

Project Memorandum #3 – Archetypes

PURPOSE OF ARCHETYPES IN THE STUDY

The primary purpose of the “archetypes” is to assist in the design and development of financing mechanisms in the Delta Flood Risk Management Assessment District Feasibility Study (the study). The archetype approach aims to represent realistic but hypothetical situations that will aid in testing the degree to which each financing mechanism might be aligned with each type of beneficiary within the widely variable set of conditions prevailing in the Delta. We anticipate that these archetypes may also suggest the organizational structures that would be needed to administer implementation of the financing mechanisms.

The archetypes are intended to provide a means of organizing the Delta’s complexities and directing attention to the beneficiaries most at risk, most levee-dependent, and most likely to be associated with an assessment program.

Five archetypes have been created to address the main concerns of any assessment scheme:

- Identify the uses and/or users that are deriving the most benefit;
- Differences in the conditions or location that would affect the level of risk and cost of remedy; and
- Administrative and legal issues that would affect the ability to assess (e.g.: federal, state, or private ownership, mixed ownership, unclear ownership, issues of liability).

Structure and Design of the Archetypes

Each archetype includes a mapped representation and an illustration of the features of interest.

The intent is to focus on the most important features likely to influence the viability of the alternative financial mechanisms under analysis. These features include: levee type, land uses, exposure to inundation, channel characteristics, type of ownership, and whether solutions can be applied to individual islands or must be part of a broader multi-island or regional effort to be effective.

The archetypes were crafted by looking broadly at issues of levee maintenance and upgrade and then selecting islands that appear representative (“referent islands”). We created the characteristics of the archetypes by extracting key characteristics from the referent islands (which remain anonymous, allowing us to focus on their key characteristics rather than detailed specifics). Where several referent islands were used to inform the contents of the archetype, GIS analysis yielded measurements for the key characteristics (e.g., levee type by miles, acreage, inundation depths, and land use). Rough estimates of the cost of levee improvements were derived from the California Department of Water Resources’ Delta Risk Management Study (DRMS)¹ (these estimates can be updated if new information becomes available).

The five archetypes are described in detail below. They include:

¹ Available at CDWR, *Delta Risk Management Strategy*, <http://www.water.ca.gov/floodsafe/fessro/levees/drms/>.

1. Island-centric with uses consisting mainly of agriculture, habitat, and recreation.²
2. Cross-Delta and in-Delta infrastructure, where protection will require coordinated development involving many islands.
3. Through-Delta water transfer and in-Delta water use.
4. In-Delta mixed use, including low-density housing, small communities, and commercial activities.
5. Islands close to areas now undergoing, or designated for, urban development.

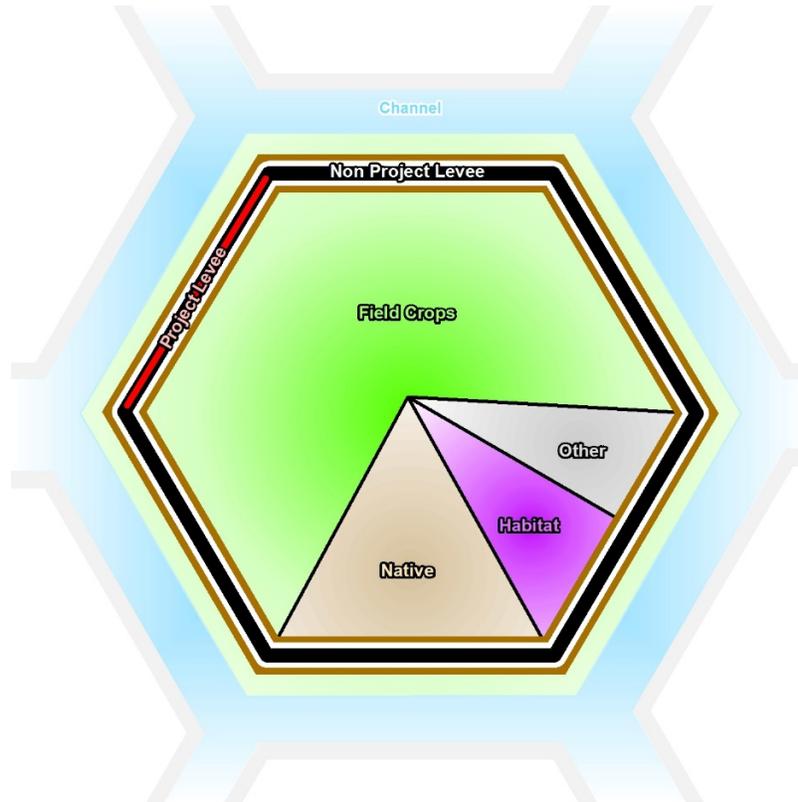
Nature of Review Sought from the Sounding Board

