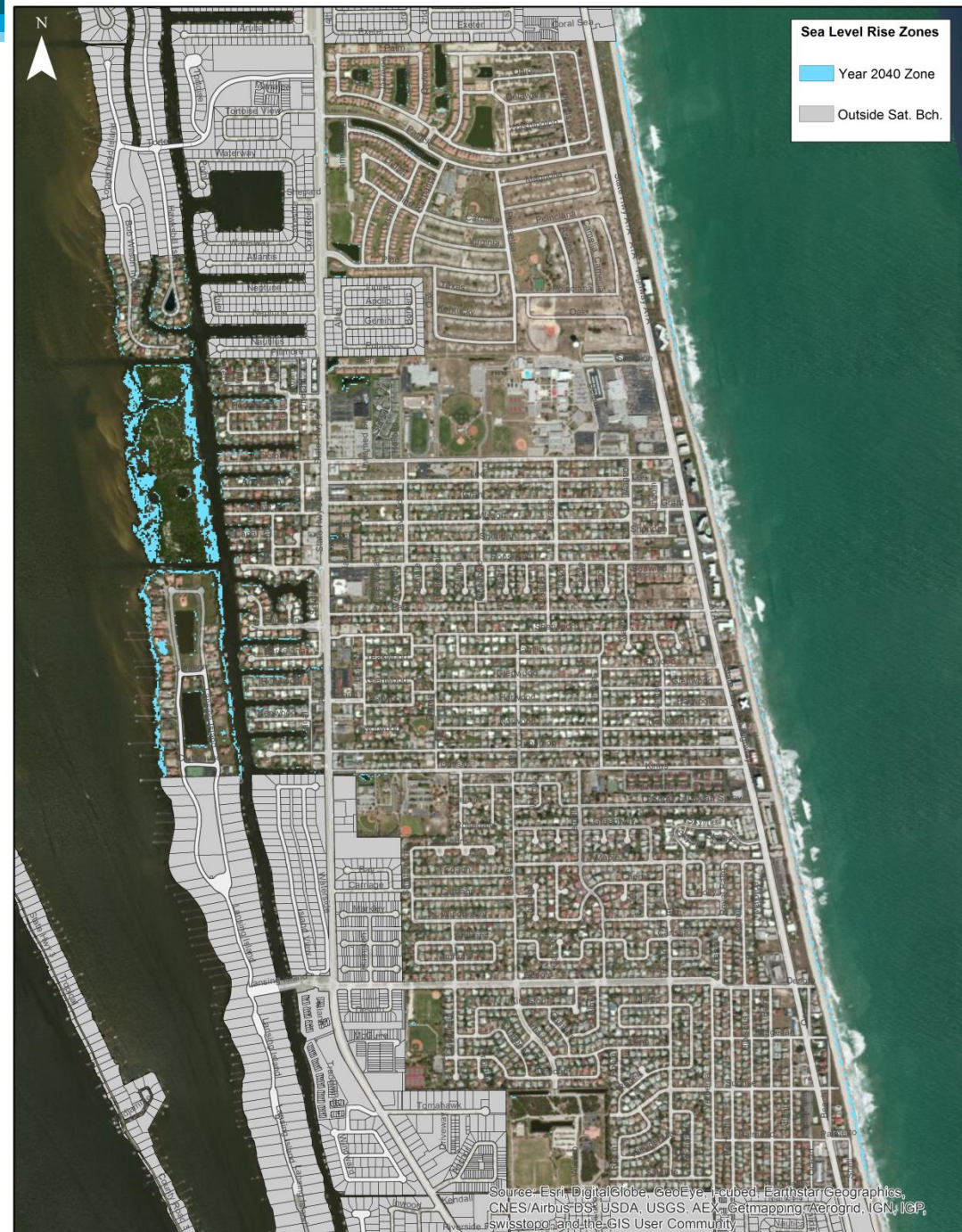
**Figure 2 Projected Sea Level Change Curves (Source USACE, 2012)**

### Low Projection Rate Curve - Sea Level Rise



# Intermediate USACE Projection Rate Curve 2040

- 2040:
  - **38** inch inundation using MHHW (Atlantic),
  - **11** inch inundation using MAHW (Lagoon)





