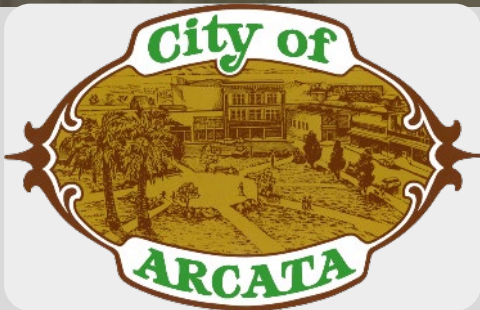




# Arcata Wastewater Treatment Facility Feasibility Study



# Arcata Wastewater Treatment Facility Feasibility Study

## Project Purpose

### Purpose

- Investigate and evaluate strategies for protecting, relocating, or otherwise adapting the City's wastewater facilities to maintain safety and regulatory compliance considering long-term climate change effects from flooding and other coastal hazards.

The City is undertaking this comprehensive planning feasibility study in part to identify long-term, cost effective pathways for wastewater compliance. This effort prepares the City to evaluate future costs and secure funding for future improvements.

# Arcata Wastewater Treatment Facility Feasibility Study

## Project Goals and Funding

### Goals

- Inform the City on options to move forward on levee resilience improvements around the Treatment Facility
- Identify multiple top-ranking alternatives to support future decisions


### Funding

- City Feasibility Study funded through a State Water Resources Control Board (SWRCB) grant administered through Rural Community Assistance Corporation with cooperation from the Coastal Commission and Regional Water Quality Control Board

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# Arcata Wastewater Treatment Facility Feasibility Study Scope

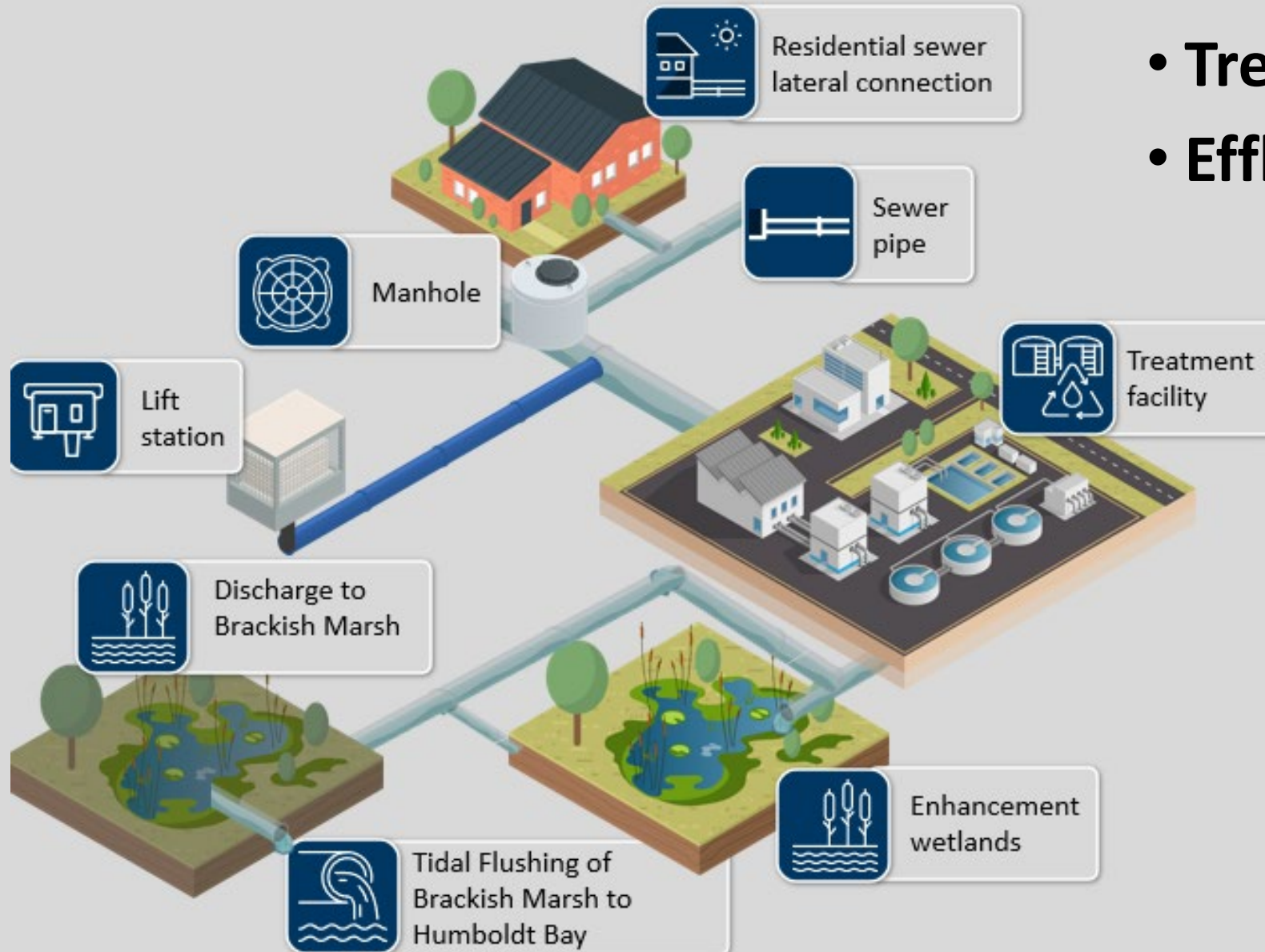
## Feasibility Study Report:

- Background Information Review
- Coastal Hazards Risk Assessment
- Adaptation Strategy Development
- Alternatives Analysis 
- Identification of Top Ranked Alternatives
- Cost Analysis and Funding Plan
- Final Feasibility Study Findings

(Final Alternative Selection not included in the Feasibility Study)

# Existing Wastewater System

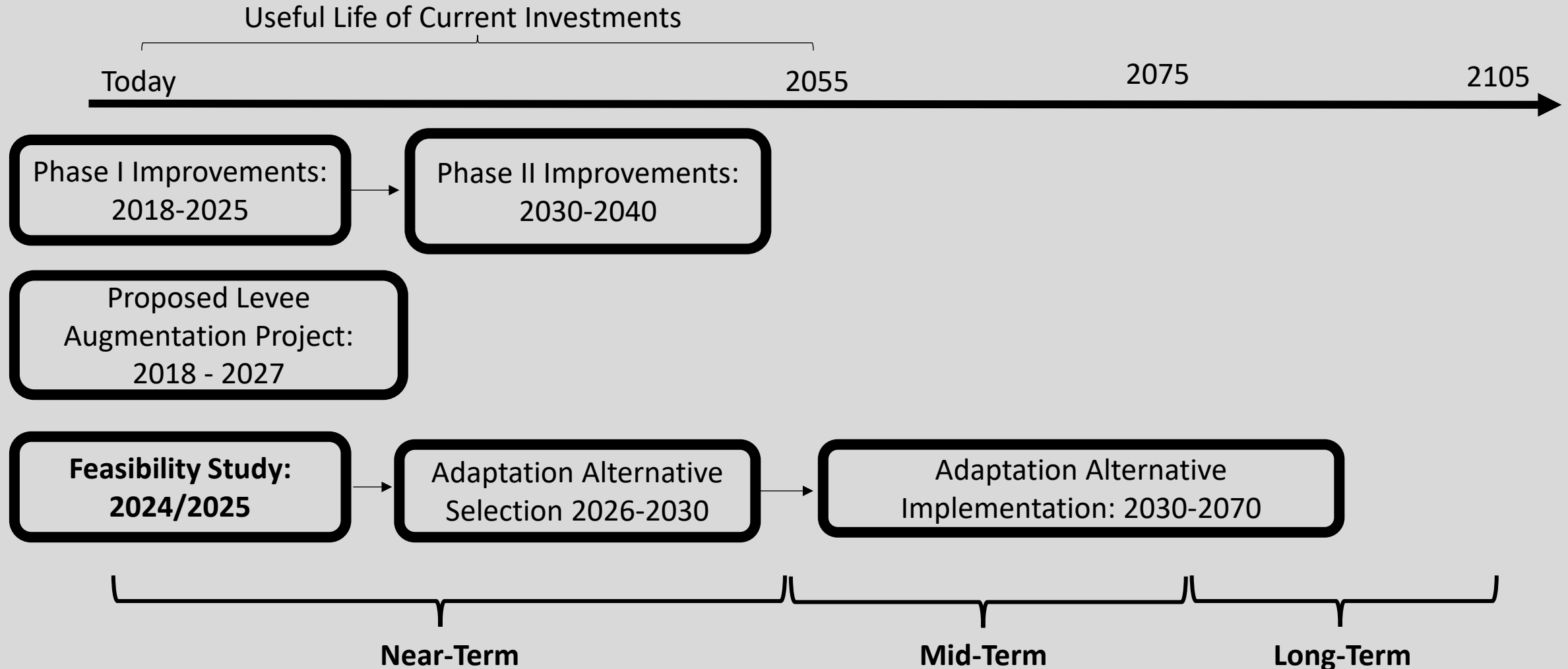
- Collection System
- Treatment Facility
- Effluent Discharge System