Stakeholders will be asked to:

- Comment on whether they see this approach as generally workable and helpful;
- Offer additions or deletions to the types of beneficiaries being considered;
- Comment on the realism of the physical and geographic conditions being represented; and
- Comment on legal and administrative issues (e.g., planning horizon, levee standards, adaptations and responses to sea level rise and climate change, adequacy of existing funding) that may affect financial mechanism feasibility for each archetype

² We recognize that islands are not in fact isolated but are dependent on broader economic, transportation and hydrologic processes. Still, levee maintenance has been island-centric and some financing mechanisms may continue to be applied in this way.

ARCHETYPE 1



Archetype 1. Island-centric agriculture, habitat, and recreation

This example is meant to provide a template for considering the need for levee upgrade and maintenance in situations where the primary land use is agriculture, with habitat protection, recreation and ecosystem restoration also of value.

While this archetype captures the role of levees in supporting land-based habitat and recreation, it does not capture the role of the levees as channels supporting the riparian/estuarine ecosystem, water management, water recreation, water quality, and water transfers (except to the degree that the Subventions Program provides some support for these broader state interests).³

Based upon our review of referent islands chosen to represent this archetype, it was given the following characteristics:

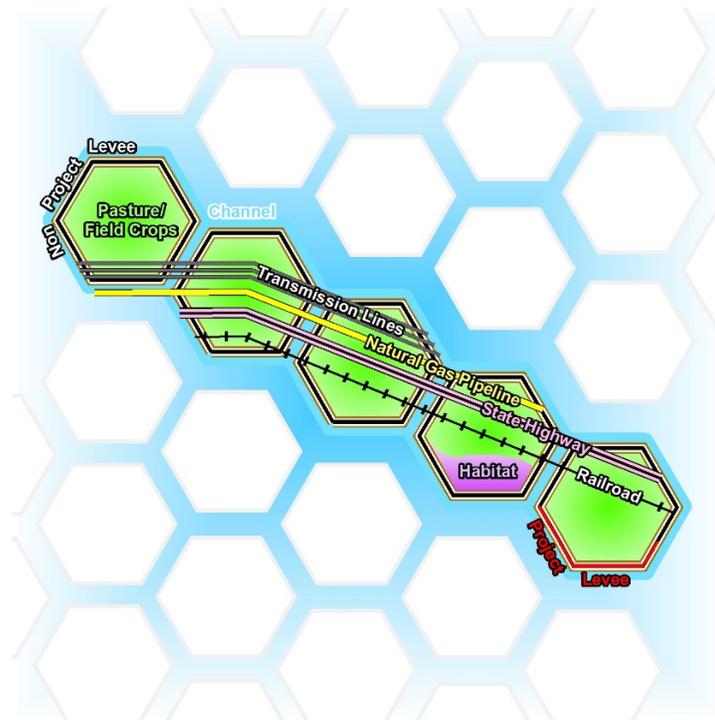
- Levee miles: 12 (mix of HMP, PL84-99, and Project)
- Acreage: 3,650
- Estimated asset value:⁴ \$2M
- Average depth upon inundation (MHHW): 16 ft.

³ Archetype 3 below addresses through-Delta water transfer and in-Delta water use.

⁴ Asset values present here are based on DRMS data. These values will be updated to represent a range as the project progresses and data is updated.

