Sea Level Rise Adaptation Strategy for San Diego Bay

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City of San Diego EESTF

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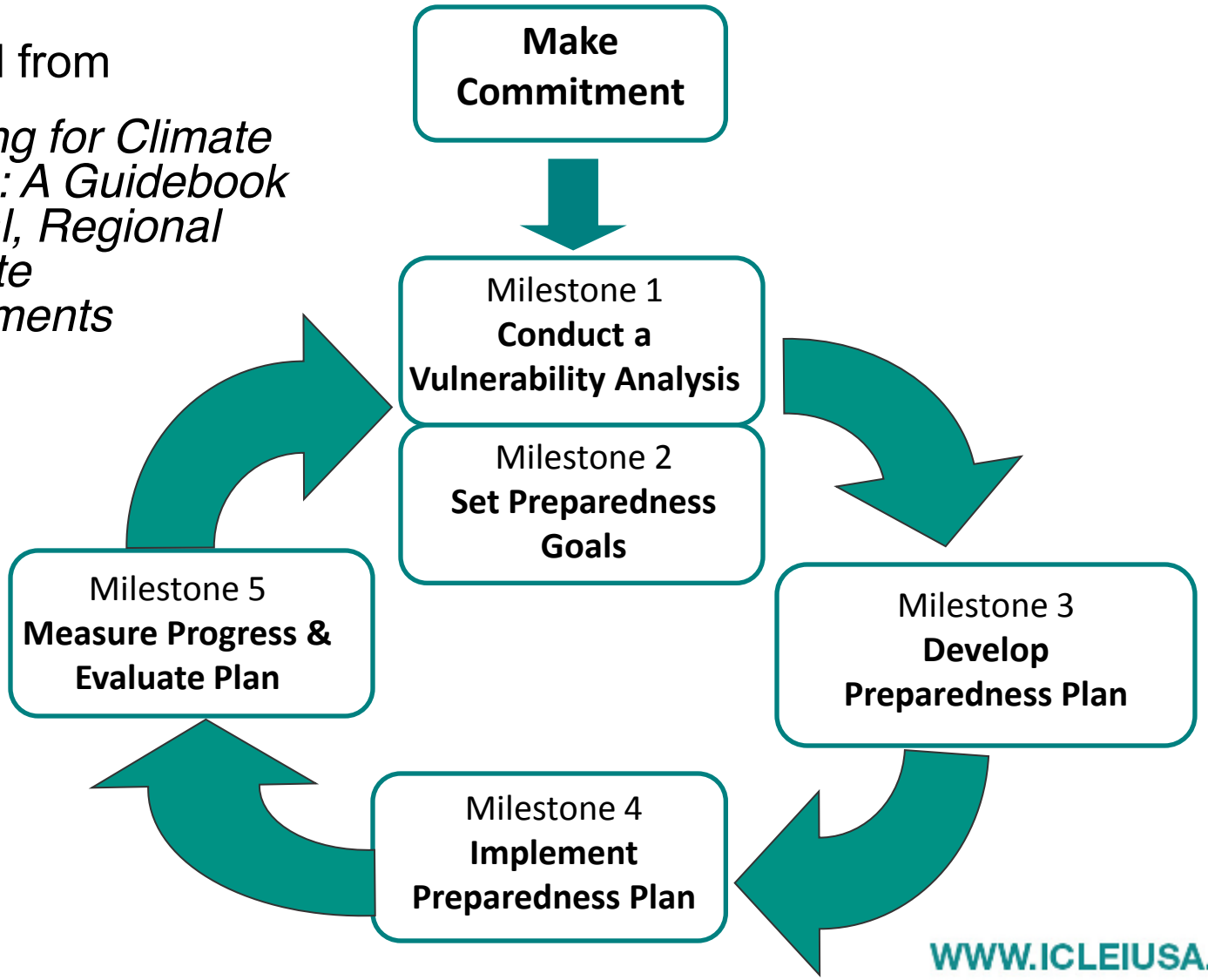
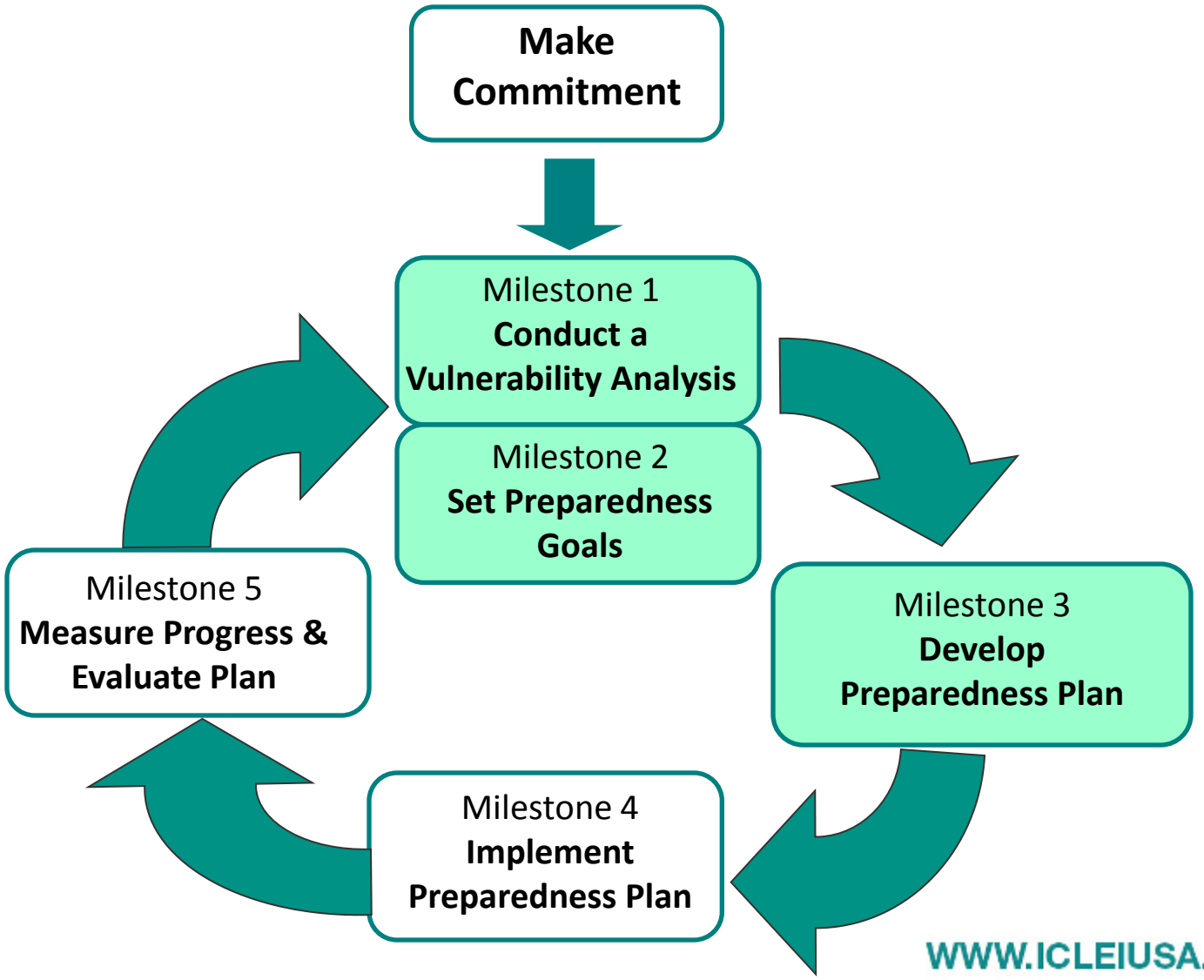
Five Milestones for Climate Adaptation

