

## Three Conceptual Landscape Visions

In the near-term, agencies will continue to implement those actions that are within their current purview and for which funding can be found and permits can be obtained. However, without a landscape vision to sea level rise and extreme tide impacts, agencies will spend time and money on short-term, patchwork solutions and not be able to effectively address long-term impacts to their assets. Because of this need for a coordinated and multi-objective adaptation strategy for the shoreline, working group members helped develop three conceptual futures for the study area. The descriptions below represent different balances of grey and green infrastructure given the physical setting of the study area and surrounding land uses. Two of the futures demonstrate 'holding the line' at current development, while the third demonstrates moving out of the hazard zone. These visions reflect findings from the vulnerability assessment and are specific to the study area.

### TRADITIONAL LEVELLE

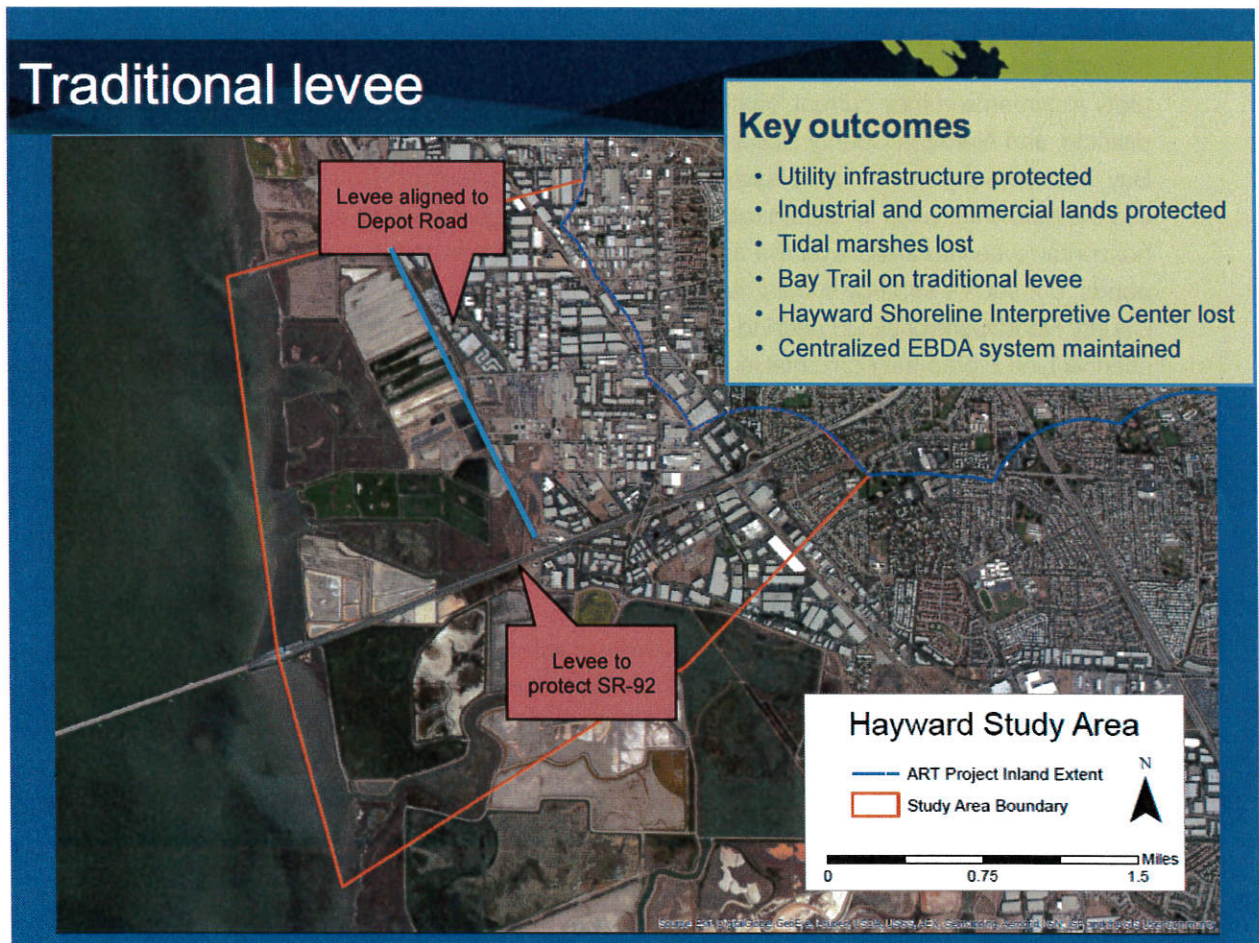


Figure 2.12 Traditional levee conceptual landscape solution.