- Ownership: Private - 2025 acres/23 parcels; public - 1625 acres/11 parcels
- Seismic risk level: High/Moderate
- Types of assets: Agriculture (mainly row- and field crops, pasture, and vineyard/orchard), some habitat, gas wells, points of water diversion
- Population: 12 people

ARCHETYPE 2



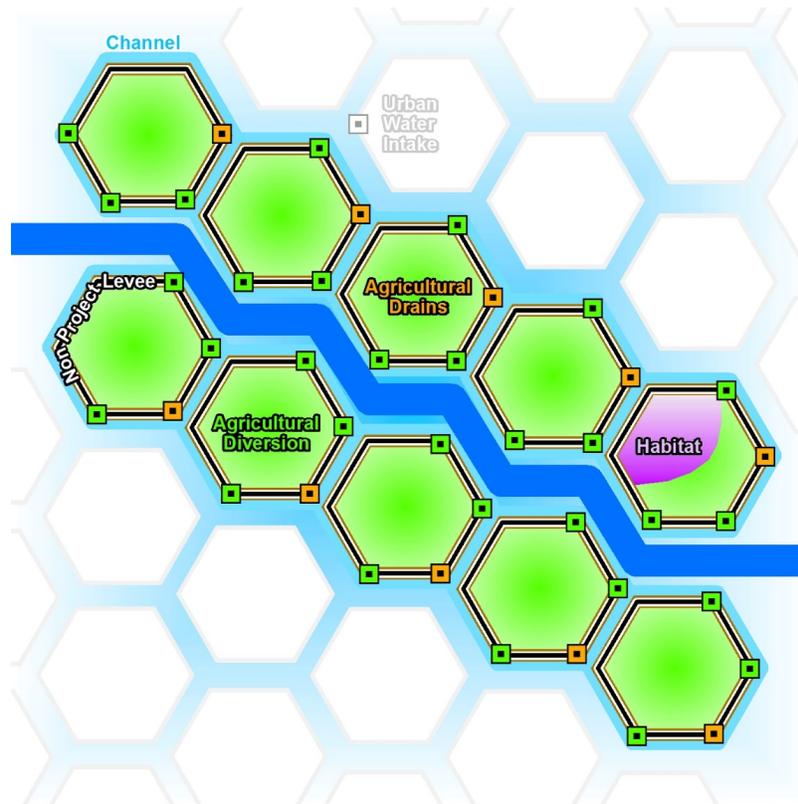
Archetype 2. Cross-delta and in-delta infrastructure

This example is meant to provide a template for considering the need for levee upgrade and maintenance in situations that involve levees on more than one island, and in which a wide range of assets are subject to a variety of Delta conditions and are exposed to different sources of risk. The assets may include State highways, county roads, railroads, electric transmission lines, communications facilities, and pipelines. Some of these uses currently benefit from Delta levees but do not directly contribute to levee improvements or maintenance. Their dependence on Delta levees varies, as some asset owners have other risk-avoidance mechanisms such as flood-proofing, redundancy, relocation, or insurance.

Based upon our review of the referent islands chosen to represent this archetype, it was given the following characteristics:

- Levee miles: 60 (mix of HMP, PL84-99, and Project)
- Acreage: 41,200
- Estimated asset value: \$34M
- Average depth upon inundation (MHHW): 11 ft.
- Ownership: Private – 29,500 acres/402 parcels; Public – 14,900 acres/195 parcels
- Types of assets: Agriculture (mostly row- and field crops, pasture, some orchard/vineyard), state highways, electrical transmission lines, gas lines, rail
- Population: 780

