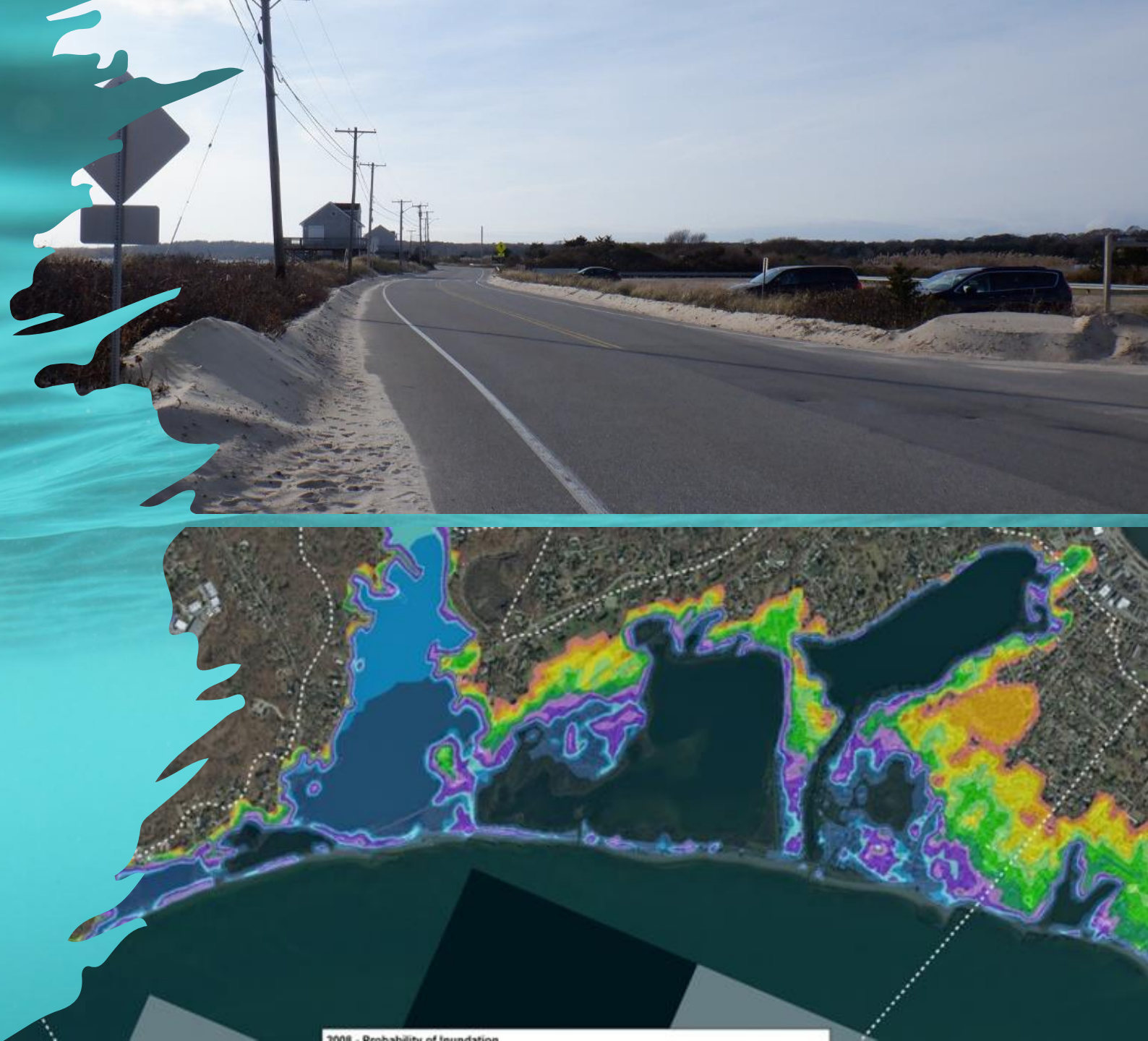


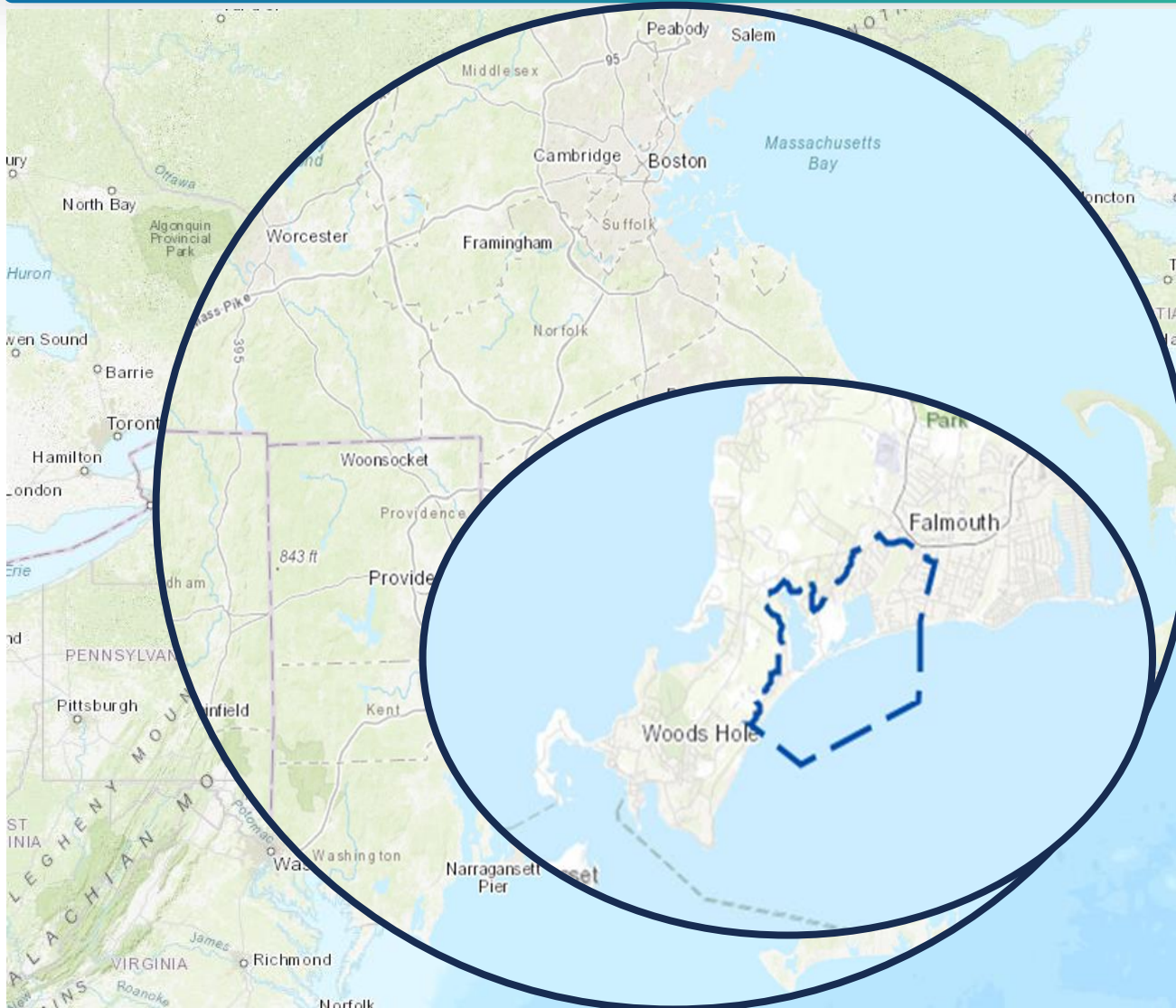
Change is Hard: Dynamic Adaptive Policy Pathways make it easier