# Arcata Wastewater Treatment Facility Improvement Timeline





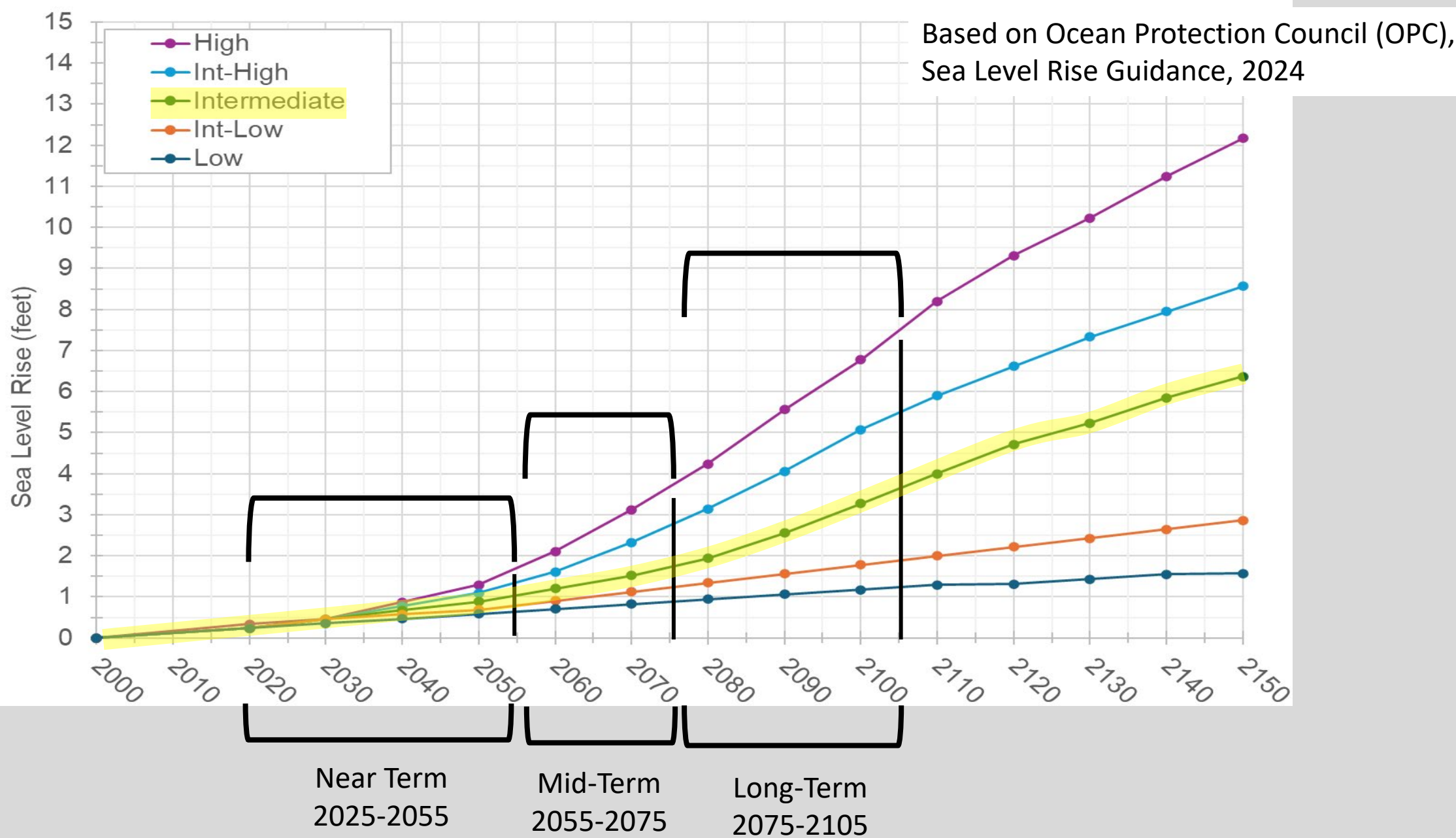
# Wastewater Treatment System

## Coastal Hazards Risk Assessment

- Coastal Hazards Risk Assessment Included the following components and outcomes:
  - Assessment of changes in sea level rise and coastal hazards over time
  - Evaluation of asset vulnerability
  - Evaluation of asset adaptive capacity
  - Likelihood that asset will be flooded
  - Consequences if asset is flooded
  - Risk of asset damage/ failure based on a combination of likelihood of flooding and consequences of flooding



# Sea Level Rise Scenarios/ Timelines Assessed





# Risk Assessment

- Risk assessed qualitatively based on
  - Likelihood of a flood event causing an impact
  - Consequences to the wastewater asset if flooded

Risk Matrix Evaluation							
		Consequence					
		Insignificant	Minor	Moderate	Major	Severe	Catastrophic
Likelihood	Almost Certain					Very High	
	Very Likely						
	Likely				High		
	Unlikely	Very Low	Low	Medium			
	Very Unlikely						
	Almost Unprecedented						

# Treatment Facility and Arcata Marsh Risk without the AWTF Levee Project

Risk Rating
Very High
High
Medium
Low
Very Low

	Flood Elevation Threshold for Impacts	Timeline/ Risk Rating			
		Today	Near-Term	Mid-Term	Long Term
Site and Facility Access	11.2 ft	Low	Medium	Medium	Medium
Essential Treatment Facilities	10.7 ft – 16.7 ft	Low	Medium	High	High
Enhancement Marshes	11.7 ft - 13.3 ft	Low	Medium	High	High

(Analysis based on Ocean Protection Council – Intermediate Sea Level Rise Scenario)

# Treatment Facility and Arcata Marsh Risk with the Future AWTF Levee Project

Risk Rating
Very High
High
Medium
Low
Very Low

	Flood Elevation Threshold for Impacts	Timeline/ Risk Rating			
		Today	Near- Term	Mid- Term	Long Term
Site and Facility Access	11.2 ft				
Essential Treatment Facilities	Protected to 15 ft				
Enhancement Marshes	11.7 ft - 13.3 ft				

(Analysis based on Ocean Protection Council – Intermediate Sea Level Rise Scenario)



# Review November 14, 2024 Public Meeting

## Goals

- **Inform** the community on the multiple efforts the City is leading to address Sea Level Risk and Hazard Mitigation as it relates to the wastewater treatment facility and the treatment marshes.
- **Discuss and solicit input** from the community on the following topics
  - Wastewater discharge infrastructure alternatives
  - Importance of wastewater discharge continuing to have a beneficial reuse in the environment
  - Priorities and wastewater system considerations

# Key Take Aways from 11/14/24 Public Meeting

- **Wastewater Discharge Infrastructure**

- Strong support for protection of the Arcata Marsh and retention of the enhancement benefits it brings to the environment with concerns about protection into the future.
- Interest in the potential for land application to increase local beneficial reuse and reduce discharge into the Bay, but also concerns related to increases in groundwater levels.
- Interest in partnering with the Harbor District on use of the Redwood Marine Terminal existing Ocean outfall.
- Interest in incorporating decentralized systems to reduce the load on the primary wastewater treatment plant.