# Intermediate USACE Projection Rate Curve 2070

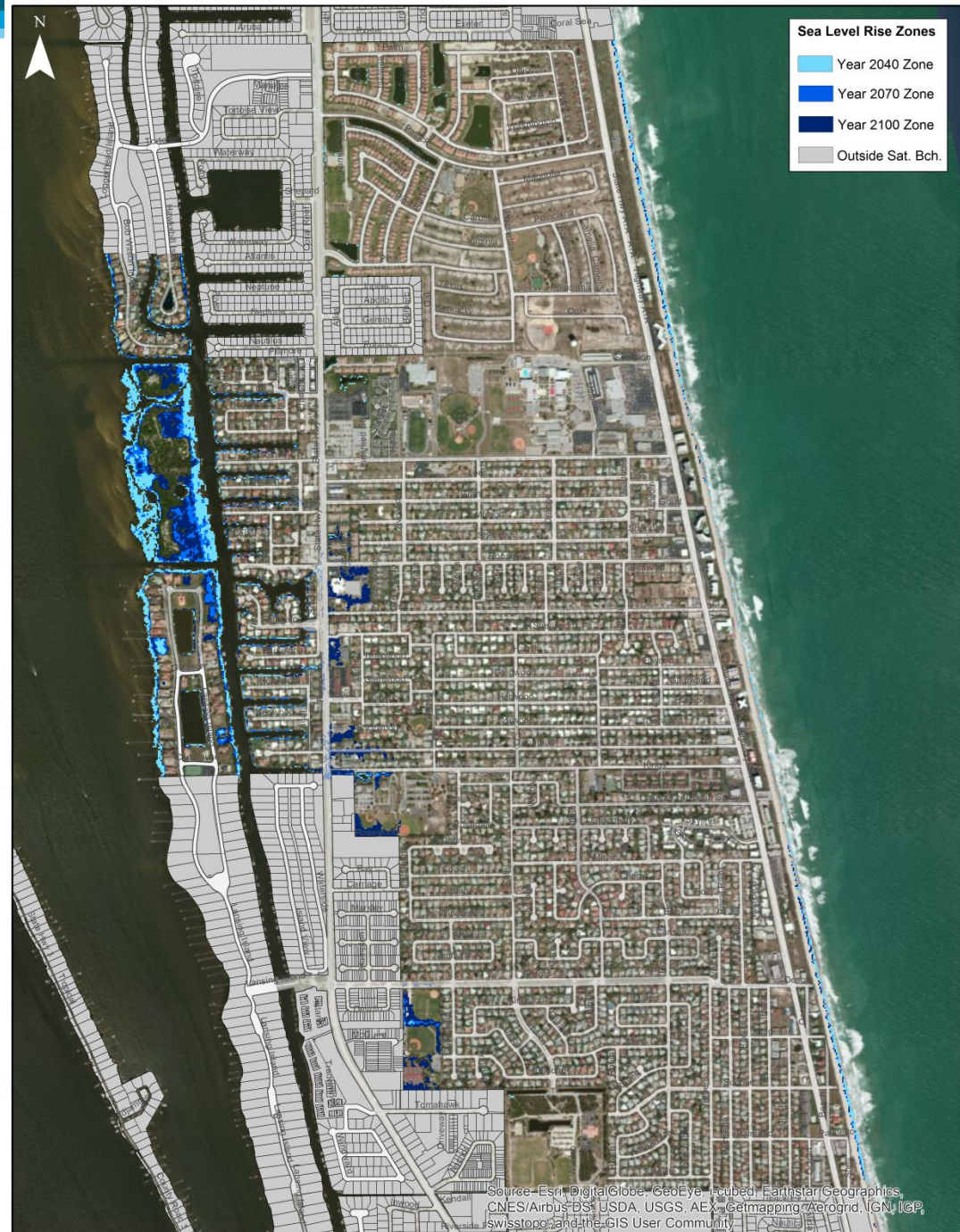
- 2070:
  - **45** inch inundation using MHHW (Atlantic),
  - **18** inch inundation using MAHW (Lagoon)





# Intermediate USACE Projection Rate Curve 2100

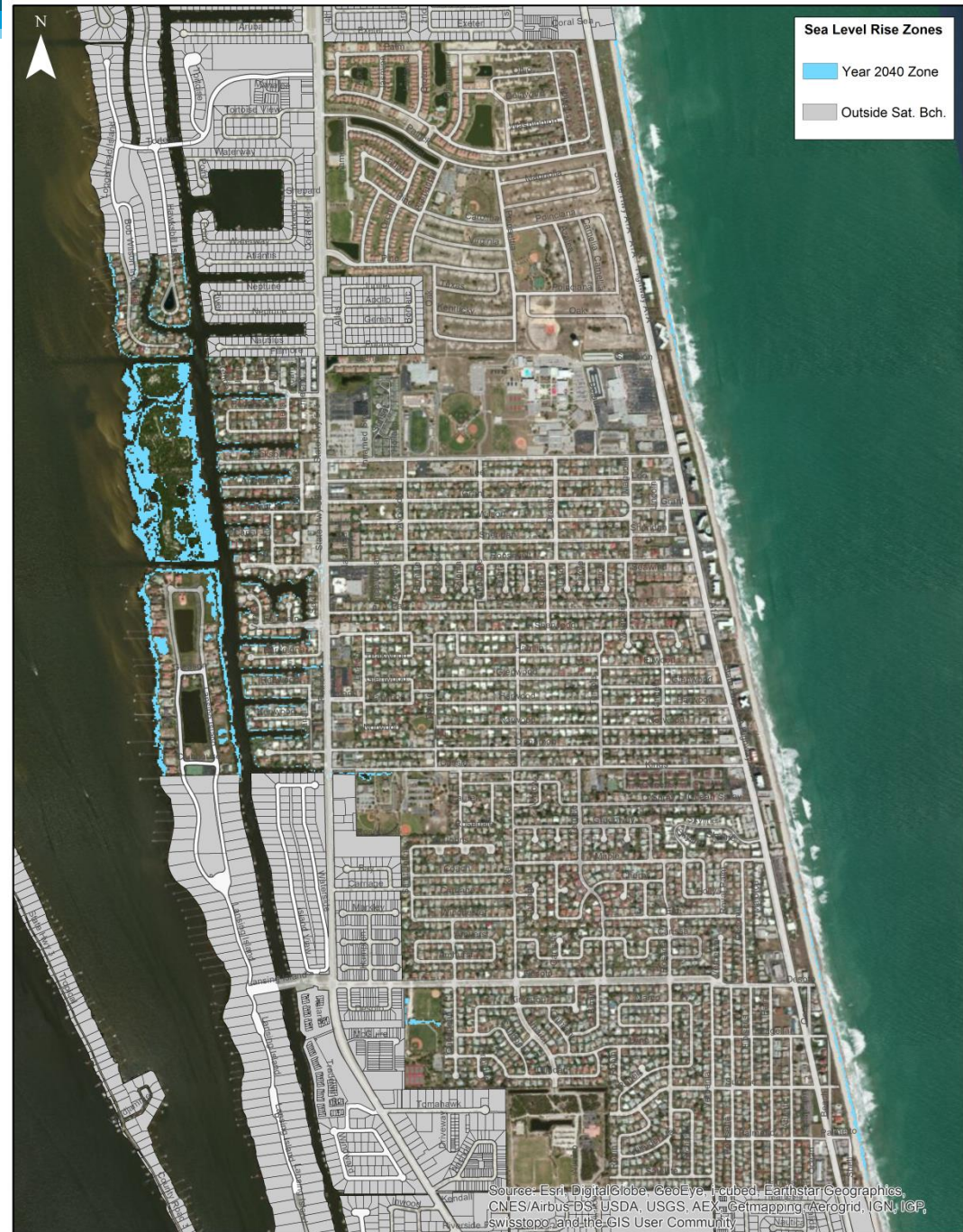
- 2100:
  - **54** inch inundation using MHHW (Atlantic),
  - **27** inch inundation using MAHW (Lagoon)