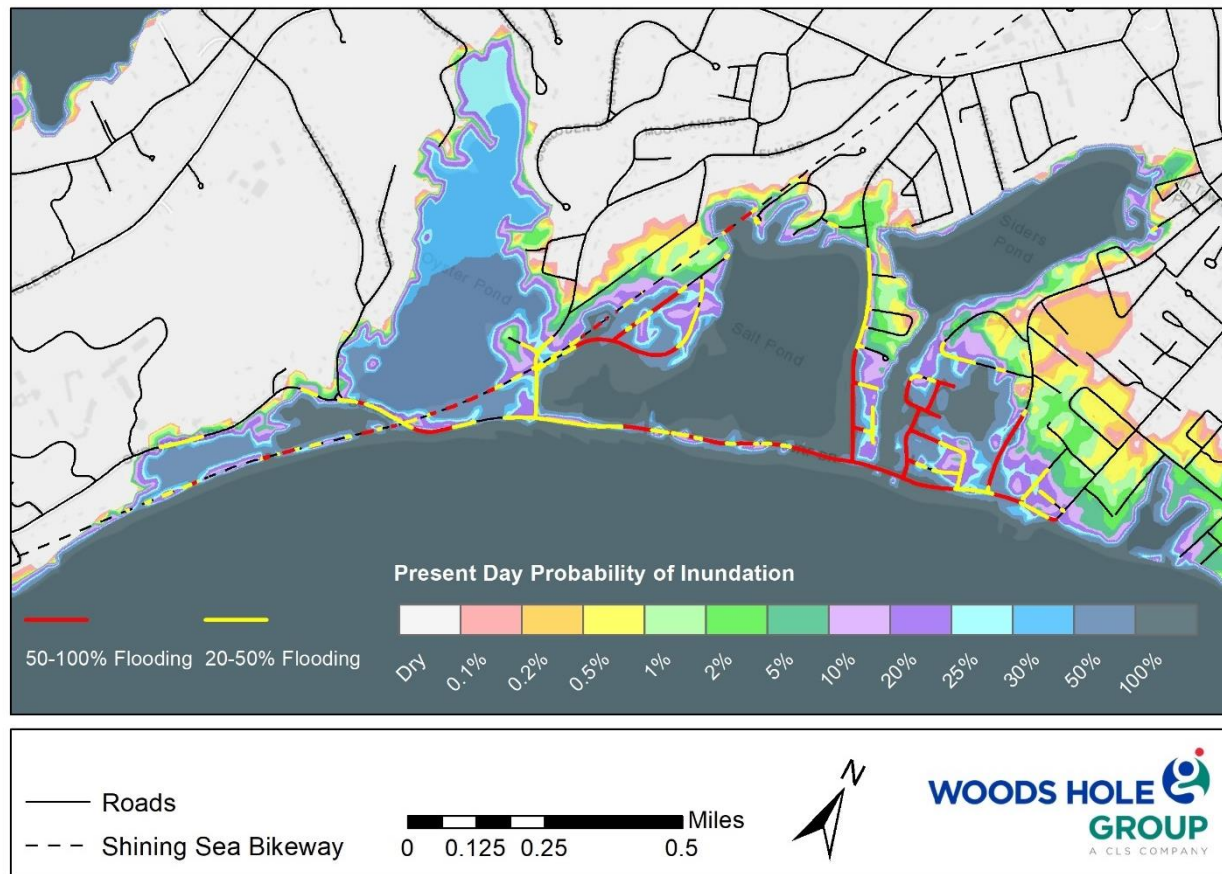
Kirk Bosma, PE

kbosma@woodsholegroup.com



Case Study Location – Surf Drive Corridor, Falmouth, MA





- The town-wide assessment identified the Surf Drive area as one of the most at-risk
- Town also concerned with protecting and enhancing the resiliency of natural habitats
- Falmouth received a state-funding (MVP Action Grant)

Framework and Process

Goals

- Maintain and promote clean and welcoming coastal resources
- Improve the resiliency of the natural resources and infrastructure
- Balance the use, access, and enjoyment of coastal resources

Science and Data Driven

- Detailed physics-based flood risk modeling
- Town wide vulnerability assessment to identify priorities
- Created buy in from the Town and community

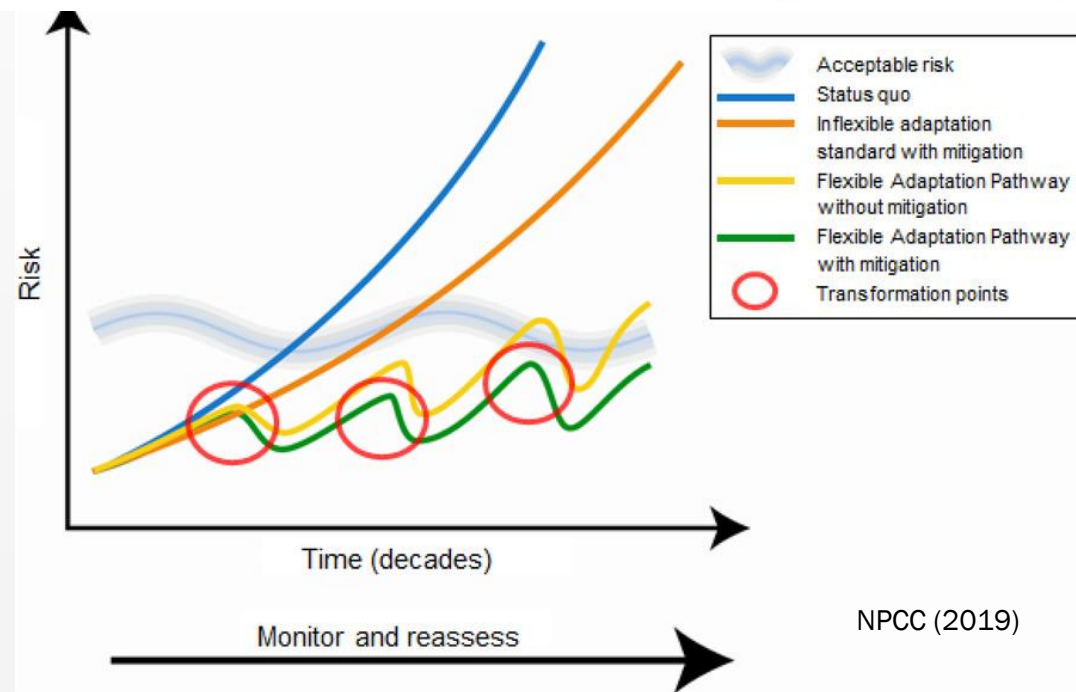
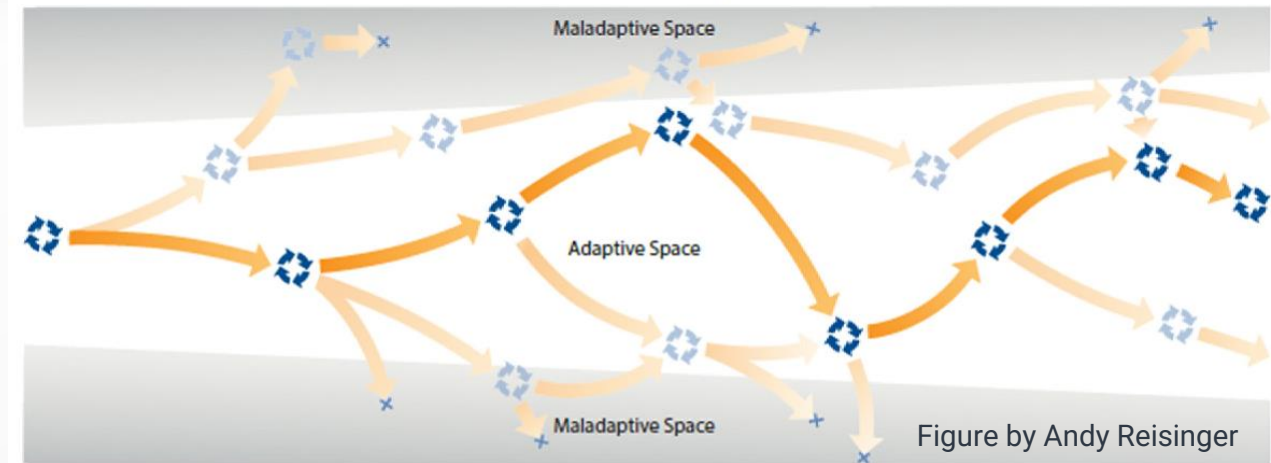
Community Led