ARCHETYPE 3



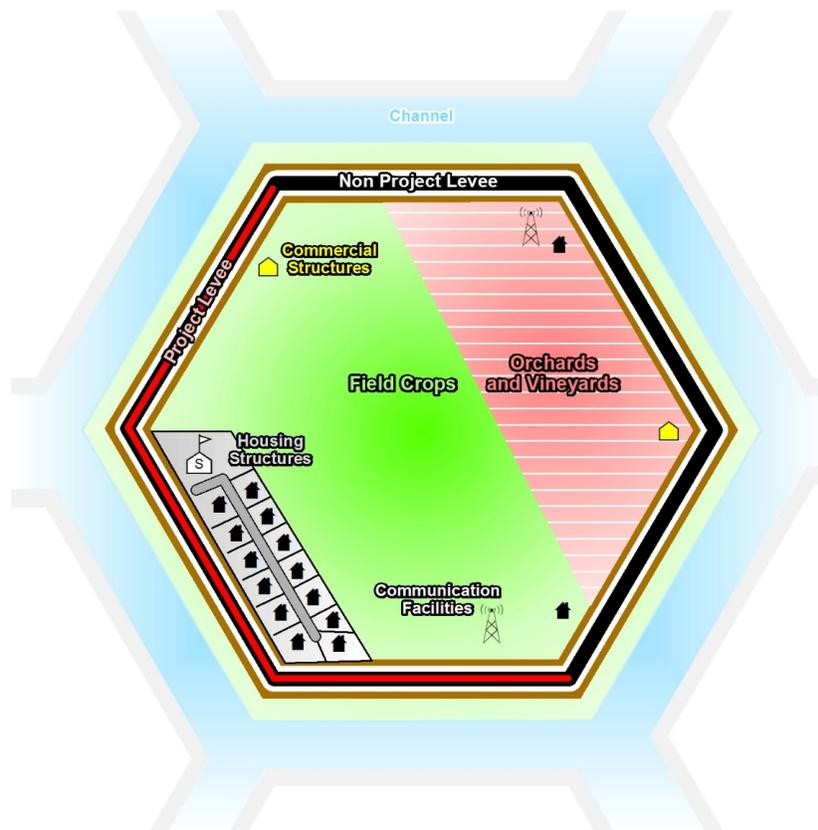
Archetype 3. Through-Delta water transfer and in-Delta water use

This example is meant to provide a template for considering the need for levee upgrade and maintenance in situations in which Delta levees protect several islands, while also providing channels (or “pipelines”) to manage water supply. Such channels serve a variety of state interests, such as conveying water to the state and federal water project pumps. Although not all Delta levees provide the same degree of such benefits, leveed channels ensure local water supplies for in-Delta use and urban water intakes, as well as water-based recreation and habitat. (This archetype does not include navigation channels maintained by the USACE.)

Based upon our review of the referent islands chosen to represent this archetype, it was given the following characteristics:

- Levee miles: 124 (mix of HMP, PL84-99, and Project)
- Acreage: 54,450
- Estimated asset value (DRMS): \$63M
- Average depth upon inundation (MHHW): 15 ft., ranging from 2.5 to 22 ft. for the referent islands.
- Ownership: Private – 52,900 acres/294 parcels; Public - 480 acres/7 parcels
- Types of assets: Agriculture, agricultural diversions, agricultural drains
- Population: 590