The traditional levee alternative reflects current approaches and understanding of shoreline protection and infrastructure and so includes a centralized wastewater system reliant on deep-water discharge. A conventional 3:1 levee would replace the existing outboard levees and move the line of protection inland to Depot Road. This vision would require Hayward, Alameda County Flood Control, East Bay Dischargers Authority, and Caltrans to work together to plan and build compatible



levee alignments to protect their assets and services. A traditional levee in this location would protect the existing Hayward Water Pollution Control Facility and commercial/industrial land uses, while utility alignments would remain in service in their current locations until water levels exceeded the height of the levee. However, the oxidation ponds used by the wastewater treatment plant would be lost, forcing the City of Hayward to invest in alternative wet weather storage facilities. The solar panels located in decommissioned ponds would also need to be relocated. While there are fewer feasibility questions associated with this strategy because the engineering standards are well developed and widely used, this strategy does not provide sufficient transition zone habitat to preserve the marshes and ponds north of SR-92, significantly reducing habitat for important Bay species and eliminating the public's wildlife viewing experience and shoreline interpretation opportunities. Future recreation would be limited to a trail on top of or behind a high levee.

### **HORIZONTAL LEVEE**

In the Horizontal Levee alternative, the study area would use a green infrastructure approach, which combines flood protection, habitat, wastewater discharge, and recreation into a joint solution to address current and future needs. Wetlands and freshwater inputs would be used to construct a horizontal levee through the oxidation ponds to protect commercial/industrial land uses and maintain utility alignments in their current location. East Bay Dischargers Authority, Hayward, the regional park districts, and Alameda County Flood Control would need to work together to plan this levee. East Bay Dischargers Authority and Hayward would need to implement wastewater system changes to use the horizontal levee for decentralized discharge. The park districts would need to factor the horizontal levee into a sea level rise adaptation strategy to preserve tidal marshes and managed ponds, but such a strategy should make that goal much easier and possible. Similarly, Alameda County Flood Control would need to consider the possibility of overflow from the flood control channel Line E onto the horizontal levee in future flood risk planning. Prior to construction of this nature-based flood protection, the oxidation ponds would need to be decommissioned and the solar panels would need to be relocated.

The Bay Trail could be sited on top of the horizontal levee crest and the interpretive center could be moved to a location along Depot Road to preserve recreation and shoreline interpretation opportunities. Elevating SR-92 and constructing a horizontal levee in coordination with the South Bay Salt Pond Restoration Project in Eden Landing would further maximize habitat connectivity. While this vision has the potential to provide multiple benefits and cost-sharing opportunities, one significant constraint is the ability to acquire sediment for construction. The proposed levee would require at least 750,000 cubic yards of material, which is the average annual total for Bay beneficial reuse of dredge material. The horizontal levee would also cross multiple property boundaries and eventually host co-located functions, so agreeing on funding for construction, maintenance, and repairs will require cooperation from at least four agencies.