# Key Take Aways from 11/14/24 Public Meeting

- **Beneficial Uses of Effluent in the Environment**

- Sustainability and Environmental Protection were central themes, with strong support for using marshlands, eco-levees, and agricultural reuse.
- There were significant concerns about the environmental impact of ocean outfalls, groundwater injection, and the byproducts of land application.
- Participants showed an interest in innovative technologies like composting toilets and small-scale, decentralized solutions, but emphasized the need for careful consideration of location and environmental suitability for each method.
- Participants emphasized the top priority of protecting existing enhancement marshlands and suggested further research on their beneficial uses. Participants also proposed integrating levees to protect the marshes from environmental threats.

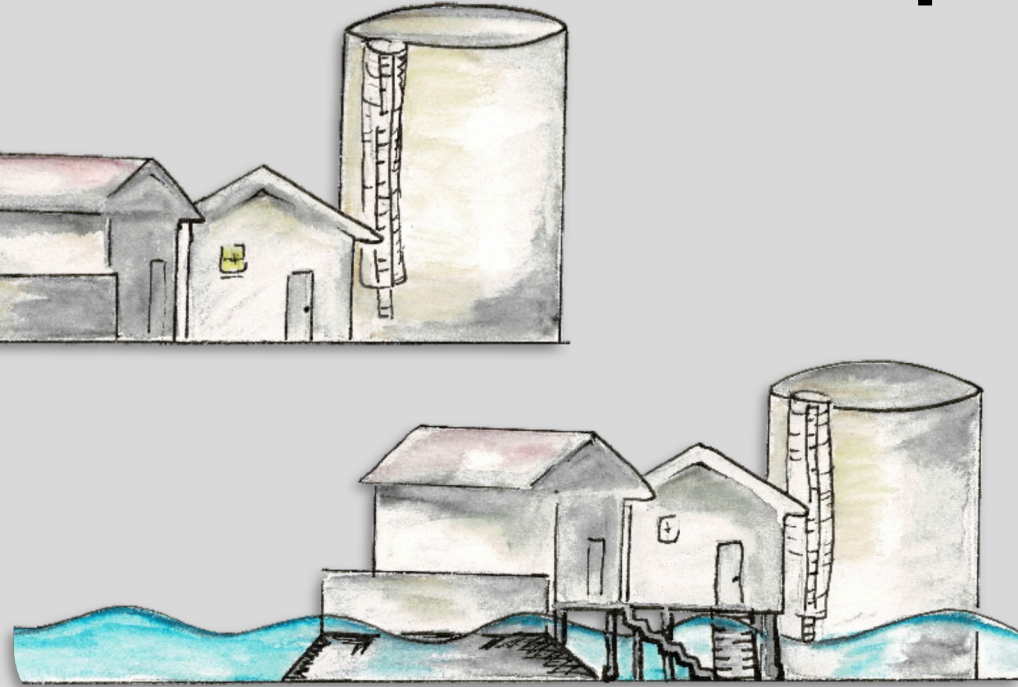
# Input Received on Decision Making Criteria (Values) and Wastewater System Considerations

Negotiable (flexible) Criteria	Relative Importance to the Community	Ranking Description
Use natural systems as part of the treatment process	1	Strategies that encompass greater use of natural systems were ranked higher
Costs	2	Strategies that may have a lower cost were ranked higher
Incorporate new beneficial reuse/ ancillary benefits	3	Strategies that added in beneficial reuse were ranked higher
Maintain existing beneficial reuse/ ancillary benefits	4	Strategies that maintained existing beneficial uses were ranked higher
Proactive climate change readiness	5	Strategies that resulted in more proactive climate readiness were ranked higher
Stay within existing footprint of the AWTF	6	Strategies that kept facilities within the existing AWTF footprint were ranked higher.

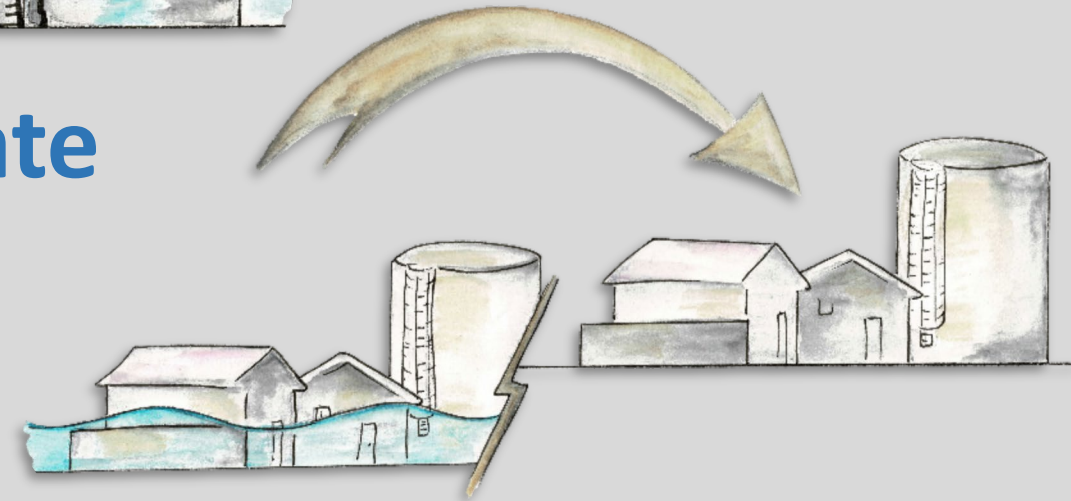


# Adaptation strategies

Protect



Accommodate



Retreat



# Collection System Adaptation Strategies

	Retreat	Protect	Accommodate
Near-term Adaptation Strategies			
Inflow and Infiltration Reduction		X	X
Elevate Pump Station Electrical Components			X
Mid-term/ Long-term Adaptation Strategies			
Continued Collection System Upgrades		X	X
Reroute Collection System for Treatment Plant Relocation	X		

# Treatment Adaptation Strategies

	Retreat	Protect	Accommodate
Near-term Adaptation Strategies			
Phase 1 Electrical Upgrades			X
Minor Levee Improvements			X
Mid-term/ Long-term Adaptation Strategies			
Levee Augmentation Project		X	
Relocate AWTF	X		
Decentralized Treatment (Not stand Alone)	X		X

# Treatment System

## Near-Term Adaptation Strategy

<b>Strategy</b>	Phase I Improvements include elevating essential electrical equipment as well as treatment upgrades
<b>Adaptation Types(s)</b>	Accommodation
<b>Goal</b>	Address vulnerability of electrical equipment to 2055 SLR threats and Improve facilities to meet discharge requirements





# Treatment System

## Near-Term Adaptation Strategy

<b>Strategy</b>	Minor levee improvements to match majority of existing grade
<b>Adaptation Types(s)</b>	Accommodation
<b>Goal</b>	Address vulnerability of wastewater facilities to flooding up to approximately 12 ft event