- Engaged town staff, committee members and residents
- Department specific interviews
- 3 engagement meetings and public workshops
- Public surveys



Dynamic Adaptive Policy Pathways (DAPP)

- Buys time and removes pressure
- Reduces uncertainty by using events not time for decisions
- Flexibility to reflect changing circumstances, doesn't box you in
- Keeps options open until there is more information, funding, or support
- Allows for learning along journey
- Can handle complex decision making



1. Identification of the Problem

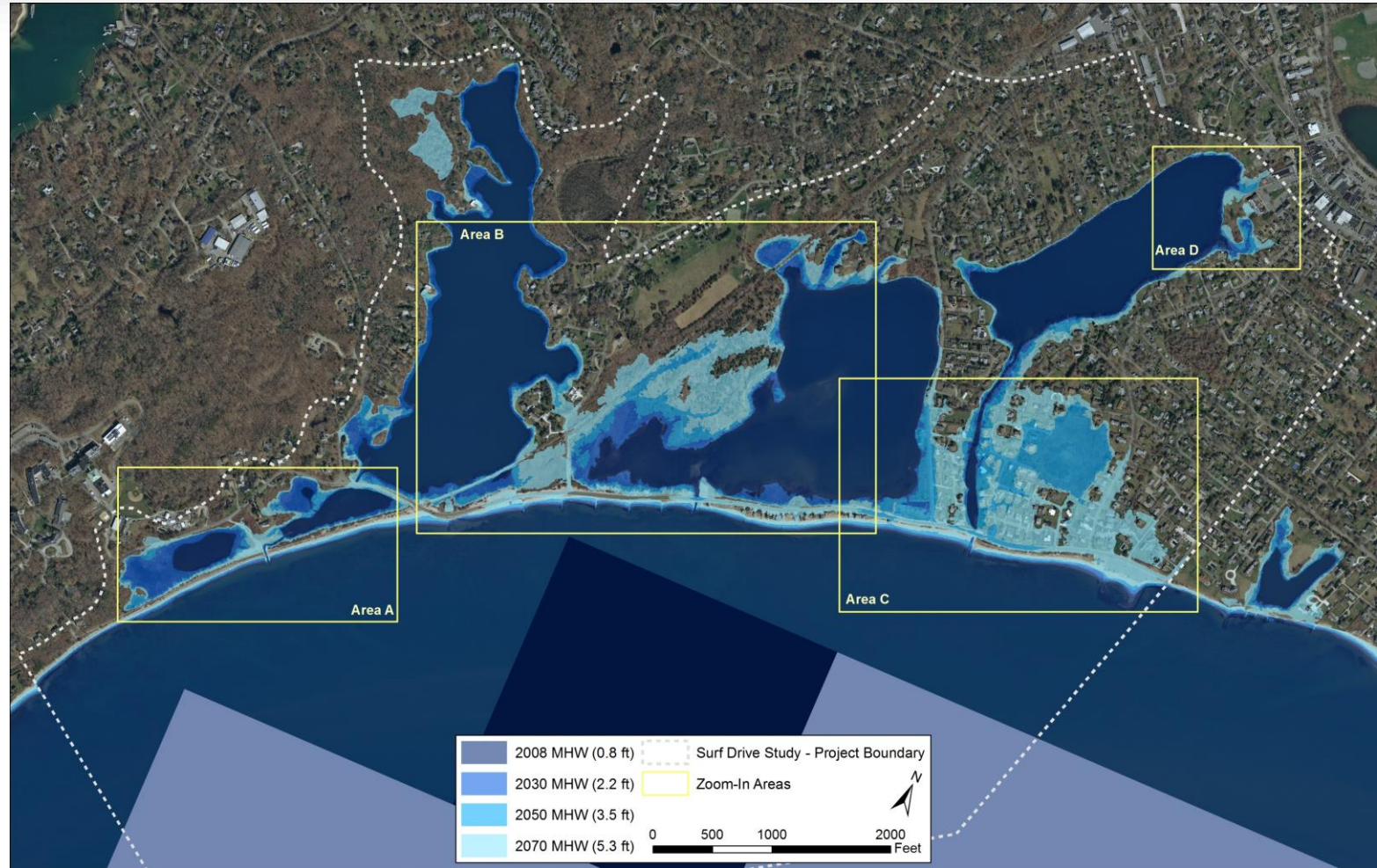
Daily High Tide Flooding



Storm Surge Inundation



Coastal Erosion



Data from the Massachusetts Coast Flood Risk Model

1. Identification of the Problem

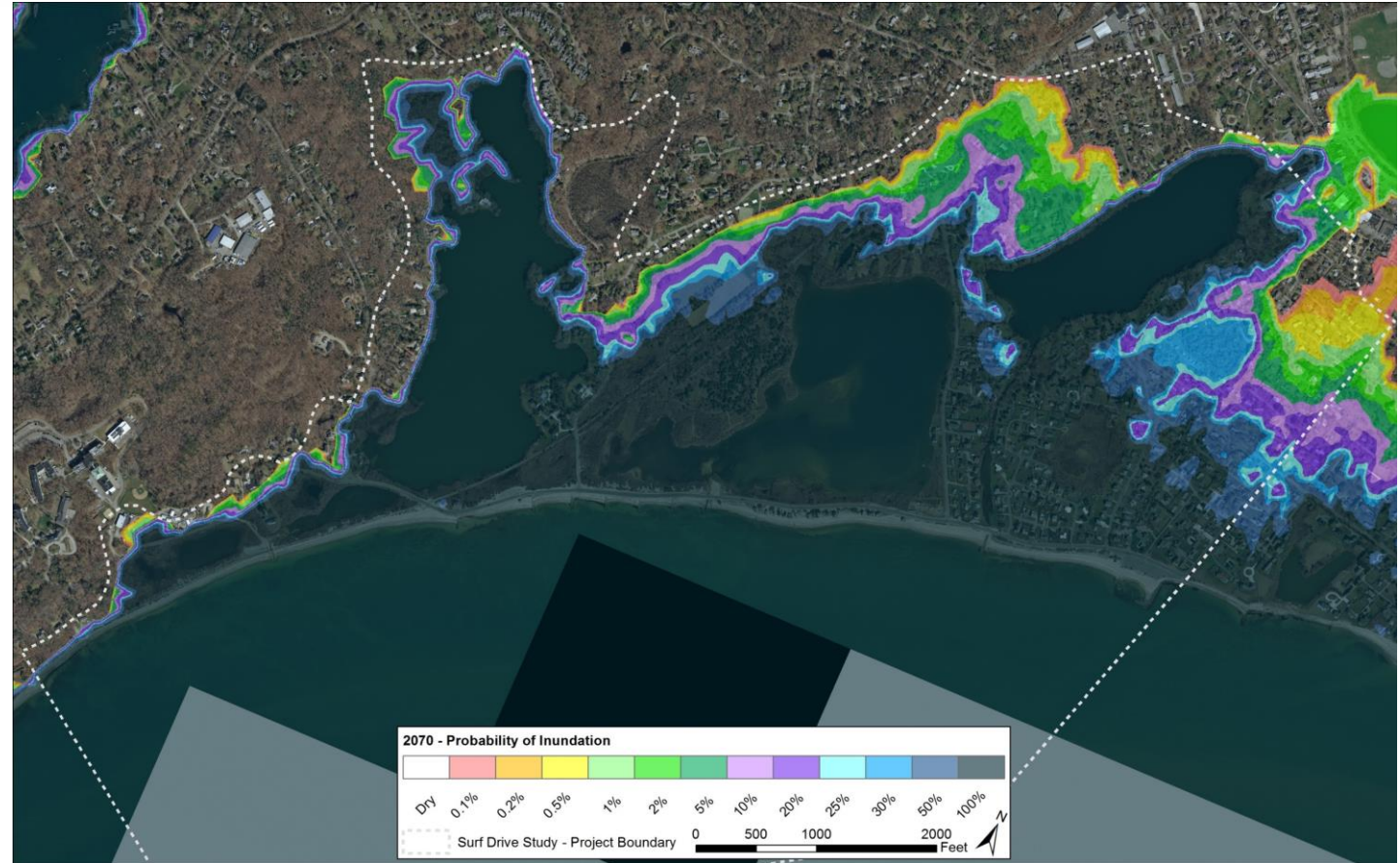
Daily High Tide Flooding



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Coastal Erosion



Data from the Massachusetts Coast Flood Risk Model

1. Identification of the Problem

Daily High Tide Flooding



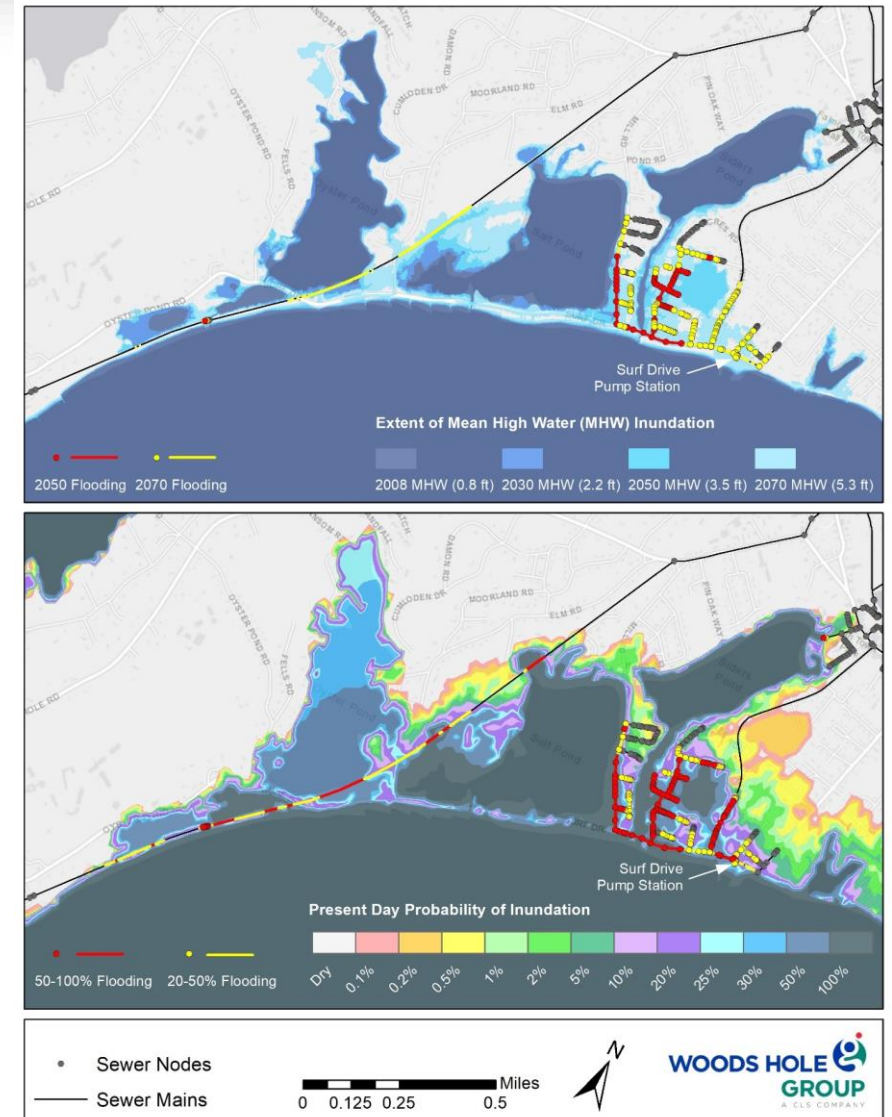
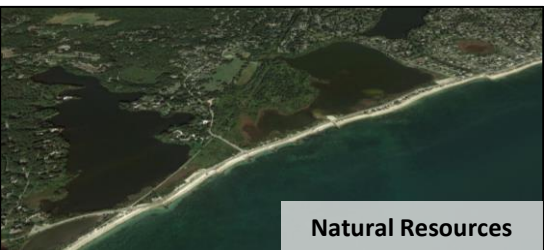
Storm Surge Inundation