# Horizontal levee

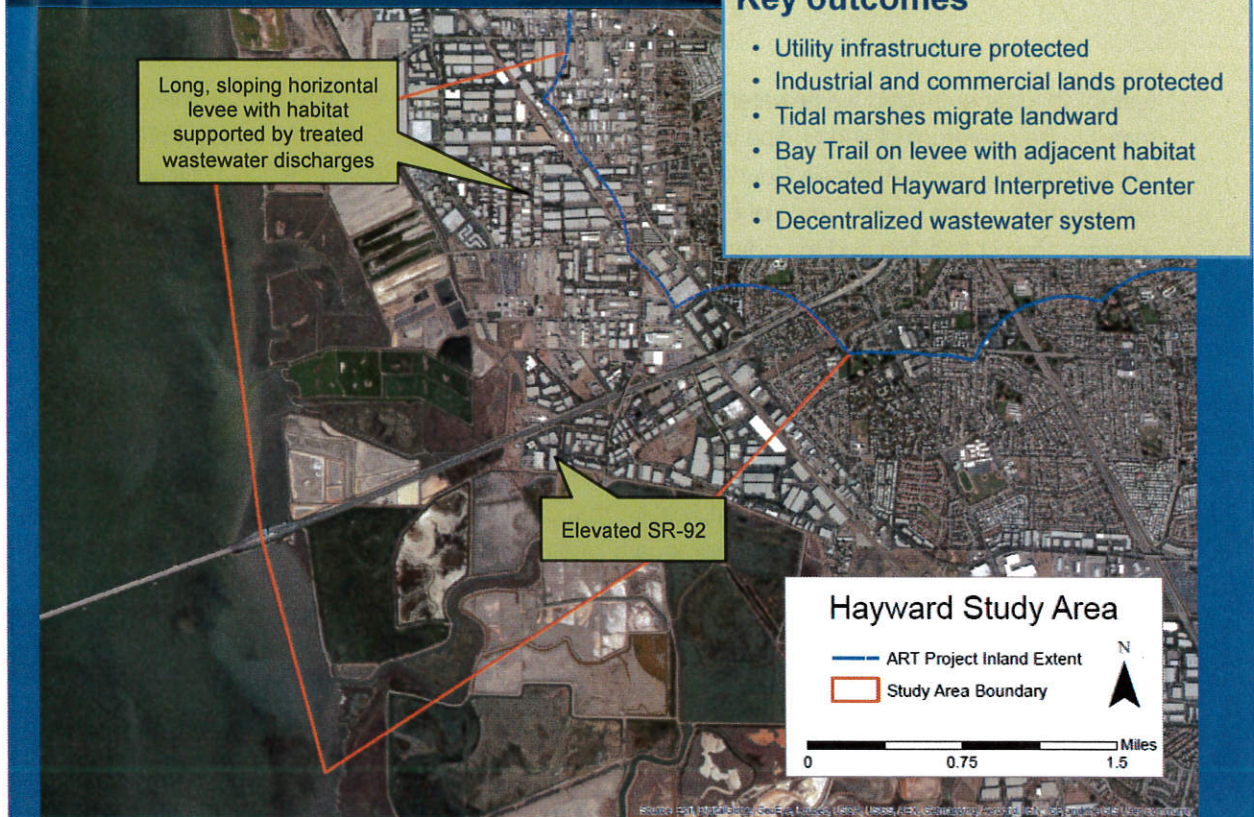


Figure 2.13 Horizontal levee conceptual landscape vision.