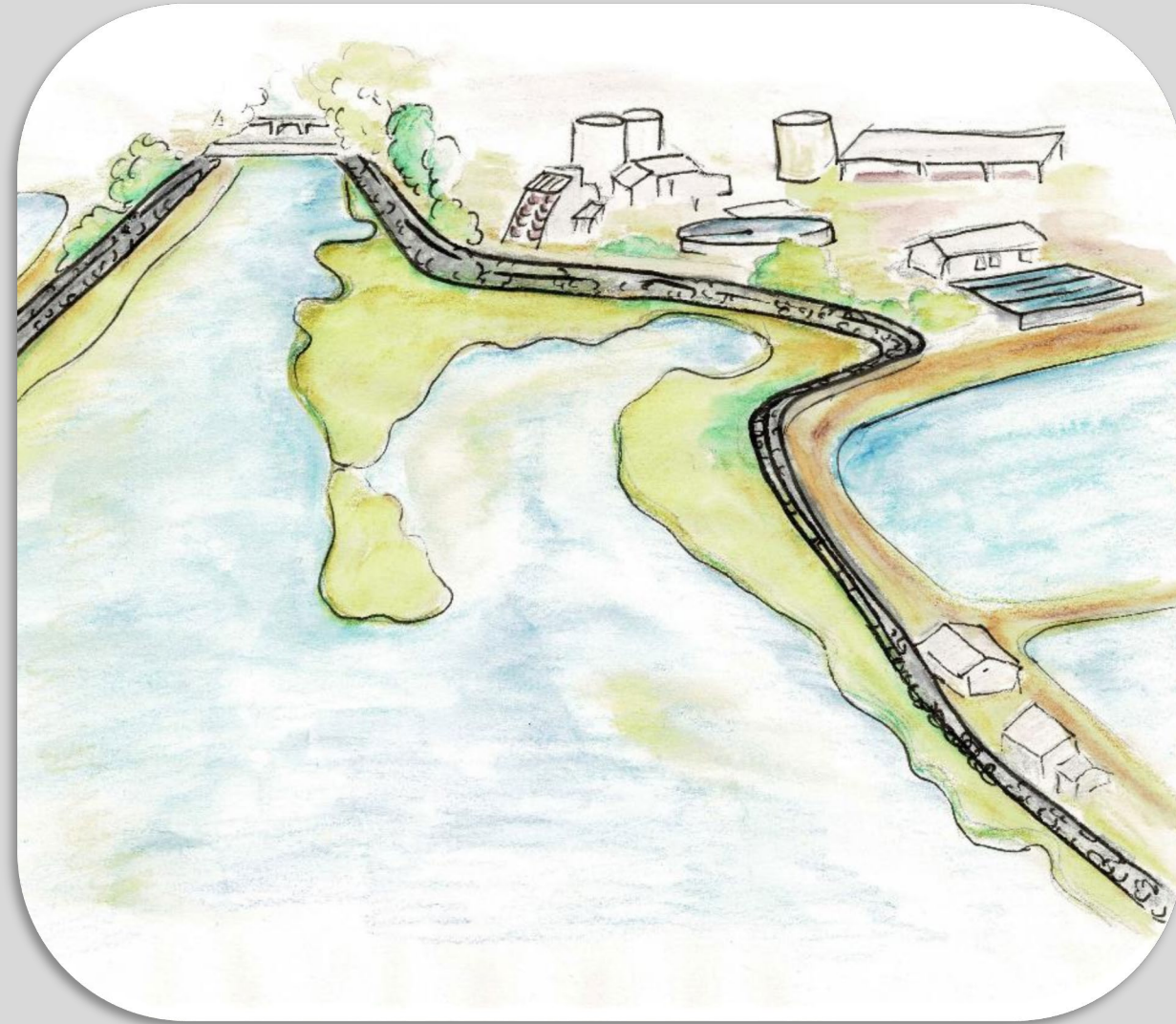


# Treatment System

## Mid-Term/ Long-Term Adaptation Strategy

<b>Strategy</b>	AWTF Levee Augmentation Project
<b>Adaptation Types(s)</b>	Protection
<b>Goal</b>	Elevate the existing levee to 15 ft and add new levee sections to protect the central plant facilities

## Hard Armored Levee Augmentation



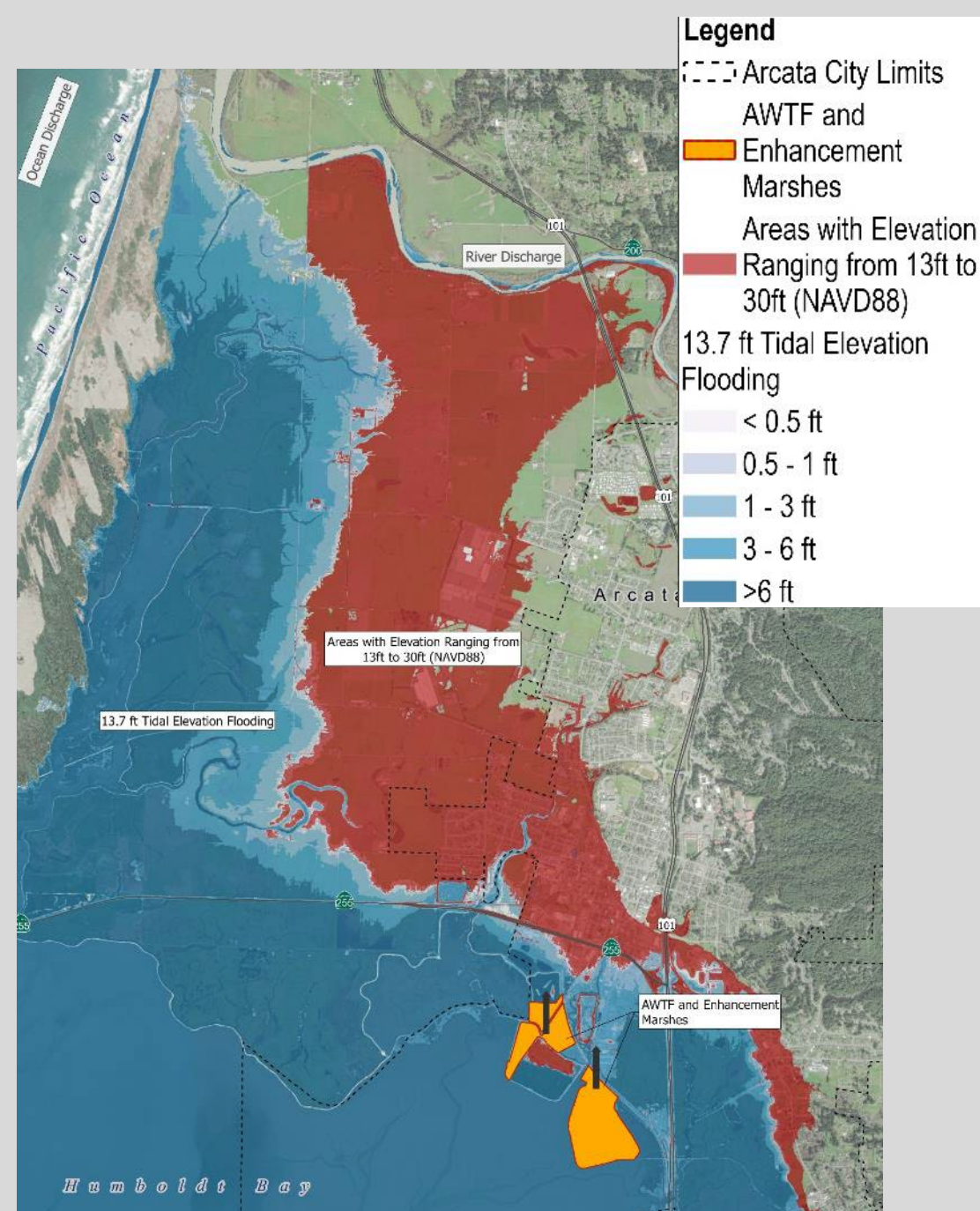
## Hybrid Green/Gray Levee Augmentation





# Treatment System Mid-Term/ Long-Term Adaptation Strategy

<b>Strategy</b>	Relocate the Wastewater Treatment Facility
<b>Adaptation Types(s)</b>	Retreat
<b>Goal</b>	Relocate the treatment facility within the same elevation range as the existing facility