Coastal Erosion



2. Identification of Key Assets



3. Development of Potential Actions

Developed regional themes based on community's goals



Natural Resources



Protection

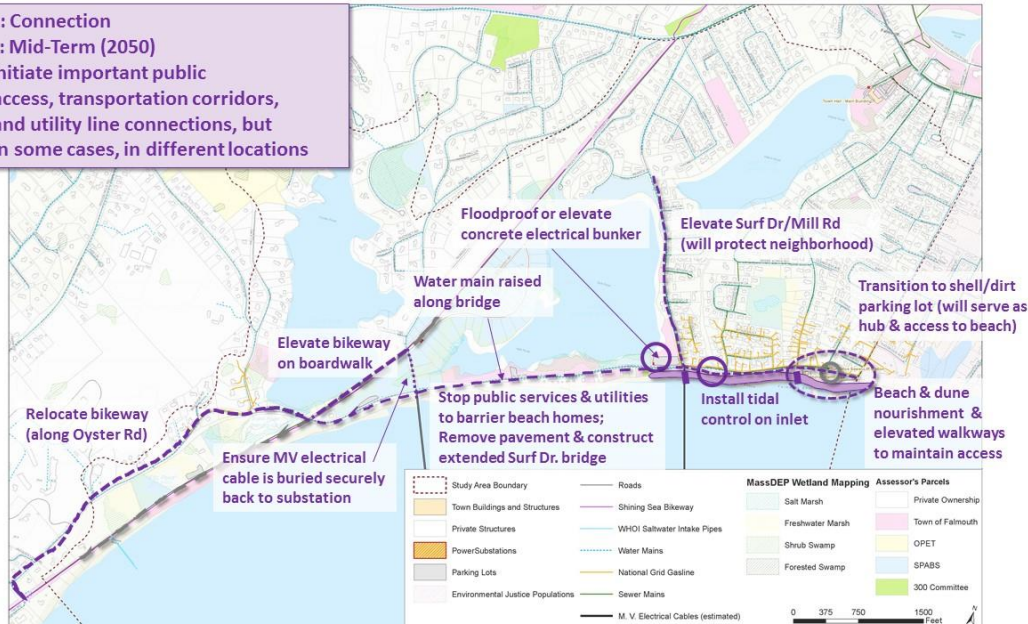


Managed Retreat



Connection

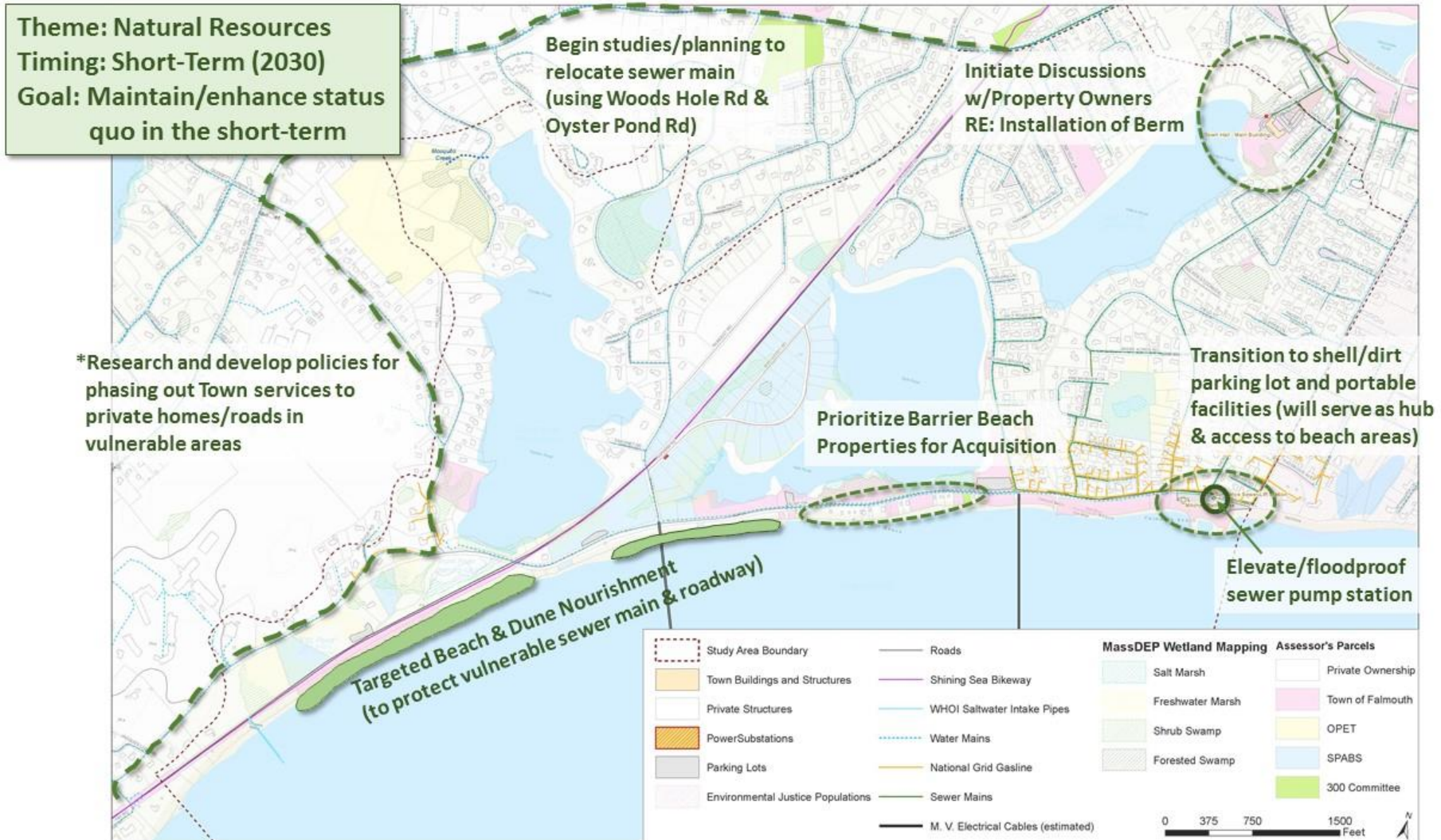
Theme: Connection
Timing: Mid-Term (2050)
Goal: Initiate important public access, transportation corridors, and utility line connections, but in some cases, in different locations



Developed potential actions for each key asset

Potential Actions – Surf Drive (along barrier beach)	Theme	Estimated Timeframe
Protect vulnerable sections of roadway with beach/dune nourishment		2030
Research and develop policies for phasing out Town services to private homes and roads in vulnerable areas		2030
Engage in public outreach to prepare residents for future changes (e.g., ending road maintenance)		2030
Cease maintenance of Surf Drive along the barrier beach (roadway can still be used, but remove pavement if damaged during storms)		2050
Remove existing Surf Drive pavement along barrier beach and construct extended Surf Drive bridge		2050
Elevate road and add revetment or sheet pile wall for protection		2050
Construct tall flood barrier (i.e., seawall) seaward of at-grade roadway		2050
Abandon Surf Drive (remove any remaining pavement)		2070