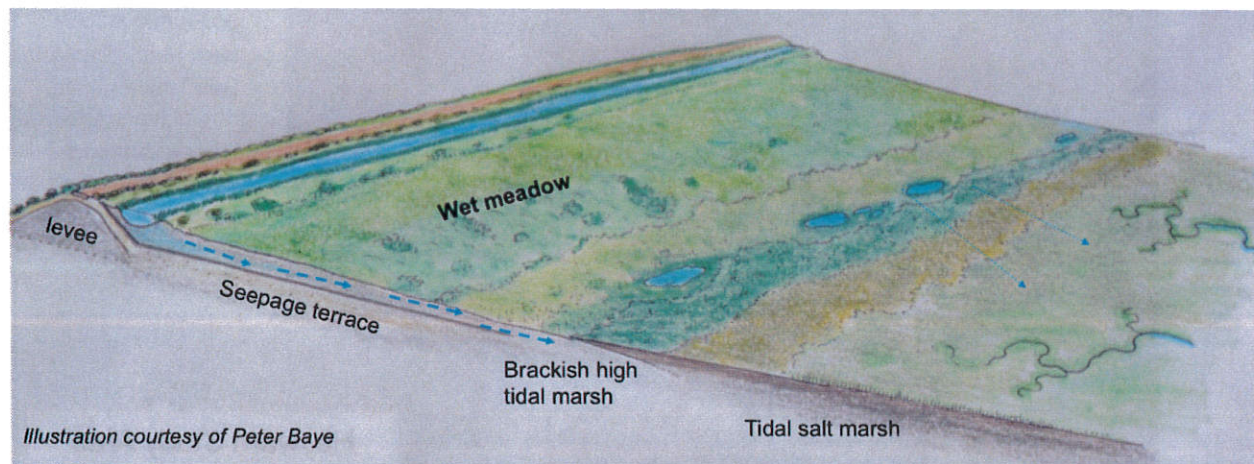


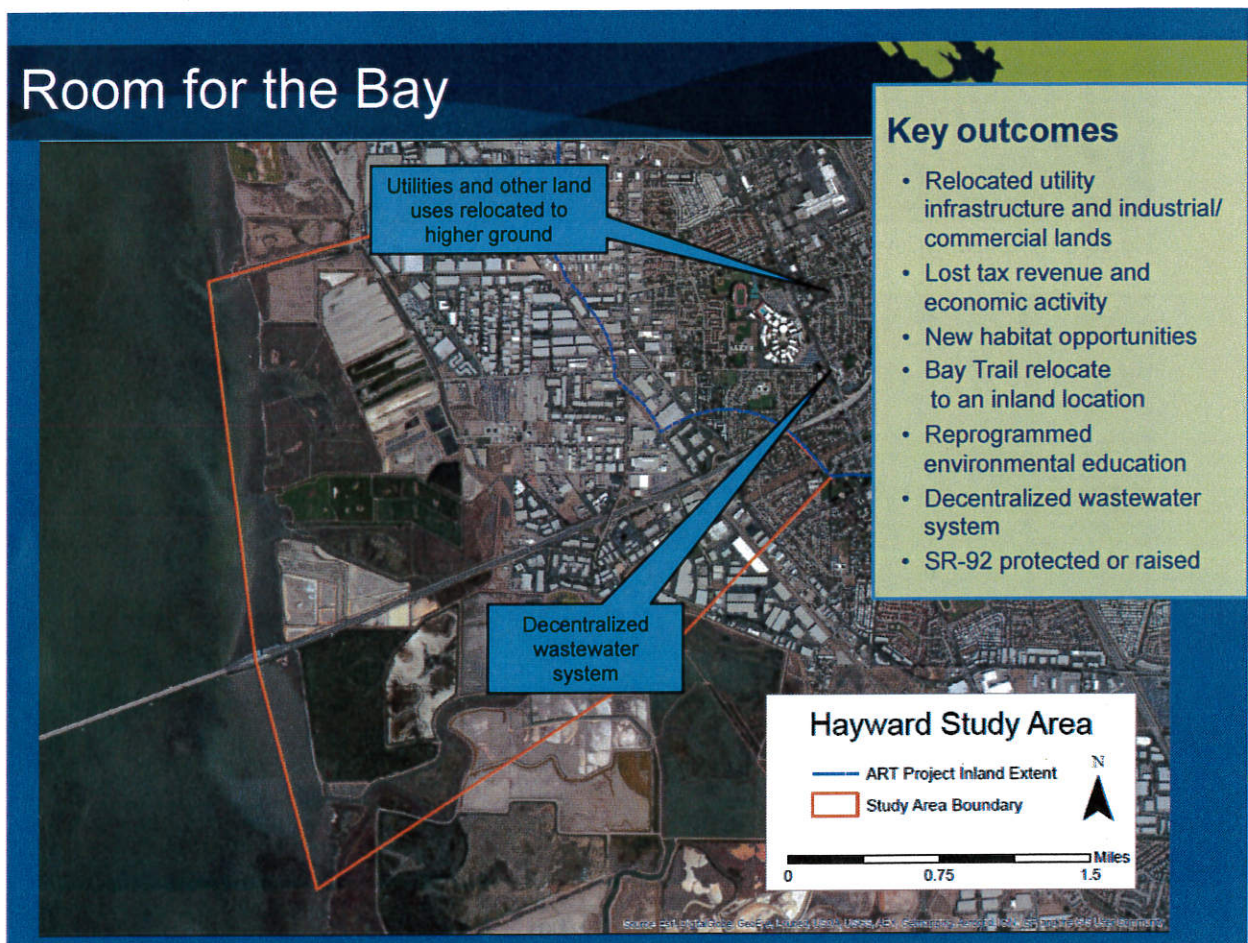
Figure 2.14 Illustration of horizontal levee. Courtesy of Peter Baye.