# High USACE Projection Rate Curve 2040

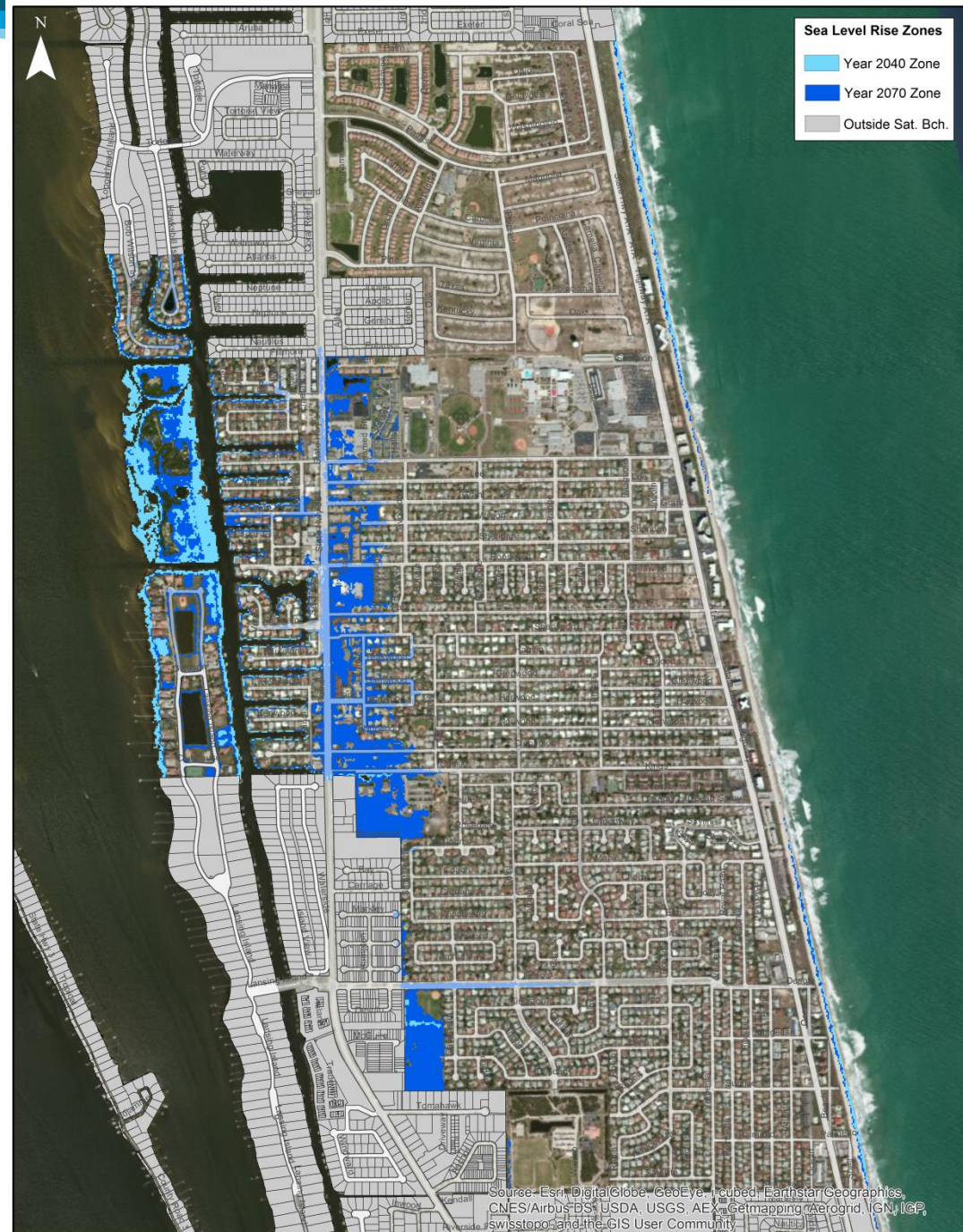
- 2040:
  - **46** inch inundation using MHHW (Atlantic),
  - **19** inch inundation using MAHW (Lagoon)