3. Development of Potential Actions

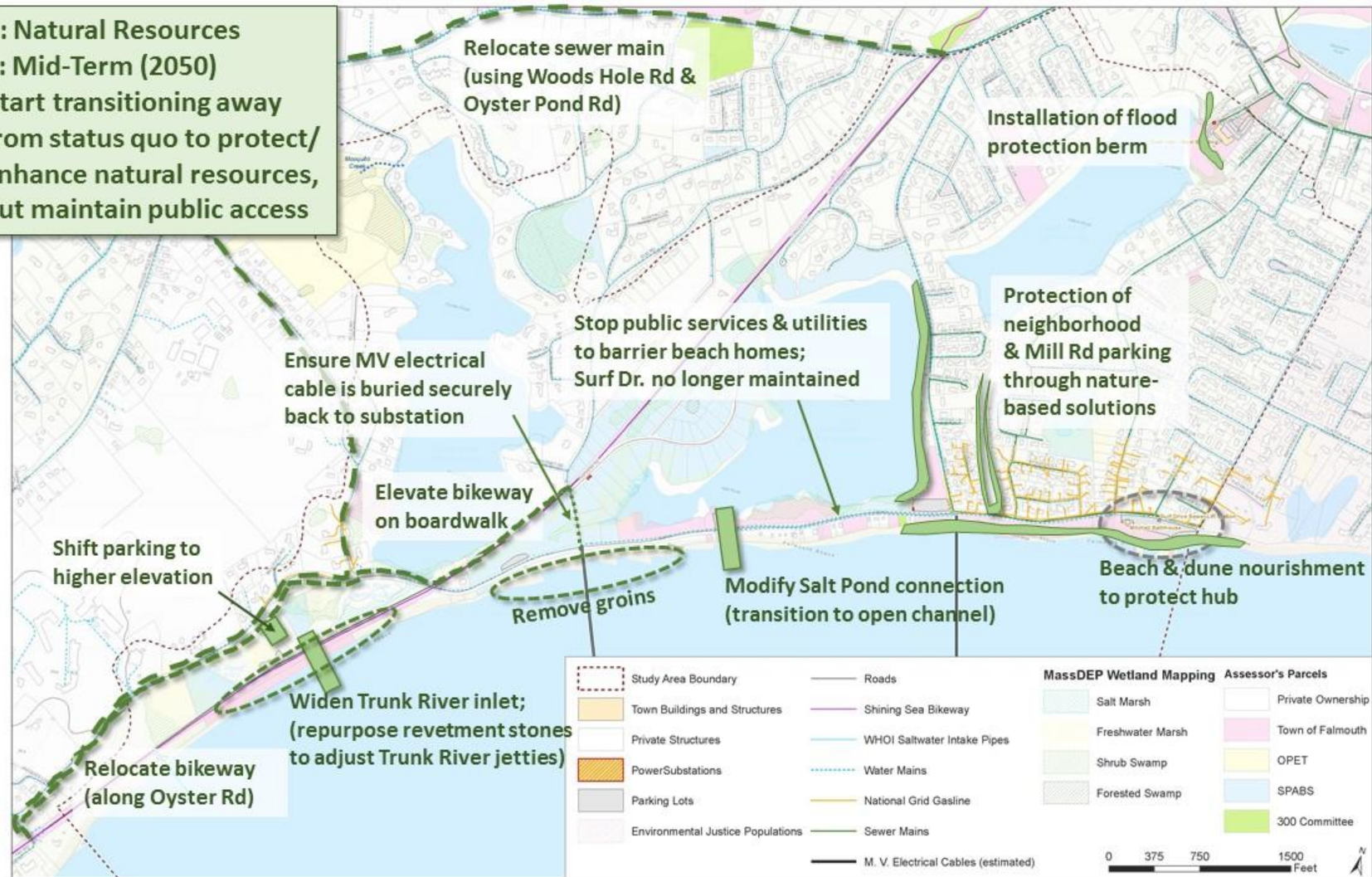


3. Development of Potential Actions

Theme: Natural Resources

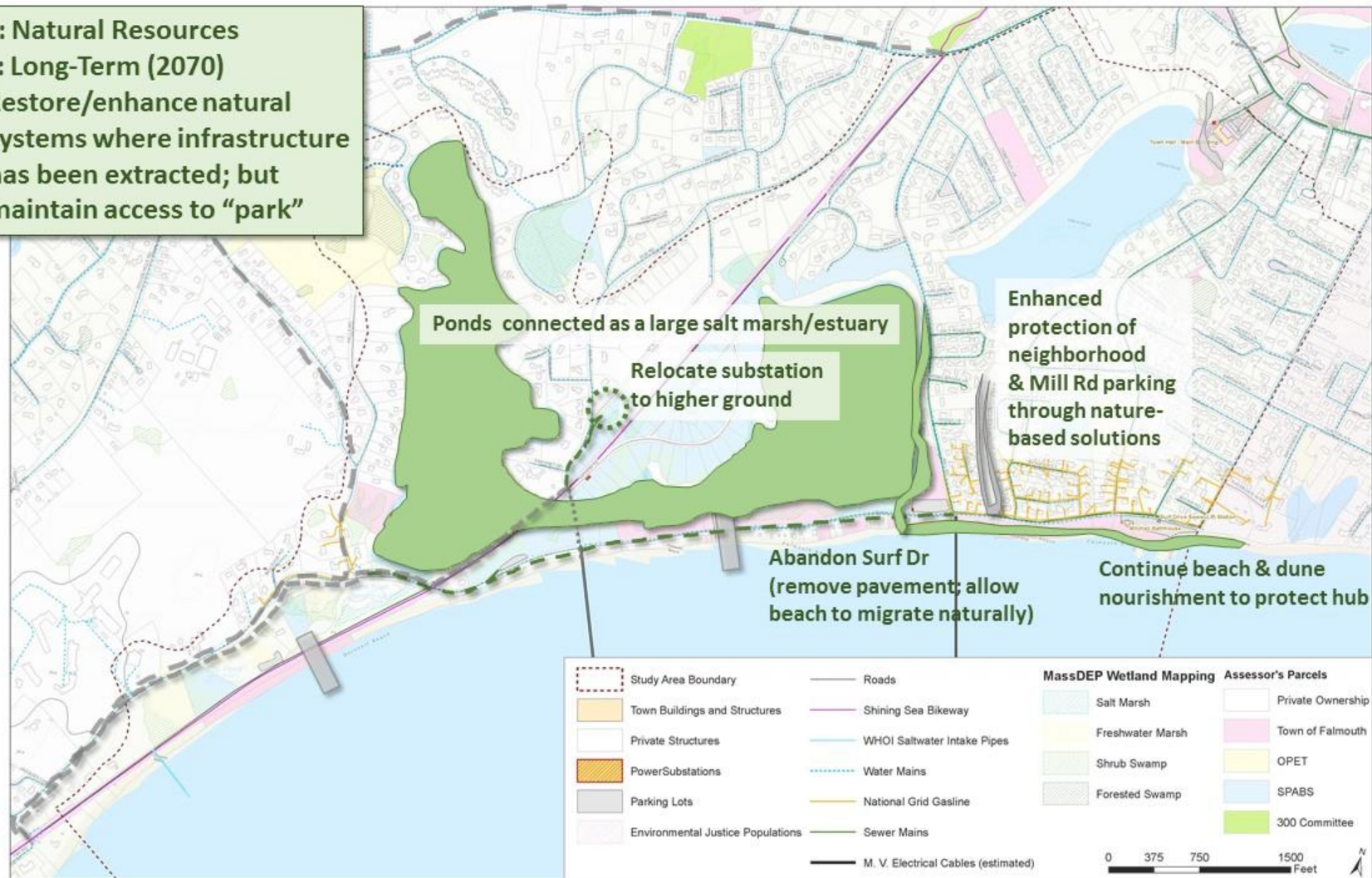
Timing: Mid-Term (2050)

Goal: Start transitioning away from status quo to protect/enhance natural resources, but maintain public access

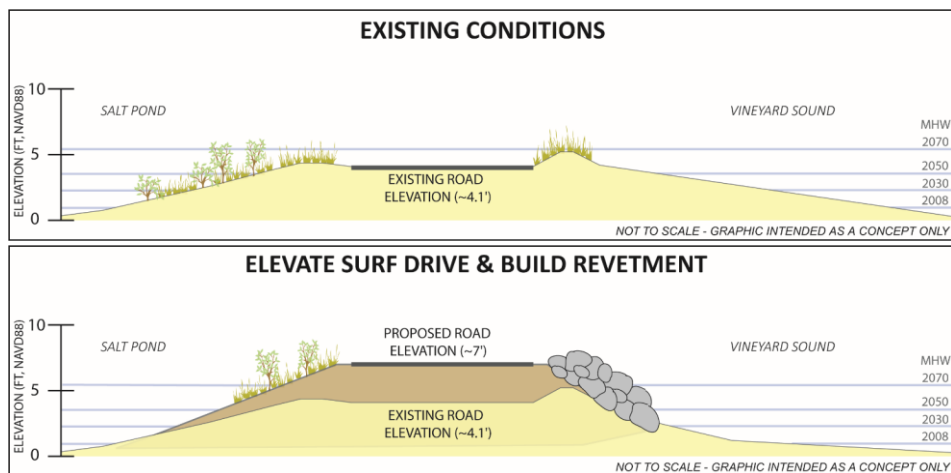


3. Development of Potential Actions

Theme: Natural Resources
Timing: Long-Term (2070)
Goal: Restore/enhance natural systems where infrastructure has been extracted; but maintain access to "park"



