

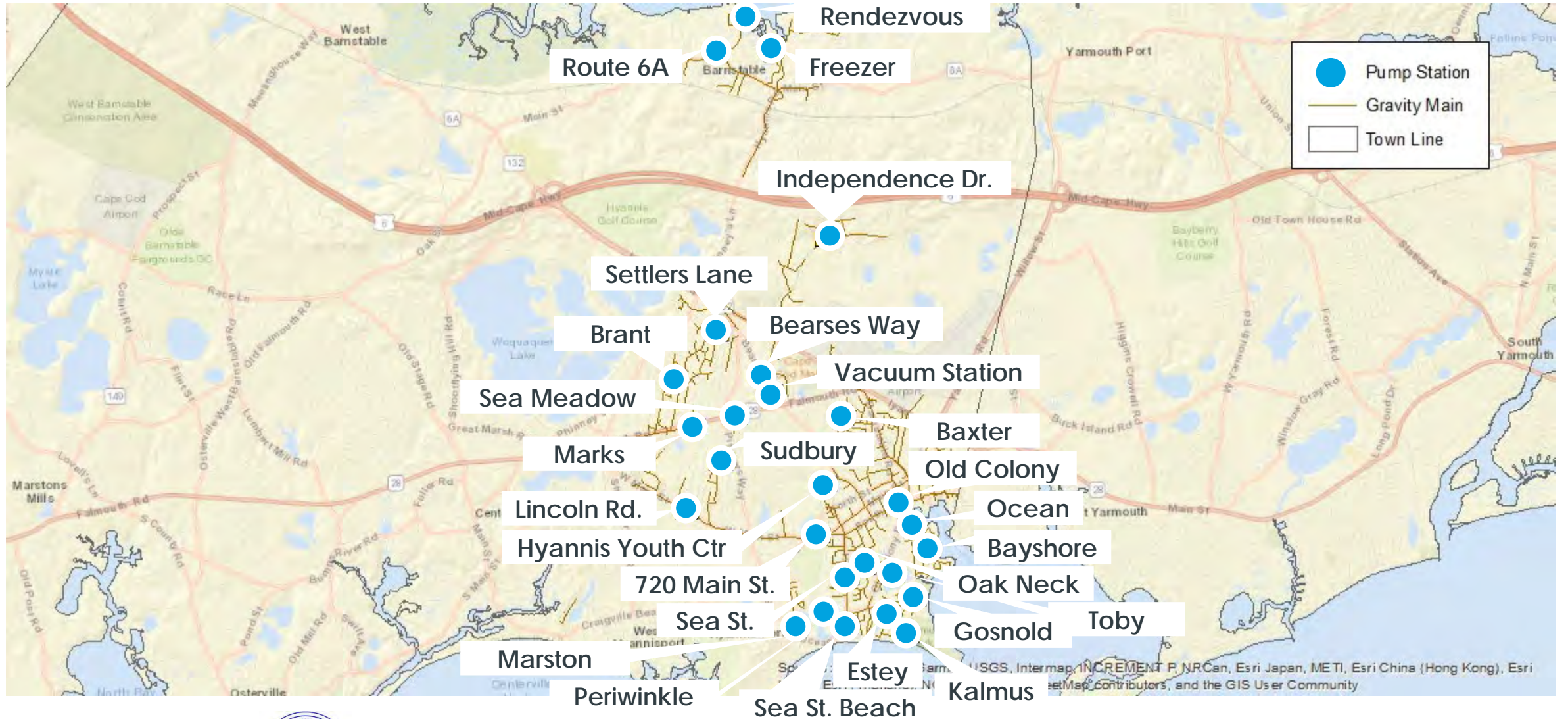
Holistic Approach to Collection System Asset Management in Barnstable

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Barnstable's Pump Stations



Holistic Approach



Part 1: Four Additional Evaluations

Capacity Analysis



- Drawdown tests
 - Two per pump
- Pump Station Capacity Requirements
 - Pump
 - Wet well
 - Force main

Energy Management Review



- Alternative power for emergency operations
- Pump motor efficiency
- VFD vs. Soft Start vs. Across the line
- HVAC Evaluation
- Lighting
- Rebate Program Opportunities