## Strategy

Relocate the Wastewater Treatment Facility

### Typical Required Area for 6 MGD Treatment Plant (acres)

Conventional Activated Sludge	21
Extended Aeration or Oxidation Ditch	27
Membrane Bioreactor	7
Lagoons, Ponds or Wetlands	148
Trickling Filter/Biofilters	13





# Arcata Marsh and Wildlife Sanctuary Benefits

- Provides unique freshwater habitat on the shore of Humboldt Bay for multiple species
- Klopp Lake and Brackish Marsh are tidally influenced via tide gates, creating a unique brackish wetland habitat that is sheltered from large tidal surge events
- Provides public recreation, including educational opportunities and over 5 miles of hiking/biking trails
- Provides water quality treatment and the mechanism for the City to comply with the State's Enclosed Bays and Estuaries Policy (EBEP)

# Wastewater Discharge/Reuse Adaptation Strategies

	Retreat	Protect	Accommodate
Near-term Adaptation Strategies			
Rehabilitate Enhancement Marshes Protection Structures			X
Mid-term Adaptation Strategies			
Determine Adaptative Capacity of Enhancement Marshes to Saltwater Intrusion			X

# Wastewater Discharge/Reuse Adaptation Strategies

	Retreat	Protect	Accommodate
Mid-Term/Long-term Adaptation Strategies			
Enhancement Marshes Levee Augmentation		X	
Enhancement Marshes Relocation	X		
Alternative Enhancement for Bay Discharge	X		
Ocean Discharge	X		
Surface Water Discharge and Land Application	X		
Consolidation with other agency(ies)	X	X	X

# **Wastewater Discharge Adaptation Strategies Considered, but Deemed Not Feasible**

- **Groundwater injection**

- No similar examples permitted in CA for wastewater discharge only
- Would not be able to dispose of all effluent, still requiring secondary discharge method

- **Year- round land discharge**

- Would require over 2,000 acres of land for irrigation and storage of effluent during the rainy season

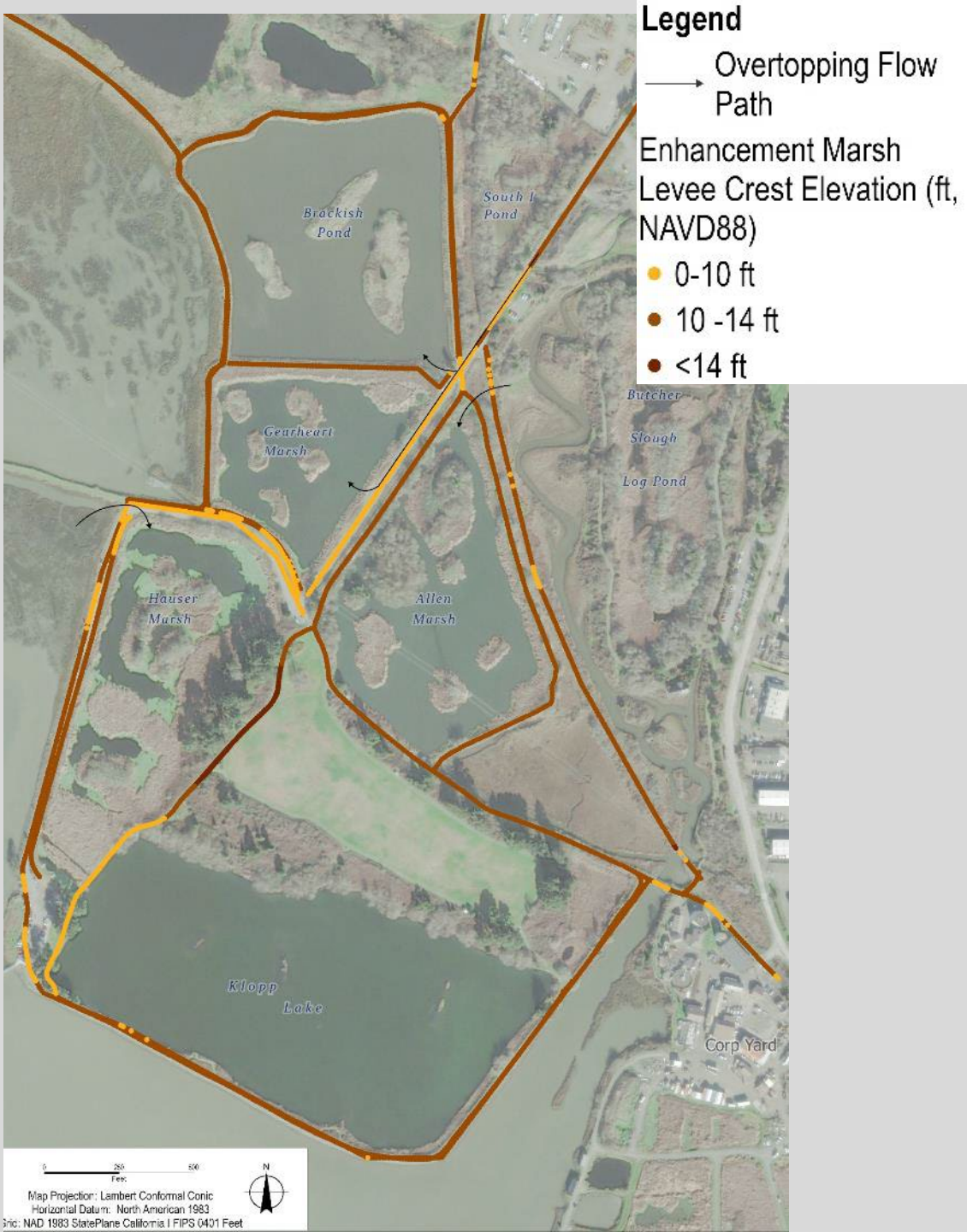
- **Year-round surface water discharge**

- Currently not permitted by Regional Water Quality Control Board Regulations



# Wastewater Discharge: Enhancement Marshes Near-Term Adaptation Strategy

Strategy	Elevate the sections of the berm around the enhanced marshes that are under 10 ft
Adaptation Types(s)	Protect/ Nature-Based Solution
Goal	Protect and sustain remaining sensitive wetland habitats, continue to conform to EBEP, and provide extended resilience for access roads



# Wastewater Discharge: Enhancement Marshes

## Mid-Term Adaptation Strategy

<b>Strategy</b>	Monitor and study the adaptive capacity of the enhancement marshes to overtopping
<b>Adaptation Types(s)</b>	Accommodate/Nature-based solution
<b>Goal</b>	Determine conditions if some of the marshes can persevere under future conditions