# High USACE Projection Rate Curve 2070

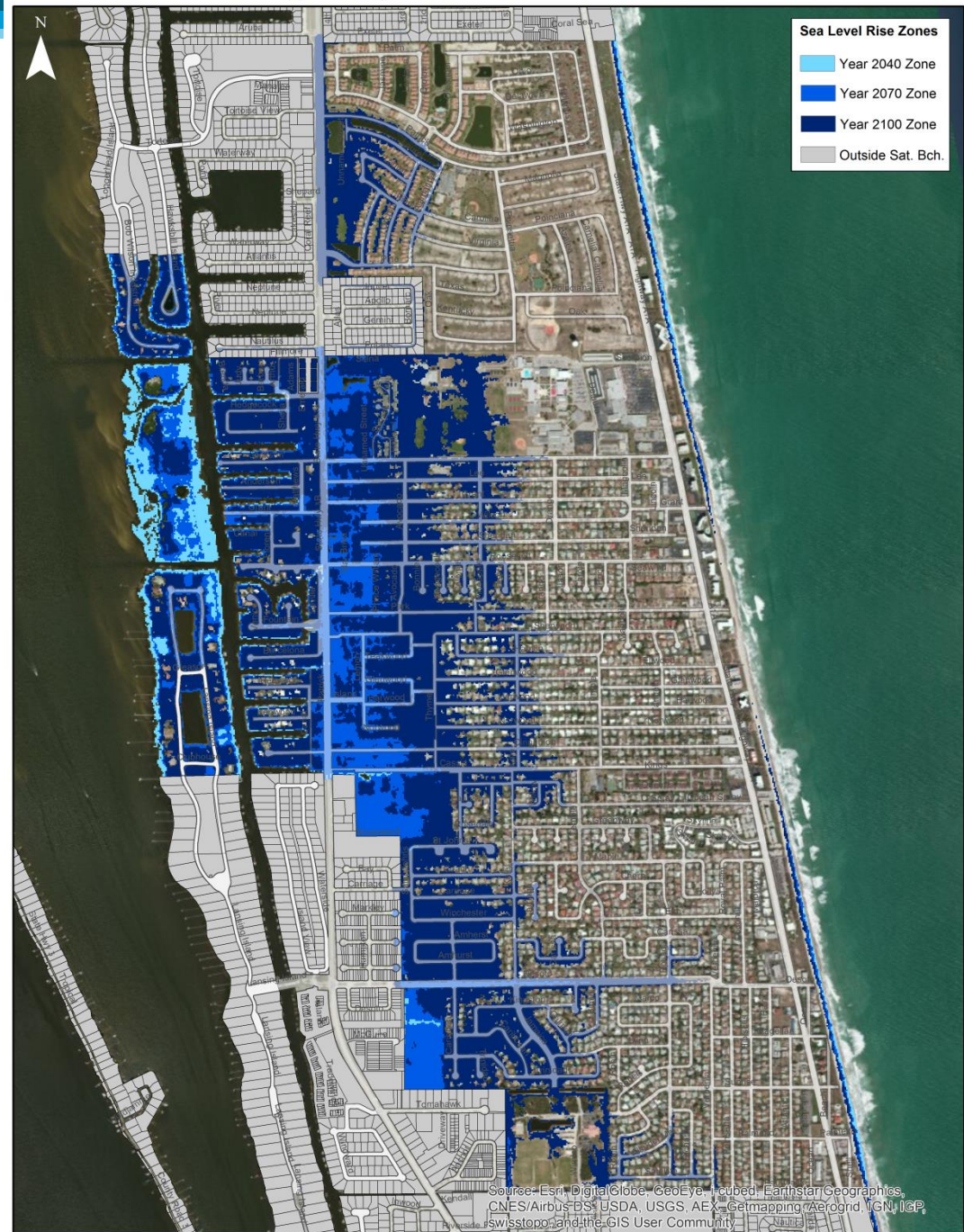
- 2070:
  - **66** inch inundation using MHHW (Atlantic),
  - **39** inch inundation using MAHW (Lagoon)





# High USACE Projection Rate Curve 2100

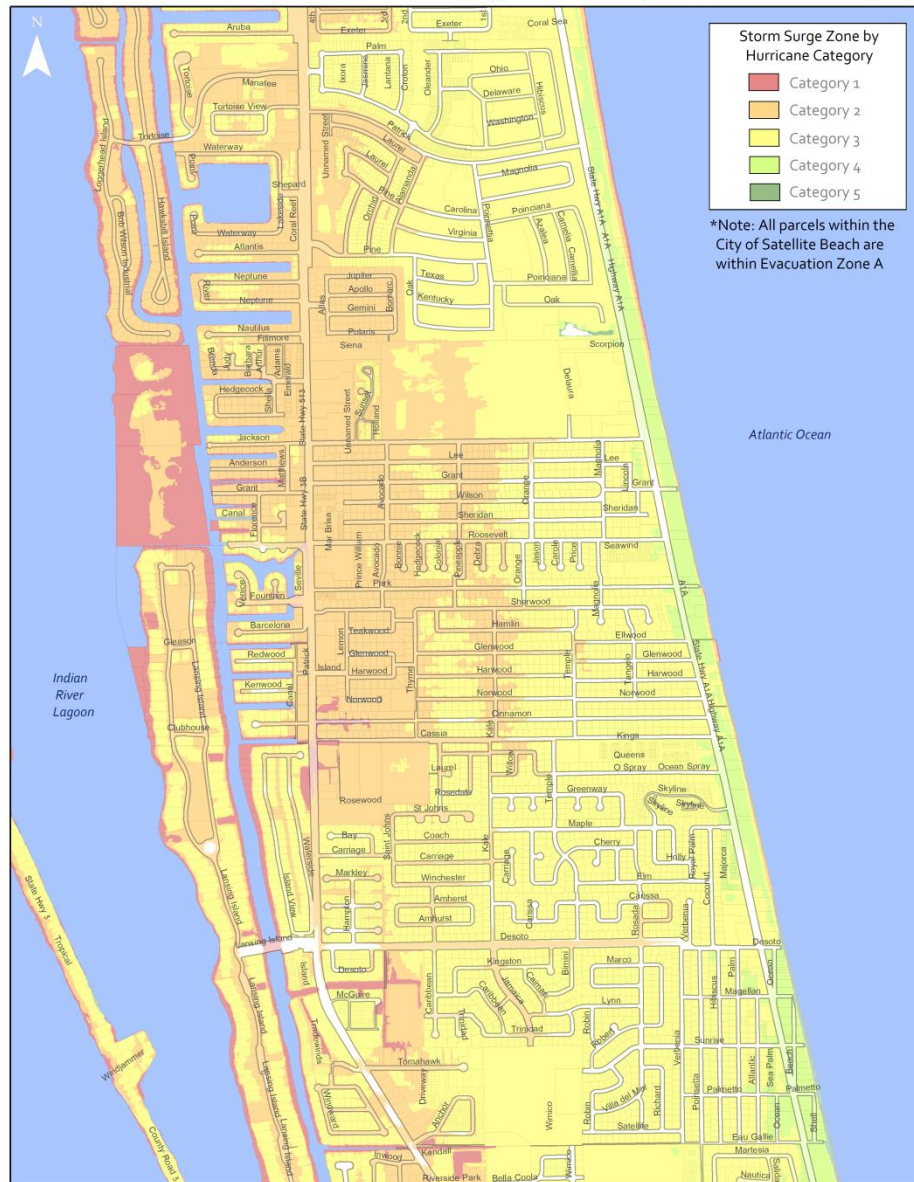
- 2100:
  - **93** inch inundation using MHHW (Atlantic),
  - **66** inch inundation using MAHW (Lagoon)