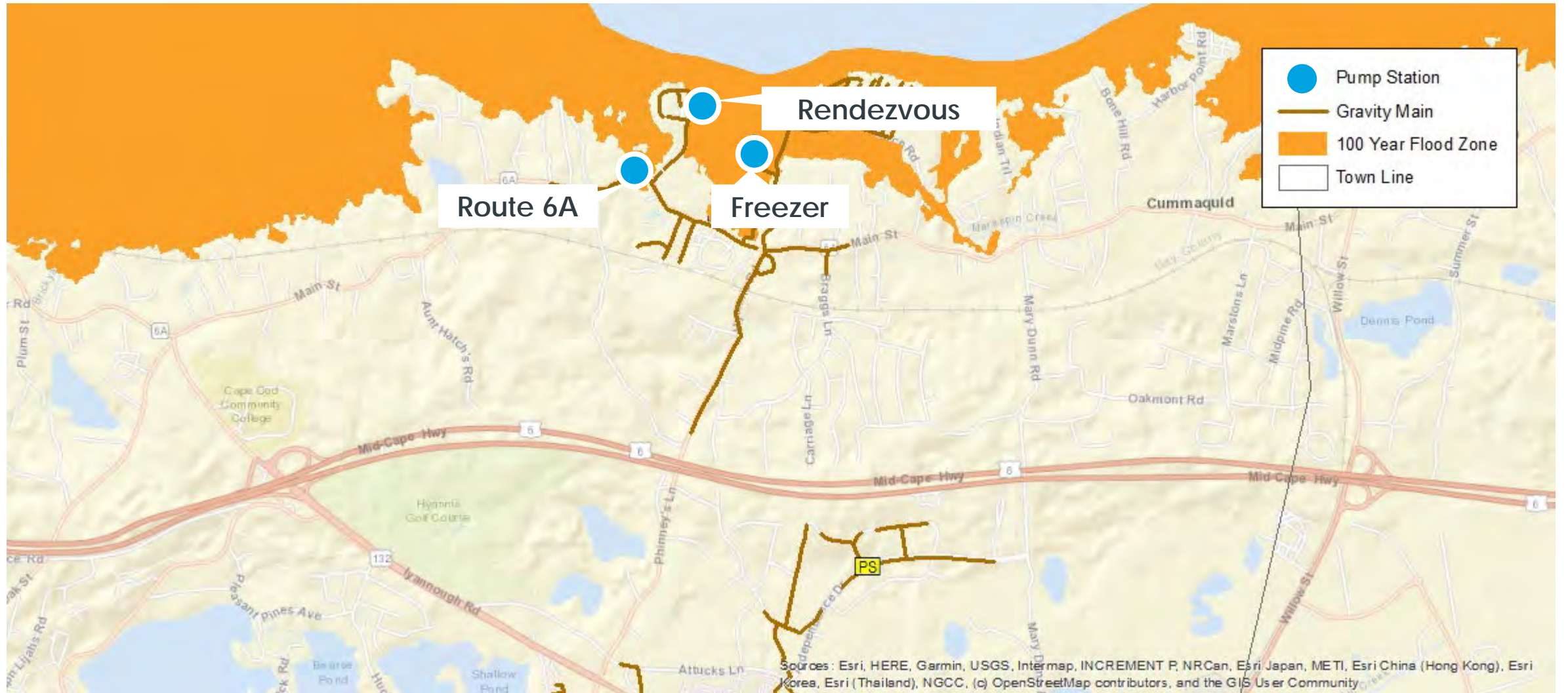
Force Main Prioritization



9 criteria used to evaluate FM's

- Diameter
- Material
- Age
- Length
- Flow
- Velocity
- Detention time
- Number of cycles to clear
- Number of stations upstream