3. Development of Potential Actions



4. Assess Efficacy of Actions

Potential Actions	Estimated Cost	Target Effects	Adverse Impacts
Protect vulnerable sections of roadway with beach/dune nourishment	\$7.2 mil	Enhances coastal ecosystem function	Not a long-term solution
Research and develop policies for phasing out Town services to private homes and roads in vulnerable areas	N/A	Balances present use w/future cost; abandon road	Loss of homes; no connection along Surf Drive
Engage in public outreach to prepare residents for future changes (e.g., ending road maintenance)	N/A	Builds public awareness of risk and need for change	Potential push back from residents
Cease maintenance of Surf Drive along the barrier beach	N/A	Avoids continued maintenance cost of high-risk asset	Potential push back from residents
Remove existing Surf Drive pavement along barrier beach and construct extended Surf Drive bridge	\$143 mil	Maintains access and utility connections	Loss of homes; no connection to beach
Elevate road and add revetment or sheet pile wall for protection	\$29-60 mil	Protects existing infrastructure	Loss of accessible beach; aesthetics
Construct tall flood barrier (i.e., seawall) seaward of at-grade roadway	\$31-50 mil	Protects existing infrastructure	Loss of accessible beach; aesthetics
Abandon Surf Drive (remove any remaining pavement)	\$845k	Avoids continued maintenance cost of high-risk asset	Potential push back from residents

5. Develop DAPPs

KEY:



Transfer Station (can change to a different adaptation action)



Adaptation Tipping Point (Terminal – Adaptation no longer meets goals)