King Tide of January 11-12, 2020  
Tide height ~8.5 feet

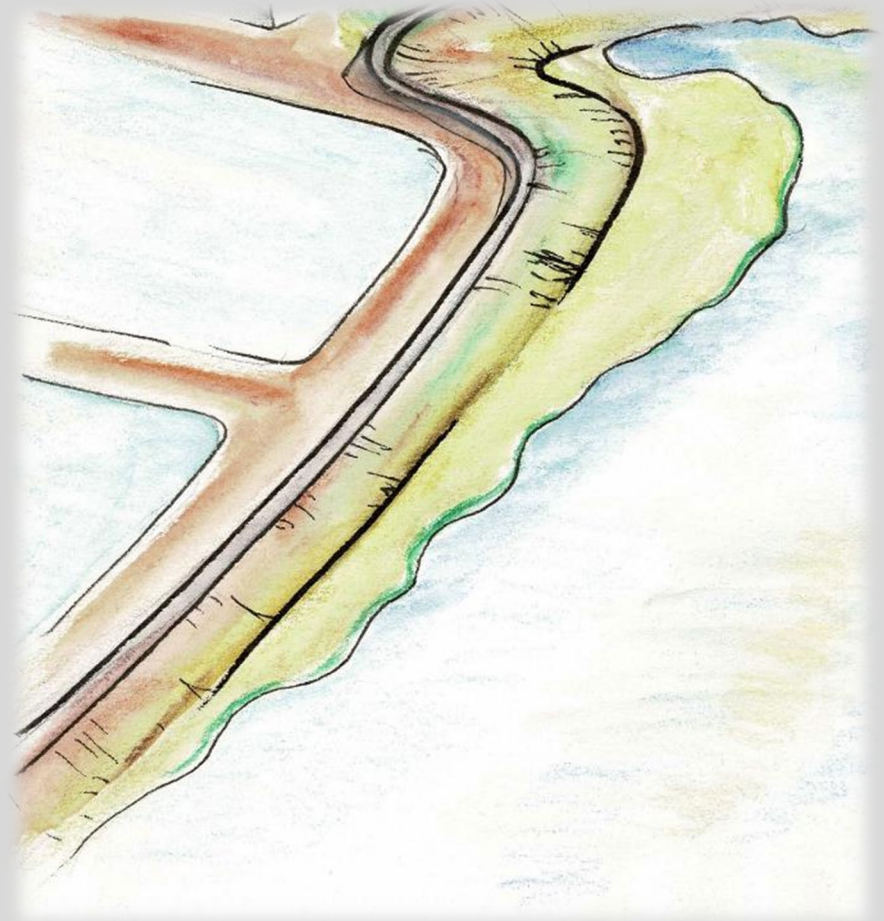
Photo credits to HSU Photographer Kellie Jo Brown and Pilot Dave Marshall.



# Wastewater Discharge: Enhancement Marshes

## Long-Term Adaptation Strategy

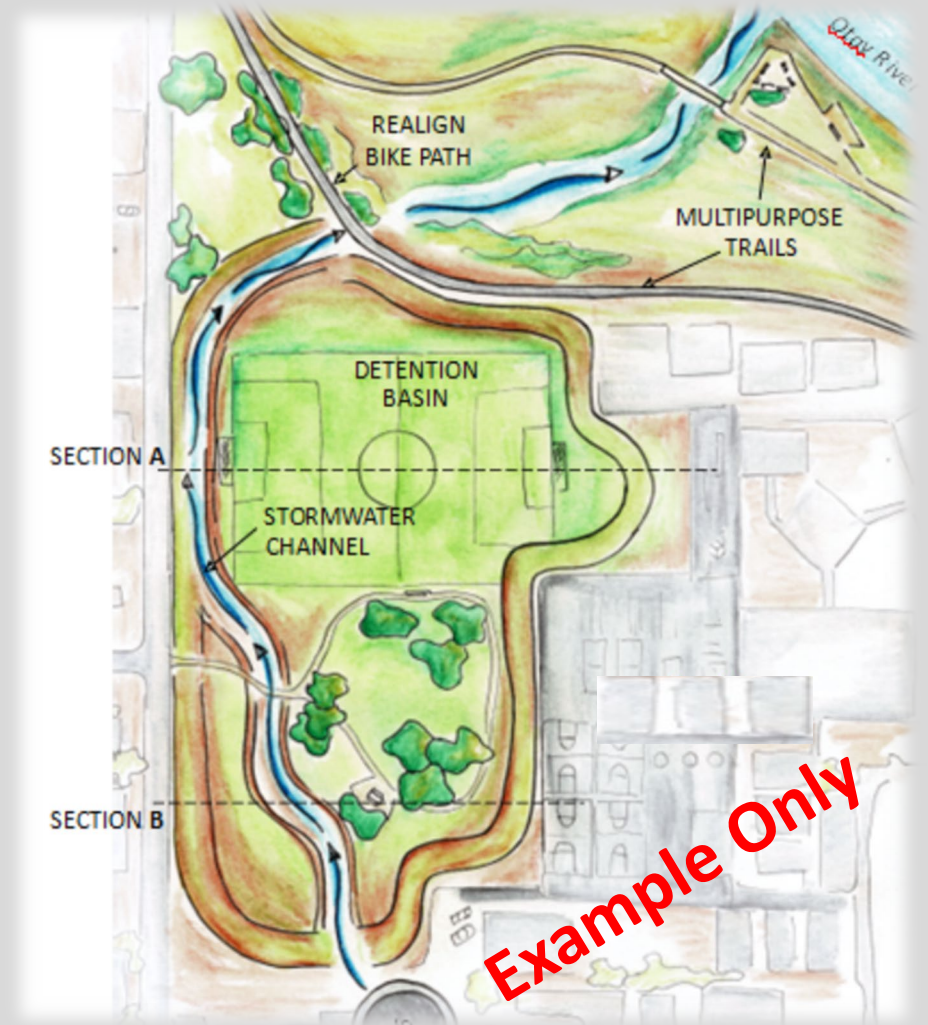
<b>Strategy</b>	Elevate/ augment the levees surrounding the Arcata Marsh
<b>Adaptation Types(s)</b>	Protect/Nature-based solution
<b>Goal</b>	Conserve marsh wetlands through approximately 2105