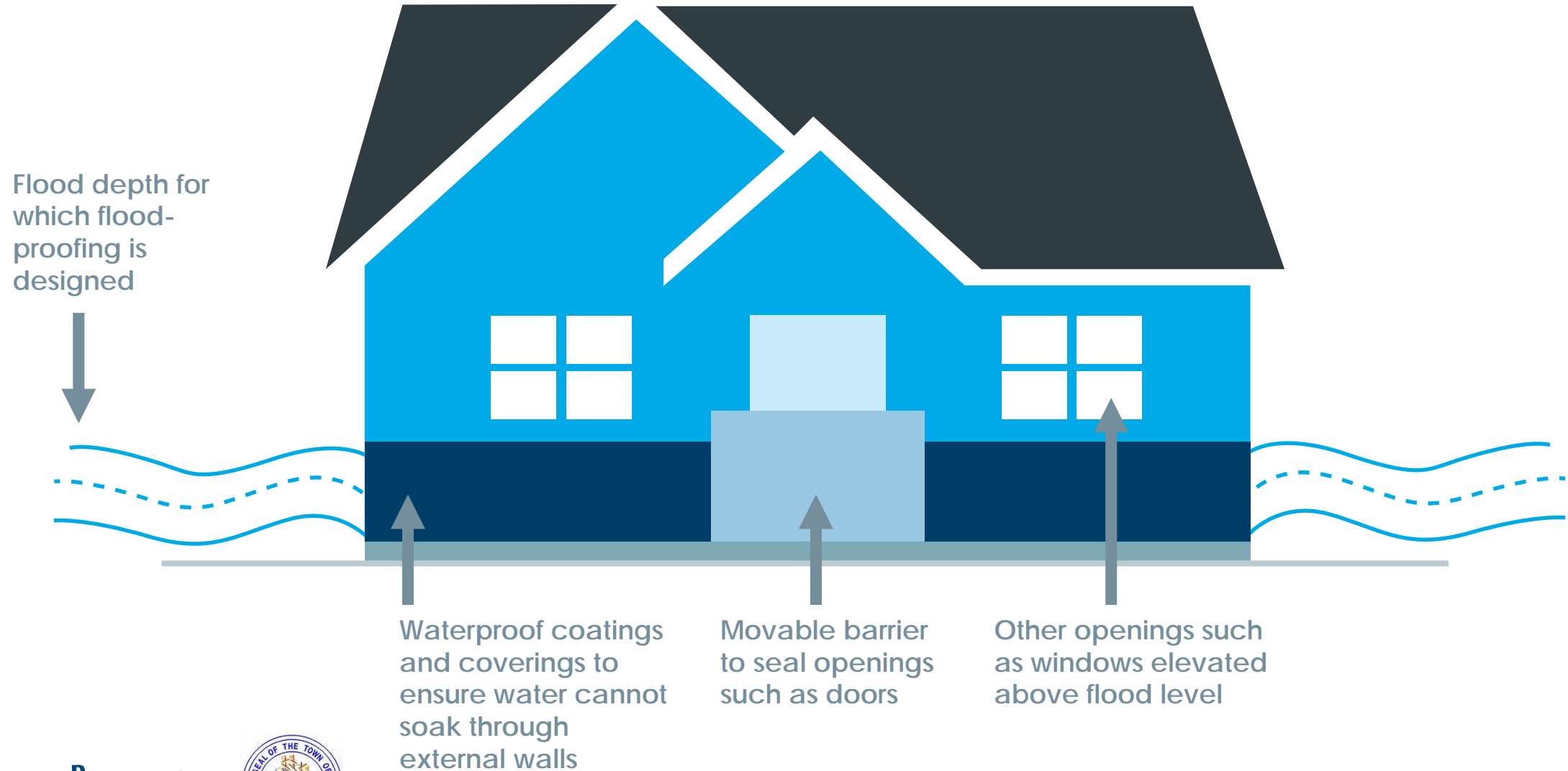
Coastal Resiliency



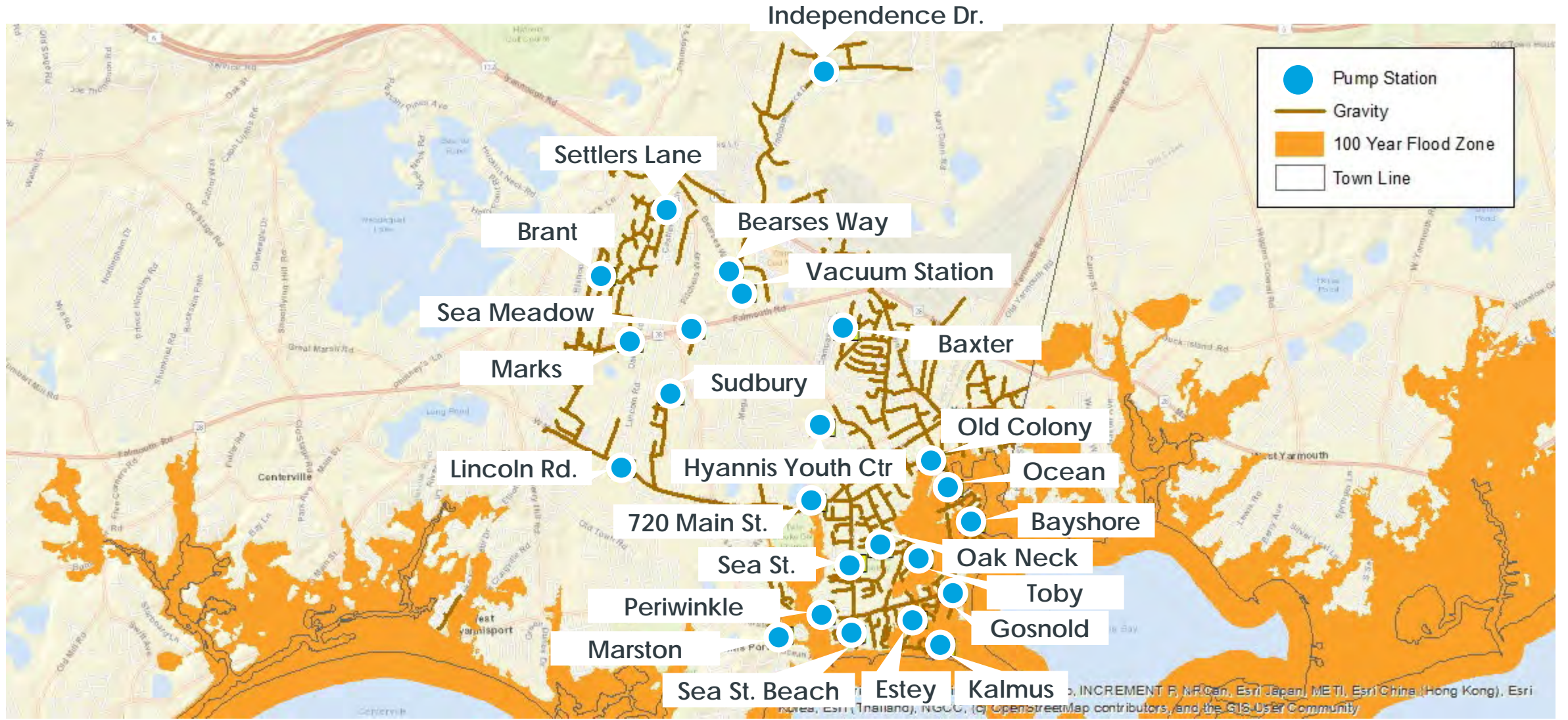
Coastal Resiliency



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Coastal Resiliency