Natural Resource theme focused pathway



Connection theme focused pathway



Protection theme focused pathway



Managed Retreat theme focused pathway

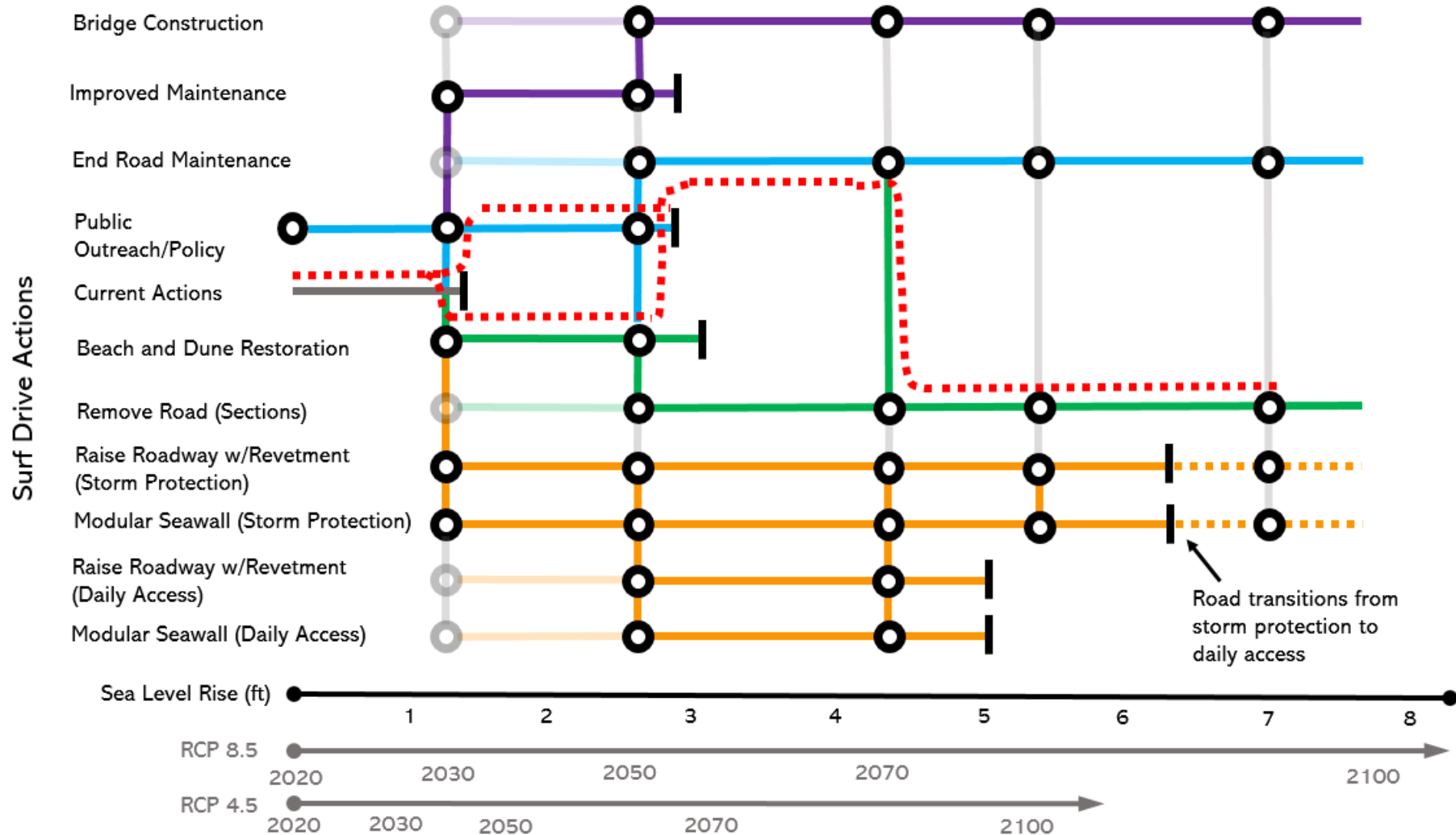


Preferred Path



Change in action function

5. Develop DAPPs

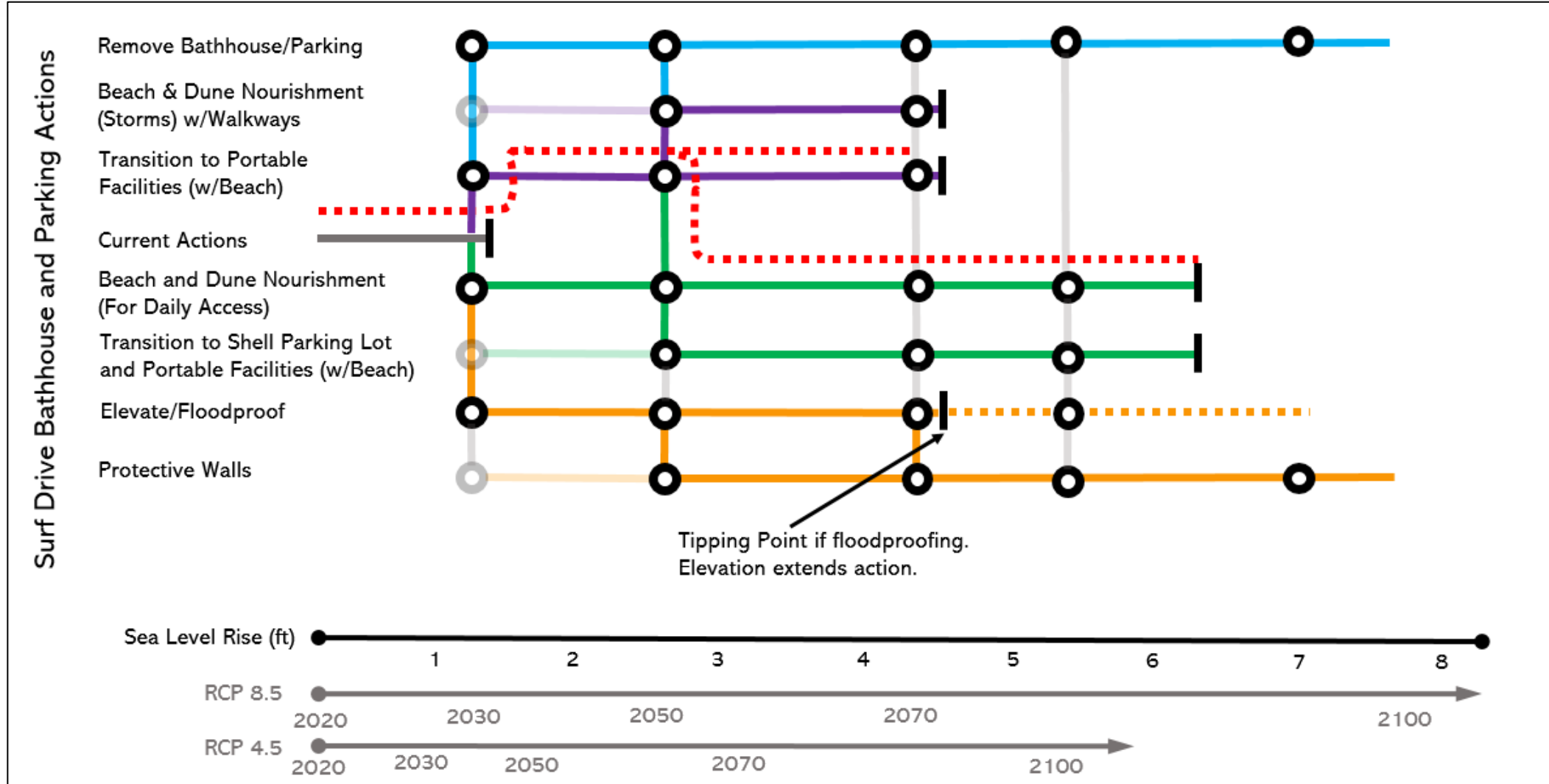


5. Develop DAPPs

Pathway Scorecard

	Path Actions	Relative Costs	Target Effects	Side Effects
1.	 Managed Retreat	+	Balances present uses with increased costs and risks in the future through a multi-phase retreat plan	Loss of Homes No Connection via Surf Drive Loss of Accessible Beach
2.	 Protection	+++++	Protects operational capacity of existing Infrastructure and features	Loss of Accessible Beach Aesthetics/Visuals
3.	 Natural Resources	+++	Preserves and enhances coastal and marine ecosystem functions	Loss of Homes No Connection via Surf Drive
4.	 Connection	+++++	Maintains important public access, utility Connections and transportation corridors	Loss of Homes
5.	   Preferred	+++	Balances present uses w/increased costs and risks in the future through a multi-phase retreat plan, while enhancing ecosystems	Loss of Homes No Connection via Surf Drive
6.	 	+++	Improved maintenance for short-term uses w/a long-term focus on ecosystem restoration	Loss of Homes No Connection via Surf Drive
7.	 	+++++	Coastal habitat restoration in the short term, w/protection of existing infrastructure in the long-term	Loss of Accessible Beach Aesthetics/Visuals

5. Develop DAPPs



Conclusions and Lessons Learned

- DAPPs allowed the Town to:
 - Navigate a difficult decision process and build consensus
 - Develop an initial action plan based on today's goals and climate projections
 - Define key triggers and tipping points to adjust planned timelines in the future
 - Switch “paths” to select a different action in the future if goals, funding, and/or conditions change
 - FLEXIBILITY!
- Managed retreat and restoration of natural resources can be coupled with targeted protection of key infrastructure to meet varied goals
- Scalability in application of DAPPs can be difficult

Additional Resources

Coastal Resiliency Planning for the Surf Drive Area

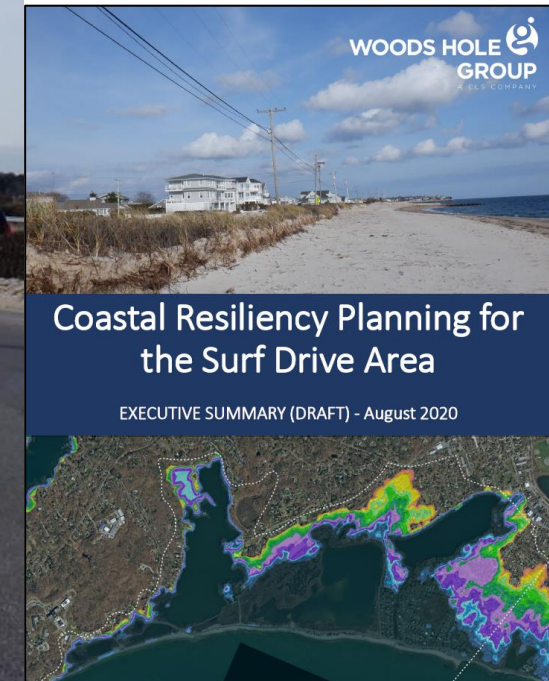
A phased management approach for reducing vulnerability to natural hazards and enhancing coastal resiliency

Town of Falmouth | September 17, 2020



[Surf Drive Story Map - Phased Adaptation Plan](#)

[Town of Falmouth - Coastal Resiliency Action Committee Webpage](#)



Fiduciary duties are legal obligations that require an individual or entity to act in the best interests of another party. In real estate, agents have a fiduciary duty to their clients, which means that they must act in the best interests of their clients and not their own interests.

These are the fiduciary duties for real estate professionals:

- Obedience
- Loyalty
- Disclosure
- Confidentiality
- Accounting
- Reasonable care and diligence

For the purposes of CRAC's focus, including mitigating rising sea level, homes at flood risk, etc. the fiduciary duty of *disclosure* is key. But, I believe the duty of *loyalty* comes into play as well.

The duty of disclosure