## Satellite Beach, Florida - Storm Surge Zones by Hurricane Category



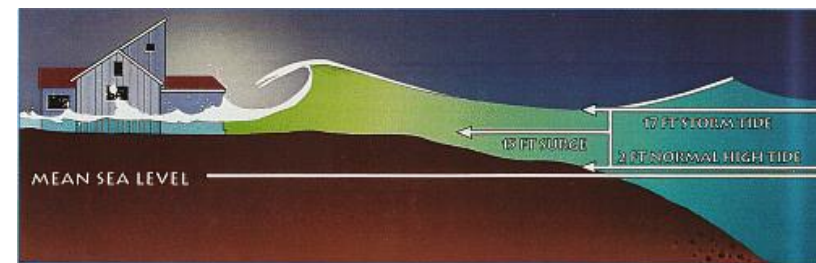
Source(s): ECFRPC, Brevard County GIS, NOAA (SLOSH)

# Storm Surge



*Storm Strength	Brevard
Category 1	Up to 6'
Category 2	Up to 10'
Category 3	Up to 16'
Category 4	Up to 21'
Category 5	Up to 26'

*\*\* Surge heights represent the maximum values from SLOSH MOMs*



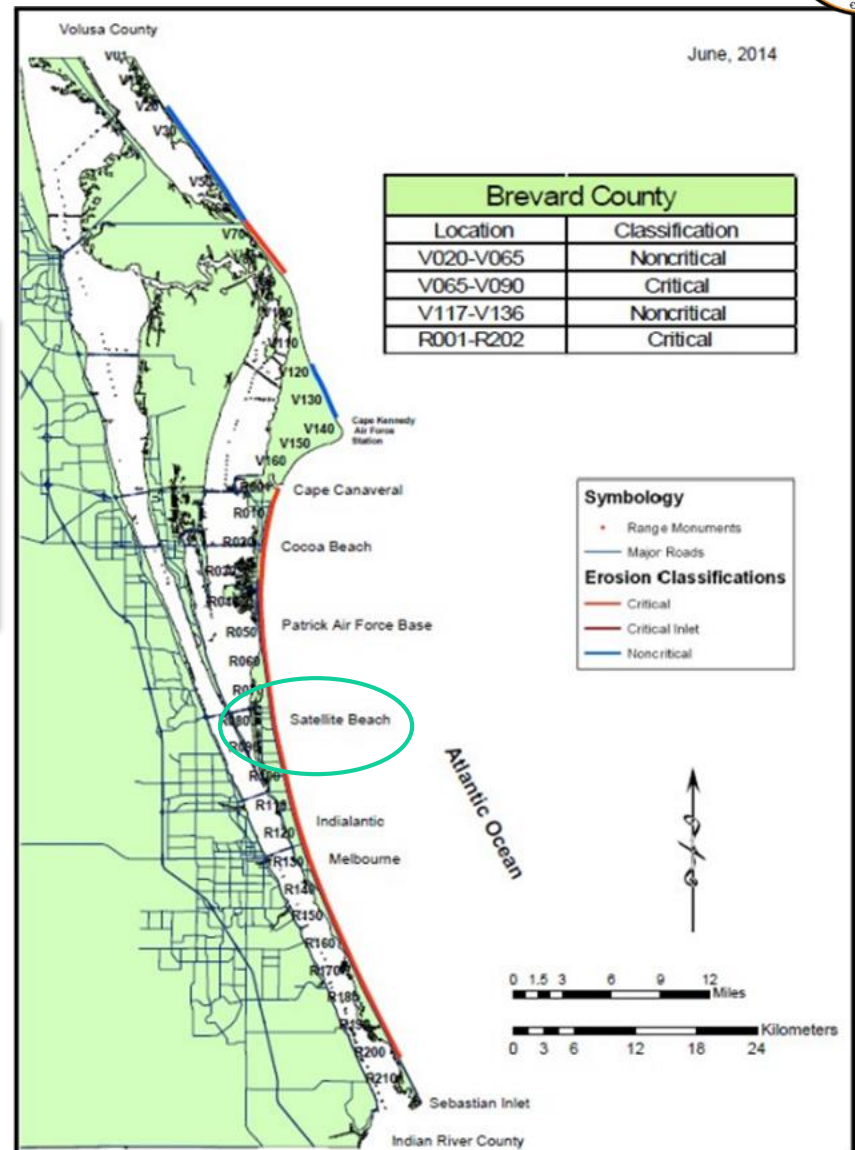


# Coastal Erosion

41.2 miles of Brevard County Beaches classified as Critically Eroded

Definition: erosion and recession of the beach or dune system threatens or caused loss of upland development, recreational interests, wildlife habitat, or important cultural resources