Holistic Approach



Part 2: Standard Condition Assessment

Condition Assessment & Risk Analysis

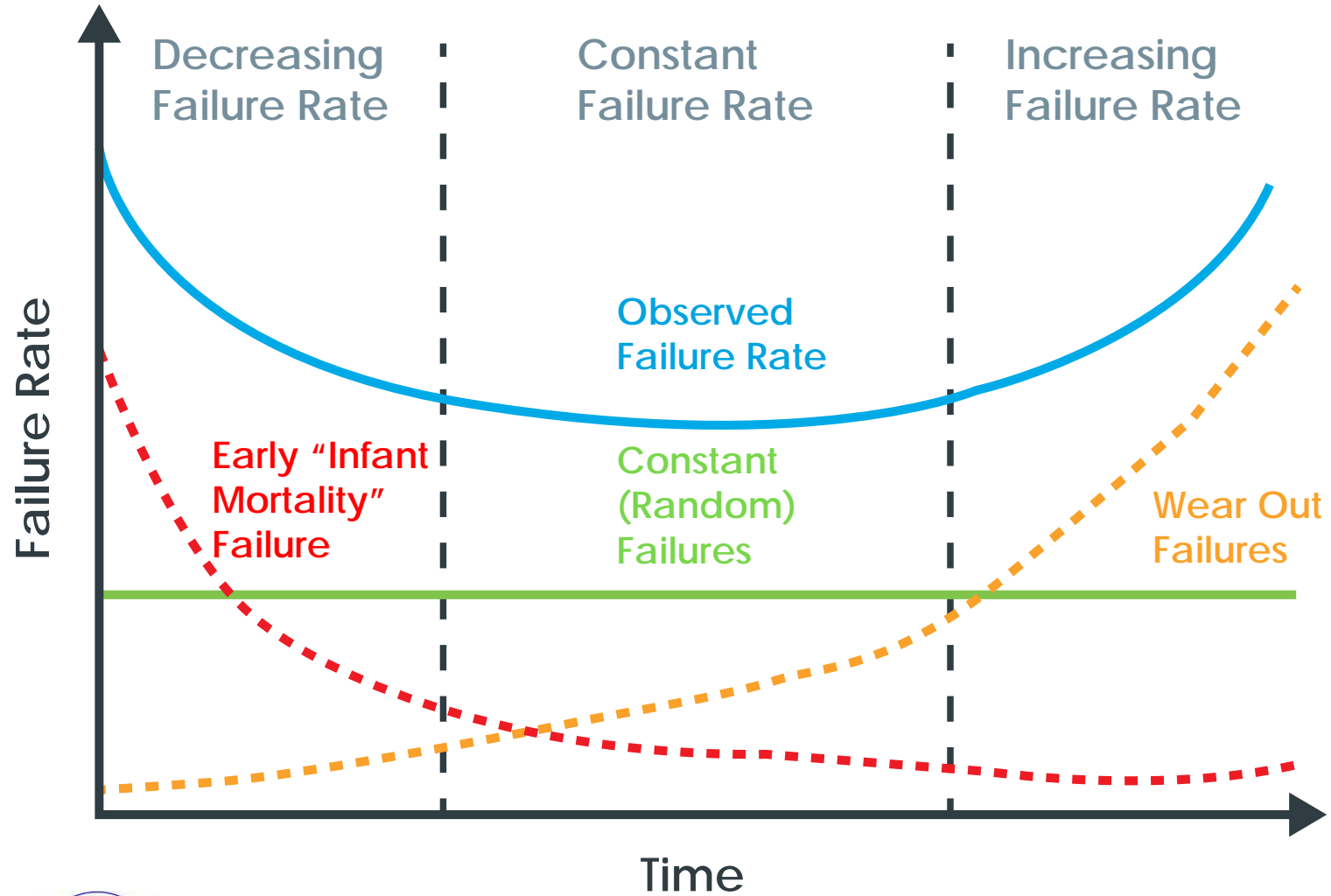
Industry Standard

- Likelihood of Failure
- Consequence of Failure
 - Triple Bottom Line Concept
 - Social, Economic, Environmental
- Business Risk Exposure Rating
- Assets with the highest BRE's are the ones scheduled for renewal first