The duty of disclosure means that agents have a legal obligation to disclose any known material facts about the property or the transaction to their clients. *Material facts are facts that could reasonably be expected to affect the value or desirability of the property.*

Example: An agent knows that there is a problem with the property's foundation. They have a duty to disclose this information to their clients, even if it may be unfavorable to the sale.

The real estate agent who represents a buyer must make a good faith effort to learn all of the available information about the condition of a property and communicate everything known about it to the buyer, so the buyer can purchase the property at a price that accurately represents its value.

The duty of loyalty

The duty of loyalty is one of the most fundamental fiduciary duties owed by an agent to his principal. The duty of loyalty requires the agent *to act at all times solely in the best interests of his principal to the exclusion of all other interests, including the brokers, and to not take any actions that would conflict with the client's interests.*

The most common lawsuits brought against real estate agents are for breach of duty because clients place trust in their agents' expertise and their agent must act in the best interest of the client.

Press Release for the Coastal Resilience Advisory Committee's Communication and Outreach Plan

The Town of Nantucket's Coastal Resilience Advisory Committee (CRAC) advises the Select Board about all things resilience island-wide. We are continuing to implement the [Town's Coastal Resilience Plan](#) (CRP) recommendation #1-1, which is a high priority, to communicate and educate the public about coastal hazards, risks, and coastal resilience related projects and issues on Nantucket. Every Thursday on the Town of Nantucket Natural Resources Department's social media accounts (Instagram: @NRDACK; Facebook: Town of Nantucket Natural Resources Department) we have posted information regarding flooding, erosion, sea level rise, CRP projects and recommendations, and related topics. Ten organizations have committed to share our posts on their social media platforms and/or newsletters including ACKclimate, Nantucket Land Bank, Town of Nantucket, Nantucket Chamber of Commerce, Nantucket Coastal Conservancy, Nantucket Conservation Foundation, Nantucket Land and Water Council, Maria Mitchell Association, UMASS Boston Field Station, and ReMain/Envision Resilience.

It is CRAC's hope that this information will be shared by the local news media to reach a wider audience on these important issues and topics. You can count on weekly submissions with associated links, QR codes and pictures to add in your briefs, environmental section, or a newly created coastal resilience section for your newspaper or e-newsletter.

If you are interested in sharing this content or have any questions, please reach out directly to the Town's Coastal Resilience Coordinator, Leah Hill (Lhill@nantucket-ma.gov; 508-228-7200 ext. 7603) or to the Coastal Resilience Advisory Committee's chair, Peter Brace 508-325-3432.