ARCHETYPE 4



Archetype 4. Small community with scattered structures

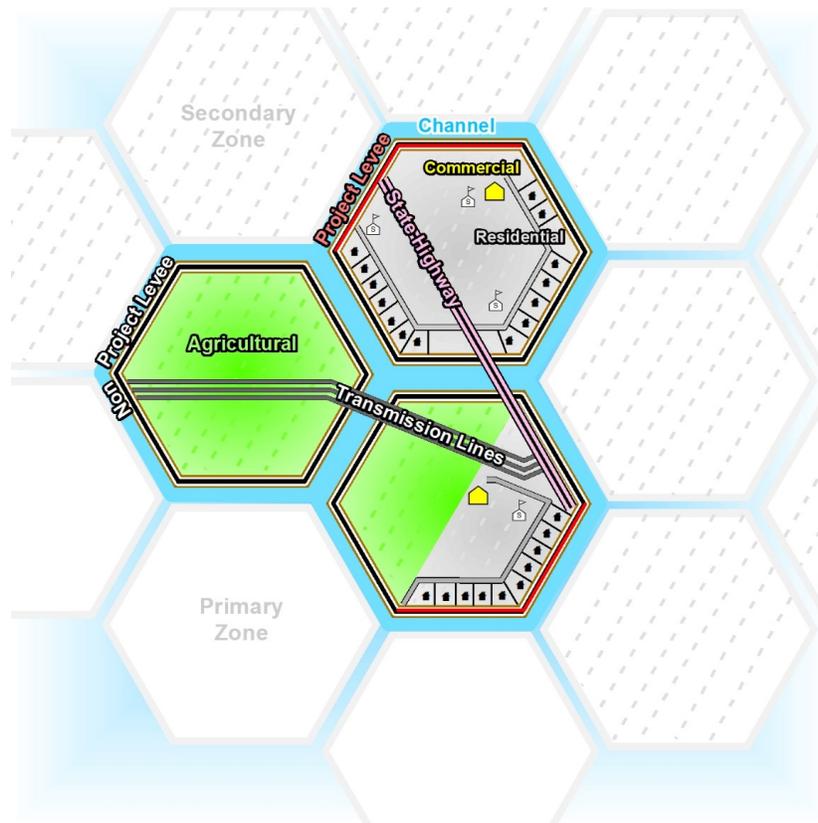
This example is meant to provide a template for considering the need for levee upgrade and maintenance in situations in which levees protect human life and some high-value properties. Current levee standards such as HMP and PL 84-99 are not intended to protect high-value assets; FEMA 100- and 200-year standards provide a greater degree of protection, but may not be affordable without state and/or federal financial assistance.

Based upon our review of the referent islands chosen to represent this archetype, it was given the following characteristics:

- Levee miles: 6 (mix of HMP, PL84-99, and Project)
- Acreage: 2,600
- Estimated asset value: \$15M
- Average depth upon inundation (MHHW): 5 ft.⁵
- Ownership: Private – 2500 acres/160 parcels; Public - 150 acres/3 parcels
- Types of assets: Housing, commerce, habitat, agriculture (row/field/pasture, some orchards/vineyards)
- Population: 360

⁵ This depth of flooding is due to tidal flooding only. Riverine flooding at the northern, eastern, and southern limits of the Delta adjacent to the Sacramento, Mokelumne, and San Joaquin Rivers could lead to flood elevations approximately 10 or more feet higher than MHHW.

ARCHETYPE 5



Archetype 5. Large urban in Secondary Zone

This example is meant to provide a template for considering the need for levee upgrades and maintenance in situations in which levees protect both agricultural uses in the Primary Zone and developed areas in the Secondary Zone. This allows us to explore two concerns: the first is whether interactions between adjoining islands and tracts with differing levels of flood protection might impose undue cost burdens on neighboring islands or tracts. The second is whether urban development in the Secondary Zone that triggers 200-year flood protection requirements can generate sufficient funds to pay for levee improvements, and whether the increased loss-of-life risk affects the choice of financing mechanisms.

Based upon our review of the referent islands chosen to represent this archetype, it was given the following characteristics:

- Levee miles: 17 (mix of HMP, PL84-99, Project and Non-Project)
- Acreage: 6,350
- Estimated asset value: \$92M
- Average depth upon inundation (MHHW): 5 ft⁶

⁶ This depth of flooding is due to tidal flooding only. Riverine flooding at the northern, eastern, and southern limits of the Delta adjacent to the Sacramento, Mokelumne, and San Joaquin Rivers could lead to flood levels approximately 10 or more feet higher than MHHW.

- Ownership: Private – 5,550 acres/11,100 parcels; Public - 81 acres/1 parcels
- Types of assets: Housing, commerce, state highways, electrical transmission lines, gas lines, rail, public/private schools, habitat, and agriculture (some row/field/pasture, some orchards/vineyards)
- Population: 39,150

APPLICATION OF THE ARCHETYPES AND NEXT STEPS

Prior to using the Archetypes in the feasibility analysis of financial mechanisms, the Team will solicit the Sounding Board's input on:

- Whether the five Archetypes sufficiently capture the primary beneficiaries and situations in the Delta; and
- Whether individual Archetypes should be modified.

The Team will then refine the Archetypes based on this input, and use the Archetypes to determine the feasibility of existing mechanisms. The Team will also design new mechanisms or suites of mechanisms that could work, given the institutional, legal, and other conditions applicable to each Archetype.