- 2005 Emergency Dune Stabilization Project from 2004
- 2014 Mid Reach Recovery Project



Source: Critical Erosion Report; FDEP  
<http://www.dep.state.fl.us/beaches/publications/pdf/CriticalErosionReport.pdf>





## Satellite Beach, Florida - 100 Year Flood Hazard Zone



# Flood-zones



Flooding from Hurricane Fay  
<http://www.srh.noaa.gov/images/mlb/surveys/fay/Fay4sb.jpg>

# Results of Public Workshop

- Opportunities:

- Do Nothing at all
- Clean up the Lagoon
- Move utilities underground/lighting
- Grow tax base away from high hazard areas
- Better Beach Restoration Plan
- Go green

- Strategies:

- Underground utilities, Address needs of seniors
- Maintain healthy beach and dune system, Solar energy
- Get tax base into lower risk areas
- Create more access to the river, encourage renewable energy, wider pipes

- Issues:

- Implementing efficient zoning ordinances
- Beach Erosion
- Cost of living in the City
- Salt water intrusion
- Revenue generation
- Belief in Scientific Information
- Belief in Scientific Hoaxes





MetroQuest  
Engagement Made Easy



## ✓ How should we grow?

WELCOME

*imagine*

hillsborough

2040

By 2040, Hillsborough County will have up to **600,000 new residents** and about **400,000 new jobs**.

Let's **work together** to turn the challenges that come with growth into opportunities for a **thriving future**.

### Imagine 2040

The vision you help develop now will guide the plans that are the roadmap to the future...

The 2040 Transportation Plan and the Comprehensive Plans for Tampa, Temple Terrace, Plant City and Hillsborough County.

➔ Begin

2

PRIORITIES

3

STRATEGIES

4

PREFERENCES

5

STAY INVOLVED

Share



help

# City's Survey

Creating a Resilient Community

Progress

WELCOME

✓ Welcome Creating a Resilient Community

As a coastal city, Satellite Beach faces unique challenges. Residents, business owners, and community members can help turn these challenges into opportunities for a more resilient future.

How should we become a resilient community?  
Satellite Beach is charting a plan for the future and needs residents' input to grow resilient. Have your voice heard!

Begin

Ready

Creating a Resilient Community

Resiliency is the ability of a community to adapt and prepare to withstand and recover from damaging events (e.g., hurricanes) and processes (e.g., coastal erosion), and preserve desirable natural, social and economic features of the community.

help

The City of Satellite Beach strives to ensure all its services and activities are accessible to individuals with disabilities. If you need assistance in navigating and/or completing the City's Creating a Resilient Community survey, please contact City Hall at (321) 773-4407.

2 VULNERABILITIES


3 STRATEGIES

4 CITY OPPORTUNITIES

5 STAY INVOLVED

# City's Survey

Creating a Resilient Community

Progress 

3 Strategies What strategies will best help us address our vulnerabilities?

WELCOME

VULNERABILITIES

STRATEGIES

4 CITY OPPORTUNITIES

5 STAY INVOLVED

INTRODUCTION

Coastal Erosion

Storm Surge

Loss of Utilities/Power

**Coastal Erosion**  
*Loss of beach, dunes, and structures.*

**Armoring**  
Installing hard structures such as sea walls, rip-rap (large rocks), geo tubes, etc.

★ ★ ★ ★ ★  
Comment

**Dune Protection**  
Plant native coastal vegetation such as sea oats.

★ ★ ★ ★ ★  
Comment

**Beach Renourishment**  
Importing sand from other areas to the beach using dredges or trucks.

★ ★ ★ ★ ★  
Comment

**Redirect Development - Erosion**  
Implement policies to direct development away from high-risk areas.

★ ★ ★ ★ ★  
Comment

**No Action - Coastal Erosion**  
Property owners should make these decisions on their own without depending on government assistance or policy support.