Adapted from

Preparing for Climate Change: A Guidebook for Local, Regional and State Governments



San Diego Bay
Sea Level Rise Adaptation Strategy



Overall Project Outcome

To develop actionable recommendations for adapting to sea level rise and associated impacts,

for participating jurisdictions to consider in local planning processes,

with a focus on City jurisdiction and cross-jurisdictional strategies,

By September 2011.


Planning Parameters
San Diego Bay in 2050 and 2100
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image U.S. Geological Survey
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Project Roles

Steering Committee

Public agencies with jurisdiction over coastal planning that are interested in developing actionable recommendations.

Stakeholders Working Group

Entities with an interest in coastal planning that will be critical to reaching desired outcomes.

Technical Advisory Committee

Entities willing to volunteer their expertise in topic areas central to the planning process.

Tijuana Estuary National Estuarine Research Reserve—Coastal Training Program

Partner in stakeholder involvement

ICLEI

Convener, project manager, and document preparer

Sea Level Rise Impacts

Flooding (periodic and temporary)

Inundation (regularly flooded)

Erosion

Water Table Rise

Saltwater Intrusion

Habitat Shift

<u>Not included</u>

Precipitation-related impacts

Additional flooding and erosion from wave action if Silver Strand is breached

Functional Systems Assessed

Subtidal Aquatic Ecosystems
Transitional Nearshore Ecosystems
Upland Ecosystems
Contaminated Sites
Stormwater Management
Wastewater
Potable Water
Commercial Building Stock
Residential Building Stock
Emergency Response Facilities
Parks, Recreation and Public Access
Regional Airport Operations
Local Transportation Facilities (under development)
Energy Facilities (under development)

Assessment Methods

Exposure

Flooding and Inundation – Geographic Information Systems (GIS) analysis based on flood mapping performed by Dr. Rick Gersberg at SDSU

Other associated impacts – Technical Advisors

Habitat shifts – Sea Level Affecting Marshes Model (SLAMM)

Sensitivity & Adaptive Capacity

Detailed survey was developed with the guidance of the Steering Committee

Local technical experts were identified, provided guidance and invited to complete the survey

Primary vulnerabilities for each system were determined based upon responses and follow-up conversations

Stormwater Management

Primary Vulnerabilities

- In all scenarios, storm sewers are very vulnerable to flooding of Bay drain outfalls due to higher sea levels, a condition that would result in localized flooding in very low-lying inland areas.
- This vulnerability will be compounded during storm conditions, when runoff in these drains would be obstructed by inundated outfalls, resulting in backwater flooding in low-lying areas.
- Storm drains and BMPs would be vulnerable if exposed to a rising water table, but more information is needed to determine the nature of potential exposure.

- ***Exposure*** to flooding is unknown. Some outfalls are already impacted at very high tides, but comprehensive data is not available for the locations/elevations of potentially impacted drains.

- ***Sensitivity*** to flooded outfalls is very high, since they cannot drain runoff in that condition. Sensitivity is still significant in non-storm conditions.

- ***Adaptive capacity*** is very low.

Wastewater

Primary Vulnerabilities

- Sanitary sewers in low-lying locations will be vulnerable to flooding and could exceed their capacity during the 2050 Extreme Event scenario, potentially resulting in discharge of wastewater to the Bay. (Inflow)
- The entire wastewater collection system in the planning area will be vulnerable to inundation impacts by 2100.
- Wastewater collection would be vulnerable if exposed to a rising water table, particularly relating to groundwater infiltration into sewer mains, but more information is needed to determine the nature of potential exposure. (Infiltration)

- ***Sensitivity*** is high, as pipe capacity could be exceeded when exposed to floodwater or groundwater, and sewage could backup and flow into the storm drains and into the Bay.

- ***Adaptive capacity*** is very low in terms of the short term coping capacity. If sewer main capacity is exceeded, there is no redundancy in the system to divert wastewater.

Wastewater

Exposure of stations

2050 Daily Conditions	2050 Extreme Event	2100 Daily Conditions	2100 Extreme Event
None	Underground •Force main air injector •Coronado Golf Course restroom pump station Buildings •Pump Station 4 – Backup Pump	Underground •2 metering stations •Force main air injector •Coronado Golf Course restroom pump station •Coronado – Point pump station Buildings •Pump Station 4 and Backup Pump •Pump Station 40	Underground •19 metering stations •5 pump stations •Force main air injector Buildings •Pump Station 1 •Pump Station 2 •Coronado – Transbay Pump Station •Pump Station 4 and Backup Pump •Pump Station 40

Commercial Buildings

Primary Vulnerabilities

- Commercial buildings have a low vulnerability to flooding and inundation in the 2050 scenarios due to limited exposure. They are highly-vulnerable to flooding and inundation in the 2100 scenarios as exposure expands to major facilities.
- Sub-surface structures in commercial buildings could be vulnerable to a rising water table if exposed.