# Wastewater Discharge: Enhancement Marshes

## Long-Term Adaptation Strategy

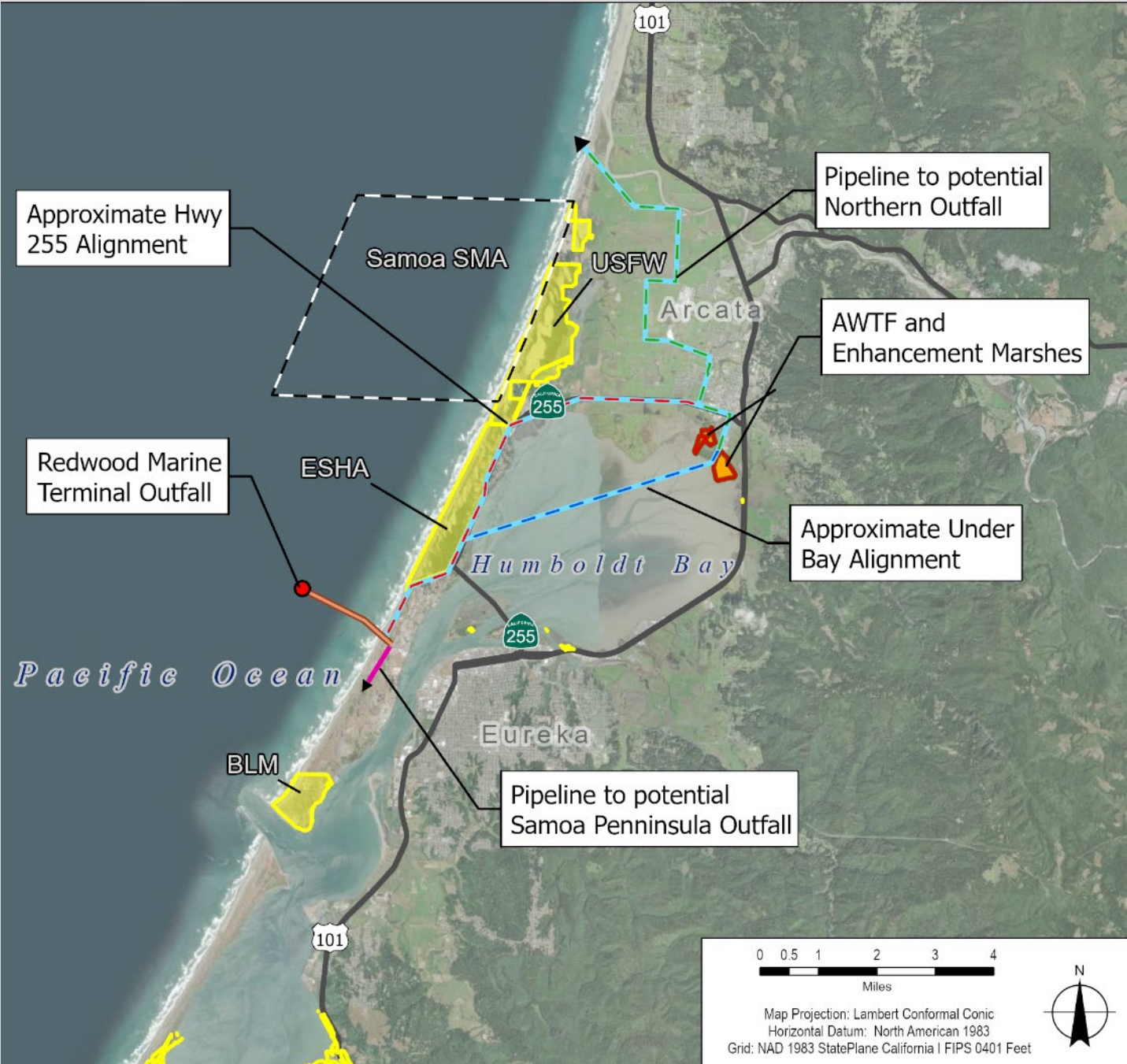
<b>Strategy</b>	Continue Bay discharge but without the existing enhancement marshes
<b>Adaptation Types(s)</b>	Retreat/Accommodation
<b>Goal</b>	Meet EBEP requirements with new technology or other wetland facilities





# Wastewater Discharge: Ocean Outfall Long-Term Adaptation Strategy

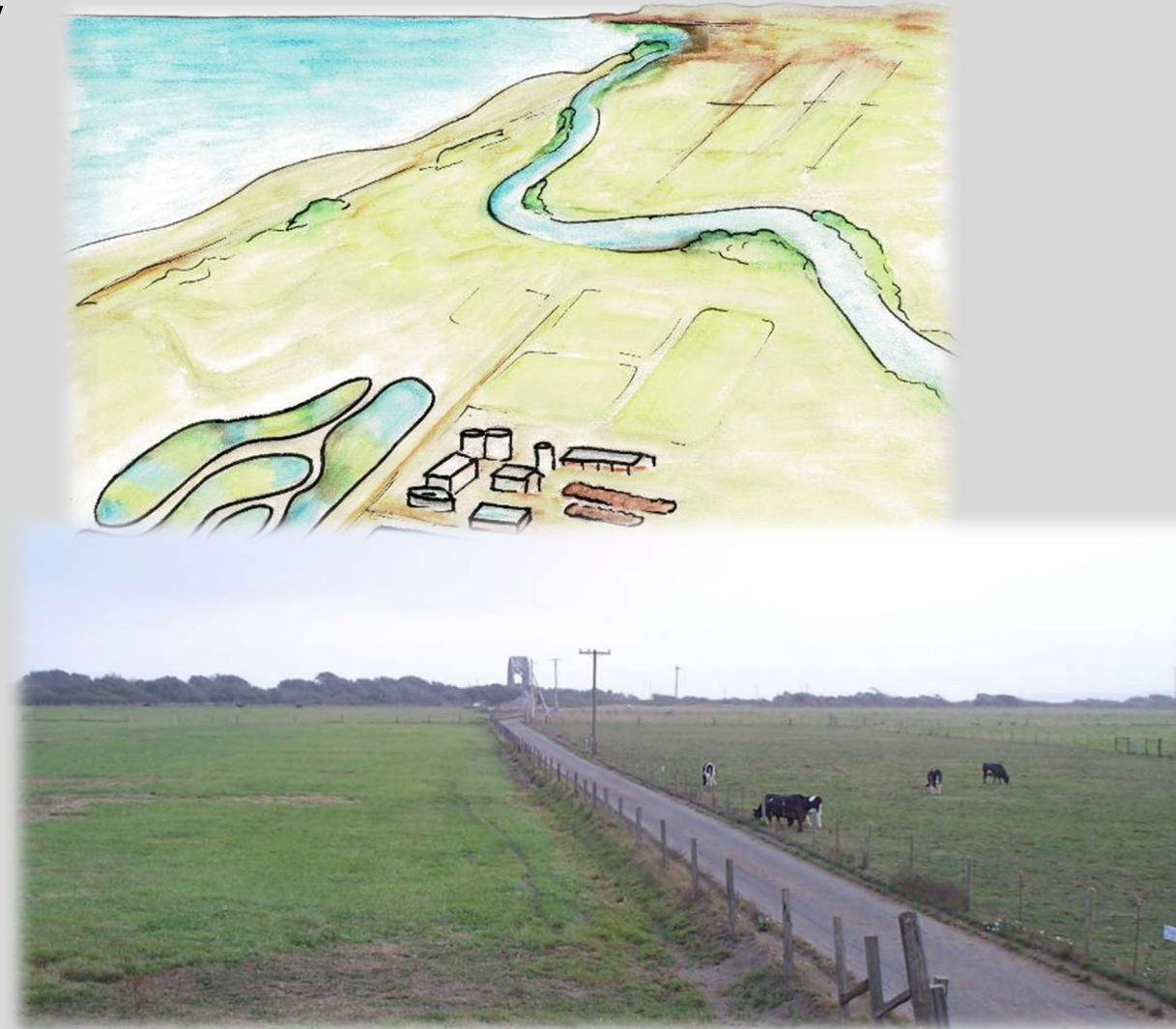
Strategy	Develop an alternative ocean discharge/outfall not in Humboldt Bay
Adaptation Types(s)	Retreat/Protect Accommodation
Goal	Establish a new discharge location that would not be subject to EBEP standards