★ ★ ★ ★ ★  
Comment

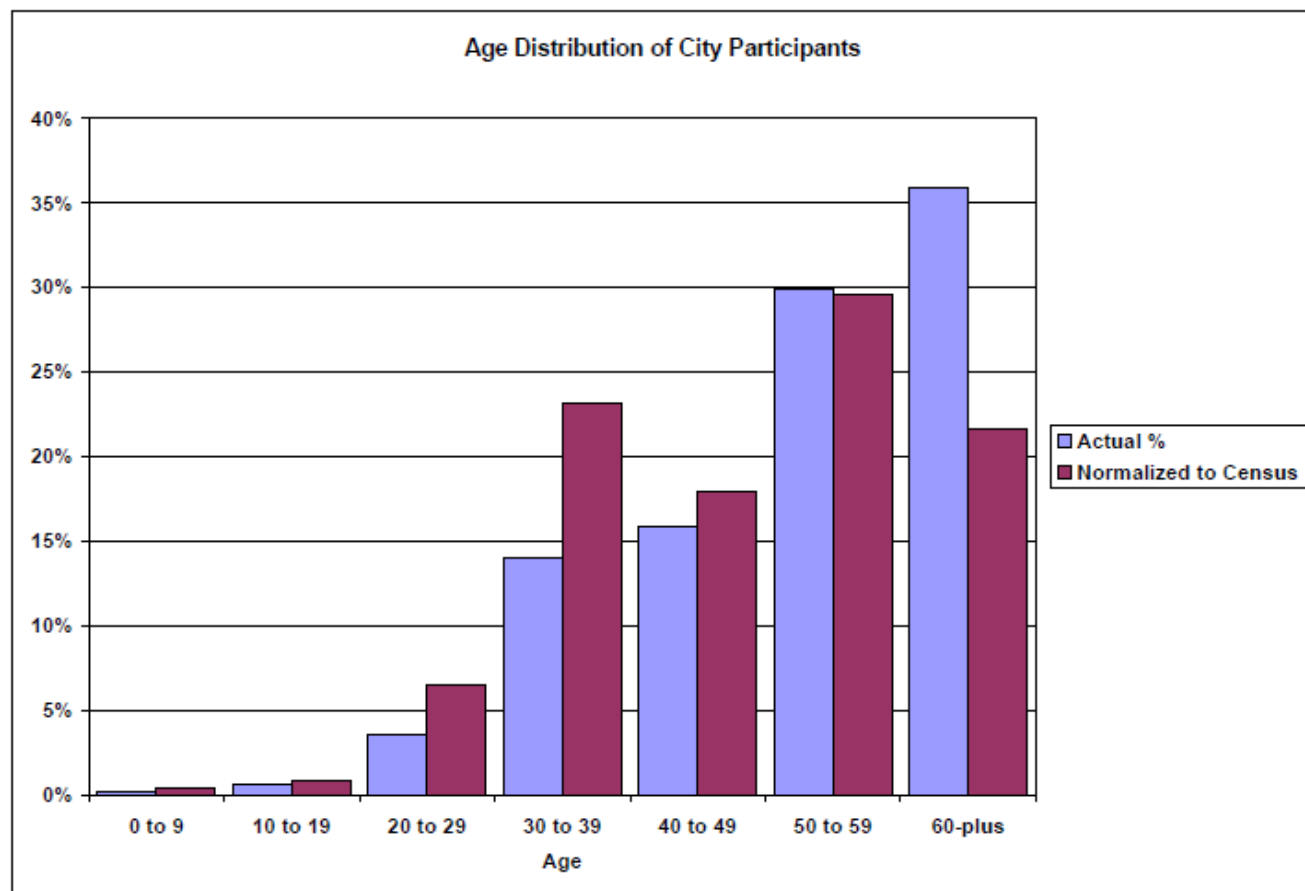
Suggest another strategy

Next

# Metroquest

- 479 validated City of Satellite Beach respondents
- 3 months of input
- Questions:
  - Which vulnerabilities are of most concern to you? (ranking)
  - What Strategies will best help us address our vulnerabilities (support/do not support)
  - Prioritize Opportunities (Ranking)





## Top 2 strategies with the most support for each Vulnerability

### **Loss of Power/Utilities:**

- 1) Work with utility companies to determine the feasibility of moving pole-mounted utilities underground.
- 2) Move critical utilities (electric trunk line and substation, sewer force main, etc.) to higher ground west of A1A

### **Coastal Erosion:**

- 1) Plant native coastal vegetation such as sea oats
- 2) Implement policies to direct development away from high-risk areas

### **Storm Surge:**

- 1) Increase construction setbacks from the shoreline
- 2) Implement policies to direct development away from high-risk areas.

## **Flooding:**

- 1) Install larger drainage pipes and structures as the system undergoes maintenance and repair.
- 2) Install vaults for stormwater storage and reuse for non-potable purposes such as irrigation, toilets and construction

## **Sea Level Rise:**

- 1) Identify areas subject to hazards of sea level rise that would benefit from long term strategies
- 2) Consider sea level rise projections in policies regarding infrastructure, zoning and construction standards

## **None:**

- 1) Plan for only storms (rainfall and hurricanes) and coastal erosion without considering climate change or sea level rise
- 2) None of this is necessary and we should stop all efforts towards planning for a climate resilient community



# Top 10 Strategies

- 1) Work with utility companies to determine the feasibility of moving pole-mounted utilities underground.
- 2) Plant native coastal vegetation such as sea oats
- 3) Install larger drainage pipes and structures as the system undergoes maintenance and repair
- 4) Increase construction setbacks from the shoreline
- 5) Implement policies to direct development away from high-risk areas (Erosion)
- 6) Implement policies to direct development away from high-risk areas (Storm Surge)
- 7) City takes action to reduce property owners' premiums for the National Flood Insurance Program
- 8) Install vaults for stormwater storage and reuse for non-potable purposes such as irrigation, toilets and construction
- 9) Promote rooftop-solar power, off-grid electric power, and other alternative energy sources
- 10) Move critical utilities (electric trunk line and substation, sewer force main, etc.) to higher ground west of A1A.

Level of Concern Analysis		Vulnerability Rankings					
		Loss of Utility/ Power	Coastal Erosion	Storm Surge	Flooding	Sea Level Rise	None
Number of Times Vulnerability was Ranked 1-3	Ranked #1	134	96	85	80	42	3
	Ranked #2	80	94	96	109	42	1
	Ranked #3	76	72	97	81	56	7
Number of Times Vulnerability was Ranked in Total		290	262	278	270	140	11
Weighted Score		638	548	544	539	266	18
Percentage of Respondents who Ranked the Vulnerability as a Concern		61%	55%	58%	56%	29%	2%
Rank Based on Weighted Score		1	2	3	4	5	6

Vulnerability: Loss of Utilities/Power		Utilities include electric power, communications, potable water, and sanitary sewer.						
Strategy Title	Strategy Description	Number of Times Ranked					Support/ Opposition Ratio	Ratio Ranking of Support within Vulnerability
		1 Star	2 Stars	3 Stars	4 Stars	5 Stars		
Underground Utilities	Work with Utility companies to determine the feasibility of moving pole-mounted utilities underground.	7	4	32	49	179	22.6	1
Relocate Utilities	Move critical utilities (electric trunk line and substation, sewer force main, etc.) to higher ground west of A1A.	30	27	70	65	64	2.2	2
Alternative Energy	Promote rooftop-solar power, off-grid electric power, and other alternative energy sources.	40	32	52	30	105	2.1	3
No Action	Continue to maintain utilities and power resources as-is.	120	33	24	11	6	0.1	4