- ***Exposure*** to flooding is limited in the 2050 scenarios, mostly affecting buildings near Paradise Creek in National City. Exposure is considerable in 2100. Most exposed commercial buildings are on Port lands. One major exception is north of Harbor Drive in Centre City San Diego.
- ***Sensitivity*** to flooding is very high.
- ***Adaptive capacity*** is low.

Residential Buildings

Primary Vulnerabilities

➢ Residential buildings have a low vulnerability to flooding and inundation in the 2050 scenarios due to limited exposure. They are highly-vulnerable to flooding and inundation in the 2100 scenarios as exposure expands to large portions of residential neighborhoods.

- ***Exposure*** to flooding is limited in the 2050 scenarios. One potentially exposed area is part of the Coronado Cays. Exposure is considerable in 2100. Exposed housing is on City land only.

- ***Sensitivity*** to flooding is very high.

- ***Adaptive capacity*** is low.

Residential Neighborhoods at Risk

2100 Scenarios

Coronado

- First Street
- Coronado Cays

Chula Vista

- Unknown. (Residential uses are included in Bayfront Master Plan—Harbor District, but elevation of this future district is not known).

Imperial Beach

- Part of the Bernardo Shores RV park
- Single-family homes on 7th Street and 8th Street

National City

- Single-family neighborhood west of Paradise Creek, near Interstate 5

San Diego

- Multi-family neighborhood in the Midway, north of Barnett Street and east of Rosecrans Street
- Multi-family buildings north of Harbor Drive
- East of Rosecrans Street, near Southwestern Yacht Club

Parks, Recreation, and Shoreline Public Access

Primary Vulnerabilities

- In the 2050 and 2100 Daily Conditions scenarios, shoreline parks and recreational facilities are extremely vulnerable to regular inundation due to extensive exposure around the Bay and high sensitivity to inundation impacts.
- In the Extreme Event scenarios, the system is highly vulnerable to periodic flooding because of extensive exposure and high sensitivity, but adaptive capacity to cope with flooding is higher than for most other systems.

- ***Exposure*** to flooding is significant in both 2050 and 2100. This is the most exposed land use in 2050.

- ***Sensitivity*** to flooding is very high – public access and recreation cannot be provided when flooded.

- ***Adaptive capacity*** to flooding is moderate. In the short term, shoreline access and recreation could be used in other unaffected locations during flooding. Adaptive capacity to regularly-occurring inundation is low. Over the long-term, adaptive capacity is mixed. It will be difficult to acquire new sites or retrofit existing sites to provide shoreline access. Shoreline parks could provide an adaptation opportunity, however, since passive parks are less susceptible to flood damage and could speed recovery through detention / infiltration.

Transitional Nearshore Ecosystems

Key Locations:

- Sweetwater marsh
- South Bay Salt Ponds
- Vernal pools of Otay Mesa/Nestor
- South Bay wildlife refuge
- Paradise Marsh and Creek
- J Street marsh and tidal flats
- Navy's mitigation wildlife island

Primary Vulnerabilities

Habitat shifts – loss of these habitats could result for a combination of higher seas and limited ability to shift landward

Flooding – amount and frequency could overwhelm this system

Factors Affecting Sensitivity

Neighboring development
Area pollutants
Past loss of ecosystem

Adaptive Capacity Strengths

Natural flood exposure
Designated Protective Parks
Salt Pond Restorations

Weaknesses

- Physical limitations
- Regional priorities

Strategy Development

See Strategy Development Framework Handout

Admin Draft Recommendations

See Admin Draft Recommendations Handouts

Key Lessons Learned To Date

- *Utilize existing research and data when possible. Avoid analysis paralysis.*
- *But, currently available information may be insufficient to inform decision-making in some areas – identify research needs.*
- *Work with stakeholders and sector-specific experts to both educate and learn.*
- *Acknowledge uncertainty and begin with strategic, no-regrets or low-regrets approaches.*
- *Recognize that climate impacts may be mostly a worsening of existing problems in the near-term. Look to align adaptation goals with other goals through existing programs where appropriate.*

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