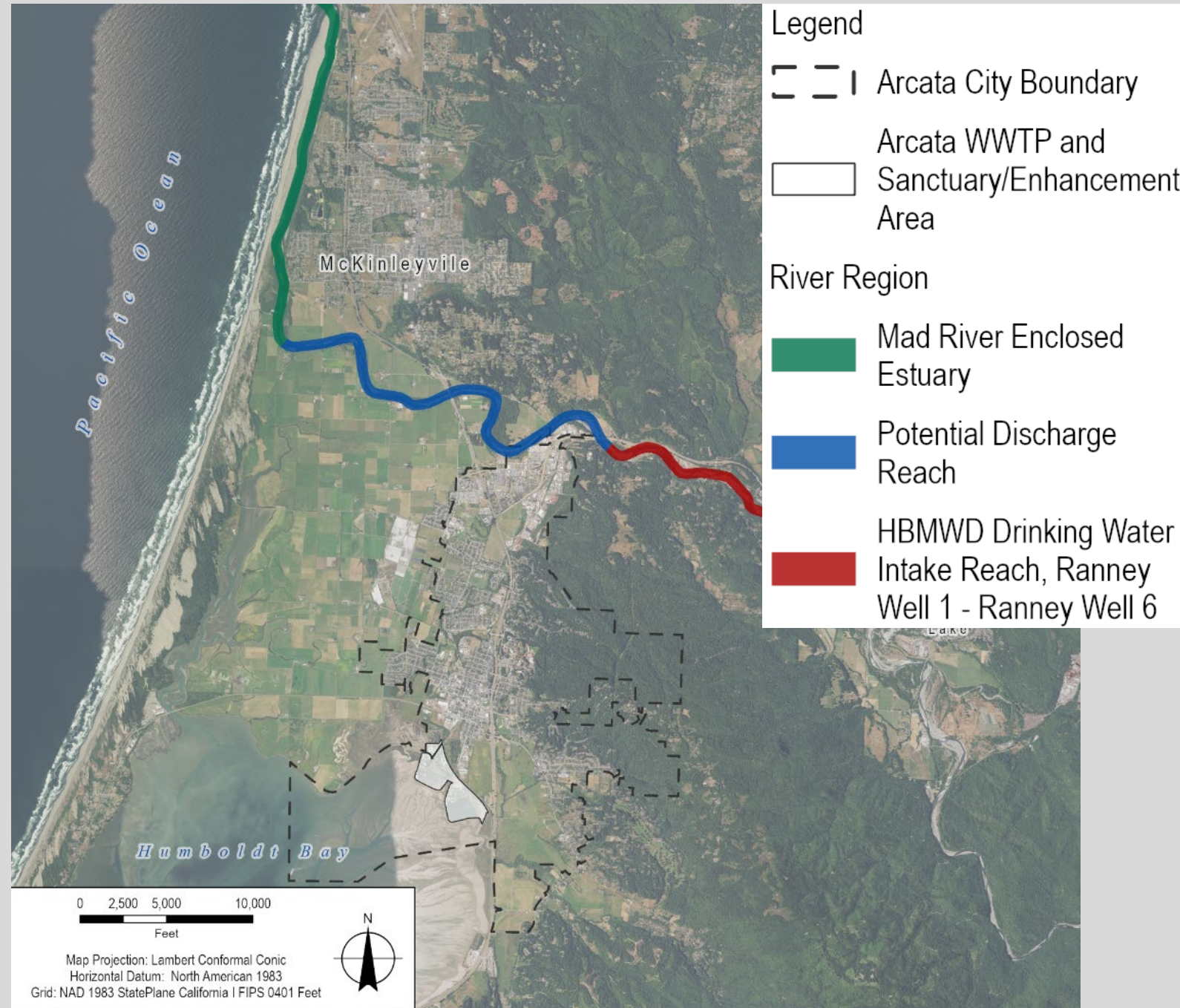


# Wastewater Discharge/Reuse: Surface Water/ Land Application Long-Term Adaptation Strategy

<b>Strategy</b>	Establish a surface-water/land-based discharge system
<b>Adaptation Types(s)</b>	Retreat/Accommodation
<b>Goal</b>	Establish a new discharge location that would not be subject to EBEP standards



- Surface Water Discharge  
October 1 – May 14
- Approximately 600 Acres of  
Land would be needed for  
irrigation of effluent from May  
15 – September 30
  - Irrigation area accounts for  
late season precipitation,  
storage for flow  
equalization, and setbacks  
from publicly accessible  
areas





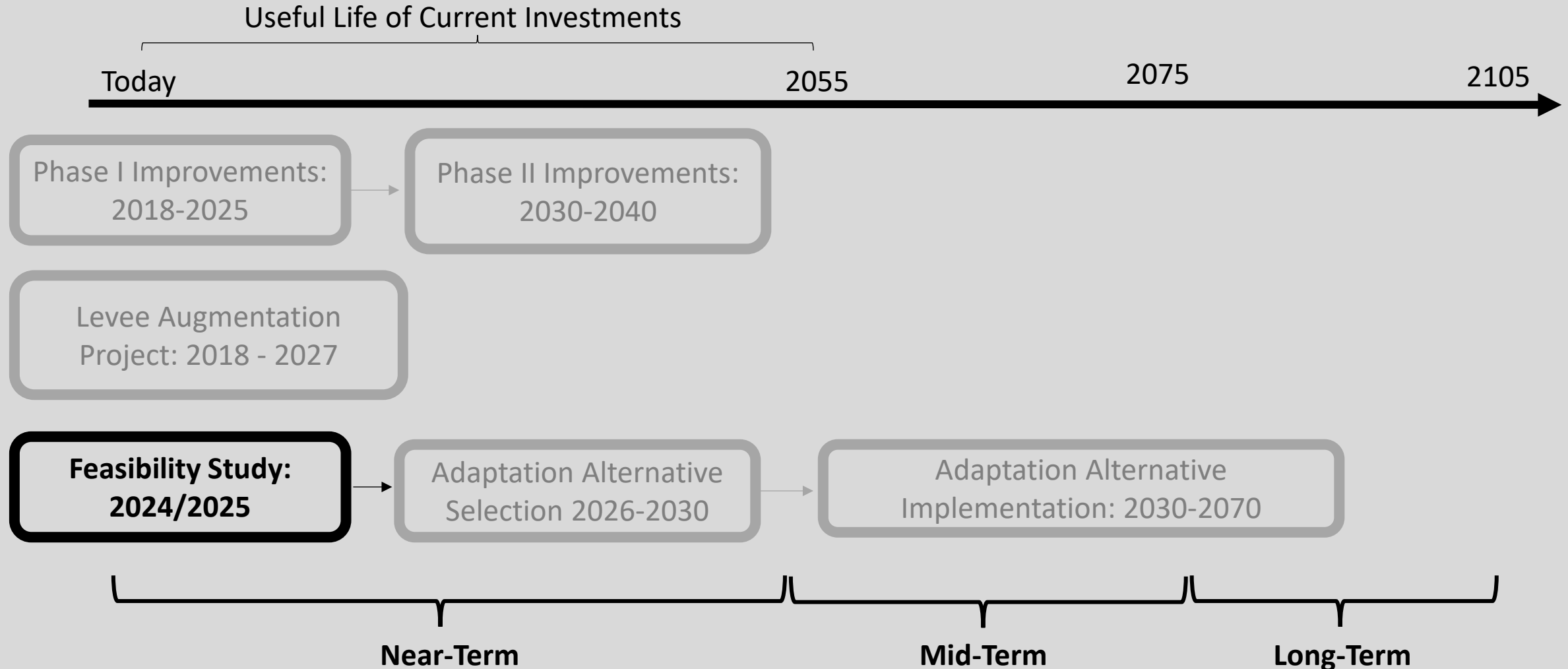
# Treatment/ Discharge: Consolidation

## Mid- Long-Term Adaptation Strategy

<b>Strategy</b>	Consolidate with other wastewater dischargers around Humboldt Bay
<b>Adaptation Types(s)</b>	Retreat/Accommodation
<b>Goal</b>	Connect to other wastewater facilities to leverage combined assets and discharge systems

- Consolidate operations with McKinleyville Community Services District
- Consolidate operations with City of Eureka
- Consolidate Operations with Humboldt Bay Harbor Recreation and Conservation District

# Arcata Wastewater Treatment Facility Improvement Timeline



# Next Steps for the Feasibility Study

- Prioritization of Alternatives and Selection of Alternatives for more detailed analysis
  - Information obtained through public meetings will be used to support the prioritization of alternatives
- Analysis of Priority Alternatives
  - Cost Estimate
  - Constraints Analysis
  - Implementation Timeline
  - Cost Benefit Analysis
- Environmental Review of Priority Alternatives
  - Identification of future technical studies (i.e. biological, archeological, groundwater)
  - Permitting Evaluation
- Completion of Final Report - December 2025



# Next: Community Input

## Breakout Groups

- 3 stations (~45 minutes per station)
- Breakout groups based on color on your name tag
- Same Information to be presented to each group
  
- Goals: Consider what the future may look like, ask questions, share your thoughts