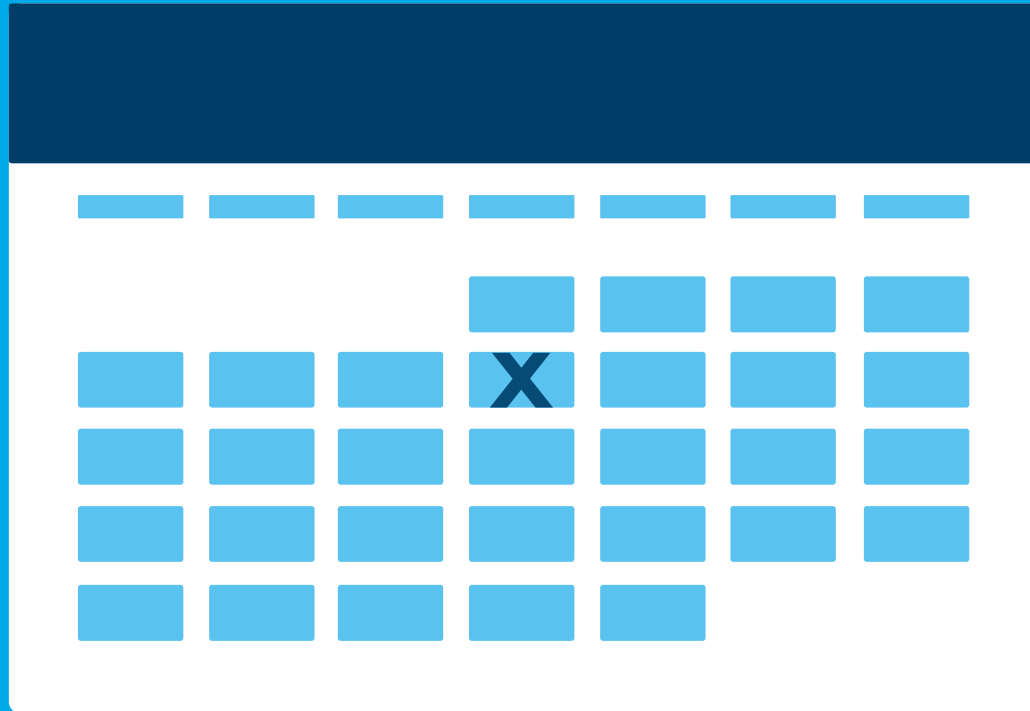
Wright-Pierce Approach

- Probability of Failure
 - Use Weibull Analysis
- Consequence of Failure
 - Triple Bottom Line Concept
 - Replacement Time & True Redundancy
- Management Strategies

Weibull Analysis

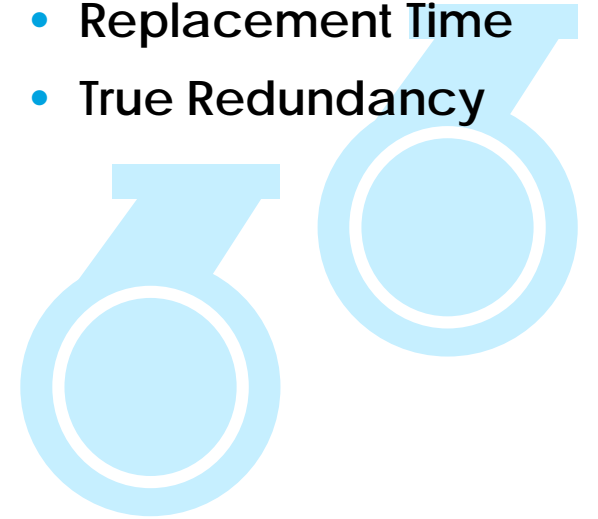


Consequence of Failure



Triple Bottom Line Concept

- Replacement Time
- True Redundancy



Management Strategies

Assignment of Management Strategies

		Consequence of Failure									
		1	2	3	4	5	6	7	8	9	10
Probability of Failure	10	D	D	B	B	A	A	A	A	A	A
	9	D	D	B	B	A	A	A	A	A	A
	8	D	D	C	B	B	B	A	A	A	A
	7	D	D	C	B	B	B	B	B	A	A
	6	F	F	C	C	C	B	B	B	B	B
	5	F	F	F	C	C	C	C	C	C	C
	4	F	F	F	E	C	C	C	C	C	C
	3	F	F	F	E	E	E	E	C	C	C
	2	F	F	F	E	E	E	E	E	E	E
	1	F	F	F	E	E	E	E	E	E	E

Summary of Assets by Strategy

Group	Strategy	Count	% Assets
A	Critical R&R	13	2%
B	Priority R&R	69	8%
C	Add PdM Schedule	78	9%
D	Opportunistic R&R	133	16%
E	Rt or PM Schedule	232	28%
F	Run to Fail	304	37%
G	(undefined)	0	0%
TOTAL		829	

Asset Life Cycle Example

Assignment of Management Strategies

		Consequence of Failure									
		1	2	3	4	5	6	7	8	9	10
Probability of Failure	10	D	D	B	B	A	A	A	A	A	A
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	2	F	F	F	E	E	E	E	E	E	E
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Asset Life Cycle Example

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	3	F	F	F	E	E	E	E	C	C	C
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Asset Life Cycle Example

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	1	F	F	F	E	E	E	E	E	E	E

Bringing it All Together: 20 Year CIP

- R&R schedule
- Capacity issues
- Energy benefits
- Force main assessment schedule
- Coastal resiliency improvements

How Barnstable Uses the AMP



Yearly Pump Station
R&R Budgeting



CMMS Integration



Inventory

Acknowledgements



Andy Boule
Griffin Beaudoin
Rob Delgado



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Eric Lemoi
Marc Moccio
Kevin Olson

THANK YOU