## ROOM FOR THE BAY

In the managed realignment future, the City of Hayward and other land owners and jurisdictions will gradually and deliberately relocate utilities and commercial/industrial land uses to higher ground and convert the future floodplain to recreation and possible natural areas. A crucial first step would include forming a working group of stakeholders, including agencies that participated in the Hayward Resilience Study and members of the public, such as landowners and tenants in the commercial/industrial park. Various voluntary mechanisms for relocation could be implemented, e.g., transfer of development rights programs, rezoning, and land acquisition through willing buyer/willing seller transactions. Hayward would work with East Bay Dischargers Authority to



establish a decentralized wastewater system. A new wastewater treatment plant (or plants) would need to be constructed and on-line before Hayward could decommission the existing plant. The City must coordinate with Alameda County Flood Control to determine the future flood risk associated with eliminating the maintenance of existing shoreline protection and relying on higher elevations to protect against flooding and to understand the options for converting the former industrial park into floodable space, e.g., a park. Hayward Area Recreation and Park District will play role in this conversion because the existing interpretative center will need to be closed and replaced with an environmental education center in the newly created park. It is unclear whether the area is suitable for wetland restoration and able to provide future habitat value. Depending on the success and implementation of a marsh adaptation strategy, there may no longer be marshes to interpret so the center may need to be reprogrammed to fit the changing environment. However, the park would provide community open space and recreation that can also withstand temporary flooding. The Bay Trail will need to be relocated to an appropriate location given the final restoration and recreation



development of the area and constructed out of floodable materials.

Figure 2.15 Room for the Bay conceptual landscape vision.

## Evaluation of Adaptation Responses



Working group members and ART staff used qualitative evaluation criteria, combined with research and working group expertise, to investigate the consequences of each of the conceptual landscape visions. The criteria identified how well each option met the study's resilience goals to:

- 1. Protect the health, safety, and welfare of those who live, work, and recreate in the Hayward Shoreline area.
- 2. Prevent the disruption of key community services by protecting critical infrastructure.
- 3. Protect the environmental value of the Hayward Shoreline area by preserving habitat, water quality, and endangered species.
- 4. Build organizational and community capacity so stakeholders can work collaboratively to address future conditions.

The criteria also asked about the technical and organizational feasibility of each option and the sustainability of the visions. Working group members rated each option as having positive, negative, or neutral effects on the criteria. The working group compared their ratings and discussed disagreements about impacts. Having this structure to evaluate consequences helped explore and weigh tradeoffs between the visions in an organized and more objective way. Working group members had many questions about feasibility of both near-term and long-term adaptation responses that would require more detailed technical analysis to answer. For example, the study did not include the geotechnical analysis that would be necessary for the traditional levee or horizontal levee, which is a logical next step for this effort. Also, some responses are outside the control of working group members and the Hayward Resilience Study such as regulatory changes by the Regional Water Quality Control Board or other parties. These unanswered questions are being investigated through ongoing work in the Hayward study area by East Bay Dischargers Authority, Hayward Area Recreation and Park District, and the ART Program.

The working group did not endorse a final proposed vision, but did explore the implications of each vision on the environment, the economy, social equity, and governance and found that some of the visions did better than others on meeting the objectives of the resilience goals. The working group agreed that individual agency actions, while necessary for the near term, were insufficient and would result in wasted effort and poor outcomes due in part to a lack of coordination between agencies. No one was ready to choose Room for the Bay, both because it scored poorly for impacts to the economy and society and equity and because it may be a strategy for even higher water levels past 2100 but not for current planning horizons. The most interest and discussion revolved around possible alignments and outcomes for the horizontal and traditional levees. The working group rated the horizontal levee more positively than the traditional levee for environmental and societal impacts but acknowledged the uncertainty around using this new type of shoreline protection.