Vulnerability: Coastal Erosion	Loss of beach, dunes, and structures							
Strategy Title	Strategy Description	Number of Times Ranked					Support/ Opposition Ratio	Ratio Ranking of Support within Vulnerability
		1 Star	2 Stars	3 Stars	4 Stars	5 Stars		
Dune Protection	Plant native coastal vegetation such as sea oats.	3	4	15	45	176	39.7	1
Redirect Development	Implement policies to direct development away from high-risk areas.	20	15	36	43	126	5.4	2
Beach Renourishment	Importing sand from other areas to the beach using dredges or trucks.	42	21	47	42	83	2.0	3
Armoring	Installing hard structures such as sea walls, rip-rap (large rocks), geo tubes, etc.	52	31	56	44	52	1.1	4
No Action	Property owners should make these decisions on their own without depending on government assistance or policy support.	133	29	27	8	12	0.1	5

Vulnerability: Storm Surge	Ocean or River Flooding							
Strategy Title	Strategy Description	Number of Times Ranked					Support/Op position Ratio	Ratio Ranking of Support within Vulnerability
		1 Star	2 Stars	3 Stars	4 Stars	5 Stars		
Increase Shoreline Setback	Increase construction setbacks from the shoreline.	13	29	42	58	111	5.1	1
Redirect Development	Implement policies to direct development away from high-risk areas.	23	21	47	55	105	4.0	2
Flood Insurance	City takes action to reduce property owners’ premiums for the National Flood Insurance Program.	25	17	52	54	98	3.7	3
Raise Elevations	Encourage higher minimum elevations for buildings and infrastructure, where feasible.	22	32	71	67	57	2.4	4
No Action	Property owners should make these decisions on their own without depending on government assistance or policy support.	113	27	29	13	19	0.2	5

Vulnerability : Flooding	Standing water in streets and lawns during and after rainstorms							
Strategy Title	Strategy Description	Number of Times Ranked					Support / Opposition Ratio	Ratio Ranking of Support within Vulnerability
		1 Star	2 Stars	3 Stars	4 Stars	5 Stars		
Stormwater Capacity	Install larger drainage pipes and structures as the system undergoes maintenance and repair.	4	6	31	83	123	23.5	1
Roadway Upgrade	This strategy would recognize periodic flooding may block access to the roadway, but the roadway would be built to withstand the prolonged exposure to water.	14	15	70	79	60	4.63	2
Stormwater Reuse	Install vaults for stormwater storage and reuse for non-potable purposes such as irrigation, toilets, and construction.	18	18	48	65	92	4.61	3
Install Pumps	Install pumps to alleviate flooding during rain events, storm surge, high tides, etc.	22	27	65	62	67	2.8	4
At-Risk Properties	Acquire at-risk properties from willing sellers.	78	43	58	22	27	0.4	5



Vulnerability: Sea Level Rise	Increasingly Frequent Flooding in lower elevations in the City							
Strategy Title	Strategy Description	Number of Times Ranked					Support / Opposition Ratio	Ratio Ranking of Support within Vulnerability
		1 Star	2 Stars	3 Stars	4 Stars	5 Stars		
Impact Areas	Identify areas subject to hazards of sea level rise that would benefit from long term strategies.	2	1	14	36	78	38.4	1
Policy Considerations	Consider sea level rise projections in policies regarding infrastructure, zoning, and construction standards.	2	4	23	33	69	21.4	2
Redirect Development	Implement policies to direct development away from high-risk areas.	3	9	19	23	77	11.8	3
Protect Public Infrastructure Only	The City should only protect City infrastructure (buildings, roadways, utilities) from adverse impacts, not private property.	57	13	21	18	20	0.5	4
No Action	Property owners should make these decisions on their own without depending on government assistance or policy support.	78	10	11	10	9	0.2	5

Vulnerability: None	The City has no known vulnerabilities							
Strategy Title	Strategy Description	Number of Times Ranked					Support / Opposition Ratio	Ratio Ranking of Support within Vulnerability
		1 Star	2 Stars	3 Stars	4 Stars	5 Stars		
Disaster Response Only	Plan only for storms (rainfall and hurricanes) and coastal erosion without considering climate change or sea level rise.	0	1	2	4	3	10.0	1
Do Nothing	None of this is necessary and we should stop all efforts towards planning for a climate resilient community.	2	0	4	0	3	1.5	2
Education	Sponsor a series of public meetings where representatives of major environmental organizations (e.g., FDEP, NOAA, USACE) discuss what is known and	5	1	2	1	1	0.3	3

Opportunity	Opportunity Description	Number of Times Opportunity was Ranked					Weighted Score	Weighted Rank	Percentage of Respondents who Ranked the Opportunity as a Priority
		First	Second	Third	Fourth	Fifth			
Beach Preservation	Keep the beach natural	96	102	92	30	22	1246	1	71%
Restore Lagoon	Address nutrients and other issues	115	88	67	36	30	1230	2	70%
Preserve Neighborhoods	Small town Character	81	65	68	54	35	1012	3	63%
Vibrant Business Community	Appropriate Variety and Scale	46	65	55	42	53	792	4	54%
Eco-Friendly	Introduce Green Practices	41	42	62	48	34	689	5	47%
Improve A1A	Safety, Convenience, Aesthetics	49	36	40	50	45	654	6	46%
Increase River Access	Increase Access to Indian River	18	39	34	34	24	440	7	31%



# Since then...

- Adopted new AAA policies into our Comprehensive Plan and implemented the policies in our LDRs.
- Working with Stetson University, ECFRPC, and Florida Sea Grant on a grant funded project to address flood plain and critical infrastructure GIS mapping.
- Established a Sustainability Board to address sustainability issues, and working with Florida Institute of Technology on a Sustainability Plan.